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ABSTRACT

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Abstract

Innovation is vital to organization's success in today's highly competitive and constantly changing business environment. Organizations need to drive value creating activities to be able to guarantee their long-term success and improve performance. This increasing need for change and growth provides a great deal of opportunity and many possibilities for businesses to renew themselves. However, innovation is a complex phenomenon, that involves high degree of uncertainty, high investments, and long-term approach. This has created a need for organizations to establish procedures that enable to control their processes and ensure the efficient use of their limited resources, balancing between the need for control and need to remain flexible and creative. Hence, the characteristics of management control systems and their suitability for innovation has raised an interest of organizational participants and researchers. This thesis aims to explore how management control systems can enhance innovation in organization. This study is based on the assumption that management control systems support innovation in organizational set-up and controls applied to innovation may have enabling and coercive design. Additionally, the use of management control systems is not limited to management but covers all organizational participants. Management control systems were studied as a package according to framework by Malmi & Brown (2008). This study was conducted as a qualitative study, having semi-structured interviews as chosen data collection method. Four interviews were carried out in one company´s innovation unit. The data gathered from interviews was analysed using thematic analysis. According to findings of this study organizations could benefit from comparing their management control systems to factors affecting their innovation management practises and balance the usage of enabling and coercive forms of control on them. Innovation is favouring the use of enabling control, but the balance is based on optimal fit. Management control systems applied to innovation should offer advanced visibility, communication, information sharing and collaboration, which are characteristics supported by enabling design of management control systems. The role of coercive controls is providing necessary limits to action and compliance. Management control systems package can also be applied to advance measuring innovation performance and generate metrics for assessing the value of innovation, which have been considered challenging tasks. This study's empirical findings support the theoretical framework of this study at large extent. The results of this study should be reflected when considering how management control systems can enhance innovation in organization.

Key words	Innovation, Management Control Systems, Innovation Management, Innovation Performance, Innovation Enhancement

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Tiivistelmä

Innovaatiot ovat elintärkeitä organisaation menestykselle nykypäivän erittäin kilpailukykyisessä ja jatkuvasti muuttuvassa liiketoimintaympäristössä. Organisaatioiden on ohjattava arvoa luovia toimintoja voidakseen taata pitkän aikavälin menestyksensä ja parantaakseen suorituskykyään. Kasvava muutoksen ja kasvun tarve tarjoaa yrityksille paljon mahdollisuuksia ja tilaisuuksia uudistua. Innovaatio on kuitenkin monimutkainen ilmiö, johon liittyy suurta epävarmuutta, ja se vaatii suuria investointeja ja pitkäjänteistä lähestymistapaa. Tämä on luonut organisaatioille tarpeen luoda menettelytapoja, jotka mahdollistavat prosessien hallinnan ja rajallisten resurssien tehokkaan käytön tasapainottaen valvonnan ja tarpeen pysyä joustavana ja luovana. Tästä syystä johtamisen ohjausjärjestelmien ominaisuudet ja niiden soveltuvuus innovaatioihin on herättänyt kiinnostusta organisaatioiden toimijoissa ja tutkijoissa. Tämän opinnäytetyön tavoitteena on selvittää, kuinka johdon ohjausjärjestelmät voivat tehostaa organisaation innovaatioita. Tämä tutkimus perustuu olettamukseen, että johdon ohjausjärjestelmät tukevat organisaatiorakenteen innovointia ja innovaatioihin sovellettavilla ohjauksilla voi olla mahdollistavaa ja pakottavaa suunnittelua. Lisäksi johdon ohjausjärjestelmien käyttö ei rajoitu johtajiin, vaan se kattaa kaikki organisaation osallistujat. Johdon ohjausjärjestelmiä tutkittiin Malmi & Brownin (2008) viitekehyksen mukaisesti pakettina. Tämä tutkimus tehtiin kvalitatiivisena tutkimuksena, johon valittiin semistrukturoidut haastattelut tiedonkeruumenetelmäksi. Yhden yrityksen innovaatioyksikössä tehtiin neljä haastattelua. Haastatteluista kerättyä dataa analysoitiin temaattisella analyysillä. Tämän tutkimuksen tulosten mukaan organisaatiot voisivat hyötyä järjestelmäpaketin vertaamisesta innovaatiojohtamisen käytäntöihinsä vaikuttaviin tekijöihin ja tasapainottaa niiden mahdollistavien ja pakottavien ohjausmuotojen käyttöä. Innovaatiot suosivat mahdollistavan ohjauksen käyttöä, mutta tasapaino perustuu optimaaliseen sopivuuteen. Innovaatioihin sovelletun järjestelmän tulee tarjota edistynyt näkyvyys, viestintä, tiedon jakaminen ja yhteistyö, joita järjestelmän mahdollistava suunnittelu tukee. Pakottavan valvonnan tehtävänä on tarjota tarvittavat rajat toiminnalle ja vaatimustenmukaisuudelle. Järjestelmä pakettia voidaan soveltaa myös haasteellisina pidettyjen tehtävien, kuten innovaatioiden mittaamisen edistämiseen ja innovaatioiden arvon arviointiin. Tämän tutkimuksen empiiriset havainnot tukevat suurelta osin tämän tutkimuksen teoreettista viitekehystä. Tämän tutkimuksen tulokset tulisi ottaa huomioon pohdittaessa, kuinka johdon ohjausjärjestelmät voivat tehostaa innovaatiota organisaatiossa.

Avainsanat	Innovaatio, johdon ohjausjärjestelmät, innovaation hallinta, innovaatio suorituskyky, innovaation tehostaminen

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ENHANCING INNOVATION IN ORGANIZATION BY MANAGEMENT CONTROL SYSTEMS

Master's thesis
in International Business

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The originality of this thesis has been checked in accordance with the University of Turku quality assurance system using the Turnitin Originality Check service.

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1 INTRODUCTION

1.1 Controls in support of Innovation

Innovation has become vital for companies to survive with intricacy of markets, increasing competition and continuously changing environment. Due to the intense competition, organizations need to drive value creating activities in order to guarantee their long-term success and improve their overall performance (Rosenbusch et al. 2011). According to OSullivan and Dooley (2008) the drivers that encourage organizations to innovate include emerging technologies, competitor actions, new ideas from customers, strategic partners, and employees, as well as emerging changes in the external environment. All these drivers require constant innovation and learning so that the process can be repeated over and over again. These factors also help create a sense of urgency about the need to create new organizational goals and generate new ideas to achieve those goals. (OSullivan & Dooley 2008). Innovation itself is a complex phenomenon, that varies significantly between different organizations and industries (Smith 2010), hence innovation takes many different forms (Dunk 2011; OECD 2005), the organizations need to establish firm level procedures that enable an efficient control of the processes and ensure the efficient and creative use of their limited resources (Haustein et al. 2014).

Managing innovation and creativity is a complicate task as the main challenge lies with balancing between the need for creativity and control, as well as with the short-term benefits of incremental innovation and more uncertain long-term benefits of radical innovation. (Werner & Tang 2017.) For highly innovative organizations, the difficulty lies with need for control of their business and the requirement for flexibility to be able to innovate (Lukka & Granlund 2003). In today´s environment, the organizations are coping to find balance between efficiency considerations and the promotion of innovation (Jørgensen & Messner 2009, 99). As the organizations need to strive innovation more actively, control systems have faced challenges to be scalable to help managers accomplish innovation (Chenhall & Moers 2015, 2).

Ever changing environments require the organizations to use different types of control procedures, which are concurrently active and linked with each other (Sandelin 2008). In general level, the field of management control is concerned with understanding the processes and mechanisms that influence the behavior of organization´s members, who

contribute to organizational performance (Speklé 2014). Management control systems (MCS) has been defined as "all devices and systems management has set to ensure that the behaviors and decisions of their employees are consistent with the organization's objectives and strategies" (Malmi & Brown 2008, 290). However, the definition itself and the various components that should be considered under the term management control systems has been under ongoing debate. Chenhall (2003) highlights that research considering MCS has been mostly centred around one theme or a specific component of MCS, which disregard the connections to other components and the fact that different components generate more extensive control system. Hence, Malmi and Brown (2008) have created a comprehensive management control systems as a package framework that offers way to study MCSs together, consisting of informal controls for example cultural controls, as well as more formal controls for example planning, administrative control systems, cybernetic control systems and reward systems. Pfister et al. (2023) also suggested that MCSs should be studied in combination with other management control practices so that it can be understood how those practices are intended, perceived, and interrelated in the empirical setting.

Earlier research on management controls systems in innovative set-up have stated that control restrict employees' autonomy and their capability to be creative and causes hindrance to innovation (Amabile 1998) because MCSs may generate bureaucratic and too detailed processes, which stiles innovation (Davila et al. 2009). In the past, the usage of controls was mostly based on formal MCS, that placed the focus on efficiency and increasing standardization. As innovation involves high degree of uncertainty, more mechanistic type of controls leads to constrain the autonomy and hinder the creativity of employees (Ahrens & Chapman 2004). These views have been lately shifted and more recent studies have indicated that MCSs might have more beneficial effect in uncertain (Eldridge 2014), and innovation-related environments (Bisbe & Otley 2004; Grabner & Speckbacher 2016) and that the formalized MCSs are useful for decision making along the innovation process (Pfister 2014). Also, recent research has showed that MCS act as a mechanism that assist in managing activities leading to innovation (Beuren & Bernd 2021, 461) and that MCSs could encourage creativity (Merchant & Van de Stede 2012) and facilitate flows of information (Lopez-Valeiras et al. 2016). Nowadays, it is generally accepted that management control includes a wide range of strategic and operational management practices that guide, influence, and monitor the behaviour of organizational

members in order to reconcile the various interests within and sometimes outside the organization towards a common purpose and goal (Pfister et al. 2023). Companies should have a clear vision of the innovation control mechanisms beneficial for different phases of the innovation process (Saunila & Mäkimattila 2018). Today´s controls do not have to be coercively constraining, rather they can be directing, guiding, enabling, supportive simultaneously leaving much room for creativity and innovation (Pfister 2014, 145).

However, when considering the relationship of management control systems and innovation (Henri & Wouters 2020; Lill et al. 2020), literature shows varying results, and much information is not provided on how systems can be designed and used to promote or enhance innovation. Also, much of the research has been conducted primarily on product innovation and the focus on key innovations for the company's competitiveness, process innovation and marketing innovation have had a minor role, even these are important in order to create new business processes, services and structural changes that allow creating value for the company. (Beuren & Bernd 2021, 461.) Additionally, the innovation management literature highlights various issues regarding the management of different types of innovations, such as a challenge of balancing creativity, flexibility and innovation with market orientation and customer focus (Burgers et al. 2008). Gama et al. (2007, 421) argues that innovation can be managed only by knowing how to measure innovation. Therefore, having good innovation metrics is important.

1.2 Research gap and purpose of the study

More research is needed in order to understand how management control systems can enhance innovation in organization as the previous view stating that control causes hindrance to innovation (Amabile 1998) has given way in the light of more recent research indicating that management control systems might have more beneficial effect in innovation-related environments (Bisbe & Otley 2004; Grabner & Speckbacher 2016), and that MCSs can assist in managing activities related to innovation (Davila 2000). As innovation is considered a central driver of economic growth and sustainability in the corporate and in the public worlds (Pfister 2014, 134), organizations need to manage their innovation activities at larger extent. The increasing need of companies to innovate foster the importance of managing the correct balance between their processes and future oriented control systems during their innovative settings (Davila et al. 2009). Baxter and Chua (2009) point out that future management control research should meet the need of

the rapidly changing real-world contexts to able organizations to handle a different kind of actions, information and consequences. According to Chen (2017) research requires better understanding of the relationships between control, innovation and creativity regarding the design and the use of management control systems when enhancing innovation in the organization. The previous literature agrees on, that creating innovations is vital for organizations to survive in the long run perspective (Bessant & Tidd 2011).

Innovation can be managed only if we know how to measure innovation. Therefore, good innovation metrics are important. Without well working metrics, innovation management can be only based on common sense, personal feelings and/or political interests. (Gama et al. 2007, 421.) Well implemented management control systems can prevent harmful organizational decisions to happened (Merchant & Van der Stede 2017, 8). Correct measurement systems are crucial to the success of innovations. The usage of random indicators and information for managing innovation may lead to situations where competent managers are overwhelmed with analysis results, that are not comparable to their work or are used inefficiently. This may lead to decrease in productivity, and to inconsistent or incorrect analyses and measures. (Davila et al. 2013.) According to Baxter and Chua (2009) and Hall (2010) there is a gap between management control theory and practice. Baldvinsdottir et al. (2010) points out that the management control research should be related to the issues that have practical relevance. Therefore, according to Henri and Wouters (2020) more research is required in order to understand, how management control practices can provide information that is able to support innovation.

MCS research has frequently centred around one theme or a specific component of MCS, disregarding the connections to different components and the fact that the components are part of a more extensive control system (Chenhall 2003). Pfister et al. (2023) argues that MCSs must be studied in combination with other management control practices in order to understand how those practices are intended, perceived and interrelated in the empirical setting. Even previous research has provided various frameworks for MCS conceptualization, it has failed to provide common agreement regarding which framework is the most fitting for the different situations (Strauss & Zecher 2013, 234). Also, most of the previous research is built on Simons' (1995) framework which does not consider different control systems very comprehensively. Beuren and Bernd (2021) points out, that it was remarked by Lopez-Valeiras et al. (2016), that previous research conducted based on Simons´ (2005) approach does not present the types of innovation,

that can be used for management success and noted by Davila et al. (2009) that within this type of approach, the focus is placed on improving idea generation, leaving other factors related to innovation process unnoticed. Describing different types of controls and observation levels during the innovation process is still needed (Saunila & Mäkimattila 2018).

The organizations can improve their competitive advantage by better understanding their controlling systems and innovation, as well as by understanding how the controlling systems may support and enhance innovation. Thus, this study aims to investigate management control systems to enhance innovation in organization and extend our understanding on management control practices related to innovation management. This study underlines the role of management control systems in helping the organization to understand their innovation control processes and its operational effectiveness on innovation. The findings of this research attempts to support the view that the effective application of management control systems in the organization can boost innovation. In consideration of the purpose of this study, the primary research question is: How management control systems can enhance innovation in organization?

Sub-research questions are defined as follows:

1) How innovation is managed in organization?

2) How management control systems are applied in innovation?

3) What kind of features are required from management control systems to enhance innovation?

These sub-research questions are used to answer the primary research question.

Further, management control systems in this study are considered from package perspective. This study is made as a single case study by conducting four semi-structured interviews in innovation and venturing unit of one company, in order to review the current set-up of innovation management and controls applied to innovation in case company, and therefore gaining better understanding how management controls can enhance innovation in organization.

This thesis is organized as follows. The first section of the thesis explores the background of the topic and introduces the research gap and research purpose. Section two presents

the theoretical part for this study by introducing the literature including innovation, innovation management and innovation performance in its first section. The second section in theoretical part concentrates in management control systems, enabling and coercive forms of control and frameworks for conceptualizing management control systems. Third section of theoretical part presents the role of management control systems in innovation and the tension of the relationship, followed by the management control systems for innovation strategy and as a package for innovation. At the end of this section, the initial theoretical framework of this study is presented. Section three explores the research methods, including the research design, data collection, and analysis methods. In the fourth section the empirical findings of the study will be presented and discussed, as well as the revised theoretical framework will be presented. The fifth section contains the conclusion of this study including theoretical contribution and managerial recommendations, followed by the limitations and recommendation for further research. The final section is a summary of this study.

2 MANAGEMENT CONTROL SYSTEMS AND MANAGEMENT OF INNOVATION

This chapter aims to present the theoretical background of this study to the reader by introducing the literature and theories related to the topic of study. This chapter has been divided into three subchapters. The first subchapter presents the concept of innovation and is further divided into five parts: a definition of innovation, types of innovation, nature of innovation, innovation management and innovation performance and its measures. The second subchapter presents the concept of management control systems into three parts: definition of management control systems, enabling and coercive forms of control and frameworks for conceptualizing management control systems. The third subsection reviews management control systems in an innovation context by presenting the role of management control systems in innovation and the tension of this relationship, management controls systems for innovation strategy, MCS as a package for innovation. Finally, the chapter summarizes the theoretical background and presents the initial framework of this study.

2.1 Innovation

Innovation is considered as a central driver of economic growth and sustainability in the corporate and in the public worlds (Pfister 2014, 134) and the principal mechanism for change in every organization (OSullivan & Dooley 2008). Innovation can emerge in a new product or process, or solely appear in a form of improvement of already existing ones (Bessant & Tidd 2011). In order to understand the theoretical background at larger extent, it is important to describe innovation and its various forms in more depth. This section introduces the concept of innovation and its different types. Further, the innovations are introduced in an organizational context and the management of innovations, innovation performance and its measurements are explored.

2.1.1 Definition of Innovation

The definition of innovation varies in previous research. Even innovations come up in many kinds of occasions, the term itself is not unambiguous and may refer to different things in different context. Creativity is considered as a essential building block for innovation (Rosenfeld & Servo 1991) and an inherent capability in all human beings

(OSullivan & Dooley 2008). Creativity is the ability to imagine and source visionary new ideas and inventions, while innovation is further the first attempt to implement those incremental or radical novelties in practice (Fagerberg 2005, according to Pfister 2014, 135). Similarly, West (2000) states that creativity concern the development of ideas, while innovation is the application of ideas. Creativity involves putting forward creative ideas, while innovation is the proposal and commercialization of a creative idea (Chen & Yin 2019). Innovation encourages the further processing of the output of the creative process (the idea), as well as allows the exploitation of its potential value through development (OSullivan & Dooley 2008, 33). Adler and Chan (2011) and Amabile et al. (1996) have highlighted that the concepts of creativity and innovation are connected with how people are working together, how new ideas are inspired by the work environment and how it further formats the ability to conduct those ideas. Davila et al. (2009) stresses the importance of creativity during innovation process and notes it as a particularly important factor at the beginning of the idea creation stage.

The terms of innovation and invention often interlace, and many confuse the terms as both are closely related, even the concepts are fundamentally different. Fagerberg (2005) stated that the main difference between invention and innovation is that invention may be implemented anywhere, while innovation appears mostly in companies that need to combine several different kinds of capabilities, knowledge, resources, and skills (Fagerberg 2005, 5). Also, Schumpeter (1934) stated that one of the tasks of an entrepreneur is to introduce new inventions into the production system, while innovation is the first commercialization of an invention. According to Hansén and Wakonen (1997) the difference between invention and innovation is that invention aims to solve a technological or scientific problem while innovation is dependent on solving a commercial problem, while Smith et al. (1996) explains that the difference comes from economic value as an invention of a new product is normally in laboratory setting that do not make direct economic contribution, whereas an innovation provides economic value and is distributed to parties other than the inventors and creators. An invention is not necessarily an innovation. Some innovations do not include invention at all, while other innovations do. Innovation concerns the translation of an invention into application and often it takes longer period of time before an invention is commercialized as an innovation. It is also very evident that many inventions do not make it into a commercial innovation. (Chen & Yin 2019.)

Drucker (1985) defines innovation as “a specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or a different service. It is capable of being presented as a discipline, capable of being learned, capable of being practiced. Entrepreneurs need to search purposefully for the sources of innovation, the changes and their symptoms that indicate opportunities for successful innovation, and they need to know and apply the principles of successful innovation” (Drucker 1985, 20). According to this view, innovation does not only concern inventions or new technology, but also about new business opportunities that arise through new technologies, products, services, processes, or business models. Also, innovation is not just occurring by itself. It is a structured or systematic process, that requires discipline and that can be learned and practiced. It requires the creator being proactive, search for the sources of innovation and exploit them in order to succeed at innovation. (Shah et al. 2015, 3). OSullivan and Dooley (2008) also noted the process concept and defined innovation as “the process of making changes, large and small, radical and incremental, to products, processes, and services that results in the introduction of something new for the organization that adds value to customers and contributes to the knowledge store of the organization” (OSullivan & Dooley 2008, 32), whereas Hisrich and Kearney (2014) came up with more shortened version of the definition “Innovation is a process for creating and introducing something new, novel, or advanced with the intention of creating value or benefit” (according to Shah et al. 2015, 4). Innovation can be considered as a creation of value by using appropriate knowledge and resources to transform an idea into a new product, process or practice, or to improve an existing product, process or practice (Varadarajan 2018, 143).

As can be noted from the above presented terminology, innovation is a complex term to define. Fernandes Rodrigues Alves et al. (2018) suggested that it is important to obtain a broad understanding of the meaning of innovation as it is quite controversial in the field of academic. As this thesis is not focusing on specific type of innovation, but in general on innovation in organization, it follows the broad definition that is the mixture of definitions previously presented in this chapter. According to this thesis innovation is defined as “the process of making changes, creating and introducing something significantly improved, advanced or new with the intention of creating value”. After defining the term of innovation used in this study, the next section moves to present different types in which innovations emerge.

2.1.2 Types of Innovation

Schumpeter (1934) was perhaps the first author that discussed the existence of different types of innovation (Fernandes Rodrigues Alves et al. 2018). Different innovation processes lead to different outputs, for instance innovation may result in concrete products or changes to them, services or the performance of organizational tasks. Siguaw et al. (2006) explain that organizations need to invest in variety types of innovation, since different types of innovation influence organizations in different ways and generate different outcomes and impacts (according to Rowley et al. 2011, 75). Tidd and Bessant (2009) offered classification of 'process' versus a 'result of a process' innovation. In this view, innovation consider the process of transformation of an idea into a new service, technology, or product. Process innovation considers the changes in the way services or technologies are created and mobilised. (Tidd and Bessant 2009.) According to Baregheh et al. (2009) the type of innovation is defined by the type of output or the result of the innovation, for instance product, service, process or technical.

A well-known way to view innovation is the 4P model, which categorises innovations into four types: product innovation, process innovation, position innovation, and paradigm innovation (Tidd and Bessant 2018, 21). In this view, product innovation considers changes in the products or services offered by an organization, whereas process innovation comprise changes in the way in which products or services are created and delivered. Position innovation embrace changes in the context in which products or services are introduced. It considers the role of innovation in exploiting new customer bases and markets, as well as the new ways of how the innovation can be offered or introduced to the potential customer. Also, the characteristics of the market can be changed by positional innovation, and it can also create a new market that did not exist before. (Francis & Bessant 2005, 175.) Paradigm innovation implies the changes in the underlying mental models which frame what the organization does. On the other hand, paradigm innovation, arises when the way of looking at things is reformulated. (Rowley et al. 2011, 80.) The categorization by OECD (2005) has been made quite similarly, and it has been primary resource almost for two decades for defining and measuring innovation in forms of product, process, marketing technique and organisation (Bulut et al. 2022, 766). Wang and Ahmed (2004) further divided firm-level innovation in five forms: behavioural, product, process, marketing and strategic (according to Bulut et al. 2022, 766). Hilmarsson et al. (2014) stated that new product- and process development

are the main focus areas in many companies when considering their innovation activities. However, the view has recently been shifting to consider innovation more broadly and relate to any part of the value chain. These parts of the value chain may be related to developing new products, services, or business models, restructuring the activities related to cooperation, different kind of revenue streams, distributors, or styles to manage. (Hilmarsson et al. 2014.)

As the literature is offering wide range of diverse types of innovations, Rowley et al. (2011) mapped the previous definitions, models, frameworks, and classifications relating to the types of innovation. Their mapping tool is presented in Figure 1. The model is based on the four main innovation types defined by Francis and Bessant (2005), being product innovation, process innovation, position innovation and paradigm innovation.

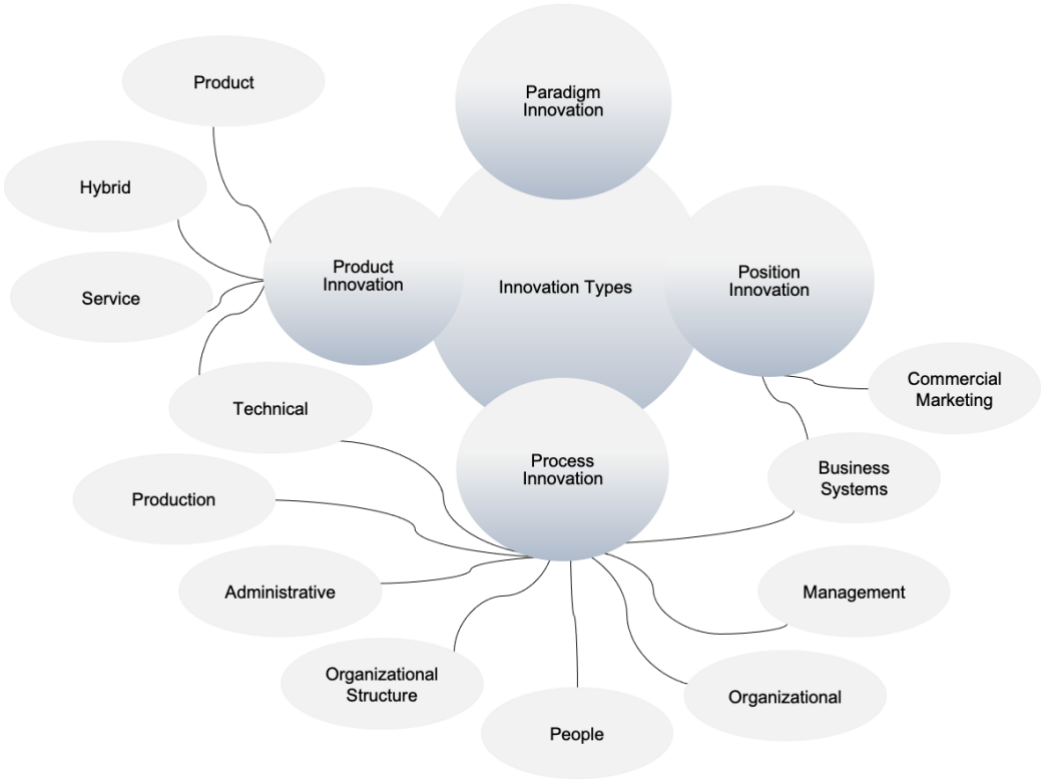

Figure 1. Innovation-type mapping (adapted from Rowley et al. 2011, 83)

Their model revealed that product, service and hybrid innovations can be grouped into product innovations, and there is an obvious overlap between them, since hybrid innovation is a mixture of service and product innovations. Innovations included in process innovation category was found to have two distinct natures: technical, or organisational meaning administrative based. Process innovation was found to have various different types such as administrative, technical, production, organisational,

management, and business system, but there was an overlap between administrative, organisational, management and business system innovations, hence relating to innovations within organisational operations of administration and management. Additionally, technical and production innovations overlap, being both related to the technical side of operations. Position innovation was considered as commercial or marketing innovation and also business system innovation at some extent. However, an overlap was also found between these two categories when business systems innovation is concerned with both administrative and marketing side of the operations. They did not find much previous focus on paradigm innovation. Paradigm innovation most likely generates further product, position, and process innovations, but there has been little opportunity to introduce alternative terms to describe this type of innovation. On top of an obvious overlaps, there is also no clear distinction between the wider categories of innovation such as product and process, since a product innovation may involve various different process innovations, or a position innovation might lead into product innovations. (Rowley et al. 2011, 83-84.)

Also, "Ten types of innovation" framework by Keeley et al. (2013) aims to provide means of identifying new business opportunities that goes beyond the product emphasis (Dunphy et al. 2018, 23) and provide a way to understand the complexities of modern business in a simple and straightforward manner (Keeley et al. 2013,11). Ten types of innovation by Keeley et al. (2013) are presented below in Table 1.

Table 1. Ten Types of Innovation by Keeley et al. 2013 (adapted from Dunphy et al. 2018, 25)

Configuration	Offering	Experience
Profit model: Innovation related to what to offer, charge, or how to collect revenues	*Product performance:* innovation associated with new features and functionality on products	*Service:* innovation focused on enhancing utility, performance, and value of an offering
Network: innovative connections between companies to share capabilities and create synergies		*Channel:* innovation in links and connections between companies and customers
Structure: innovation focused on organizing company assets to create added value	*Product system:* innovation rooted in how products and	*Brand:* innovation based on developing identity that attracts buyers

Configuration	Offering	Experience
Process: innovation in the operations and processes that deliver offerings to customers	services are bundled together	*Customer engagement:* innovation in the means by which customers are engaged

According to their view innovations are divided into three categories: configuration, offering and experience and further these categories represent ten different types of innovations. Innovations in the configuration category are focused on the innermost workings of a organization and its business systems and includes four different innovation types. First being profit model, that often challenges the old assumptions of the industry (Keeley et al. 2013, 18). It considers innovation related to what to offer or charge and how to collect revenues. Second innovation type is network, which relates to innovative connections between companies to share capabilities and create synergies. (Dunphy et al. 2018, 25.) Network innovations provides a way to take advantage of processes, technologies, offerings, channels, and brands of other companies. These innovations means that companies may benefit from the capabilities of other companies, while capitalize their own strength as well as benefit from risk sharing related to development of new offerings and ventures. (Keeley et al. 2013, 22.) Open innovation can be considered as a one form of networking in today´s environment. Third innovation type is structure, which infer to innovation focused on organising company assets to create added value (Dunphy et al. 2018, 25) in other words how you organize and align your talent and assets. Structure innovations in most cases entail significant organizational changes and/or capital investments, which makes them difficult for competitors to copy. Examples of structure innovation include incentive systems, standardizing assets or creating corporate university. (Keeley et al. 2013, 26.) Fourth type in configuration category is process that refers to innovation in the operations and processes that deliver offerings to customers (Dunphy et al. 2018, 25). This type of innovation requires a significant change away from the ways that business has been done in usual way and often form the core competency of the organization. It involves the usage of unique capabilities, function efficiency and quick adaptability. Ideally process innovation yields advantage for many years forward and is unreplicable by the competitors. Lean production is one of the famous examples of this type of innovation. (Keeley et al. 2013, 30.)

Offering category includes only two types of innovation: product performance and product systems. Product performance relates to innovation that is associated with new features and functionality on products. (Dunphy et al. 2018, 25.) It addresses the value, features, and quality of a company´s offering and involves completely new products as well as updates and line extensions. It can offer delight to customers and drive growth and be such as simplifications or customizations as well as sustainability related. (Keeley et al. 2013, 34.) Product system consider innovation rooted in how products and services are bundled together (Dunphy et al. 2018, 25) and helps to build ecosystems that captivate and delight customers and protect against competitors being fostered through interoperability, modularity, integration, and other ways of creating connections between somehow distinct and disparate offerings (Keeley et al. 2013, 38). Finally, experience category includes four types of innovations. First one is service considering innovation focused on enhancing utility, performance, and value of an offering (Dunphy et al. 2018, 25). These types of innovations make products easier to use, reveal features or functionalities that could be otherwise overlooked by customers and fix problems along customer journey. Service innovations are increasingly delivered through electronic interfaces, remote communications, and automated technologies and include examples such as product use enhancements, maintenance plans, customer support, information and educations, warranties and guarantees. (Keeley et al. 2013, 42.)

Second type of innovation in experience category is channel, the innovation in links and connections between companies and customers (Dunphy et al. 2018, 25). It considers all the way that the company´s offerings are connected with the customers and users. The organizations that are skilled in this type of innovation, often find many but complementary ways to bring their offerings to customers, with the goal of ensuring that customers can buy what they want, when and how they prefer to buy it. However, channel innovation is very sensitive to industry context and customer habits and e-commerce has been dominant in this section during recent years. (Keeley et al. 2013, 46.) Third one is brand referring to innovation based on developing identity that attracts buyers (Dunphy et al. 2018, 25). It assists to ensure you are being recognized, remembered, and preferred by your customers and users. This is typically in the form of “promise” that attracts the buyers. Brand innovation can transform commodities into more pricy and valued products, as well as confer the meaning and intent of the offering and organization. (Keeley et al. 2013, 50.) The last one is customer engagement that refers to innovation in

the means by which customers are engaged (Dunphy et al. 2018, 25). It considers the understanding the deepest aspirations of the customers and users, and further using those insights in order to create meaningful connections with them. Technology plays key role in this type of innovations, but these might include more simple gestures as well, such as special packaging. (Keeley et al. 2013, 54.)

To summarize, the previous research considers the types of innovations differently and authors have variously developed sub-themes under the "main" types of innovations, for example under the well-known 4P model, which categorises innovations into four types: product innovation, process innovation, position innovation, and paradigm innovation (Tidd & Bessant 2018, 21). The categorization depends on which kind of innovation the organization is focusing on, as some organizations might only focus on few types, while others invests in several types. Next section moves forward to define different natures of innovation.

2.1.3 Nature of Innovation

The previous research mostly tends to distinguish between incremental and radical innovations when discussing the nature of innovations and the level of novelty involved (Engen & Holen 2014). Radical innovation comprises significant improvements in products and services and the provision of new products and services. It is a key incentive to improve organizational performance, leading to competitive advantages. (Nguyen 2018.) It can be seen as "a traditional concept of innovation", which generates entirely new and modern products and services that differ significantly from the previous ones (Lopez-Cabarcos et al. 2020). Radical innovations may menace or make obsolete to the existing innovative capabilities of the company, as they demand different kind of knowledge and capability sets (Thuhang 2008). Incremental innovation includes improvements made to a company's existing products or services in a form of addition of some new value or differentiation (Okuyama 2017). Incremental innovation is based on the organization's existing knowledge and skills in order to gradually improve the aesthetic and functional features of a product or process (Thuhang 2008) and therefore incremental innovations can be seen as more easier to develop for organizations than radical innovations as incremental innovation does not require the introduction of entirely new, providing the environmental conditions that are more specific and certain reducing the potential risks of failure (Harris 2017).

Henderson and Clark (1990) noted that the polarization of innovations into the incremental and radical innovation offered only two types of extremes and therefore suggested to make a distinction between component and architectural knowledge. Their framework presented in Figure 2 includes four levels of innovation: radical, incremental, architectural and modular.

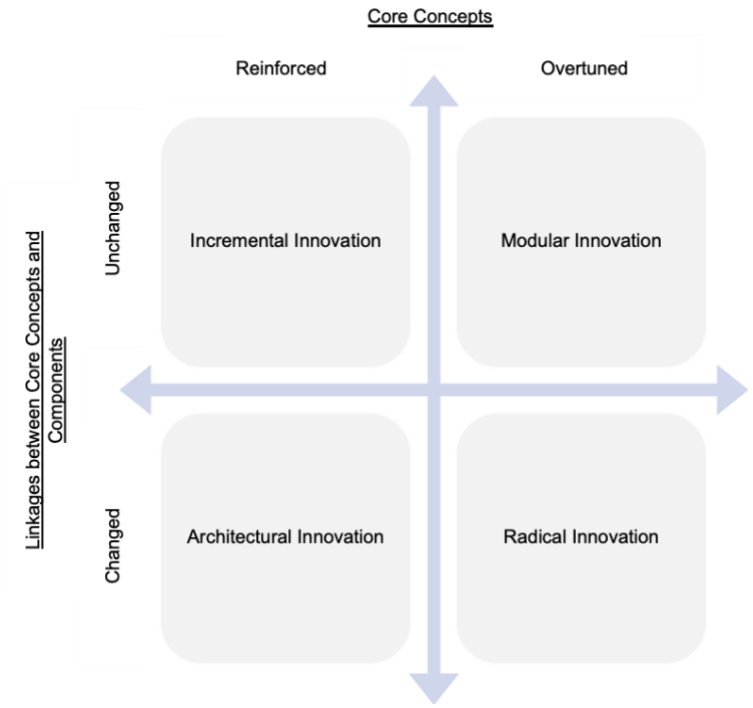

Figure 2. Nature of innovations (adapted from Henderson & Clark, 1990, 12)

Architectural innovations change the way that components are connected to each other, but the core concept and basic design of the components remains unchanged, whereas in modular innovations the core concept is reversed, but the connections between the components remain unchanged. According to this view, a product innovation is a system of components that are interconnected to function as a final product. Incremental development does not fundamentally change the core components or their connections. However, radical innovations change both core concepts and their connections. Component replacement means replacing or changing the parts that make up the whole system but keep the same joints. (Thuhang 2008.)

The innovation process is viewed mainly as a function of internal organizational influences, but in contrast Christensen and Raynor (2003) includes the influences of external stakeholders, such as suppliers, distributors, and end consumers by categorizing

innovation types as sustaining and disruptive. Thuhang (2008, 289) also pointed out, that some of the previous research recognizes that innovation occurs as a response to changes in the external environment such as customer demands or competitive pressures. Sustaining innovations offer incremental improvements by existing companies, that improve product performance, whereas disruptive innovations can provide worse performing alternatives than currently available products but bring other benefits to customers and reaches therefore new user groups. Other benefits can be in the form of simplicity or convenience for example. (Kivimaa et al. 2021, 111.) Christensen and Raynor (2003) further divided disruptive innovations into low-end and new-market disruptions. A new-market disruption concerns an innovation that provides an possibility a larger population of people to buy and use a product and do the job for themselves who were previously not able to afford it or lacked the skills needed (Christensen & Raynor 2003, 102), whereas low-end disruptions comprise those that attack the least-profitable and most overserved customers at the low end of the original value network (Christensen & Raynor 2003, 45). According to OECD (2005) a radical innovation can be referred as a disruptive innovation as well and is defined as an innovation that has a significant impact on a market and on the economic activity of firms in that market. This concept focuses on the impact of innovations and impact may change the structure of the market, create new markets or render existing products. (Kawamoto & Giovinazzo Spers 2019, 73.) This brings challenges to assess whether innovation is disruptive as it might not be apparent long period of time after it has been introduced, which caused that OECD (2005) sort innovations based on their novelty into three concepts: new to the firm, new to the market, and new to the world in their survey. New to the firm implies that innovation might be introduced by the other companies already, but it needs to be either new to the specific organization or significantly improved version. New to the market demand that the organization introducing the innovation is first in the specific market, and respectively first in the world. (OECD 2005, 57-58).

According to Pisano (2015) innovation can be classified in two dimensions: to what extent it involves a change in technology and to what extent it involves a change in the business model. Even each of the dimension exists on a continuum, together they create four categories of innovation. The four innovation categories presented by Pisano (2015) include routine innovation, disruptive innovation, radical innovation and architectural innovation, of which the last three mentioned have already been introduced. According

to Pisano (2015) routine innovation is based on the company's existing technological know-how and fits its existing business model. It adds value to existing offerings and provides multiple small enhancements or upgrades to the company's current offerings with a focus on improvement. The second category; disruptive innovation requires a new business model but not necessarily a technological breakthrough. The third category; radical innovation is the complete opposite to disruptive innovation and purely technological. The fourth category; architectural innovation combines technological and business model disruptions (Pisano 2015).

According to Bessant (2005) innovations can be continuous or discontinuous by nature. Continuous, also referred as incremental innovations are concerned by doing small improvements, whereas discontinuous innovation refers to doing something different. As can be seen from the previously presented literature, the degree of innovation can be defined in various ways. Discontinuous innovation by Bessant (2005), have similar characteristics as the radical innovation defined by Henderson and Clark (1990) and disruptive innovation by Christensen and Raynor (2003). In Pisano´s (2015) view, the difference lies in division between degrees of change in technology and business model. Regardless of how they are called, the main idea of this type of innovation lies on bringing something new. In Pisano´s (2015) case, the disruptive- and radical innovation categories would fit into this bucket. Similarly, continuous innovation by Bessant (2005) has same kind of characteristics than incremental innovation by Henderson and Clark (1990), sustaining innovation by Christensen and Raynor (2003) and routine- or architectural innovation by Pisano (2015) which consists of changes or improvements to existing entities.

Overall, innovation is a complex socio-cultural process that involves various diverse actors and sources of knowledge. It concerns addressing the major social challenges on top of sustaining the competitive advantage of firms and organizations. Regarding this change, the nature of innovations is evolving from innovation of economic productivity to innovation of sustainable development and from risky innovations to socially responsible innovation, as well as from narrow concepts to broadening the socio-technological-cultural perspectives of innovation. The key challenge that the field of innovation faces is creating the complete picture of innovation, that has a comprehensive definition and suitable metrics, as well as is able to overcome the terminological

‘Babel'ization and fragmentation of the field of innovation research. (Edwards-Schachte 2018, 76.)

To conclude, innovation is a complex process and the degrees of it has been characterized differently in previous literature by different authors. A common way is to categorize innovation between radical and incremental innovation, but also further categorization has been applied. After clarifying and reviewing the context of innovation carefully through previous sections, the next section focuses on innovation management and it´s different perspectives including innovation process, in order to understand how innovation can be managed in organizational set-up.

2.1.4 Innovation management

As stated in several researcher within the field, innovation has important role to maintain growing and promising organizational performance (Wong & Chin 2007, 1290.) Innovation management is a important factor between the organization and innovation, and therefore it needs to be considered. Du Preez and Louw (2008) points out that most organizations have noted the importance of innovation and therefore invested significant amount of resources on that, but these investments have failed to generate a satisfactory return with regards to profit or competitiveness. Often innovation management has its basis on two assumptions, that innovation is a process, and this process can be influenced (Tidd & Bessant 2013, 86).

According to Smith (2010) innovation is a complex process, which includes three phases: the exploration phase, discoveries or breakthroughs phase and the diffusion phase. The exploration phase relates to new ideas. Discoveries or breakthroughs phase concern the exploitation, which deals with the commercialization of the potential new products and services. The diffusion phase concerns the phase at which an innovation is introduced and adopted by the consumers when launched into the market. (Smith 2010.) Innovation management takes place as a solid chain of previously developed practices, a focus on problems and challenges, and a new way of looking at creating solutions beyond existing answers (Fortino 2011, according to Ošenieksa & Babauskaa 2014, 83). As the outcome of novelty cannot be precisely planned, innovation management differentiates very much from traditional project management, and rather balances between uncertainty, capabilities, resources and demands (Schulz 2008).

The traditional innovation management has mainly concentrated on the creation of technology or innovation processes, and the processing of inventions or innovating the product has been the role of management (Zhirong et al. 2003). A key factor in traditional innovation is competitive advantage and the performance has been related to R&D (Baniasadi et al. 2021, 4-5). One of the most well-known innovation process frameworks in the literature and practice is the Stage-Gate model introduced by Cooper in the 1980s. It is currently still widely utilized even it is among the first models in the field. The Stage-Gate Model is a theoretical and operational model that can be used by the companies as a tool to guide their innovation process, from an idea to a final product (Cooper 2008). The original model includes seven stages that are meant to collect specific information in order to move the project to the next stage or to a decision point defined as gates in the model. The stages are divided based on the activities within the stage as: idea discovery, scoping, build the business case, development, testing and validation and finally launch. The gates act as a quality checkpoint and are defined by a set of inputs, exit criteria and an output. Input is most important deliverable that must be brought to the gates. The input is then evaluated based on the defined criteria, which are the requirements that must be achieved in order to proceed to the next stage. The output can be go, kill, hold or recycle based on the decision made. (Cooper 1990.)

Tidd et al. (2005) suggested more simplified innovation process model that allows companies to shape the model for most suitable version for them. The first phase in their innovation process is called as a search phase, which involves scanning the internal and external environment, detecting and processing relevant signals concerning the possible threats and opportunities for change. Followed by the search stage, comes select phase. In this phase it is decided which signal should be responded to. After the signals worth to pursue have been selected, comes implementing phase, where the potential ideas need to be turned into actual form, for instance in a new product, process, or change in process. The Implementing phase includes further four elements: Acquiring, Execution, Launching and Sustaining. (Tidd et al. 2005.)

Compared to traditional mechanistic command and control management, innovation management in today's world means a fundamental change in the organization's strategic understanding and requires consideration of many management challenges, such as managing human capabilities in a strategic way, networking with the internal- and external partners, creating adaptive and interactive organizational structures, process

efficiency vs. destructive innovation, and individual and company motivation by developing an innovation strategic vision. The challenges of the new knowledge-driven economy are related to the new characteristics of the market, types of innovation, the needs of stakeholders, the approach to innovation management, the ability to evaluate technological innovations and the need for new innovation management tools. (Hidalgo & Albors 2008.) Traditional linear innovation process models have recently been criticized as being time consuming and hindering creativity. Concepts called as total innovation management (Xu et al. 2007) and holistic innovation management (Chen et al. 2018) has therefore emerged.

According to Xu et al. (2007) total innovation management is the reinvention and management of an innovation value network that at all levels of an organization dynamically integrates the conception, strategy, technology, structure and business process, culture, and people. Organizations should focus on enhancing these capabilities when viewing their innovation management practices. (Xu et al. 2007, 14.) The important components of total innovation management include innovation strategy, innovation culture, the organizational structure, technology management, and innovators. Respectively, innovation synergy lies among the innovative elements. The most significant difference between total innovation and traditional innovation management is that the employment of total innovation management goes through other departments as well, therefore not applying to traditional research department only. It goes from individual innovation to overall innovation, from separate innovation to integrated innovation, and from a focus of company's internal resources only to a focus of the integration of internal and external resources. The concept of innovation is therefore an integrated strategic process for value creation. (Baniasadi et al. 2021, 4-5.)

Chen et al. (2018) explains that holistic innovation provides a systematic and holistic view of combining strategic management, organizational design, cultural construction, and industrial trends for organizations as it combines strategic innovation, total innovation, collaborative innovation and open innovation (Chen et al. 2018, 11). Additionally, new kind of innovation practices and new ways of working has been considered such as previously mentioned Lean and Open Innovation, as well as Agile and Scrum, which have created the shift moving towards more agile approaches. Cooper (2016) also published a hybrid approach called as Agile-Stage-Gate model that combines the structure of his previous Stage-Gate with of agile methods. In this new model, the

agile methods can be utilized in all phases of the Stage-Gate model, and phases are not precisely planned in advance as in the traditional model, but contain iterations according to agile methods, each with its own goals based on customer feedback and what is generally achievable.

According to Smith et al. (2008) nine factors influence the organizations' ability to manage innovation, which are presented in Figure 3.

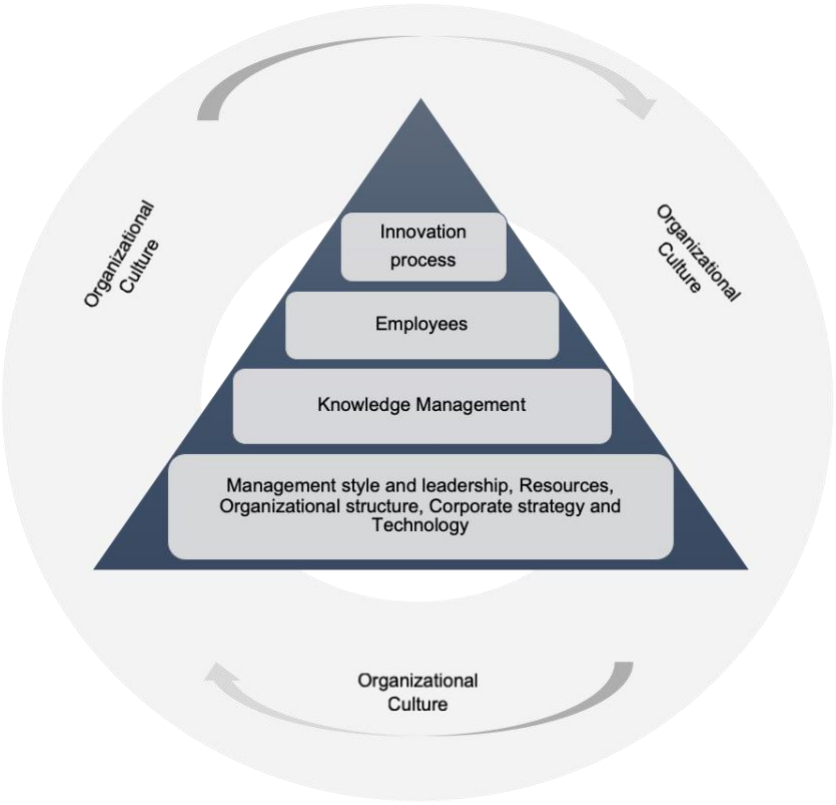

Figure 3. Factors influencing an organization´s ability to manage innovation (adapted from Smith et al. 2008, 13.)

Organizational culture has been seen to play a pervasive role in the management of innovation and it was the most commonly discussed factor identified within their study relating to an organisations ability to manage innovation. The culture relates to the values and beliefs of the organisation and how these impact the management of innovation within the organisation. It considers the approach of organization to collaboration, communication and risk. (Smith et al. 2008.) Organizational culture is often an integral part of the organization's operating methods and values, which it generates in its operations (Smith et al. 2008) that can endorse and boost creative solutions which can further develop into innovations (Kenny & Reedy 2007). According to Dobni (2008) a culture that promotes innovation is important because it guides the behaviour that is

appropriate, as well as strengthens cohesion, loyalty, clear rules and regulations. Dobni (2008) further provides a multi-dimensional approach of organizational culture in promoting innovations in organizations that highlights four sections: intention to be innovative, infrastructure to support innovation, behaviour to influence market orientation, and an environment to implement innovation. (Dobni 2008.) Smith et al. (2008) highlights that organisational culture develops and evolves continuously and due to the reason that changes are made as well in the other levels of their pyramid model, the organisational culture also changes on the way and provides a virtuous or vicious circle of culture that engenders or inhibits innovation. The culture that encourages innovation is often described as open, which encourages creativity and risk taking and information runs freely through the whole organisation. Also, shared vision of an organisation, where supports and encouragement for idea generation and development exist plays an important role and needs be put in place before other changes to organizational factors can be made. (Smith et al. 2008.)

As visible from the Figure 3, Smith et al. (2008) grouped together the factors such as management style and leadership, resources, organizational structure, corporate strategy and technology as a base of their pyramid. They are referred as the foundation factors that define an organisation. Other factors, including knowledge management, employees and the innovation process has been placed alone, as they are not impacted by other factors within the model. Knowledge management and employees are the "tube" between the organisation and the innovation process as the employees of the organisation are the ones that generate ideas for innovation process. Knowledge management is a targeted coordination of knowledge and the management of organisational environment aiming to support individual knowledge transfer and creation of collective knowledge. (Smith et al. 2008, 13-14.) Knowledge can ne turned into profit by effective innovation management (Ošenieksa & Babauskaa 2014). Lopez and Esteves (2013) recognized three drivers for the application of knowledge in innovation. These were to create, build and maintain competitive advantage through utilization of knowledge and through collaboration practices, see knowledge as a resource used to reduce complexity in the innovation process and integrate the internal and external knowledge in the organisation and make it more available and accessible. (according to Ošenieksa & Babauskaa 2014, 86-87.)

Smith et al. (2008) has placed the innovation process at the top of the pyramid due being the only endogenous factor within the model and it is affected by all other factors. In

general, an innovation process is a set of steps from an idea's generation to its implementation, but innovation management literature has offered several different models and tools for effectively managing the innovations. According to Tidd (2001, 169; 180) the contributions are still inconsistent and the reason for this lies on an insufficient consideration of contextual and situational factors and variables. The suitable type, degree and organization of innovation are affected by the environmental uncertainty and complexity impact. When uncertainty and complexity are low, the main concerns are towards product and service differentiation and marketing, for instance in consumer products. When uncertainty is high and complexity low, the main concern shifts to technological or scientific issues, whereas, when uncertainty is low and complexity high, the most critical factors are on project management. Both uncertainty and complexity being high, creates a need for multiple competencies for example flexibility and ability to learn. (Tidd 2001,176.) Van de Ven and Rogers (1988), explain that two types of developmental theories; macro theory and micro theory should be approached when studying innovation processes due to the reason that innovation is practiced over long periods of time, but immediate action systems run through time. (Van de Ven & Rogers 1988, 645). Macro theory describes and explains the general development process. It shows general trends over long periods of time and provides an explanation for why long-term developments unfold as they do. Micro theory describes and explains operating processes that create development patterns in the short term. In addition, micro theory specifies the interaction between people, ideas and context that give rise to innovation. (Van de Ven & Rogers 1988, 644.)

To conclude, innovation is a complex phenomenon to manage as the activities related to it involves high uncertainty. Traditional linear innovation process models- and management has been criticized for not fitting in today´s business needs, that includes many changing factors. Therefore, new innovation management concepts have emerged such as total innovation management and holistic innovation management. Smith et al. (2008) recognized nine factors that influence the organizations' ability to manage innovation, including: management style and leadership, resources, organizational structure, corporate strategy, technology, knowledge management, employees, innovation process and organizational culture, which plays a pervasive role in the management of innovation. Innovation can be managed only if we can measure innovation. Therefore, good innovation metrics are important. Without well working

metrics, innovation management can be only based on common sense, personal feelings and/or political interests. (Gama et al. 2007, 421.) Thus, the next section discusses innovation performance and its measures.

2.1.5 Innovation performance and its measures

Innovation capability is one of the organization's background factors of performance (Saunila 2016). According to Hung and Thong (2020) innovation capability has four components: sensing capability, combination capability, networking capability, and learning capability. Innovation performance is a result of multiple influencing factors representing achievements and results derived from innovation. Concepts are based on input-output relationships to describe innovation performance and define it as the result that arises from the innovation process, which includes the development and implementation of innovation activities (Robertson et al. 2023, 2).

Adams et al. (2006) states that some possible reasons for the lack of good measurement practices and methods in innovation management are the complexity, inconsistency, and accessibility of measuring innovations. This correspondingly leads to lack of opportunities for effective and efficient innovation management process. Performance can be measured at different levels in the field of innovation, for example, on an organizational level, portfolio, or project level. (Adams et al. 2006, 38). Metrics for innovation are important as such metrics presents the value of innovation and those can be used to justify investments for innovation projects that are typically long run and higly risky projects. Metrics can also support better investment decisions based on hard data. Well working innovation metrics enable organizations to allocate resources more effectively, in such a case as evaluating employees, objectives, programs and projects. Innovation metrics also affect human behaviour and support a common language that results better communication throughout the whole organization. (Gama et al. 2007, 420.) According to Tidd et al. (2001, 376) the metrics describing the success of innovation activities include three concepts: output metrics, such as new products, patents or publications, operational or process metrics including customer satisfaction surveys or quality improvements and strategic success metrics regarding profit, market share and productivity. However, Lönnqvist (2004) notes that the main principles among the offered frameworks for performance measurement are often the same, considering the following: 1. measurement is based on the organization to the vision and strategy, 2. the

success factors are chosen from many different perspectives to get a sufficiently comprehensive picture of the factors that affect the organization's success, 3. the aim is to limit the number of success factors to only essential ones, 4. the aim is to use a set of indicators to plan in such a way that there are causal relationships between the success factors and 5. the measurement system can be used to communicate strategy and implementation. (Lönnqvist 2004, 52.) Adams et al. (2006) points out that most often the input and outputs are only measured, ignoring the processes in between. However, Muller et al. (2005) have created a framework for measuring innovation activity, that also considers process aspect on top of the inputs and outputs. Their innovation framework is divided into three areas: resources, abilities, and leadership. The resource perspective describes the organization's ability balance between current business and innovations. The capability perspective means the organization's ability to transform its culture, competencies, and conditions as opportunities for business renewal. Lastly, the management perspective describes how the management culture of the organization supports innovativeness. (Muller et al. 2005.)

As innovation is often looked as a linear process and measurement methods are used for some part of the innovation processes, Adams et al. (2006) designed a broader framework that considers different levels. Hence suggesting to measure areas such as 1) input: people, physical and financial resources and tools 2) Knowledge management: idea generation, knowledge repository and information flows 3) Innovation strategy: strategic orientation and strategic leadership, 4) organization and culture: culture and structure, 5) portfolio management: risk/return balance, optimization tool use 6) project management: project efficiency, tools, communications, collaboration, and 7) commercialization: market research, market testing and marketing and sales (Adams et al. 2006, 26). Moreover, it was suggested by Birchall et al. (2011) that the metrics should meet the following criteria's: 1) measure and cover critical issues 2) be simple and clear to all stakeholders 3) not depend on complex or difficult access to data 4) be valid and reliable 5) weaknesses and limitations should be recognised and understood 6) be reasonably easy to evaluate 7) be actionable.

From the frameworks presented in the literature the most common is the Balanced Scorecard (Malmi & Brown, 2008). Balanced scorecard is the framework that consider four different perspectives: Financial, Customer, Internal Business Processes, and Learning and Growth. The framework links the mission, vision and strategy of the

organization and divert these into operational objectives and measures. (Simons 2000.) Figure 4 below presents the different perspectives of Balanced scorecard.

Figure 4. Four perspectives of Balanced Scorecard (adapted from Kaplan & Norton, 1996)

According to Kaplan and Norton (1996) financial perspective measures to which extent organization´s strategy, implementation and execution are contributing to bottom-line improvement. Financial goals are typically related to profitability, which can be measured with figures such as operating profit, sales growth, or financial indicators. Customer perspective considers organization's performance from its customers' perspective and aims to identify those customer- and market segments in which the organization compete focusing on how the organization wants to be viewed by its customers. Third perspective is internal business process in which the organization considers the critical internal processes that it must excel. It focuses on how well the organization operates its activities and delivers promised value to its customers and shareholders. Finally, the last perspective of learning and growth focuses on the capabilities and skills that the organization must build and excel in order to create value for their customers and create long-term growth. The main focus is to identify the factors for the future success and the measures used for that include employee education and skills measurements, employee satisfaction and retention. (Kaplan & Norton 1996).

Even the original idea of balanced scorecard focused on business strategy, it can be applied to other process in organization as well, including innovation (Bremser & Barsky

2004). However, Gama et al. (2007) does not agree that the traditional BSC is appropriate to measure the value added by innovation, due to the reason that innovation projects typically create more intangible value than tangible value, such as increase in the customer satisfaction level. Intangible value is not measurable by using traditional financial methods. Also, vast majority of innovation projects are difficult to justify because the ROI (Return on Investment) depends on tangible value, resulting that lots of money is wasted in opportunity costs by organizations. (Gama et al. 2007, 418-419.) They suggest that innovation metrics should be combined with balanced scorecard in order to measure and manage innovation, as well as to align innovation projects with strategic objectives. They call this combination as Innovation Scorecard. Systematic approach to manage innovation with a cause-and-effect relationship and a broad and clear definition of innovation for the entire organization needs to exist, in order for investments in innovation to actually deliver results. Otherwise, investments on innovation may be wasted and the organization might not even knowledge that. (Gama et al. 2007, 421.) Gama et al. (2007,422) propose that the Innovation Scorecard can be used by organizations to: 1. Communicate the organization strategy, and the benefits expected by innovation projects, to everybody in the organization. 2. Evaluate the potential value that will be created by innovation projects. 3. Align innovation projects to the strategic objectives of the organization. 4. Map a cause-effect relationship to identify the sources of intangible benefits. 5. Measure the value created by innovation projects after implementation. 6. Provide a framework to manage innovation projects. 7. Identify the most innovative employees and departments. 8. Put pressure on employees to become more innovative. Birchall et al. (2011) concludes after a review of previous research that the nature of the innovation process clearly needs to be better understood so that the measurements can be harmonized, and the measurement results can be implemented better. It is necessary to better understand the areas where measurement is considered the most necessary, in order to support decision-makers in the design of measurement systems and the selection of suitable measures. More restrained metrics need to be developed to meet accepted good practice design criteria. (Birchall et al. 2011.)

To summarize, innovation capability is one of the organization's background factors of performance and performance can be measured at various levels in the field of innovation. The complexity, inconsistency and inaccessibility of innovation measurements are some of the possible reasons for the lack of good measurement practices and methods in

innovation management. Metrics used for innovation should be able to measure and manage innovation, as well as to align innovation projects with strategic objectives. The next chapter moves to review the literature regarding management control systems and identifies their different components and usage in practise in order to verify their suitability for innovations and their management.

2.2 Management control systems

Even after decades of management control research, the field of management control is nevertheless unclear by its definition. The major challenge in research is the inconsistent view on what is the definition of management control systems overall and which type of the controls does it contain (Malmi & Brown 2008, 288).

2.2.1 Definition of management control systems

Directly interpreted from the words, management control systems include three concepts: "management", "control" and "systems". Starting with the word "control" and what does it actually comprise. The word control has many different meanings and connotations, from which many are not even applicable to the management field (Carenys 2010, 1). In general, control implies directing, restraining, or regulating for many people. Collier (2005,323) have listed synonyms for control such as, command, dominate, direct, rule, exercise power or authority over, govern, manage, lead, conduct, guide, oversee, supervise, check and hold back among others. The field of researchers seems to have accepted that control does have different meaning to different people. According to Chua et al. (1989, 4), control is intended for steering or regulation and domination of one or more people or groups of people by other people or groups, as well as for process of the management control and power. Merchant (1985, 1) outlined that control means "keeping things on track" and control acts as a final function in the management process being a significant function of managers (Merchant 1985, 2), whereas Simons (1995, 29) stated that control implies managing the inherent tension between creative innovation and predictable goal achievement so that both are transformed successfully into profitable growth. In many occasions, control acts as a potential corrective action between the planned and actual performance. The function of control is to take measures to increase goal congruence or prevent organizational participants from behaving in ways where goal incongruence exists. (Merchant 1985, 43.)

The second word, “management” is in its general level, the activity carried out by managers in organization setting. However, it has been noted that management as an activity is not only limited to what managers do (Machin 1983, 36) and scholars has stated that under uncertain conditions, the involvement of other organizational participants is also needed in management of activities (Otley 1994, 292). According to DuBrin (2000) management is “the process of using organization resources to achieve organizational objectives through the functions of planning, organizing and staffing, leading, and controlling” (DuBrin 2000, 3). Hutzschenreuter (2009) points out that the main difference between management control and management control systems is that the management control systems are the systems or tools used as correspondents of control. In case these systems are implemented, they are aimed to enhance performance. The word control has been implemented with a negative side meaning. (Herath 2007, 896-900.)

In general level, the field of management control is concerned with understanding the processes and mechanisms that influence the behavior of organization´s members, who contribute to organizational performance (Speklé 2014). When an organization does not expect any significant surprises and has confident in its employees and knowledge, it can be described as an situation, where the organization has a good management control. The situation where an organization has a perfect control is however an unrealistic expectation, as that would require a completely reliable employees and set of systems. (Merchant & Van der Stede 2007) The concept of management control has evolved over the time along with the changes in the environment and circumstances in which organizations are operating.

Merchant and Van der Stede (2007) discuss the definition of management control systems in narrow and broad views, whereby early definitions of MCSs are mostly subject to the narrow view. Considering narrow view, Anthony’s (1965) work has been seen as very influential (Merchant & Otley 2006, 788), because Anthony (1965) separated the topic of management control from the other fields of research and discussed it separately, as well as he was the first author to highlight the usage of accounting information for facilitating management planning and control (Zeff 2008, 43). Anthony (1965) defined management control as “the process by which managers assure that resources are obtained and used effectively and efficiently in the accomplishment of the organization’s objectives” (Anthony 1965, 17). According to Pfister et al. (2023) this definition was rather narrow, and the emphasis was mainly put on accounting-related controls, placing management

control between strategic planning and operational control. Similarly, Kloot (1997) has outlined that management control exists in order to ensure that organisations achieve their objectives, and Fisher (1995) stated that control is used in order to create the conditions that motivate an organisation to obtain predetermined results. Thus, the concept of control in organizations seemed to be related to the existence of certain organizational goals or objectives (Carenys 2010, 2).

Anthony et al. (1989) separated controls into two different types - formal controls and informal controls. The earlier times control systems have been seen as cybernetic and formal systems, which were based on the usage of financial and accounting information systems through cost accounting and budgets. (Carenys 2010, 1.) Formal controls include results- and output controls and can therefore be financial and feedback-oriented. In many cases, formal controls are referred as budgets and the purpose of formal MCSs is to guarantee the desired result, which can be achieved by measuring, monitoring and correcting. (Langfield-Smith 1997, 208.) Simons (1995, 5) defined MCSs as formal, information-based routines and procedures managers use to maintain or alter patterns in organizational activities. Simons (1995) states that these information-based systems become control systems if used to maintain or alter patterns in organizational activities. In case they are not used for formerly mention purpose, those are information for decision-making. Also, Merchant and Van der Stede (2017) classified the narrow MCSs as a cybernetic or regulating system with a single feedback loop, that creates a reactive control environment. In this environment the function of managers is to take corrective actions, in case the performance measurement indicators is not in line with the pre-set standards. (Merchant & Van der Stede 2017, 8.) Ferreira and Otley (2009) argue that the narrow view of MCS focused on formal accounting control and therefore failed to consider controls in a wider context, meaning that it was not able to capture the richness of different issues, neither the relationships associated with the design and use of MCSs. Similarly, Langfield-Smith (2006) argued that Anthony's (1965) view does not consider the full complexity of MCSs as it views MCSs in too narrow basis.

Even the focus of MCSs used to be placed mainly on formal controls, over time it has increasingly begun to contain informal controls as well (Chenhall 2003). Compared to formal controls, informal controls are more ambiguous. Informal controls are part of an organization's culture and include controls based on shared values and norms. (Langfield-Smith 1997, 208.) The earlier viewpoint was accompanied with different additions, that

focused on analysing the influence of psychosocial and cultural aspects as key variables in the control of organizations. These studies focused on aspects of control, such as human relationships, leadership, motivation, and the organisation's culture. (Carenys 2010, 1.) Merchant and Van der Stede (2017, 8) views that the nature of MCS is proactive and the role as preventive. They state that "MCS includes all the devices or systems that managers use to ensure the behaviours and decisions of their employees are consistent with the organization's objectives and strategies". If MCSs are well implemented, they can prevent harmful organizational decisions to happened. (Merchant & Van der Stede 2017, 8.) Chenhall (2003) suggested that MCSs aims to assist in achieving organizational goals and include management accounting systems, personal, and cultural controls, whereas Tessier and Otley (2012) pointed out that management controls can have different objectives and further grouped management controls into four different systems: strategic performance, operational performance, strategic boundaries, and operational boundaries. These categories include various types of controls, such as social controls for example values and culture, or technical controls such as procedures, rules and routines. This development has resulted that today´s organisational management control is not designed as a closed mechanistic system. It is rather an open system that is in connection with the organization´s members and its environment. (Carenys 2010, 1.)

In this thesis, management control systems are defined as "systems and the set of formal and informal procedures and processes that organizational participants use in order to help ensure the achievement of their goals and the goals of their organization". It is a mixture of previously presented definitions due to the reason that perfectly fitting existing definition was hard to find as the field of MCS in general is inconsistent with the definitions of MCS (Anthony 1965; Chenhall 2003; Malmi & Brown 2008). In Anthony´s (1965) definition, the focus has set to achieving the organizational objectives, which wanted to be broadened to include the goals of individual participants in organization as well. Merchant and Van der Stede (2012) have also the goal compatibility aspect, similar to Anthony (1965), but they limit the usage of MCSs to managers only. In the view of this thesis, the other organizational participants may use the systems as well. Simons (1995) only focuses on formal controls in his definition and was therefore excluded, due to the reason that informal controls were found to be appropriate to include. Malmi and Brown (2008) made a distinction between systems that are used for control and decision-making purposes and excluded accounting systems used only for decision support from

their definition. According to them, the difference between accounting systems and management accounting systems designed to support decision-making in different organisational level can be defined by whether the system is monitored or unmonitored. If the use of systems is unmonitored, the system should be called as a management accounting system. In this thesis, these systems were seen to fit better under the same definition, therefore those are also included in the term of management control systems. The definition is purposely set to have wide aspect, due to the complexity of innovation. Applying more comprehensive approach has been suggested as the findings of studies that have focused on single components of control and control systems have provided limited information (Haustein et al. 2014). This is also in line with the highlights of Pfister et al. (2023), stating that even with broad range definition, behavioural focus is at the core of MCS research, meaning that someone seeks to control the behaviour of another, in other words, aim to manage their performance. Performance can relate to different things. It can accede to the individual or the collective, to different type of dimensions such as financial and non-financial, as well as to various different aspects such as sociological and psychological.

To conclude, management control systems have various definitions in previous research and different components are included based on the author´s preferences. This study uses the following definition of MCS "systems and the set of formal and informal procedures and processes that organizational participants use in order to help ensure the achievement of their goals and the goals of their organization" which is a mixture of previously presented definitions. Most of the focus of MCSs has been placed mainly on formal controls, but lately it has increasingly begun to contain informal controls as well. In order to understand the functioning of control mechanisms, the next section views enabling and coercive forms of control.

2.2.2 Enabling and coercive forms of control

Control mechanisms can function in enabling or coercive ways (Adler & Borys 1996). In general, the term enabling refers to procedures that seize organizational memory, codify best practices, as well as assists employees to work more effectively. Whereas coercive refers to forcing compliance, without much possibility for deviation from the rules and procedures, also reducing the commitment of employees. (van Veen-Dirks et al. 2021.) Enabling formalization suggests that rules and systems are designed to support instead of

control. Enabling controls aims to facilitate structure as well as refine and guide work processes. (Adler & Borys 1996.) The use of enabling controls concentrates on facilitating autonomy and learning (Radtke & Widener 2016). Whereas the coercive formalization includes rules and systems that aims to force compliance with pre-specified standards (Adler & Borys 1996) and focuses on controlling behaviour (Radtke & Widener 2016). According to Hoy and Sweetland (2001) enabling controls encourage an interactive dialogue, relish the unexpected, promotes trust, and sees problems as opportunities, whereas coercive controls are characterized by compliance with rules, punishment of mistakes, and the unexpected situations are feared and appearing problems seen as obstacles. (Beuren & Santos 2019.)

The previous literature on enabling and coercive systems has discussed two dimensions: design characteristics of the system, and the development process of the system (van Veen-Dirks et al. 2021). According to Adler and Borys (1996) the differences between enabling and coercive formalizations depends on the characteristics of the formalization, as well as on the design and implementation process of the systems. Their four design principles of repair, internal transparency, global transparency, and flexibility is useful way to explain how management control systems are enacted in practice. Repair relates to problem-solving and within an enabling context, it consists of the unification of repair activities into routine procedures, in which the system allows employees to look for and obtain the needed repairs in order to complete their tasks. (Ahrens & Chapman 2004.) Coercive logic does not offer repair options as this logic sees deviations from the formal procedures as suspect, because coercive formalization´s main purpose is ensuring the compliance of employees' actions and these systems won´t allow autonomy for employees to repair procedural breakdowns but instead request the help from experts. Coercive logic limits the autonomy and discretion of the employees advancing the likelihood that these types of procedure are seen as unfair. Respectively, enabling procedures provides repair opportunities that enables employees to resolve issues themselves generating the likelihood that employees consider the procedures as fair. (van Veen-Dirks et al. 2021.)

Internal transparency occurs when the internal processes are visible for the employees, and they develop a better understanding of their local processes and systems (Ahrens & Chapman 2004). When employees are more familiar with the functioning of the system, they will view it in a more positive terms, leading to the higher procedural fairness

perceived. In contrast, the coercive procedures are formulated more as an duty based and in order to support supervisors rather than employees. When applying coercive logic, the employees should follow the specified formal procedures and a proper understanding of the systems that they are working with is not required. (van Veen-Dirks et al. 2021.) Global transparency occurs when employees develop more advanced understanding of the company´s business strategy. In many cases employees are not very aware of how the local processes that they are more focused on fit into the entirety of the organisation. (Ahrens & Chapman 2004.) As an enabling system provides more information to the employees beyond their own tasks, it helps employees to interact with the overall context of the organization. Coercive systems have partitioned tasks and employees only gets access to information related to their specific and personal responsibility areas. This kind of system generates risks, such as minimized global transparency and compulsion of employee´s compliance with organizational policies without facilitative of understanding. (van Veen-Dirks et al. 2021.) Finally, flexibility is related to the employee´s discretionary power regarding the use of control systems (Ahrens & Chapman 2004). A flexible system sees that deviations from procedures offers learning opportunities and makes decision making easier in case of the emerging events, while a coercive system forces employees to follow a specific verified steps and deviations require approval from the supervisor (van Veen-Dirks et al. 2021).

When management control systems are formed with enabling design, it is assumed that users can have more autonomy and flexibility to act on possible contingencies, as well as make suggestions for possible changes, improvements on processes and increase the efficiency of their activities because the characteristics of enabling design enables better access, repairs and transparent internal and global information concerning the functioning of work processes (Adler & Borys 1996; Ahrens & Chapman 2004). Enabling design can also assist in control and managing unexpected events as well as generate rapid responses (Chenhall & Moers 2015). According to Beuren and Santos (2019) management control systems with enabling design with characteristics such as favouring communication, intergroup participation, task mastery, and flexible and decentralized relationships, advanced organizations to deal more effectively with turbulences and adversities. Fried (2017) argue that the nature of MCS being either enabling or coercive depends primarily on an optimal fit. Additionally, Adler and Borys (1996) states that a balance can be found when formal procedures are designed and implemented as enabling rather than coercive

measures. Related to the innovations, Jørgensen and Messner (2009) discussed the link between efficiency and exploitation as well as flexibility, innovation, and exploration. If organization wishes to be efficient, they need to exploit their current capacities and be enough flexible in order to generate possibilities for innovation by generating balance between efficiency and flexibility. Balancing enabling and coercive designs aims for efficiency and flexibility, as well as helps to develop habits for management controls to shape innovation (Ahrens & Chapman, 2004, 297).

To conclude, control mechanisms can function in enabling or coercive ways. Enabling considers procedures that seize organizational memory, codify best practices, and assists employees to work more effectively, whereas coercive refers to compliance, without much possibility for deviation from the rules and procedures, also reducing the commitment of employees. As enabling design allows more flexibility and has therefore been considered better suited in innovative environments. However Fried (2017) suggest that the nature of MCS being either enabling or coercive depends primarily on an optimal fit. The next section introduces frameworks for MCS conceptualization and compares their components.

2.2.3 Frameworks for conceptualizing management control systems

Previous research has provided various frameworks for MCS conceptualization, but failed to provide common agreement regarding, which framework is the most fitting for the different situations (Strauss & Zecher 2013, 234). As MCS is a broad and complex subject, it is important to select the most applicable and fitting framework (Anthony 1965, 1-2). Haustein et al. (2014) built more updated version of Hutzschenreuter's (2009) framework as presented in Figure 5 by distinguishing between direct and indirect modes of control based on the degree of interaction with employees.

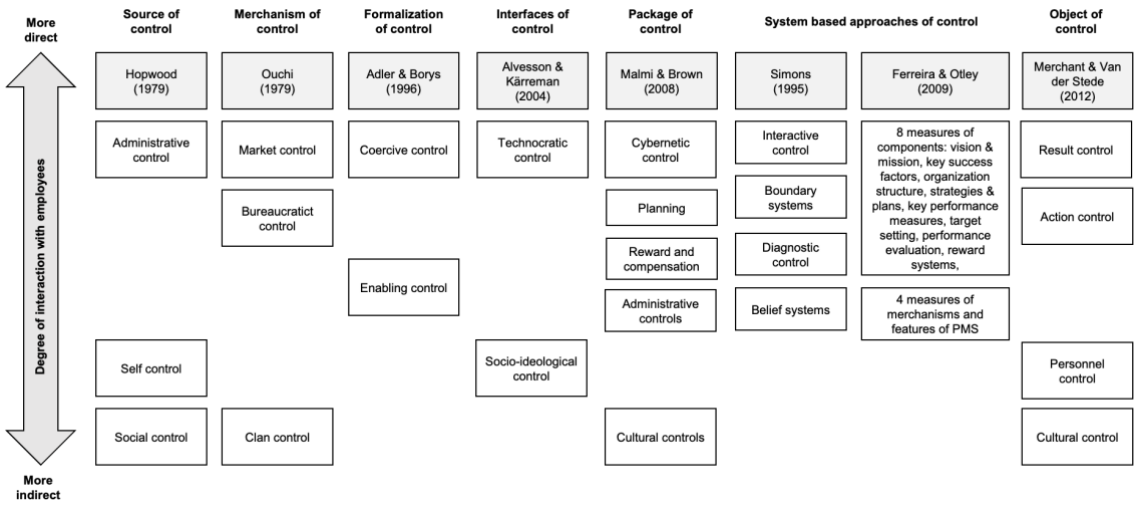

Figure 5. Overview of MCS frameworks (adapted from Haustein et al. 2014)

Direct- and indirect controls, were originally called as formal- and informal controls by Jaworski (1988). Formal control defined as a written, management-initiated mechanism and informal control as an unwritten, typically worker-initiated mechanism. (Haustein et al. 2014, 346.) Hopwood (1976) and Ouchi (1979) being among the first to consider socialization processes as a form of control. They named these social control and clan control, respectively, but these controls were seen as informal controls that arose without the express influence of the organization's leadership. Alvesson and Kärreman (2004) created the concept of social-ideological control. It concerns efforts to get people to adapt to certain values, norms, and ideas about what is good, important and commendable in work and organizational life. Initiated by management, it constitutes formal supervision. Adler and Borys (1996) discussed the formalization on control between coercive and enabling controls, which was discussed already in previous chapter in more detail. Coercive controls are designed to force reluctant compliance and remove reluctant effort. Enabling control creates procedures that facilitate responding to real-world situations by providing users with visibility into the processes they control, explaining its key elements by codifying best practice routines. (Haustein et al. 2014, 347-349.)

Malmi and Brown (2008) provided a framework to study MCSs as systems and packages seriously considering the holistic point of view of management control system research. Simons (1995) in his levers of control framework theorized how managers can use formal control systems to implement strategy. His framework distinguishes between belief systems, boundary systems, diagnostic systems, and interactive systems, whereas Ferreira and Otley (2009) created 12 questions that assist researchers in obtaining a pragmatic

overview of different but interrelated MC practices, with the purpose of describing and analysing the operation of control holistically. Merchant and Van der Stede (2012) used the object of control to categorize management control practices into results control, action control, personnel control and cultural control. (Pfister et al. 2023, 5.)

The frameworks of Simons (1995), Merchant & Van der Stede (2012) and Malmi & Brown (2008), are being used in management control research extensively (Straub & Zecher 2013, 265) and therefore these three frameworks are further explored in more detail. Levers of control framework by Simons (1995), is shown in Figure 6.

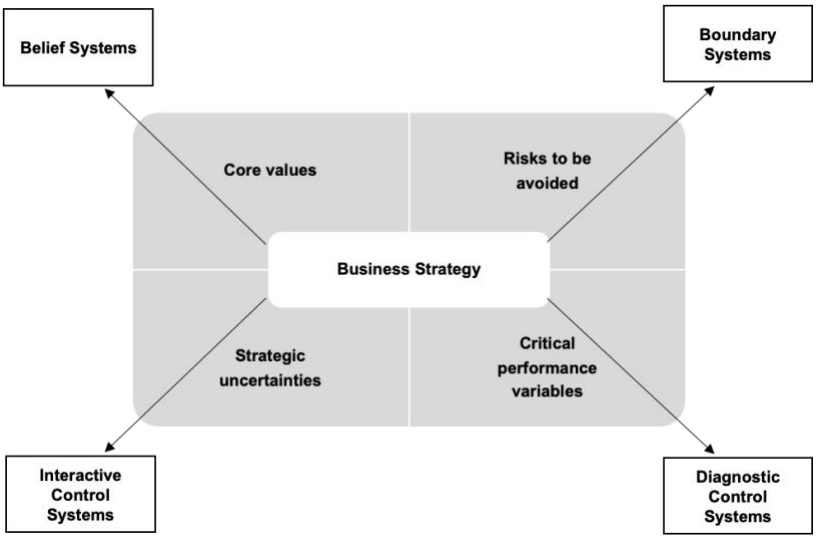

Figure 6. Levers of control framework (adapted from Simons,1995, 5)

As previously mentioned, the framework is built on business strategy, as it highlights how organizations are to interact with the external environment. The next level includes four key constructs: core values, risks to be avoided, critical performance variables, and strategic uncertainties, that are necessary to understand in order to successfully implement a business strategy. Each of these four key constructs are directly controlled by a lever of control, that presents different types of MCS. The four levers are called as belief systems, boundary systems, interactive systems and diagnostic systems depending on the strategic orientation, that the system have and usage by higher management. (Simons 1995.) This framework focuses on formal control, and therefore does not include social and cultural aspects of control. According to Simons (1995) interactive controls and belief systems are classified as positive forces that can improve creativity, while diagnostic control systems and boundary systems are negative forces that compel obedience and limitations. However, the framework represents highly direct way of control as Simons (1995) defines

interactive controls being “formal information systems managers use to involve themselves regularly and personally in the decision activities of subordinates” (Simons 1995, 96).

The core values are controlled by the beliefs system, which are “the definitions that senior managers communicate formally and reinforce systematically to provide basic values, purpose and direction for the organization” (Simons 1995, 32). When an organization is not facing any obstacles, beliefs systems guide the creative process in the search for new possibilities and instills widely shared beliefs eventually creating value for the organization. When obstacles arise, beliefs systems act as a motivator to search for ways to solve problems and further find solutions. Beliefs systems in organization can be for instance mission statements and statements of purpose. (Simons 1995, 31-34.) Second construct defined as risks to be avoided is controlled by the boundary system, which as opposite to belief systems have a negative and restrictive role by limiting the domain from which the company looks for new opportunities motivated by belief systems (Simons 1995, 39). The usage of boundary systems helps organization to avoid unexpected risks. When boundaries are in place and the subordinates comply with them, managers can allow their subordinates to make their own mind without confirmation on decisions. (Simons 1995, 37-39.) Capital budgeting system, in other words the asset acquisition system is a commonly applied boundary system. Boundary systems further includes strategic boundaries and business conduct boundaries. Strategic boundaries contain checklists and planning systems, such as strategic planning that offer guidance on whether specific opportunities should be chased after. Business conduct boundaries clarifies certain business conduct accepted in an organization. (Simons 1995, 51.) Critical performance variables are controlled by the diagnostic control system which monitors, assess and reward achievement. Diagnostic control systems are “the formal information systems that managers use to monitor organizational outcomes and correct deviations from pre-set standards of performance” (Simons 1995, 57). Examples of diagnostic control systems are business plans, project monitoring systems, goal and objective systems, profit plans and budgets (Simons 1995, 59). Finally, strategic uncertainties are controlled by the interactive control system, having a mission to promote organizational learning and the development of new ideas and strategies. Interactive systems can be used by managers when interacting with subordinates and it becomes interactive when manager chooses to use a control system (Simons 1995, 93-95).

The second framework presented in more detail is the object of control framework by Merchant and Van der Stede (2012), which divides controls into four categories: results control, action control, personnel control and cultural control. These specific categories require controlling, due to the three major management problems: personnel limitations, motivational problems and lack of direction. Personnel limitations implies that people are motivated and knowledged what is expected from them but unbale to act according to due to the certain limitations. Motivational problems implies that people know what they are supposed to do, but motivational aspect is limiting them to act accordingly, whereas lack of direction implies that people do not know what is expected from them, and therefore fail to act. (Strauß & Zecher 2013, 248.) Table 2 shows an overview presented by Haustein et al. (2014, 350) of the four categories of control: results control, action control, personnel control and cultural control, their definition, and examples of corresponding control techniques.

Table 2. Actions of control based on Merchant & Van der Stede´s Framework (adapted from Haustein et al. 2014, 350)

Category	**Result control**	**Action control**	**Personnel control**	**Cultural control**
Mode of control	Direct	Direct	Indirect	Indirect
Definition	Enforce target achievement through monitoring and rewarding outputs	Prevention of undesired behaviour, promotion of desired behaviour for task accomplishment	Fulfilment of job requirements	Control through establishment of shared values, social norms and beliefs
Notion of control	Control of outputs through management	Control of behaviour through management	Exercise of self-control by individual employees	Group control among organizational members
Examples of controls	Performance measurement (e.g. ROE, net income) -Budgeting -Reward structures -Report of achievements	-Procedure guide -Operating manual -Supervision of rules -Physical or administrative restrictions	-Recruitment policies -Training programmes -Job design -Provision of sufficient resources for the job	-Code of conduct -Group-based rewards -Interaction -Manager serves as a role model

These four categories are divided into direct and indirect control systems. Results control and action control are typically direct control methods, whereas indirect control methods include personnel control and cultural control. Result control influences each individual's action and behavior, as it makes employees to think about the consequences of their actions. When facing motivational problems, results controls can be effective as they make employees to pursue the results according to organizations wishes without the supervision from upper-level managers. (Strauß & Zecher 2013, 248.) Results controls are typically performance measurements, budgeting, reward structures or reports of achievements (Haustein et al. 2014, 350). Action control makes employees to act according to the best interest of the organization and they are used to directly control the action of employees, by putting the actions as the focus on control (Merchant and Van der Stede 2007). The actions need to be predefined, whether being desirable or not, in order to use this type of control. Action controls can be further divided into behavioural constraints, pre-action reviews, action accountability and redundancy based on which control problems they address (Strauß & Zecher 2013, 248). Behavioural constraints directly restrict actions that subordinates are able to take, whereas pre-action reviews enable actions to be approved or disapproved by managers before undertaking the action. In action accountability, subordinates are accountable for their own actions resulting that desired actions are rewarded, whereas undesired actions are punished. Redundancy increases the capacity of employees or equipment for the task to reduce the likelihood of a capacity gap. (Kantola 2017, 8.) Action controls are often in forms of procedure guides, operating manuals and physical or administrative actions such as expenditure approvals or passwords (Haustein et al. 2014, 350).

Personnel controls and cultural controls are strongly connected as cultural controls are an accumulated form of personnel controls. Personnel controls place the emphasis on employees' natural tendencies to control and motivate themselves. The control problems can be solved by introducing a self-monitoring mentality within the employees. Successful implementation of personnel controls requires finding the right people from the organization, who are enough self-motivated by their own goals and coherent with the overall objectives of organization. (Strauß & Zecher 2013, 249.) The techniques of personnel controls may include recruitment policies, trainings, job designs and provision of sufficient resources for the job (Haustein et al. 2014, 350). Finally, cultural controls

are “designed to encourage mutual monitoring: a powerful form of group pressure on individuals who deviate from the group norms and values” (Merchant and Van der Stede 2007, 85). Cultural controls often work effectively in groups with high emotional ties and/or a high degree of reciprocal dependency. (Strauß & Zecher 2013, 249.) The examples of cultural controls include codes of conduct, group-based rewards, interaction and managers serves as a role model (Haustein et al. 2014, 350).

Finally, the third framework presented in more detail is the management control systems as a package framework created by Malmi and Brown (2008). They prefer to use the term package due to the reason that it more clearly brings out the idea, that different sorts of control systems are often introduced by various interest groups at different periods of time and therefore cannot be defined as a single system. They also suggest, that MCSs are connected and operate in synergy instead of being separated as a single system. (Malmi & Brown 2008, 287-291.) Their management control system package framework is presented in Table 3 below, and it includes five different types of controls: planning, cybernetic, reward and compensation, administrative and cultural controls.

Table 3. Management control systems as a package (adapted from Malmi & Brown, 2008)

Control	Definition by Malmi & Brown (2008, 292)	Categories
Cultural controls	Influence employee’s behaviour through established values, beliefs and social norms	Clans
		Values
		Symbols
Planning	Controls the activities and directs effort and behaviour of groups and individuals by setting and aligning the goals of the functional areas of the organisation. Provides the standards to be achieved in relation to the goal by stating the expected level of effort and behaviour.	Long range planning
		Action planning
Cybernetic controls	Measures that enable quantification of an underlying phenomenon, activity or system. Standards of performance or targets to be met. Feedback process that enables comparison of the outcome of the activities with the standard. Variance analysis arising from the feedback	Budgets
		Financial measurement systems
		Non-Financial measurement systems

Control	Definition by Malmi & Brown (2008, 292)	Categories
	and ability to modify the system's behaviour or underlying activities.	Hybrid measurement systems
Reward and compensation	Rewards to control effort direction, duration, and intensity by motivating and increasing the performance of individuals and groups	
Administrative	Organisation design, structure, rules, restrictions and regulations aiming to direct employee behaviour through the organizing of individuals.	Governance structure
		Organization structure
		Policies and Procedures

Planning controls in Malmi & Brown (2008) framework are divided into action planning and long-range planning. Action planning sets the goals and actions of the organization for the near future, usually for a twelve-month period. Long range planning has more of a strategic focus, and it sets the goals and actions for the longer period of time. They justify planning as a MCS considering it is a ex ante form of control due to the reasons that planning sets out the goals of the organization and provides the standards and expectations of organizational members, therefore directing the behaviour. Planning also enhance goal achiving within functional areas and thereby controls the activities of different groups and individuals in the organizational set up. (Malmi & Brown 2008, 291-292.)

Cybernetic controls include four different elements: budgets, financial measures, non-financial measures and hybrid measures. According to them, the role of budgeting as a control mechanism is "the planning acceptable levels of behaviour and evaluating performance against those plans" (Malmi & Brown 2008, 293). Financial measures can be related to budgets, but budgets itself are not financial performance measures as such. They argue that financial measurements can be used in target setting in a narrow and simple form. Examples of financial measures include return on investment (ROI) and economic value added (EVA). Non-financial measures include the measures that typically complement financial measures by specifying some performance drivers that financial measures are not able to imply. Hybrid measurements can include both financial and non-financial measures. The example of this kind of system is balanced scorecard. (Malmi & Brown 2008, 293.)

Rewards and compensation controls have important role creating goal congruence between the activities of employees and the goals of the organization. The presence of these controls have been noted to increase the effort of the employees by making individuals to direct efforts on the task, which can impact the performance in three ways: effort direction, meaning the tasks that individuals are focusing on; effort duration, in other words how long people dedicate themselves to the task; and effort intensity, meaning how much attention individuals pay to the task. They note that reward and compensation systems are often linked to cybernetic controls but express that alternative reward and compensation schemes also exists. (Malmi & Brown 2008, 293.)

Administrative controls are divided in three groups in the framework of Malmi & Brown (2008) being organization design, governance structures and policies and procedures. Organizational design may encourage certain types of contact and relationships, and therefore act as a control device, whereas governance structure relates to the board structure and composition of the organization as well as its management and project teams. Policies and procedures include standard operating procedures and practices as well as rules and policies. (Malmi & Brown 2008, 293-294.)

Finally, cultural controls include clans, values and symbols, and these controls. Values are working on three levels. The first level happens when organizations deliberately recruit individuals having matching values with the organisation. The second level is when individuals are socialized, and their values change to match the values of organization. The third level emerges when values are explicated and employees act according to them, although possibly not adhering them personally. Symbol-based controls include visible expressions, such as workspace design or dress code, created by the organization in order to develop certain type of culture. The idea of clan control is that individuals are part of a socialization process that plants certain set of skills and values to them. The groups in socialization process may be related to professions, or groups in organizations that form some kind of boundary, for example an organizational unit or division. Clan controls comprise ceremonies and rituals of the clan that create values and beliefs. (Malmi & Brown 2008, 294-295.)

When considering the similarities and differences between these three frameworks, Simons (1995) stands out as the most distinctive. Even Simons' framework has been widely used in previous research, Tessier and Otley (2012) consider that the definitions

of the framework are vague and to some extent ambiguous. Simons' framework only considers formal type of controls and aims for strategy implementation having the key role of balancing of tensions in it (Simons 1995, 13). This framework also presents the ways in which certain control systems are used by senior management and focuses on distinction between diagnostic and interactive usage of the systems but leaves out the categorization of different actual systems. The framework of Malmi and Brown (2008) appears to be the broadest and the different concepts are most specifically defined. It includes four separate groups of cybernetic controls, which are all grouped under the diagnostic controls in Simons (1995) framework. Also, the organizational and governance structure controls have been included in Malmi and Brown (2008) framework, while these are not existing in the Levers of Control and the Object of Control frameworks. The object-of-control framework by Merchant and Van der Stede has quite similar typology in general with Malmi and Brown (2008) but one difference relates to planning concept. Merchant and Van der Stede (2003) see planning being a subtype of financial results controls, whereas Malmi and Brown (2008) state that planning does not have to have link with finance and therefore consider it as a separate type of management control.

To conclude, this section reviewed closely the most often used frameworks of Levers of Control by Simons (1995), Object of Control framework by Merchant and Van der Stede (2012) and MCSs as a package by Malmi and Brown (2008). Overall, this chapter reviewed the definition of MCS, enabling and coercive use of controls as well as the frameworks for conceptualizing MCS in order to move to the next chapter which links management control systems with innovation and views how MCSs can support innovation.

2.3 Management control systems for innovation

This section links management control systems with innovation and present insights of previous research results regarding this relationship. The role of management control systems in innovation is reviewed and the items affecting innovation management has been considered and placed together with the management control systems in the process of innovation management with the aim of creating initial framework for this study that helps to answer the main research question of how management control systems can enhance innovation in organization.

2.3.1 The role of management control systems in innovation and the tension of the relationship

Managing innovation and creativity is a complicate task as the main challenge lies with balancing between the need for creativity and control, as well as with the short-term benefits of incremental innovation and more uncertain long-term benefits of radical innovation. (Werner & Tang 2017.) For highly innovative organizations, the difficulty lies with need for control of their business and the requirement for flexibility to be able to innovate (Lukka & Granlund 2003). As the organizations need to strive innovation more actively, control systems have faced challenges to be scalable to help managers accomplish innovation (Chenhall & Moers 2015, 2). Earlier research on management controls systems state that control causes hindrance to innovation (Amabile 1998) because MCSs may generate bureaucratic and too detailed processes, which stiles innovation (Davila et al. 2009).

The scope of management control systems has changed significantly since Johnson and Kaplan (1987), argued that the approaches to management accounting and control have become irrelevant and the challenge lies in developing flexible approaches to performance measurement systems and management control. Nowadays these systems contribute mainly to flexibility and autonomy and the scope of management control has spread to the field of strategy, as well as to consider the aspects of value creation, such as identification, measurement, and management of value drivers that guarantee customer satisfaction, investor return and organisational innovation. (Barros & Ferreira 2019, 348.)

More recently studies such as Bisbe and Otley (2004) and Grabner and Speckbacher (2016) have indicated that MCSs might have more beneficial effect in innovation-related environments and that MCSs can assist in managing activities related to innovation Davila (2000). According to McCarthy and Gordon (2011) MCSs should offer freedom within boundaries in innovative set-up. Pfister (2014) found that management control systems could advance decision-making across the innovation process, while Merchant and Van de Stede (2012) stated that MCSs encourages creativity. MCSs can also smooth information flows (Lopez-Valeiras et al. 2016). In uncertain environment, it is beneficial to have high interaction within the organization in order to stay responsive (Chenhall & Morris 1986) and to successfully manage innovation high knowledge integration between sub-units is required (Davila 2000) meaning that the structure of organization should have

well-functioning developed communication processes and support cross-functional collaboration.

Barros and Ferreira (2019) recognized the use of multiple controls regarding innovation as one theme considering the recent research about the role of management control systems in innovation, meaning that the use of control systems in innovation comprise various controls, that are used in different ways. The results and routines that controls further produce, depends on the way that they are used and therefore can impact innovation either by supporting or constraining it. Majority of the studies related to innovation and management control systems are based on Simons' (1995) approach on the use of levers of control framework, as it recognises the use of multiple controls and styles in their use. (Barros & Ferreira 2019, 349-350.) Organizations with high environmental uncertainty including rapid changes and high competition may benefit from the interactive use of performance measurement systems, as those enhance entrepreneurship, innovation and organizational learning (Henri 2006). Sakka et al. (2013) found that the interactive use of MCS enhanced performance when task uncertainty was high, but when task uncertainty was low, the use of MCS was detrimental to performance. However, when task uncertainty was low, performance was increased with the diagnostic use of MCS. Diagnostic control systems have been brought up related to the success of projects by Rezania et al. (2016) and Müller-Stewens et al. (2020) suggested that diagnostic control systems have beneficial role in new product development, while Bedford (2015) stated that diagnostic control systems can provide space for exploitation of the existing markets and technological capabilities. McCarthy and Gordon (2011) as well as Bedford (2015) found that boundary systems have a positive role in innovation, whereas related to belief systems, there is not much collected evidence. (Barros & Ferreira 2019, 351.) According to Davila (2000) non-financial controls are beneficial when measuring innovation.

The second theme of recent research concerning the role of management control systems in innovation by Barros and Ferreira (2019) relates to distinctions on the use of controls. They summarize that Davila et al. (2009) and Chenhall and Moers (2015) noted that different types of innovation may require different control mechanisms. According to Fried et al. (2017) management and control of innovation depends on the specificities of innovation, which varies between different organizations and projects. Also, the stages and magnitudes of innovation, as well as different times require distinct controls and

divergent usage. (Barros & Ferreira 2019, 353.) Davila et al. (2009) argue that incremental and radical innovations require divergent management controls. Similarly, Manneri (2016) concluded that belief systems play an important and supportive role in promoting innovativeness in organizations focused on exploitative innovation. He found that the dynamic interplay between belief and boundary systems supports exploitative innovation but inhibits exploratory innovation by limiting employees' risk-taking. In addition, diagnostic control systems that had formalization of enabling features support exploitative innovation, while belief systems and reward systems play an important role in balancing the tensions that arise from building a strategy that includes diverse elements. The results of Bedford (2015) showed that control levers has complementary rather than additive effects on performance in organizations that specialize in one form of innovation in organizations focusing on exploratory innovation, the interactive control use was found to be associated with performance, while organizations focusing on exploitative innovation mostly benefit from usage of diagnostic and boundary systems. In organizations that pursued both, exploitation and exploration, the balanced and combined use of diagnostic and interactive controls that created dynamic tension enhanced performance. (Bedford 2015.)

Chiesa et al. (2009) noted that different project stages require evolvement from MCSs as the information needs changes. They concluded that the use of interactive and boundary control systems fits better for innovation process in early stages, because the level of uncertainty is then higher, whereas diagnostic control system should be adopted in the final stages due to the reason that information processing requirements are incompatible with its use in the initial stages. (Barros & Ferreira 2019, 353.) Saunila and Mäkimattila (2018) concluded that different phases of the innovation process have distinct demands regarding innovation control and suggest the multi-level approach to innovation control. This process is presented in Figure 7.

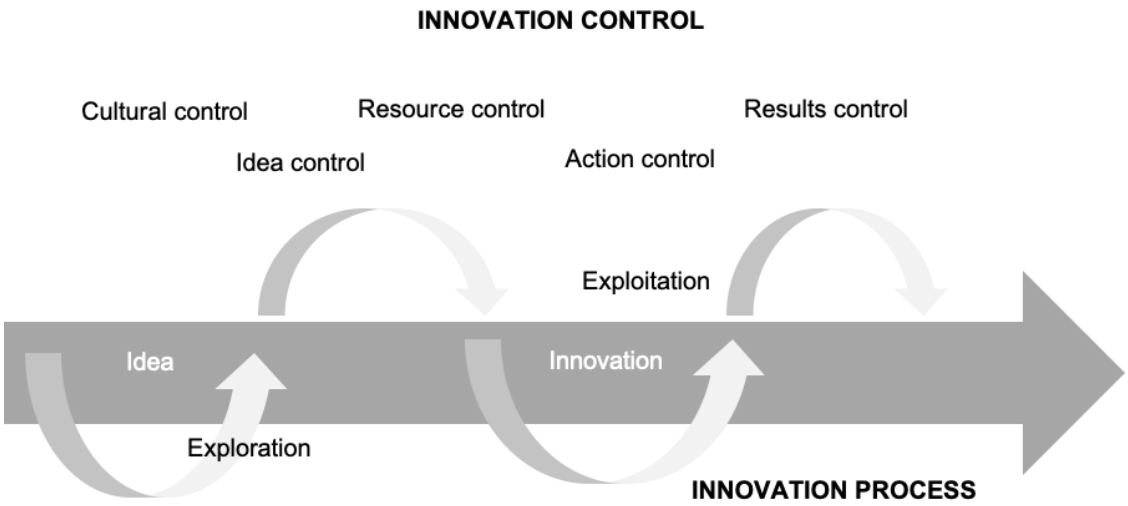

Figure 7. Multi-level approach to innovation control (adapted from Saunila & Mäkimattila 2018, 14)

The early phase of innovation process benefits from indirect control mechanisms, such as cultural control acquiring and sharing cross-functional information. Idea development should be guided with a free and supportive manner including platforms to integrate ideas from different departments, conduct evaluation in cross-functional teams and link to organizational strategy and connect individual cognitive processes. The concept phase should emphasize the excitement that the organization is looking for multiple options and have a defined common goal, where resource controls can be applied. The project development phase should have direct mechanisms able to control execution and resources, such as action control including cost and resource controlling, whereas the results controls could be used to testing, implementing, measuring innovation process as well as learning. The balancing of freedom and restrictions based on the agent group structure enables the merging of individual, group, and organizational interests in practical measures. (Saunila & Mäkimattila 2018, 13-14.)

Multiple levels of analysis have been also separated as an own theme by Barros and Ferreira (2019), meaning that innovation may emerge from various sources. The existence of these various levels should be acknowledged when analysing innovation. Different levels may imply organisations, projects within the organisations, or inter-organisational temporary organisations and therefore may require diverse uses of controls. Further these controls would need to ensure alignment with other controls and strategies. (Barros & Ferreira 2019, 356.) Controls should support the dialectic process of innovation in a constructive and efficient manner. A multiplicity of control

mechanisms is needed, which require different emphases at different stages of the process supporting the development of innovation. (Saunila & Mäkimattila 2018, 16.)

Mundy (2010) explains that management control systems have two complementary and interdependent roles. They are formed to exercise control to reach organizational goals and to provide help for opportunity search and problem solution. MCS´s controlling role involves formality, predictability, and efficiency to obtain the short-term goals, whereas the enabling role relates to transparency, adaptability, information sharing and spontaneity that attempts to diminish uncertainty and enhance the decision-making process (Mundy 2010, 499-500). These two roles can be seen as very divergent, and the right balance is difficult task to accomplish. For instance, Dunk (2011) found that controls had a positive impact on product innovation and performance, when used as a planning measure, but contrary effect when used as a control measure, which is consistent with findings of Abernethy and Brownell (1997) and Bisbe and Otley (2004). These competing demands has been defined as tensions by Lövstål and Jontoft (2017). Management needs to have control mechanisms that aid to follow strategic direction, but at the same time, innovation activities require maintaining freedom and flexibility. The controlling and enabling roles generate dynamic tensions that create distinctive organizational capabilities and competitive advantage (Henri 2006). A capability to manage tensions is required for this kind of competing demands (Perez-Freije & Enkel 2007, 11). Barros and Ferreira (2019) also categorized their third theme to concern synergies, dichotomies, and tensions on control use. They further explain that constraining and enabling behaviours generate tensions between the controls used and between competing organisational demands that impacts the outputs of innovation. However, the impact could also generate synergies between these controls. (Barros & Ferreira 2019, 355.)

The tensions have been approached from different angles in previous research. According to Speklé (2017) the balance can be found by matching the problems faced by the organisation and the problem-solving abilities available. Combining the use of management controls as controlling and enabling, produce dynamic tensions that may lead to unique organisational capabilities and competitive advantage. The balance between creativity and control can be found by designing MCSs that fosters creativity and simultaneously provides boundaries and information. (Speklé et al. 2017.) The paradox approach sees that the tensions are beneficial and should not be avoided, and therefore tries to find ways on how these existing and competing demands can be

managed simultaneously. Since a paradox cannot be resolved and it persists over time, there isn't any clear responses suggested for it, except to accept it and learn living with it (Lövstål & Jontoft 2017, 46-48). The dynamic capability approach is quite similar. Dynamic capabilities are firm's ability to use resources and competences to deal with changing environments (Teece et al. 1997). According to dynamic capability approach, these capabilities can enable a organization to integrate their processes and balance their competing demands in a competitive way (Lövstål & Jontoft, 2017). Many studies regarding management control and innovation applies contingency theory approach (Davila et al. 2009). Regarding the context of management control and innovation, contingency approach addresses how MCS can be designed to match the internal and external characteristics associated with innovation and thereby suppress tensions, while the practice-oriented approach looks at how management control is used, tensions are experienced and dealt practically in innovative environments. (Lövstål & Jontoft 2017, 55.)

The use of the enabling formalization approach has been brought up by researchers as it helps to understand the role of control in supporting the innovation process (Davila et al. 2009). As previously presented, enabling formalization aims to support, instead of to control, and consist of rules and systems that are planned to facilitate the structure and refine the work processes, without unnecessary hierarchical implications, whereas coercive formalization stands for rules and systems aiming to force compliance with pre-defined standards. The formalization characteristics that define the design of enabling- and coercive controls include repair, internal- and global transparency, and flexibility (Ahrens & Chapman 2004). Jørgensen and Messner (2009) point out that the enabling characteristics of management control system can provide support for innovation, because the characteristics of flexibility and repair enables the application of procedures that aims for the development of new products, processes, and marketing. Internal- and global transparency may assist the creation of more formal controls, for example budgets, as well as support informal side, for instance in information sharing among organizational participants. (Jørgensen & Messner, 2009.) It has been also recognized that the enabling design can stimulate learning and empowerment of employees and lead to advanced coordination and management of functional interdependencies (Davenport 1993). Guo et al. (2019) notes that as enabling design provides organizational participants with a better understanding of the organization's systems and enables greater ability to work and

interact with their tasks, resulting new ideas related to process innovation. Enabling designs can also stimulate positive behaviour of managers, that directs them to use specific controls more intensively, which indirectly stimulates more innovative actions in order to response to the needs of customers, markets and products (Mahama & Cheng 2013), as well as influence marketing innovations, since marketing innovations requires an environment, where unpredictable opportunities available in the market can be spotted (Gupta et al. 2016). Additionally, Guo et al. (2019) states that it can assist to implement and commercialize new ideas, while Davila et al. (2009) brings out that enabling design can promote dialog and creation of ideas. (Beuren & Bernd 2021, 463.)

The varying control requirements concerning different types of innovations has been also discussed in previous research. Different innovations, such as exploitative and exploratory innovations, may need different management approaches because they require different degrees of change, likely due to different combinations of environmental, organizational, managerial and structural forces. Different degrees of novelty require different management and maintenance, where structural variables that reduce the degree of radical innovation can simultaneously increase the degree of incremental innovation. (Van de Ven et al. 1999). Radical change creates a high degree of uncertainty especially in the early stages of exploratory project but also in the whole organization, whereas in incremental (exploitative) innovations, the level of uncertainty seems to be much lower (Chiesa et al. 2009).

Wongkaew (2013) stated that organizations are able to reach continuous innovation with the right integration of the control levers. He highlighted the careful management of innovation process as an important factor. Control can be directing, enabling, and supportive at the same time, and lead to innovation and creativity rather than restricting them (Pfister 2014). Different phases of the innovation process have been found to require different control mechanisms (Saunila & Mäkimattila 2018). Further, management control systems can help management to discover improvements, new solutions and tools, that create more innovative responses for process management (Chenhall & Moers 2015). However, the literature in general shows varying results and little information is provided on how systems can be designed and used to promote innovation (Beuren & Bernd 2021, 461). The concept of management control system seems to have moved from traditional techniques and controlling individuals to contain a much wider scope that includes organization´s strategy support as well as innovation enhancement. Barros and Ferreira

(2019) explain that this does not mean, that the traditional techniques will disappear, but remain to co-exist with the more recent techniques aiming to support the role of innovation within the organization. Therefore, management control systems have developed to be able to back innovation and provide reasonings for discussion regarding innovation issues (Chenhall & Moers 2015).

Having identified the role of management control systems in innovation nowadays, the next section will take a closer look on strategic concepts for management control systems and innovation, as well managed innovation is an integral part of an organization's strategy and activities, which can even create new business strategies (Gama et al. 2007, 418).

2.3.2 Management control systems for innovation strategy

Innovation strategy is "an organization´s relative emphasis on different types of innovations and the associated pattern of resource allocation, in alignment with its strategy at the corporate and business unit levels" (Varadarajan et al. 2018, 143). Pisano (2015) defines that innovation strategy should amplify how organization´s different innovations are in line with its overall strategy and how the resources are allocated. Innovation strategy should also show the organization´s emphasis regarding different types of innovations ie. the focus on radical, incremental, market and so on. (Pisano 2015.)

The organizational process related to innovation at both, operational and strategic levels consist of the organizational forces that identify, nurture, and translate the initial of idea into value. Innovation can form a organizational process that is prone to management and clarifies the reasons why some organizations succeed better than others. (Davila 2005, 42.) Davila (2005) have proposed a framework in order to connect management control systems and innovation and to demonstrate the effect that these innovations have on changes in business strategy. The framework is built around the type of innovation being either radical or incremental, and the locus of innovation meaning whether the actions in organization consider top management or day-to-day actions. The use and design of the management control system varies and depends on aspects such as type of innovation and locus of innovation and therefore the role of the MCS differs between the different innovation strategies. Radical innovation redefines the company's future strategy in a significant way, whereas incremental innovation modifies it slightly. The new ideas for

possible innovation can come both from top management and from the employees of the organization. (Davila 2005.) The framework is presented below in Table 4.

Table 4. MCS for innovation strategy (adapted from Davila, 2005, 43;47)

Locus of innovation	**Type of innovation defining strategic change**	
	Incremental	Radical
Top management formulation	*Deliberate strategy*	*Strategic innovation*
Day-to-day actions	*Emergent strategy/ induced strategic actions*	*Emergent strategy/ autonomous strategic actions*
	Structural context Current strategy	Strategic context Future strategy

Regarding incremental innovation, there are two types of strategy involved: deliberate strategy and intended strategic actions. Davila (2005) explains that deliberate strategy is referred to an incremental modification of the existing strategy that originates from top management's decisions and actions (Davila 2005). The role of management control system in deliberate strategy is to support the execution of the strategy and translate it into value. The relevance of the systems regards to their ability to execute efficiently and with speed. These systems aim to simplify the application of knowledge and leverage resources. The strengths of the systems include the effectiveness in translating deliberate strategies into action plans, monitoring the execution, and identifying deviations for correction. These strengths can also be seen as the weaknesses of the systems at the same time and the process of enhancing efficiency, can threaten the organization's ability to innovate. (Davila 2005, 47-49.)

In case the innovation happens throughout the organization, it translates into emergent strategy. In case being within the current strategy, it happens through induced strategic action. MCS can be designed to capture the learning that occurs during the periodic execution of processes. Systems involved in induced strategic actions capture and code experiences in order to enhance execution. The interaction between day-to-day actions within organization as well as deliberate strategy results in knowledge creation and advanced understanding regarding the ways to refine the current strategy. MCS can capture these incremental innovations to the current strategy. (Davila 2005, 49-50.)

Moving over to the right side of the table concerning strategic organizational context of radical innovation of future strategy, which includes two types of innovation strategy: strategic innovation and autonomous strategic action. These both cases involve a successful radical innovation that will be incorporated as part of the corporate strategy and further the structural context is redesigned to implement and refine this new strategy. As mentioned, in case the innovation happens throughout the organization, it translates into emergent strategy. When it is outside of the current strategy, this happens through autonomous strategic actions. Autonomous strategic actions are more unpredictable than incremental innovation and they change radically the future strategy of the organization. These can happen at any point of time within anywhere in the organization, but the process from ideation to actual value creation is more unstructured, as the head forward is unclear. The presence of MCS has an effect on radical innovation. MCSs can be used proactively to define the strategic context, hence their characteristics in this role are mostly opposite to the ones of traditional systems. MCSs for autonomous strategic actions encourage experimentation, discovery and exceptions. The goals related to these types of systems are broad and the way leading to them is unknown. Additionally, these systems assist local efforts, provide information for decision-making within very uncertain setting, and consider value creation options that are rarely used in routine processes. (Davila 2005, 52-53.)

The other dimension in strategic context is strategic innovation, which supports top management in assessing the need for radical changes as well as the opportunities that formulate strategies to build on radical innovations. Strategic innovation benefits from MCS that is able to monitor the environment in depth, in cases of business opportunities related to changed regulation, trends regarding customer needs, possible acquisitions, new markets, or new technologies. MCS can extend top management´s informal networks as well as their information network across the existing set of informants. Additionally, MCS play important role in spreading the learning associated with discovery events that need further analysis involving local experiments and building economic models that are depending on control systems such as scenario planning. MCS also builds a constant back-and-forth between vision and operations with regular meetings and deadlines to review progress. Unlike incremental innovation, where value-generating systems compare plans with progress to ensure the project is on track, knowledge-building

systems use these deadlines to pace the organization and bring together different actors to exchange and crystallize knowledge. (Davila 2005, 55-56.)

According to Kanter (2006) one factor within innovation strategy is common for successful innovators, which is having couple of big ideas at the top of the strategy, large volume of promising ideas within the testing stage and broad number of early-stage ideas or incremental innovations. All innovations cannot make it to become “superstars”, but also incremental and smaller innovations may have significant value for the organization and yield profits in future. (Kanter 2006.) After proceeding through the previous literature presented so far, it is clear that innovation requires different types of control systems that are able to support changing areas and operations of the organizations. Therefore, the next section reviews management control systems as a package for innovation, in order to provide comprehensive control package for complex phenomena such as innovation.

2.3.3 Management control systems as a package for innovation

MCS research has frequently centred around one theme or a specific component of MCS, disregarding the connections to different components and the fact that the components are part of a more extensive control system (Chenhall, 2003). Disadvantages of studying MCS as a single instrument are many. MCS does not exist in isolation, meaning that the single subjects and practices are part of a broader control system entirety despite that they seem unrelated to one another and the setting in which they operate. (Malmi & Brown 2008, 287.) Organizations have often various separate MCSs, that may have linkages between each other, and the operation of single system is impacted by other MCSs (Abernethy & Brownell 1997). Fisher (1998) argues that research considering only a single MCS may lead to faulty conclusions because it disregards the relationship to different components.

The perspective of controls as a package, where systems operate together has been noted in research (Fisher 1998; Otley 1999; Malmi & Brown 2008). Management control systems package is formed when various management controls are collectively operating together in order to ensure the achievement of organizational goals (Bedford et al. 2016). Control sets can include formal controls that are specifically designed, written techniques and procedures, as well as informal controls that include the unwritten social controls derived from the organizational culture (Malmi & Brown 2008). Adding informal

controls to the research on top of the much-researched formal controls can provide interesting outcomes (Chenhall 2003).

Highly performing organizations have managed to combine MCS components successfully. MCSs can improve the strategic competitiveness of organizations, when focusing on how strategies, goals and operations are combined, and when they are aimed to provide an understanding of the interdependencies in value chain. (Ahrens 2018.) Davila (2000) argues that when management control is dealing with innovation and new product development, it cannot be limited to traditional accounting measures. He highlights that the broader set of measures is needed. Research regarding innovation strives to investigate a holistic view of the entire management control system rather than study the single control instruments. This kind of holistic view is present in Malmi and Brown's (2008) package of controls and Simons' (1995) levers of control model (Haustein et al. 2014). However, Pfister et al. (2023) highlights that MCSs must be studied in combination with other MC practices in order to understand how those practices are intended, perceived and interrelated in the empirical setting. As the term already indicates, different informal and formal parts interrelate and together they form a complex whole. As mentioned MCSs also include informal forms of control such as social and cultural aspects on top of formalized policies and procedures to achieve control. However, social aspect is not limited to informal controls only but covers MCSs overall as MCSs are fundamentally social, producing and reproducing the values and social norms within an organization. (Pfister et al. 2023, 4-5.) Also, Sandelin (2008) referred to several conceptual frameworks available for studying MCSs as a package, including Malmi and Brown (2008), Merchant and Van der Stede (2012) and Simons (1995). These frameworks have been presented earlier in Section 2.2.3 of this thesis.

As this study strives to explore all management control systems used in the case company´s innovation department rather than single instruments of control, the management control systems as a package by Malmi and Brown (2008) has been applied. The framework of Malmi and Brown was considered to be most fitting for this thesis after the comparison between different frameworks at the end of the Section 2.2.3 and therefore selected to be used. The most often used framework by Simons (1995) was considered irrelevant, due to ignoring the informal side of controls and therefore not applied based on the reasonings provided by Pfister et al. (2023). The framework of Malmi and Brown (2008) offers broad conceptualization of different systems, while also clearly specifying

and defining the separate concepts. It is built on previously used frameworks, such as the Levers of Control and Object of Control frameworks, which decreases the likelihood that some component of controls could be overlooked. This selection also corresponds to Davila´s (2000) suggestion to encompass a broader set of measures.

2.3.4 Initial framework

This section summarizes the main subjects from the presented literature review as a bases for a theoretical framework for this study. The initial framework illustrated in Figure 8 below, has been built to guide the process and it presents the important factors gained from previous literature that should be considered when answering the research question of this thesis "How management control systems can enhance innovation in organization" .

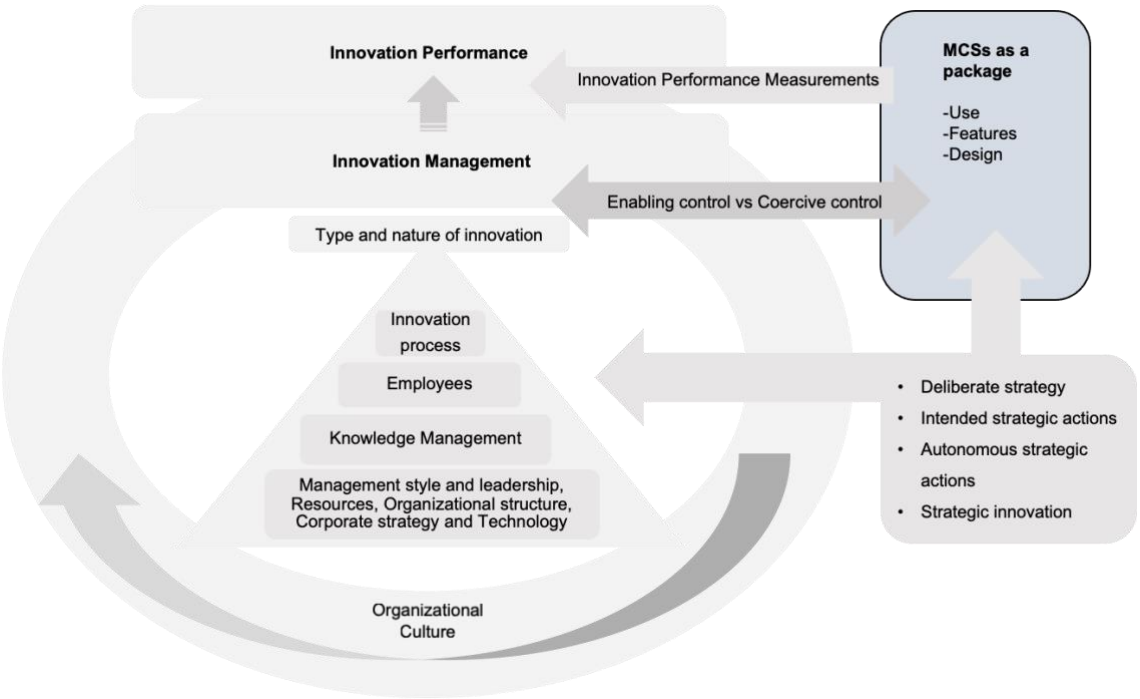

Figure 8. Initial framework of the study

Organizational factors affecting innovation management forms the base of the framework from left side. According to Smith et al. (2008) organizational culture has a significant impact on management of innovation. The culture is related to values and beliefs of the organisation and how these impact the management of innovation within the organisation. Organizational culture comprises company´s approach to collaboration, communication and risk. (Smith et al. 2008.) From culture part, the model moves up in a pyramid to group considering the factors such as management style and leadership, resources,

organizational structure, corporate strategy and technology. Smith et al. (2008) determine these as the foundation factors that define an organisation. Knowledge management and employees are the pipeline between the organisation and the innovation process as the employees of the organisation are the ones generating ideas for innovation process. Knowledge management considers the targeted coordination of knowledge and the management of organisational environment aiming to support individual knowledge transfer and creation of collective knowledge. Innovation process has been placed at the top of the pyramid as being the only endogenous factor within the model and affected by all other factors. (Smith et al. 2008.)

Type and nature of innovation is placed between innovation management and these factors were discussed in previous paragraph. Innovation can take many forms that require divergent management control systems. Therefore, the type and nature has been left undefined at this stage. The definition of innovation in this study is “the process of making changes, creating and introducing something significantly improved, advanced or new with the intention of creating value”. Innovation performance has been placed on top of the framework and it is a result of multiple influencing factors representing achievements and results derived from innovation (Robertson et al. 2023). This study does not research innovation capabilities but is based on the argument that innovation capability is one of the organization's background factors of performance (Saunila 2016). Innovation can be managed only by knowing how to measure innovation, therefore good innovation metrics are important (Gama et al. 2007, 421) having a link between innovation management and innovation performance within the framework.

The right side of the framework consist of management control systems as a package. This study follows a broad definition of MCS as “systems and the set of formal and informal procedures and processes that organizational participants use in order to help ensure the achievement of their goals and the goals of their organization”. Performance can be measured at different levels in the field of innovation (Adams et al. 2006) and MCSs can support that as well, therefore having a link to MCS package section in framework. Other link between MCSs and innovation management is enabling vs coercive control, as control mechanisms can function in enabling or coercive ways (Adler & Borys 1996).

Innovation strategy is “an organization´s relative emphasis on different types of innovations and the associated pattern of resource allocation, in alignment with its strategy at the corporate and business unit levels” (Varadarajan et al. 2018, 143). Davila (2005, 42) explains that the organizational process related to innovation at operational and strategic levels consist of the organizational forces that translate the initial idea into value. Bottom right side includes different innovation strategies presented by Davila (2005) in order to connect management control systems and innovation and to demonstrate the effect that these innovations have on changes in business strategy. The use and design of MCS varies and depends on aspects such as type of innovation and locus of innovation and therefore the role of the MCS differs between the different innovation strategies.

This theoretical framework gives the understanding of the factors affecting and involved in innovation management and innovation management. It also presents the concept of management control systems package, including its usage, features and designs, as well as the different usage possibilities of controls. The framework also links the business strategy to this process, as it gives the guidelines for innovation in organization.

3 METHODOLOGY

This chapter presents the methods that has been used for conducting this research and justifies the choice of the qualitative research approach. This part will also discuss the research design, chosen data collection- and data processing method, and provides an overview of interviewees description, and operationalization table. Finally, the data analysis of this research and its trustworthiness are considered.

3.1 Research design

Research designs are plans and the procedures for research that contain the decisions from broad assumptions to detailed methods of data collection and analysis (Creswell 2018). It is the general plan for how you are going to answer your research question(s) and the first methodical choices that researcher faces in the research process. Research design can be quantitative, qualitative, or mixed methods research design. (Saunders et al. 2019, 173-174.) This research was conducted as a qualitative case study with a single case company department. Qualitative approach is based on contextual understanding and rich data, whereas quantitative approach is more generalizable and hard data (Bryman & Bell 2011). Qualitative approach aims for exploring and understanding the meaning individuals or groups ascribe to a social or human problem. In the qualitative research process, the focus is on studying the meaning that the participants have regarding the problem or issue. Researchers conducting qualitative research tends to collect data from the setting where participants experience the issue or problem that is under the study. They aim to develop a complex picture of their study issue by reporting different perspectives and identifying various factors that are involved in a situation. Further generating larger picture of the issue including multiple factors that are interacting in different ways and mirroring real life context and the ways that events emerge in the real-world setting. (Creswell 2018, 257-258.) A qualitative research method was considered more suited for this thesis, since the topic is complex and requires deep understanding of phenomena, which would have been difficult to obtain by using a quantitative research approach. According to Eriksson and Kovalainen (2008, 3–5) qualitative approach is more suitable for complex, business-related phenomena in a real-life context. This choice of approach is also supported by Barros and Ferreira (2019, 342), who argue that qualitative method is able to bring the complexity of control, innovation and the two realities combined into the discussion, as well as by Otley (2016), who suggests that management control research should take a

contingent approach with theories made explicit and open to adoption. Furthermore, a qualitative approach enables to focus on understanding the context instead of generalizing the findings (Bryman & Bell 2011) and it was therefore more suitable for this thesis, when studying how management control systems can enhance innovation in organization, allowing this study to capture the complexity of the subject area and phenomena overall.

Qualitative approach allows the usage of certain designs (Bryman & Bell 2011). According to Saunders et al. (2007) the main research strategies are experiment, survey, case study, action research, grounded theory, ethnography and archive research. In the context of this thesis, a case study was found to be the most appropriate as according to Yin (2009), case studies have been found to be most suitable, when exploring "how" or "why" questions. Saunders et al. (2019, 196) described case studies as an in-depth inquiry into a topic or phenomenon within its real-life setting, that can generate greater insight, leading to detailed, empirical descriptions and theory development. Case studies are found useful when the studied phenomena are dynamic, complex and involves many variables (Cooper & Morgan 2008) and the research questions concern a present phenomenon in its actual surroundings which the researcher is not able to control (Yin 2009). Thus, this study involves two complex and dynamic matters: innovation and management control systems with many different variables to consider, holistic point of view was considered beneficial provided our research scope and objective.

This study was made as a single case study within one company´s innovation department. Multiple case study could have been other alternative way of doing this study in order to get wider analysis and results for example to contain the whole organization. However, it would have required more time to complete this study and was therefore dismissed, when considering the existing time limits to complete this thesis. A single case study is the best option when the researcher only wants to focus on a one single thing, such as a person from a specific group or a single group, such as a group of people (Yin 2003). The case company of this study wanted to stay anonymous for several reasons and therefore it is referred as Company X. Company X is a public Finnish company, which operates in energy industry. When conducting a single case study, researchers need to consider whether to apply an embedded or holistic case design. Embedded cases may be useful if the case under study has multiple subunits and studying these units would provide additional insights for the research of interest. Holistic case design can be used if the research question focuses on a holistic organizational level process, in which the subunits

does not provide additional theoretical insight, or if the case does not have any clear subunits. (Ozcan et al. 2018, 93-95.) The company X has its own innovation and venturing unit that aims to identify, nurture and develop internal start-ups and new business areas. The holistic case design was found more fitting, due to the reason that the company X has this separate department focusing on innovation, and therefore including other units from different organizational levels would not have added value as this study targets innovation.

This case company created an interesting research opportunity for couple of reasons. First, the energy industry is under many changes currently, and the companies operating in that industry needs to be able to react on these changes. New alternatives are entering the market constantly and the industry needs to comply with tightened climate measures and environmental issues. Second, the company has established innovation unit, meaning that the focus has been placed on innovation in organization already separately. This creates the environment where innovation enhancement can be studied more efficiently, as the structure already exist and the enhancement by management control systems is easier to target. Also, the participants do not have to be searched throughout the whole organization from different departments that would be time consuming. The innovation division has five subdivisions but further details on the nature of the subdivisions could not be revealed due to the case company being anonymous.

3.2 Data collection

Qualitative data contains spoken words meaning verbal data or written, typed or printed words meaning textual data (Saunders et al. 2019, 638). There are different options available for data collection, when considering qualitative research, but according to Suter (2012, 344), the most common sources of qualitative data include interviews, observations, and documents. Saunders et al. (2019) points out that interviews and observation are appropriate data collection methods, when doing the research as a case study. Due this study being a case study, both interviews and observation were considered for the data collection methods. Observation as a data collection method for this study was excluded due to the challenging set up of such a method. Observation is time consuming, as you might not be able to get the desired conditions for the research or participants in the situations where you would need them. Many companies have applied hybrid way of working after Covid-19 situation and therefore it could have been difficult

to get the data by using observations. When considering the research questions of this thesis, interviews were found to be the most suitable option. Interview is appropriate method to gain individual viewpoints (Bryman & Bell 2015) as well as to generate meanings from the experiences of the participants (Daher et al. 2017). Hence, the subject was approached by using "how" research question, the individual viewpoints and experiences played an important role in this thesis.

Interviews can be constructed as a structured interviews, semi-structured interviews, or in-depth interviews, often referred as unstructured interviews as well. These forms have different features, and depending on your research problem, they can be used in various ways. Structured interviews use questionnaires, that are based on a predetermined and standardised or identical set of questions (Saunders et al. 2019.) The structured interview is more commonly applied and better suited for quantitative research. (Bryman & Bell 2011) whereas it was considered unsuitable for this study due to the possibility, that it would limit the important insights gained from the interviews and narrow down the results. Bryman and Bell (2011) explain that semi-structured and unstructured interviews work better for qualitative interviews, which aims to gain wider perspective. In-depth interview neither has predetermined themes or questions (Saunders et al. 2019, 438), whereas in a semi-structured interview, the interviewer has the drafted topics and questions to be addressed with the interviewees in an interview guide, but it leaves opportunity for free-form discussion of the research topic and therefore possibility to gain more information and uncover items that may have been forgotten in the interview guide (Bryman & Bell 2011). From these previously mentioned interview types, the semi-structured interview was found to be most appropriate as certain areas were defined necessary to cover in order to answers the research questions, which excluded un-structured interviews from the options. The semi-structured interview offered a "skeleton" for this study and possibility to have some standardized questions, which were considered important in order to compare the responses based on themes and further identify patterns. This interview type also allowed to receive enough abundant data from every interviewee, but also leaved room for follow-up questions and addressing the more specific issues. The participants in this study were focusing on innovation in their work, and it was uncertain if they were familiar with the concept of management control systems, therefore semi-structured interviews also allowed to explore the meanings deeper and the possibility to verify that all interviewees understood the meaning of the

questions and were therefore able to provide comparable answers. In order to use the semi-structured interview technique effectively, the researcher must have strong knowledge about the topic studied (Saunders et al. 2012, 384). Based on my previous knowledge on subject and after conducting a literature review (see Chapter 2), I estimated to be qualified for conducting semi-structured interviews and proceed to create interview guide (see Appendix 1 – Interview guide). Interview guide defines topics that is intended to be covered in the interview along with initial questions and probes that may be used to follow up initial responses and obtain more details from the interviewees (Saunders et al. 2012, 386). This study's interview guide was formed theoretically based on the study's operationalization framework shown in Table 5. The operationalization table included six themes: innovation in organization, innovation management, innovation performance, management control systems, enabling and coercive control and innovation enhancement, that were identified from existing literature. Operationalization framework indicated which theme gathered information to each sub-questions and which interview themes were linked to each theme.

Table 5. Operationalization framework

Research question	Sub-questions	Theme	Interview theme
How management control systems can enhance innovation in organization?	How innovation is managed in organization?	Innovation in organization	1
		Innovation management	1, 2
		Innovation performance	1, 2
	How management control systems are applied in innovation?	Management control systems	3, 4
		Enabling and Coercive control	
	What kind of features are required from management control systems to enhance innovation?	Innovation enhancement	2, 4

Interview guide included the set of introductory questions, that were not linked to any theme. These were meant to get more familiar with the interviewees and receive some

background information about the participants. The first interview theme was innovation in organization, which aimed to find out how innovation exist in organization, what type and nature of innovation is worked with and how organization is dealing with the innovation. The second theme was innovation management, which purpose was to discover interviewee's opinion on managing and controlling of innovation, as well as to understand how it is done in the organization. This theme also included question related to how innovation performance is considered in organization, and also aimed to discover the elements for innovation enhancement. Third theme was management control systems, that identified which kind of management control systems the participants are working with and in general finds relevant. Based on this, the enabling vs coercive control approach was considered. Finally, the fourth theme merged management control systems and innovation, by aiming to find out how management control systems can be used to enhance innovation. Even though the themes were predefined to answer specific sub-questions, the responses also influenced and provided insights on other questions and themes, which were considered relevant. Finalised interview guide included 27 questions in total, from which four were not linked to any theme. The first three questions were introductory questions, as mentioned above, and one was a finishing question asked at the end of the interview, in the case interviewee wanted to add something.

In qualitative research, the idea is to purposefully select participants and materials that will best enable the researcher to understand the problem and the research question (Creswell 2018, 262). This thesis aimed to understand how management control systems can enhance innovation in organization, therefore it was also important that the persons interviewed were working with the innovation context, which was considered to provide enough rich data for the purpose of this research. According to Creswell (2018, 262) the sample size in qualitative research depends on what kind of qualitative design is being used. Innovation department of Company X included employees working in various settings and contexts, and with different types of innovations. Therefore, four different "teams" were identified to include: Research collaboration and IPR activities, Innovation projects, Growth projects: technology scouting and foresights and Finance. One participant from each team was asked their willingness to participate, in order to provide enough rich data to cover the department, but also to avoid saturation. Even some of the themes were repeated during interviews, the participant´s different working roles brought new perspective into discussion. Conducted interviews are visible in Table 6.

Table 6. Conducted interviews

PERSON	DESCRIPTION	LENGTH (MIN)	DATE
1	Research collaboration and IPR activities	59	8.3.2023
2	Growth projects: technology scouting and foresights	45	9.3.2023
3	Finance	48	10.3.2023
4	Innovation projects	68	13.3.2023

Furthermore, all interviews were conducted during March 2023, and each participant was interviewed individually, in order to enable them to express their views privately and retain confidentiality. Three of the interviews were conducted as face-to-face interviews in company´s office space and recorded using company provided Teams video conference service tool. One interview was conducted online via Teams, as the participant was located abroad, due to which face to face interviews was not an option. All interviews included both vision and sound in order to ensure that participants could properly engage in the conversation. Interview participant overview is further presented and discussed in next section. The participants were informed beforehand by email about the research topic and interview themes, as providing participants with a list of the interview themes before the event can promote credibility, validity and reliability by informing the research areas of interest and provide the opportunity to prepare for the discussion in which they are to engage. (Saunders et al. 2012, 385.) The emails were also accompanied with Privacy notice (Appendix 4) and Informed consent (Appendix 3), which will be further discussed in Section 3.4. The consent was confirmed and recorded at the beginning of the interviews. Notes were taken by researcher during the interviews concerning the key ideas from participants, in case of recording failures. However, all recordings for transcriptions remained clear.

3.3 Data analysis

Data analysis in qualitative research concentrates on qualities more than quantities. Data analysis of qualitative research seeks patterns and extracts the meaning from rich and complex sources of linguistic or visual data. (Suter 2012.) This involves segmenting and detaching the data and also putting it back together (Creswell 2018, 267). Qualitative data analysis has one common goal being a establishment of credibility of qualitative research findings and conclusions (Suter 2012) therefore the data analysis of this study were

carefully considered. Creswell (2018) suggest researchers to consider qualitative data analysis as a process that includes sequential steps, which should be followed. The overview of the data analysis process followed in this study has been presented in Figure 9 and has been created based on the suggestions from Creswell (2018, 268-269).

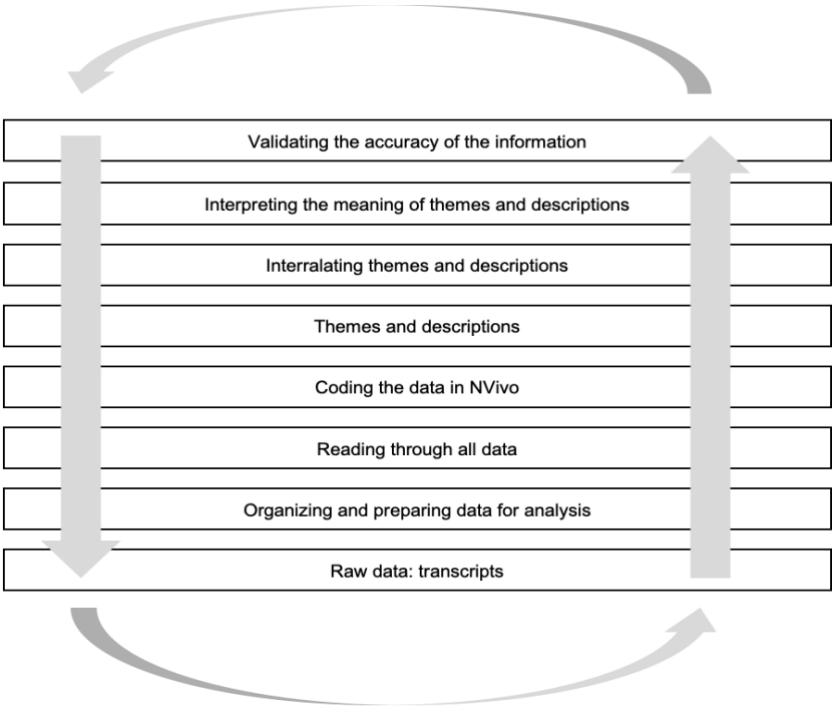

Figure 9. Overview of the data analysis process (adapted from Creswell 2018, 269)

First step in data analysis process was to organize and prepare the data for analysis. This step includes tasks such as transcribing interviews, scanning of the material, adding field notes, cataloguing the different visual materials, as well as sorting and arranging the data into different types based on the information sources (Creswell 2018, 269). In this study, the recordings were automatically transcripted into text during interviews. Therefore, this step involved reading all transcriptions, while listening the recordings at the same time in order to make sure that the transcripts were formed correctly according to recordings and have preserved intact. Also, the materials received from informants were studied and placed within the transcripts. Final transcripts were imported in qualitative data analysis software system called NVivo. In second step, the organized data and materials were read through one more time to check the correctness. Third step contains the coding of the data, which is the process of organizing the data (Creswell 2018, 269). In this step, the text was coded according to pre-formed themes generated by the researcher. These themes appear as major findings in qualitative studies and are also used many times as headings in the finding's sections of studies (Creswell 2018, 269).

Qualitative researcher may follow inductive or deductive approach. In inductive approach the patterns, categories, and themes are built from the bottom up by working the data into organized and more abstract information sections. In inductive process, the researcher is working between the themes and their database until a more extensive set of themes has been established. When the researcher chooses deductive approach, they get back to their data from the themes, in order to define if more evidence can be found to support selected themes or whether additional information needs to be gathered. (Creswell 2018, 257-258). It is also possible to combine deduction and induction within the same piece of research (Saunders et al. 2007, 119), which was applied in this study. The initial framework was built based on the theoretical background of this study and the themes were formed from initial framework. These themes also guided the planning of semi structured interviews. Third and fourth step were worked simultaneously. The data was coded according to pre-defined themes, but also at the same time the researcher paid attention if new necessary main themes emerge from the data. However, no additional main themes were found, and the data was further coded under the main themes generating sub-themes and descriptions under each theme, which is the fifth step. After the completion of fifth step, the themes were once more examined and the validity of each of them was confirmed. The final themes and sub-themes are presented in Table 7.

Table 7. Coded themes

Main themes	**Sub-themes**
Innovation in organization	Description of innovation
	Innovation type and nature
	Importance of innovation
	Future of innovation
	Conditions for innovation
	Strategy
	Structure
	Uncertainty
Innovation management	Factors affecting innovation management
	Innovation management structure
	Innovation management practises and procedures
	Innovation enhancement
Innovation performance	Innovation performance practises
	Innovation performance measures and metrics

Main themes	Sub-themes
Management control systems	Cultural controls
	Planning controls
	Cybernetic controls
	Reward and compensation controls
	Administrative controls
Enabling and Coercive control	Controls with enabling design
	Controls with coercive design
Innovation enhancement	Role of MCS in innovation enhancement
	Features of MCS in innovation enhancement

As previously mentioned, the main themes were not amended and left as pre-defined. The main themes will appear as a heading of the findings section and all sub-themes will be discussed separately. Hence, the sixth step in data analysis process consist of interpreting the meaning of themes and sub-themes. Interpretation in qualitative research includes the following procedures: summarizing the overall findings, comparing the findings to the previous literature, discussing a personal view of the findings, and stating limitations and future research suggestions. (Creswell 2018, 273.) In terms of overall findings, themes were compared with the information gathered from the previous literature and theories. In this way, author was able to make suggestions whether the findings confirmed past information or diverged from it, compare the findings with the general literature on the topic and also make additions. Finally, the interpretation also contained presenting limitations of a study and making suggestions for the future research directions.

3.4 Evaluation of the study

When evaluating the quality of a research, two important aspects are to be considered, reliability and validity. However, their compatibility in qualitative research have been questioned (Bryman & Bell 2011) due to the reason that the findings of qualitative research depend mainly on the viewpoint of the researcher and therefore cannot be considered from reliability and validity aspects, which are often applied for quantitative research (Saunders et al. 2019, 216). According to Bryman and Bell (2011) credibility, dependability, transferability and confirmability, can be considered instead, when doing qualitative research. In order to conduct trustworthy qualitative researcher, researcher must be able to show that data analysis has been made in a precise, consistent, and exhaustive manner, in order the reader to be able to estimate whether the process is

credible (Nowell et al. 2017). In order to ensure trustworthiness and authenticity of this research the evaluation criteria by Lincoln and Guba (1985) were followed and the process of conducting a trustworthy thematic analysis presented by Nowell et al. (2017) was considered. Trustworthiness criteria introduced by Lincoln and Guba (1985) is widely accepted among the qualitative research (Nowell et al. 2017, 3) and it includes four aspects as mentioned by Bryman and Bell (2011) earlier, being credibility, dependability, transferability and confirmability.

Credibility determines that the research is expected to be believable to critical readers and addresses the suitability between the researcher's representation and the view of respondents (Lincoln & Guba 1985, 296). According to Shenton (2004, 64) credibility can be promoted by the adoption of research methods well established. In this study, the data- collection and analysis method was carefully chosen by considering alternative methods as well. Examination of previous research findings as well as frequent debriefing sessions between the researcher and his or her superiors can also increase credibility of the research (Shenton 2004, 67-68). In this study, the theoretical background section was conducted based on a vast amount of previous research including a variety of different sources in order to create trustworthy base for this research. Operationalization table was created based on the literature studied and study's interview guide was formed theoretically based on the operationalization framework. Also, this study has been discussed with thesis supervisors throughout the writing process. Feedback for interview guide was also sought from supervisors before conducting the interviews. Shenton (2004, 66) also mentions tactics to help ensure honesty in informants in order to generate credibility. These tactics, such as participant´s right to refuse to participate and right to withdraw from the study at any point of time was applied in this research. Participants were also encouraged to discuss the subjects freely by presenting them as anonymous and telling them that there are no right or wrong answers.

Dependability considers the ability of the researcher to produce reliable research. In order to achieve dependability, research process needs to be logical, traceable, and clearly documented, meaning that the logic, reasoning, methods, and results of the research are expected to be consistent (Tobin & Begley 2004). Dependability of the research is easier to be estimated, when the readers can examine the research process (Lincoln & Guba 1985, 299), hence attention was paid to present the research process well in detail and completing interview guide (Appendix 1).

Transferability considers can the findings of research be applied or generalized in different contexts (Bryman & Bell 2011). The researcher cannot know who would like to transfer the findings but is responsible for providing rich descriptions, so that if someone wishes to transfer the findings to their own research, they are able to judge transferability (Lincoln & Guba 1985, 296–297). In the sense of transferability, it is important that the researcher convey the boundaries of the study to the reader (Shenton 2004, 70). This study´s limitations have been presented in Section 5.1. Additionally, important information to be shared with the reader was stated by Shenton (2004, 70) including the information such as the outlook of organisations taking part in the study and their location, the number of participants involved in the fieldwork, the data collection methods that were employed, the number and length of the data collection sessions, as well as the time period over which the data was collected. All of this information has been stated and clearly presented in this study.

Confirmability considers the objectivity of the researcher to the subject under study (Lincoln & Guba 1985, 300). It is important to ensure that the findings presented are the result of the experiences and ideas of the informants, instead of the preferences of the researcher (Shenton 2004, 72). The recordings were automatically transcribed alongside the interviews and therefore the changes made to transcripts by researcher was kept as minimal as possible. In-depth methodological description that allows integrity of research results to be explored promotes confirmability of the research (Shenton 2004, 72). Hence, the research methodology of this study has been considered profoundly and presented clearly.

Ethical concerns are significant in research projects involving human participants (Saunders et al. 2019, 232). Hence, research ethics have been thoroughly considered in this study by applying data protection practices. Data management plan presented in Appendix 2 was created by university provided DMPTuuli system guiding the processing, usage, storing, documenting and destroying of data used in this research. Research participants needs to be informed about the processing of their personal data, as it is a crucial part of the transparency principle stated in the General Data Protection Regulation of the European Union (GDPR). The provided information must ensure that the participants understand how their personal data are being collected, used, stored, disseminated or otherwise made available, or otherwise processed. All participants were provided with the informed consent form presented in Appendix 3, accompanied with

privacy notice (Appendix 4) and interview guide (Appendix 1). These were sent to participants by email prior the interview in order to offer them the opportunity to review the material carefully and consider their participation to this study.

4 MANAGEMENT CONTROL SYSTEMS FOR MANAGING INNOVATION

This section reviews the empirical findings of the study, that aimed to find out how management control systems can enhance innovation in organization. First section presents how innovation appears in case organization, creating a basis for second section which discusses how innovation is managed in organization and also considers participant´s own opinions regarding the management of innovation, answering the first sub question: *How innovation is managed in organization?* Third section concentrates on the themes of management control systems that were generated from the analysis of the data and answers the second sub question: *How management control systems are applied in innovation*? Finally, in fourth section the role of management control systems in innovation enhancement is discussed answering the third sub question: *What kind of features are required from management control systems to enhance innovation*?

4.1 Innovation in organization

In order to be able to answer the research question and the sub questions of this study, it is important to understand how innovation emerges in organization and what kind of structure and strategy exists in organization for it. Therefore, the first theme presents the views of the interviewees regarding the current stage of innovation in organization, as well as the perceptions for future. Because innovation is surrounded by uncertainty, the participants' view on how the company will work with innovation in the future was asked. The uncertainty related to innovation was jointly announced as a challenge and it has been approached differently in different areas of the company. In general, the upper management has recognized the importance of innovation and has an encouraging attitude towards it.

As it has been previously discussed in this thesis, innovation may occur in various ways in different context and organizational setup. At first, the participants were asked to describe innovation in organization that they work for. The purpose for this was to form understanding of the type and nature of innovation that exist in organization as a base for further analysis. The case company and innovation unit were presented in Section 3.2. All participants are working in or with that innovation unit and described innovation in organization rather similarly. Perceptions of innovation were mainly in line with the

definition used in this study; “the process of making changes, creating and introducing something significantly improved, advanced or new with the intention of creating value”. Contrary to general dichotomy between incremental and radical innovations (Brady & Hobday 2011), informants explained that innovation unit focuses on both incremental- and disruptive innovation. Incremental innovation was descripted similar to (Okuyama 2017) as focusing on innovation that boost the current business, supporting the own innovation processes of the business units and developing these processes. Disruptive innovation was described to have significant impact on a market (OECD 2005) by changing the structure of the market or by creating new markets (Kawamoto & Giovinazzo Spers 2019). Separate business unit may do their own innovation activities as well, where innovation unit participates and brings their point of view. Company X did not have specific categorization for different innovation types, but the general descriptions included similar main-types and sub-types to Rowley et al. (2011) and Keeley et al. (2013).

Innovation was considered broadly and relate to different parts of value chain such as new products, services, or business models, restructuring the activities related to cooperation, different kind of revenue streams, distributors, or styles to manage (Hilmarsson et al. 2014). An idea matured within the innovation unit can be added to the company as a business if it is seen as a suitable part of the company, or it can be developed into a separate start-up that can even be sold at some point. Innovations are sought from inside of the company, as well as from outside and it needs to have some link to the current business, even it can be challenged if a phenomenon that seems significant is found. The organization is currently having discussions regarding the recent strategy update, and which type of innovation, they should focus more on the future. They are facing the similar issue than many other companies, trying to balance the existing resources as efficiently as possible and focusing on the right type of innovation. Incremental innovations can be easier to develop for organizations than radical innovations as not requiring the creation of entirely new, therefore providing more specific and certain environment that reduces potential risks of failure (Harris 2017).

The energy sector has gone through turbulent times recently, which generates the need for new ways of thinking and close cooperation. Also, climate measures set their own goals for the companies and energy sector is currently undergoing a strong reform towards a carbon-neutral future. Innovation was seen to have significant role in order to compete

in dynamic and changing business environment (Dooley & Sullivan 2003) and maintain growing organizational performance (Wong & Chin 2007) by all participants. The importance of innovation was described in the following ways:

> *"I don't think there are very many fields that are undergoing such a big change at the moment. When we think about this upheaval around us, it does require quite a lot of change, and then that change requires innovation and challenging."* (Participant 4)

> *"The whole energy sector is undergoing huge changes and challenges, therefore innovation is really important for the company. We need to find new ways of delivering a reliable clean energy, so I think it's very important to have different types of innovation activities in a company." (Participant 3)*

> *"Innovation is extremely important for us because today's world is evolving and changes are happening so fast, so the company has to evolve all the time and predict what's going to happen. To some extent in this industry, the whole way of production is being redone from what it was 20 years ago, so it is very different from what it has been in the past."* (Participant 2)

> *"Today's company cannot survive if it does not invest in renewal, and one way to renew is to innovate. The world is changing quickly, and new competitors, startups and operations are entering the market, which strive to disrupt and find their own place. When doing that, there is a risk that old big companies will have difficulties, or they will be played out of the game, if they do not renew themselves. Start-up scene has also changed significantly during the last 10-15 years, and from there comes as much new as from the academic side nowadays. You will need to be ready to partner and cooperate with them. Also, a company that does not innovate or invest in renewing, is not perhaps seen as such an attractive employer these days."* (Participant 1)

Next, the discussion moved to the required conditions for innovation. The most important conditions for innovation in the company, that the participants brought up during the interviews related to similar items as presented by Smith et al. (2008) within their pyramid. Conditions for innovation as perceived by participants are listed in the Table 2 below including six main conditions being culture and atmosphere, resources, strategy, management style, internal relationships and organizational structure.

Table 8. Conditions for innovation as perceived by participants

Condition for Innovation	Emerged themes
Culture and atmosphere	Freedom
	Desire to develop
	Confident
	Brave
	Daring
	Inspiring
	Creative
	Renewing
	Flexible
	Encouraging
	Curious
	Diverse
	Understanding for possible failures
Resources	Funding
	Employees
Strategy	Guidelines for development
Management style	Risk tolerance
	Courage
	Readiness
	Support
Internal relationships	Willingness to cooperate
	Openness
	Partnering
Organization structure	Innovation team location

Culture and atmosphere for innovation were described the most, hence it plays a pervasive role in the management of innovation. The culture relates to the values and beliefs of the organisation and how the organization approaches collaboration, communication and risk (Smith et al. 2008). Related to risk, the importance for understanding that some innovations may failure and some are not worth sticking to by force was discussed with couple of participants. The emerged themes around the culture included a necessary level of freedom and desire to develop. The culture that encourages innovation is open and encourages creativity and risk taking and information runs freely through the whole organisation (Smith et al. 2008). The atmosphere was described as confident, brave, daring, inspiring, creative, renewing, flexible, encouraging, curious and diverse. Creativity acts as important building block for innovation (Rosenfeld & Servo 1991) and

implies how people are working together, how the work environment inspires new ideas and how it further formats the ability to conduct those ideas (Amabile et al. 1996). Factors considering internal relationships has similar characteristics to organizational culture mentioned by Amabile et al. (1996); Dobni (2008); Adler & Chan (2011). It includes the willingness to cooperate, openness for new ideas and ways of doing things and the importance for partnering through the whole organization. Internal relationships was separated as a own section due to being discussed extensively together with the culture aspect.

Management style and leadership, resources, organizational structure, corporate strategy and technology are the foundation factors that define an organisation (Smith et al. 2008). Resources, such as funding and employees were highlighted by all participants. It was also mentioned that freedom within boundaries is important in innovative set-up (McCarthy & Gordon 2011). Innovation needs to have some kind of strategy, but more as a guideline for development. Management support was recognized and associated with management abilities such as risk tolerance, courage and readiness. The structure of the organization was described supportive, including only concerns related to correct place of innovation team within the overall organization´s structure. Innovation requires high knowledge integration between sub-units (Davila 2000) meaning that the communication processes should be well-functioning and support cross-functional collaboration. Company X is a large organization, which sometimes brings challenges to communication and collaboration. Informants also explained that the creation of innovation culture for whole organization is not the responsibility of the innovation team, as it would be too large task to accomplish considering the size of their team.

> *"Through the innovation work we do, we also aim to influence the change of the general culture and how we can contribute to the rest of the company."*
> (Participant 1)

Separate and relatively large innovation team was seen as an advantage. However, the placement of innovation unit within whole organization and how it appears to the business units was seen as difficult accomplishment and the risk of becoming siloed was noticed. In general, the importance of whole company wide support, neutrality and enough close relationship with management were highlighted. At the time of the interviewees, the company strategy was just renewed meaning that the innovation strategy was still in the planning phase. Previous innovation strategy of organization was described similar to

Varadarajan et al. (2018) and Pisano (2015) being structured in line with the overall strategy of the company and specifying the areas of development. It was also mentioned that even innovation strategy is a subordinate, it should not be identical to overall strategy. Innovation strategy needs to be able to challenge. As the new innovation strategy of Company X was not formulated at the time of the interviews, the assumptions regarding the strategy type presented by Davila (2005) cannot be made. After reviewing the management control systems package of Company X, suggestions for suitable MCSs for each innovation strategy type can be made.

As last items in this theme, the uncertainty related to innovation was discussed and how organization is coping with that. Uncertainty has been approached with careful familiarization with the subject and with planning and budgeting that defines possible limits for the project. The situation with high uncertainty and complexity requires different competencies from organization, such as flexibility and ability to learn (Tidd 2001,176). Views from outside the company have also been sought, and the external environment is constantly observed. For some innovations, demand and customers are checked in advance, and testing and piloting are carried out. It was also concluded that after the careful preliminary work, at some stage you will need to trust the idea enough and go with it. Other important fact that needs to be understood regarding innovations is that all innovations won´t fly (Kanter 2006). The future with innovation was seen a bit uncertain at that stage due to the new strategy and relocation of innovation unit in the company. In general, the future was seen as positive with a lot of possibilities.

> *"Start-up cooperation will certainly continue or intensify. I can see that we will need a great deal of innovation in the future as well. It has certainly been recognized and talked about that we need more cooperation in the future and I think that these particular innovation development projects are also reflected in the new company's strategy and show the direction where we are going."* (Participant 2)

To conclude, innovation of two natures: incremental (Okuyama 2017) and disruptive (OECD 2005; Kawamoto & Giovinazzo Spers 2019) appear in organization. Specific categorization for different innovation types did not appear in Company X, but described innovation main-types and sub-types were similar as presented by Rowley et al. (2011) and Keeley et al. (2013) and related to different parts of value chain (Hilmarsson et al. 2014). The most important conditions for innovation in the company followed the same items as presented by Smith et al. (2008) placing the high importance on organizational

culture, as well as on open collaboration and communication through the organization (Davila 2000). The strategy of organization was lately renewed, and the team was working on innovation strategy to be in line with overall strategy (Pisano 2005). Uncertainty related to innovations was noticed and therefore competencies such as flexibility and ability to learn (Tidd 2001) were paid attention to. Next section discusses how innovation is managed in Company X.

4.2 Management of innovation

This section discusses innovation management and answers the first sub-research question: *how innovation is managed in organization?* Interviewee's general views on management of innovation are presented and after that moved forward into organization´s setup to discover how management of innovation is done in a case company. As innovation performance is a important measurement of innovation, that has also been brought into the discussion and how it can be enhanced in organizational environment.

4.2.1 Balance between control and flexible freedom

The main challenge of managing innovation and creativity lies with balancing between the need for creativity and flexibility to be able to innovate and need for control regarding the overall business and the organization´s innovation activities (Werner & Tang 2017; Lukka & Granlund 2003). All informants agreed that innovation needs to be managed and controlled at certain level, but the balance is difficult to accomplish. Everyone pointed out that innovation management should provide some kind of framework for action. Innovation management should give enough space to think freely. One informant highlighted that freedom to think broadly is especially important in idea generation phase, while other informant mentioned that way of tracking received ideas is also important. In general, the opinion was that innovation should not be controlled too radically, but the process should include certain control points. Other items mentioned on ways to manage innovation included funnel where the progress of taken initiatives can be seen, and evolution steps are visible. In general, the development of innovation and it´s levels of maturity were found important. Within the progress in the funnel, it would be also important to see when to close project because it's important to kill the projects if they're not meeting certain criteria's. A good speed in the funnel was mentioned to be important

factor, so that the progress is not taking too long. However, it was also noted that the correct timing to kill the projects is difficult to estimate.

External knowledge was brought up as one item. Respondents discussed the importance of existing market for the innovation and the knowledge concerning competitors. Innovations should be discussed with customers and the need and interest for the innovation should be clarified and verified time to time. Otherwise, the situation can lead to the fact that the market does not exist, and the resources used are wasted. Also, the need to track the cost of innovation was also discussed and the way of tracking the future value was brought up as a challenge in innovation management.

> *"I would say that the main challenge of innovation management and controlling relates to uncertainty of innovation and how do you assess the value. Because the value of innovation is not the cost you have put in. It is kind of also the learnings and what you take from it."* (Participant 3)

Other viewpoint related to funding and uncertainty included sharing an existing monetary resources available in the organization, meaning the decision whether to invest in uncertain innovation that might not provide returns in many years or something that is providing steady returns already. Other challenges related to innovation management also included some internal factors. One respondent mentioned that sometimes it is difficult to sell some ideas to other organizational members, as they do not find resource such as time for it. Additionally, the importance of the connection to existing business was deliberated as a challenge.

> *"If an idea is not seen to be linked to our own business, can a good idea be omitted because we do not know or recognize those opportunities, or rely on the research that is behind it."* (Participant 2)

4.2.2 Innovation management in organization

Innovation management and controlling was discussed with informants based on their own work tasks in order to gain comprehensive understanding concerning the innovation department as the ways of working varies between different sub-units. The management of innovation in organization is steered through the innovation and venturing unit. Figure 10 shows the hierarchy structure to outline the description and illustrate the reporting relationships in organization.

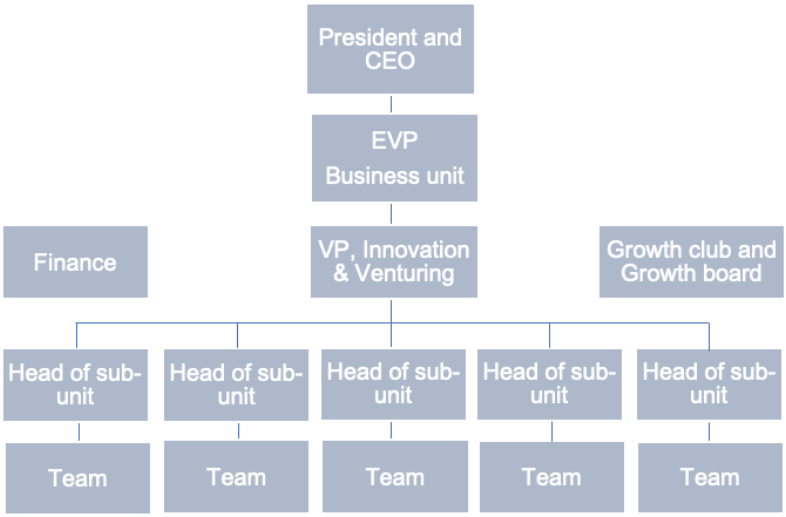

Figure 10. Structure of Innovation and Venturing team of Company X

VP, Innovation & Venturing is the highest position within Innovation and Venturing unit and having the overall responsibility regarding the unit. VP reports to EVP, Business unit, who further reports to the President and CEO. Each head of sub-unit is reporting to the VP, Innovation & Venturing and they have responsibility over their own budget and team. Innovation & Venturing management team consist of VP Innovation & Venturing, heads of sub-units and member from finance. Growth board includes members around the whole organization.

Finance does not directly belong to Innovation and Venturing unit, but their role is in business control and performance management, including monthly closing of books, generating the budget with head of sub-unit, forecasting and analysis. Finance also offers business support by identifying priorities, and analysing and understanding the implications of data as well as they offer recommendations in finance related issues and legal company compliance in co-operation with other functions and stakeholders. Finance provides figures for management team of innovation and venturing unit and supports the member of the whole unit as well as the Growth Board. Finance is also involved in investment and divestment situations. Own budget is defined for each head of sub-unit, and they decide on how their budget is split within their team. They can divide their budget also in project level, for which finance can bring the actual costs used for each project including the employee costs and activity cost. Employee costs estimates the workforce resources needed for the project, whereas activity side includes all activity-based costs for the project.

Innovation project can move forward in two ways. It can be seen as valuable for the company´s business, when it can be handed over to some business unit, who´s own management team then also begins to monitor the progress of the project and decides how much funding they give for the project. If the project is not much related to the current business, it can be also seen as a potential spin off as a start-up that can be learned from, or as a possibility to be scalable to an independent business when it moves to be pitched in the Growth Board. Growth Board acts more on the commercial side and decides if they want to give funding for the project and for how long period of time. After that step, the project continues in growth board as a standalone.

Regarding the research collaboration team, innovation management is essentially related to collecting ideas and bringing them to the company, but not so much to working on them. They have a global research challenge, with which they try to collect ideas from outside the company as well and they are working closely with start-ups and universities. The IPR side in turn is related to the protection of inventions. Technology & Foresight team and Innovation projects team have same model in use for innovation management, which has similar characteristics to The Stage-Gate Model created for innovation process, from an idea to a final product by Cooper (2008) as well as to more simplified innovation process model by Tidd et al. (2005). But it also generates items related to holistic innovation view of combining strategic management, organizational design, cultural construction, and industrial trends (Chen et al. 2018). Company X has idea bank, where all ideas are visible and from which the most potential ideas can be taken further. Currently, the ideas brought into the idea bank comes mostly from innovation unit only. Team is having weekly meetings, where they view the ideas in idea bank and analyze the potential of them. The model is used to visualize and track how the project maturity is evolving and will be presented in more detailed level in Section 4.3.1. Before, innovation project team needed to search approval for their projects from Innovation management team, but that practice is not applied anymore. Currently, when projects move forward, they get the steering. One informant explained further that the project model is better structured when going to growth board than when going to other business unit, as in that they mostly report on what has been done regarding the project.

The informants were also asked their personal opinion regarding the most important factors needed for innovation enhancement in organization. One informant discussed the importance of generating large volumes of ideas through the whole organization and from

wider areas, highlighting the fact that this should not be based on the general knowledge of person working with innovation regarding the organization. Having large volume of promising ideas within the testing stage and broad number of early-stage ideas or incremental innovations is in common for successful innovators (Kanter 2006). Also, the ability to ensure and verify the quality of outputs was considered having significant role as well as having knowledge when project should be terminated in order to not spend too much resources for too long time if signs are visible for failure. Similar factors that were considered important for innovation in general were mentioned including culture, acceptance, atmosphere, possibility for failures, acceptance and interest from management, resources: money and people (Smith et al. 2008) and framework to operate with some guidelines. Informants also discussed that time and space to be innovative should be considered, as well as highlighted the importance of internal and external conversation and market need knowledge. The items discussed were similar to ones that Adams et al. (2006) suggested to measure related to innovation measurements.

Lately Company X has been trying to enhance innovation by thinking the ways of doing things differently and considering the role of different personnel within innovation. They have tried to increase the level of knowledge and communication by spreading insights in a more structured way, therefore increasing the value, by organizing innovation competition, where all employees were able to participate as well as increase the interest of management by presenting the innovation cases. Also, they have tried to find the ways to generate more ideas and seek more cooperation with other parties. One informant also mentioned that funding has been generated for start-up portfolio, in order to improve this activity. Informants did not consider any of these activities as failures, but discussed the difficulties faced with them. One informant mentioned difficulty of getting enough out of the events organized, such as ideation workshops with entrepreneurs and open innovation projects with other companies. Other informant discussed the difficulty of timing of some projects. Sometimes they have advanced specific projects, and they were terminated as not seen valuable at that period of time. However, after some time the idea might have become an important phenomenon elsewhere, when they were already out of the competition.

4.2.3 Innovation performance

Innovation performance is measured by yearly Innovation & Venturing team targets (KPI´s). Each individual has their own targets, which will be described in more detail in Section 4.3.1, and 30 percentages of team target weight adds to each individual´s own targets, except for management team members, who has more extensive goal weight. Targets for the year 2022 were available only, as the new company strategy was just launched, and therefore Innovation & Venturing team was also scaling their new strategy and team targets for 2023. Figure 11 below illustrates how the innovation team measured it´s performance.

Main goal	Target	Needs improvement	On track	Meets expactation	Remarkable	Outstanding	Overall Result
Building options for new business and supporting business renewal	Number of new relevant ideas submitted to the idea bank and start-ups to Innopipe	X number	X number	X number	X number	X number	X %
	Number of projects scaled to business and GB	X number	X number	X number	X number	X number	X %
	Percentage increase of the I&V portfolio value during the year	X %	X %	X %	X %	X %	X %
Stakeholder satisfaction and insight sharing	Stakeholder satisfaction for I&V	X Number between 1-5	X Number between 1-5	X Number between 1-5	X Number between 1-5	X Number between 1-5	X %
	Number of activities/reports done to share insights with the rest of the organization	X number	X number	X number	X number	X number	X %

Figure 11. Innovation & Venturing team targets

Innovation capability is one of the organization's background factors of performance (Saunila 2016) generating two main goals for innovation team targets. First one concerned building options for new business and supporting business renewal. This goal had three separate targets including number of new relevant ideas submitted to the idea bank and start-ups to “Innopipe”, number of projects scaled to business or GB and the percentage increase of the Innovation & Venturing portfolio value during the year. Second main goal was stakeholder satisfaction and insight sharing including two separate targets, which were stakeholder satisfaction for I&V unit in scale from 1 to 5 and the number of activities and reports done to share insights with the rest of the organization. Innovation team targets in Company X follows the same concepts than presented by Tidd et al. (2001, 376) including output metrics, in this case new ideas and scaled projects, operational or process metrics, here as stakeholder satisfaction survey and strategic success metrics related to market share and productivity as well as to information sharing. Innovation measurements

of Company X are based on the organization´s vision and strategy and the success factors are gathered from different perspectives in order to generate comprehensive picture of the factors that affect the organization's innovation success. Also, the success factors are limited to essential ones and measurements can be used to communicate innovation strategy and implementation. (Lönnqvist 2004, 52.)

Innovation metrics were considered to cover critical issues, be enough simple and clear to all stakeholders as well as reasonably easy to evaluate and actionable (Birchall et al. 2004). Each of this target had own measurement value that corresponds the outcome in levels of: needs improvement, on track, meets expectation, remarkable and outstanding, which generates the overall target result in percentage. Innovation performance is also measured from financial side regarding the cost of innovation unit overall, including employees and also how much individual projects costs. Metrics for innovation are important as such metrics presents the value of innovation and those can be used to justify investments for innovation projects. Well working innovation metrics enable organizations to allocate resources more effectively, affect human behaviour and support a common language that results better communication throughout the whole organization. (Gama et al. 2007, 420.) One informant concluded that current ways of doing are sufficient at the moment, since they do not have a good way available for tracking the future value of innovation.

To conclude, this section presented how innovation is managed and innovation performance is measured in Company X. Company X is using their own model to work with innovation process, which considers many internal and external factors. Also, financial information is available regarding innovation activities, which measures the cost of innovation department. Innovation performance is measured by Innovation and Venturing team targets, that follows the same concepts presented by Tidd et al. (2001, 376) and had same principles as discussed by Lönnqvist (2004, 52). Next section moves to review how management control systems are applied in innovation in Company X.

4.3 Management control systems

In this section, the organization´s current management control systems applied in innovation are presented, answering the second sub research question: *how management control systems are applied in innovation?* The results from interviews have been structured according to the five control groups in Malmi and Brown's (2008) MCSs as a

package framework, which generates five sub-themes for Management control system's main theme of this study. Also, the controls are reviewed whether having enabling- or coercive usage in Company X.

4.3.1 Management control systems package

As previously mentioned, the definition of MCS applied to this study is "systems and the set of formal and informal procedures and processes that organizational participants use in order to help ensure the achievement of their goals and the goals of their organization" and the management control systems are considered as a package for organization. Management control systems package applied to innovation in Company X is presented in Table 9. All five control categories are discussed separately, and this section will compare the empirical evidence in order to find out which control groups proposed by Malmi and Brown's (2008) are present in the organization.

Table 9. Management control systems package of Company X

Control	Categories	Controls in Company X
Cultural controls	Clans	-
	Values	-Values -Purpose
	Symbols	-Brand -Open office
Planning	Long range planning	Long term forecast (LTF)
	Action planning	Forecast
Cybernetic controls	Budgets	Long term forecast (LTF)
	Financial measurement systems	Occasional measurement needs: ROI, IRR etc.
	Non-Financial measurement systems	-Number of ideas -Number of start-ups -Number of projects scaled -Increase of portfolio value -Stakeholder satisfaction -Number of activities/report to share insights with the organization -VIRAL model
	Hybrid measurement systems	-

Control	Categories	Controls in Company X
Reward and compensation		Short term incentive (STI)
Administrative	Governance structure	According to Finnish Companies Act
	Organization structure	Different authority levels based on role
	Policies and Procedures	Companywide policies and procedures extensively

4.3.1.1 Cultural Controls

Malmi and Brown (2008) consider three aspects within cultural controls: clan controls, value-based controls and symbol-based controls. These controls influence employee's behavior through established values, beliefs and social norms (Malmi & Brown 2008). Company X is a large organization, and therefore the informants were not able to recognize any clan control types. The values of Company X are curiosity, responsibility, integrity and respect that provide a foundation for their company culture. They have also code of conduct that defines how they do business, and it is embedded in their values and open leadership principles. Company's values, purpose and code of conduct are communicated in their website and intranet as well as continuously by management to employees in their information sessions. Open leadership principles of Company X are: believe, want and expect. They aim to strengthen empowerment and a performance culture as well as encourage employees to take a more active role in the dialogue about company´s agenda with their customers, suppliers, regulations and other stakeholders. Regarding the symbols-based control, Company X has their brand communicated to employees in intranet. They consider that their brand is a valuable asset for realizing their business strategy and purpose. Their office space is open, following the similar type of design in different floors and locations. The open space encourages for free dialogue, and has hot desk type of arrangement, enabling employees to work from anywhere within the building. However, most business units and team have preferred to gather together, which has led to the quite clear floor division. Everyone can still move freely and decide their own working spot. Overall, the informants did not consider that cultural controls would have been used heavily in their organization, but more as an guideline.

4.3.1.2 Planning Controls

Planning controls are aimed to control the activities and direct effort and behavior of groups and individuals by setting and aligning the goals of the functional areas of the organization. Planning controls provides the standards to be achieved in relation to the goal by stating the expected level of effort and behavior. They consider two aspects within planning controls being long range planning and action planning. Action planning relates to the short-term goals that are set for 12 months, while long-range planning includes goals for longer run. (Malmi & Brown 2008.)

Company X follows group wide annual clock. Long range planning is called as LTF, meaning long term forecast, which is prepared during autumn for the next 3 years. This planning is also called as a budget and after preparation it is locked in the current year. LTF is prepared based on the strategy, in which the innovation team has its own thematic areas. As the LTF is locked, the action planning is called as forecasting in the Company X. Forecast can be changed during the year, based on the changes in operations and costs. Sub-unit managers are responsible for LTF, forecasting and action planning regarding their own areas and teams. Currently, Company X has different systems and tools used for planning, but most of it is done in excel form regarding innovation and venturing team. Malmi and Brown (2008) suggest evaluating whether the planning of the company builds the commitment of employees or is done in order to decide on future activities only. The planning of Company X involves LTF, that is built on strategy and team targets, therefore building the commitment of employees as well.

4.3.1.3 Cybernetic Controls

Cybernetic controls can be information systems for decision making support or management control systems used to detect consistency problems and direct employees' behavior. Malmi and Brown (2008) divide cybernetic control systems into budgets, financial measures, non-financial measures and hybrid measures. (Malmi & Brown 2008.) As mentioned in planning section, Company X calls its budget as LTF and it also stands for long term forecast. Innovation team has its overall "budget", which is further divided for the innovation sub-units. Sub-unit managers are responsible for allocating their budget to their own teams based on the focus areas of the team. Changes in actual versus forecasted costs are mostly followed by finance, who reports them monthly to innovation management team. Company X is not using many other financial

measurement systems. One informant told that in venturing side, the measurements such as internal rate of return or value growth has been applied. The company does not have active project cost monitoring, but they would have possibility to produce one based on the hours spent on the project by the personnel and other project-specific costs, which are sometimes requested by innovation project managers.

Non-financial measurement systems in Company X include the team targets presented in Table 9. The areas of measurement include number of new ideas submitted to the idea bank, number of new start-ups to "innopipe", number of projects scaled to business and GB, percentage increase of the innovation and venturing portfolio value during the year, stakeholder satisfaction for innovation and venturing, and finally number of activities and reports done in order to share insights with the rest of the organization. Also, as previously mentioned innovation and venturing team uses the model called VIRAL model, which helps assessing and planning projects in all life stages across multiple different dimensions and has its core in business maturity self-assessment. VIRAL model is presented in Figure 12.

Innovation funnel stage	Idea to concept (ideation & concept study)			Concept to product (Experiment)		Productization	Product to market		Business / scale	
Level	1	2	3	4	5	6	7	8	9	10
Name	Exploration formation	Problem validation	Solution validation	Business validation	MVP implementation	Productization & preparing to sell	Go to market	Product Market Fit	Scaling up	Profitable & Growing
Team										
Problem & Vision										
Value proposition										
Product / Service										
Financial Model										
Market										
Sustainability										
Operations										
Sales										
Risk & Legal										
Value chain										
BU co-operation (when relevant)										

Figure 12. VIRAL model of Company X

Maturity assessment is a systematic approach to understand the current status of the project, identify gaps and plan next steps. It is aligned with the internal processes and innovation funnel. It also eases communication both inside and outside the project team and is leading with data. Top row of the model includes innovation funnel stages, which have different levels within each stage. The first level in innovation funnel is idea to concept, in other words ideation and concept study phase, that consist of three levels: exploration formation, problem validation and solution validation. Second step in

innovation funnel concerns concept to product, experiment stage, which has two levels: business validation and MVP implementation. Further, the third innovation funnel stage is productization including only one level of preparing to sell. Fourth stage is named as product to market, and it has two levels: go to market and product market fit. Finally, the fifth stage is business scale including two levels of scaling up and profitable and growth. VIRAL model includes different assessment areas, against which the project can be mirrored. These include team, problem and vision, value proposition, product and service, financial model, market, sustainability, operations, sales, risk and legal, value chain and business unit co-operation. Each of these areas have own specified set of criteria within each of the innovation funnel stage.

The VIRAL model was placed under non-financial measurement systems by all informants, and they did not recognize having any systems that relates to hybrid measurement system, even this model is having similar characteristics than for example innovation scorecard proposed by Gama et al. (2007).

4.3.1.4 Reward and Compensation Controls

Rewards and compensation aim to control effort direction, duration, and intensity by motivating and increasing the performance of individuals and groups. Key objective of Company X´s rewarding is to encourage and recognize high performance, professional development and behavior that is in line with their strategy and values. Short-term incentive (STI) is meant for all employees with purpose to focus performance on what drives business success in the short-term and reward for achieved financial and strategic results. The performance measured includes financial targets, safety targets and individual / team targets, which all correspond with specified percentages on final outcome. Each employee belongs to the specific STI group, which is based on their job grade. This group defines the earning possibility percentage based on the annual income. Company X has also Long-term incentive (LTI) for top management, which supports the enforcement of the company´s strategy. Fringe benefits of Company X include lunch benefit, mobile phone benefit and car benefit. They also offer employee share saving program. Intangible rewards of Company X include career development opportunities, wellbeing trainings and programs, Open leadership, work environment and culture.

4.3.1.5 Administrative Controls

Administrative controls include organization design, structure, rules, restrictions, and regulations aiming to direct employee behavior through the organizing of individuals. Malmi and Brown (2008) categorize these as governance structure, organization structure and policies and procedures. (Malmi & Brown 2008.) Company X being a public company, defines their governance structure at large extent. Their governance is essential for the benefit of shareholders, financial markets, business partners, employees and the public. The responsibility of the board of directors and the CEO for the administration and management of the company is regulated in the Finnish Limited Liability Companies Act, which is supplemented by the Finnish Listed Companies Management Code.

Regarding organizational structure Company X has also decision authorities and financial authorities that defines who can enter into different types of decisions, sign agreements, make purchases and approve invoices. User rights for different systems are defined based on your job profile. Company X has comprehensive list of policies and procedures covering different areas in their intranet available for all employees. The areas include authorizations, brand, change management, communication, design thinking, document management, employment, ethics and legal guidelines, financials, grant management, hybrid work model, process management, procurement, project management, risk management, safety and security, sustainability, travelling and innovation and venturing. Innovation and venturing section include separate items such as: patents, investments, sparring sessions, boot camp, business creation, business unit collaboration, growth board and club, ideation, innovation portfolio, research collaboration, startup collaboration and technology scouting.

Overall, the company has extensive administrative controls, which is typical for big corporations, in order to make sure that employees are compliant. Intranet also includes contact persons for different areas, which can be contacted for further information. After reviewing the control package of Company X based on Malmi and Brown (2008) framework in this section, the next section moves to clarify whether these controls are used in enabling or coercive ways.

4.3.2 Interplay between enabling and coercive controls

The use of coercive- and enabling controls in Company X is considered separately for each control system defined in MCS package framework by Malmi and Brown (2008) in order to see whether different controls have divergent characteristics. As earlier explained, enabling controls are designed to support instead of control by facilitating structure as well as refining and guiding work processes. Correspondingly, coercive systems aim to force compliance with pre-specified standards. (Adler & Borys 1996.) Cultural controls in Company X were considered only as enabling and descripted more as a guideline for best practises. Also, reward and compensation controls were seen to have enabling design. Employees are able to discuss their targets freely with their supervisors and the targets are defined and reviewed together, which increases the motivation working towards them. Enabling procedures codify best practices and assists employees to work more effectively (van Veen-Dirks et al. 2021).

All other controls were considered to have both, enabling and coercive characteristics. Planning controls were seen to include more enabling formalization, as action planning can be modified based on the changing needs. The purpose of LTF is to give structure for activities and it was described similarly than Adler and Borys (1996) did as to facilitate structure as well as refine and guide work processes. On the other hand, the long-term planning is locked for the next three years and that cannot be changed. Therefore, an employee responsible for their LTF needs to be able to explain if big deviations happen in forecasting compared to locked LTF, which brings some coercive characteristics in to picture as the use of coercive controls focuses on controlling behaviour (Radtke & Widener 2016). As previously mentioned, budgets in Company X are the same as LTF, therefore the planning and budgeting are a combined activity meaning that the mixture of enabling and coercive formalization applies to this control, as explained in previous paragraph. Non-financial measurements of Company X had all enabling formalization. These systems were meant to support work processes (Adler & Borys 1996) and facilitating autonomy and learning (Radtke & Widener 2016).

Administrative controls were seen to have more coercive design compared to other controls. The use of coercive controls focuses on controlling behaviour (Radtke & Widener 2016) and aims to force compliance with pre-specified standards (Adler & Borys 1996). Governance structure of the Company X is based on Finnish Companies Act,

which controls the behaviour of the company and its employees. Organization structure also pre-defines the authority levels of each employee regarding decision ability on contracting and purchases among others, without much possibility for deviation from the rules and procedures, also reducing the commitment of employees (van Veen-Dirks et al. 2021). Policies and procedures exist in Company X at large extent, and these covered different areas, some having more enabling formalization, such as communication and way of working, while other such as financials, risk management and safety and security were more coercive in their characteristics.

Overall, the controls of Company X are designed with enabling features, but some controls seem to require coercive characteristics, which is in the line with Fried (2017), who stated that the nature of MCS being either enabling or coercive depends primarily on an optimal fit. Enabling control features aims to encourage an interactive dialogue and promotes trust, whereas coercive controls aim compliance with rules (Beuren & Santos 2019). Systems with enabling designs had similar characteristics considering repair, internal transparency, global transparency, and flexibility as defined by Adler and Borys (1996). Also, coercive design followed their examples by limiting repair possibilities, global transparency and flexibility. However, within internal transparency the employees should follow the specified formal procedures, the proper understanding of the systems that they are working with is required.

To conclude, almost all separate control groups listed in MCSs as a package framework by Malmi and Brown (2008) were found from Company X. Company uses non-financial measurement systems at large extent, as well as different type of policies and procedures. The controls of Company X are mostly designed with enabling features, but some controls require coercive characteristics. Next section will review what kind of features are required from MCSs to enhance innovation and the initial theoretical framework is updated based on the empirical findings.

4.4 Enhancing Innovation by Management control systems

This section defines the role of management control systems in innovation enhancement and answers the third research sub-question: *what kind of features are required from management control systems to enhance innovation?* At the end of this section the initial theoretical framework is updated based on the empirical findings.

4.4.1 Role and features of management control systems in innovation enhancement

Management control systems used for innovation in Company X were generally considered important and useful in uncertain environments (Eldridge 2014) and aimed to exercise control in order to reach organizational goals and provide help for opportunity search and problem solution (Mundy 2010). Summarized factors regarding the roles and features of MCS in innovation enhancement described by informants are presented in Table 10.

Table 10. Roles and features of MCS in innovation enhancement described by informants

Role of MCS in innovation enhancement	Features of MCS in innovation enhancement
• Exercise control to reach goals • Provide help in opportunity search • Provide help in problem solution • Provide visibility through organization • Increase knowledge • Increase visibility • Facilitate information flows • Provide help for critical thinking • Provide help in task assignments • Provide help aligning with strategy • Improve compliance • Enable research • Ensure and improve quality • Contribute to flexibility and autonomy • Provide limits to activity • Offer transparency • Maintaining business • Enable, follow and track activities • Enable innovation culture	• Flexible to use • Not too bureaucratic • Not too time consuming • Easy to access • Not involve too many reporting requirements • Have most of the information in same space • Focus on right objects and measurements • Include metrics applicable to innovation

MCSs have advanced the visibility throughout organization, which has increased the knowledge regarding other business units and tasks that they are working on, as well as enabled visibility on challenges and problems that other persons are facing and therefore helped to think possible solutions on those facilitating flows of information (Lopez-

Valeiras et al. 2016). The systems have helped to visualize the progress of projects, to challenge one's own thinking and assisted in managing activities leading to innovation (Beuren & Bernd 2021). Also, the systems have helped aligning the strategy with one's own work and with the team's goals. At large extent, management control systems were seen to improve compliance. Budgeting, planning and different authority levels were considered to facilitate doing things in compliant and consistent way. Systems also enables to properly research different ideas and subjects, therefore increasing the confidence of working as well as getting familiar with the market and general laws and regulations. Management controls includes a broad strategic and operational spectrum of managerial practices that steer, influence and monitor the behaviour of organizational members in order to align the different interests within and sometimes beyond the organization towards a common purpose and objective (Pfister et al. 2023).

Innovations were considered to require different types of management control systems depending on the nature of innovation, which is in line with the statement from Chenhall and Moers (2015). Use of control systems in innovation comprise various controls, that are used in different ways (Barros & Ferreira 2019). Company X pursue both, exploitation- and exploration innovation, therefore balancing and combining the use of diagnostic and interactive controls in order to enhance performance, as suggested by Bedford (2015). Coercive type of controls in organization were discussed to apply quite well to all kind of innovation. This concerned mostly the administrative controls such as policies and procedures, including who is authorized to do certain type of activities. It was pointed out that the general guidelines should apply to every activity in order to keep it within a reasonable limit. However, in case of disruptive innovation, specific information might not be available and therefore cannot be controller. Informants agreed that management control systems should contribute to flexibility and autonomy, similar to Barros and Ferreira (2019, 348) and be able to ensure and improve the quality of innovations. The systems should offer guidelines and transparency on activities, which also enables possibility to challenge one´s ideas and ways of working as well as gain support from others. The role of management controls systems was considered to be also on maintaining business and enabling, following and tracking of the activities.

Regarding the features of management control systems, informants described that the systems should not include too much bureaucracy nor be too time consuming to work with. Systems should be easy to access and flexible to use. MCS should be able to offer

a place where most of the information is easily accessible within the same place, in order to avoid spending time on moving from one system to another. In particular, they should not include too many complicated reporting requirements.

> *"If the systems are too time-consuming to use and require complex and too precise reporting, the quality of the work easily becomes too controlling, which reduces the author's time from his actual tasks. When working with innovation, systems should make work easier, not harder."* (Participant 1)

Systems should focus on right objects and measurements. Informants argued that the metrics used should be verified to be comparable to work with innovation and agreed with Gama et al. (2007, 421) stating that good innovation metrics are important.

> *"Innovation cannot be measured only with a profit and loss thinking model. It can take years for the monetary value to appear, and a large part of the value that the innovation produces may never be seen directly in monetary terms."* (Participant 1)

MCSs should offer transparency and open communication as well as to strive for new ways of working and enable culture, where questioning existing ways of doing and challenging is encouraged, as well as coming up with new ideas. Many of these statements advocate the usage of enabling design in management control systems as enabling characteristics of management control system can provide support for innovation, because the characteristics of flexibility and repair enables the application of procedures that aims for the development of new products, processes and marketing, as well as help to understand the role of control in supporting the innovation process (Davila et al. 2009). Enabling design can also stimulate learning and empowerment of employees and lead to advanced coordination and management of functional interdependencies (Davenport 1993) as well as provide organizational participants with a better understanding of the organization's systems and enables greater ability to work and interact with their tasks, resulting new ideas related to process innovation (Guo et al. 2019).

As the innovation strategy of Company X was not yet known, only suggestions can be made based on different options. In case of deliberate strategy, Company X could benefit from MCS that is able to support the execution of the strategy and translate it into value. MCS should have ability to execute efficiently and fast, aiming to simplify the application of knowledge and leverage resources. The strengths of the systems include the effectiveness in translating deliberate strategies into action plans, monitoring the execution, and identifying deviations for correction. (Davila 2005, 47-49.) In case of

induced strategic action. MCS can be designed to capture the learning occurring during the execution of processes. This type of systems captures and code experiences in order to enhance execution, create knowledge and advanced understanding to refine the current strategy. MCS can capture these incremental innovations to the current strategy. (Davila 2005, 49-50.) Regarding autonomous strategic action, MCSs can be used proactively to define the strategic context. These MCSs encourage experimentation, discovery and exceptions. The goals related to these types of systems are broad and the way leading to them is unknown. Additionally, these systems assist local efforts, provide information for decision-making within very uncertain setting, and consider value creation options that are rarely used in routine processes. (Davila 2005, 52-53.) Finally, in case of strategic innovation, the MCS should be able to observe the environment in depth and expand the informal networks of top management and their knowledge network beyond the existing pool of informants. In addition, MCS plays an important role in disseminating learning from discovery events that require further analysis, including local trials and building economic models that rely on control systems such as scenario planning. MCS also builds a constant back-and-forth interaction between vision and action, holding regular meetings and deadlines to review progress. (Davila 2005, 55-56.)

Informants were also asked, which MCS they would find important when enhancing innovation in organization, in which they do not currently have access to. Some informants wished to have better visibility to projects, in order to see other people´s project as well as to offer visibility to their own projects, as they considered getting feedback from outside parties as an important factor. Common idea generation tool for whole organization was also mentioned. The aim of this type of system would be to spread innovation culture across the organization, as also employees outside innovation team could add easily their ideas and give suggestions and comments in general. In that system, one could leave questions and cooperate on building ideas. The risks were also seen regarding early-stage projects in this kind of set-up, as these could get very critical approach. On the other hand, informants also saw this as an advantage to build the idea further based on criticism. Other informant said that many projects are worked in power-point templates and a system that would gather information in one place and show persons involved with the project could advance their way of working. This could also advance the ad-hoc and reporting needs as well as the general project management. From the finance side the interest was placed to learn more about innovation accounting and its

development. This type of activity relates to ways to track innovation value and returns on investments.

4.4.2 Revised theoretical framework

The initial framework for this study was presented in Section 2.3.4, which was outlined based on the previous literature. Based on the empirical findings of this study, revised theoretical framework was build and it is presented in Figure 13.

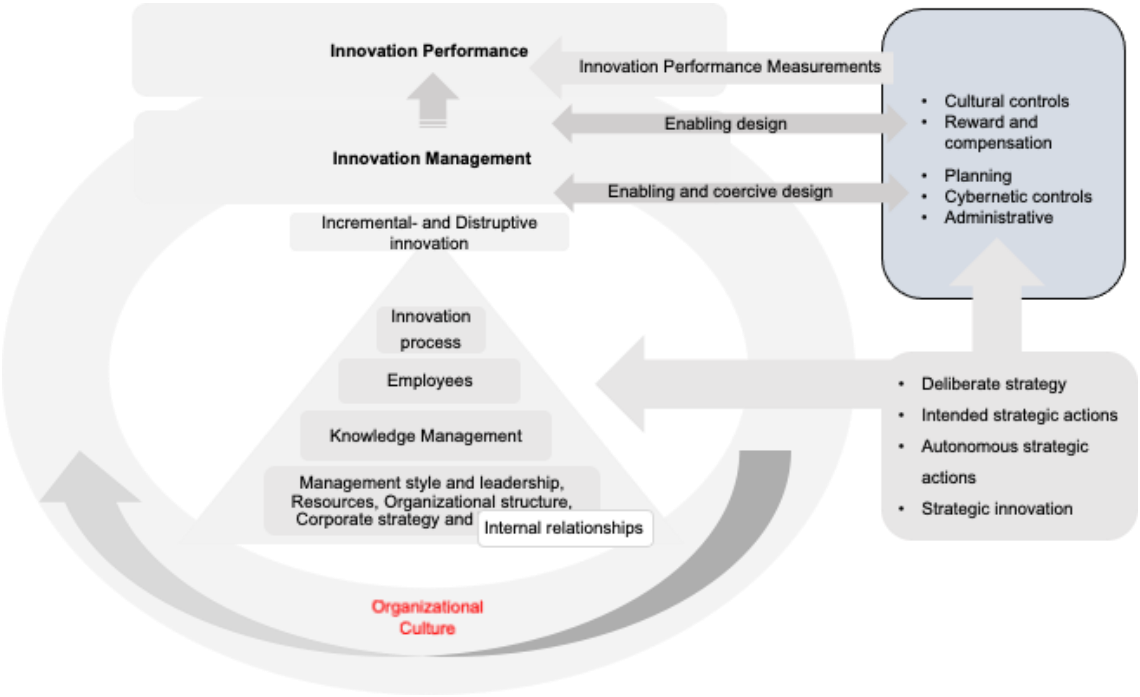

Figure 13. Revised theoretical framework

The empirical findings of this study support the initial theoretical framework at large extent. The factors affecting innovation management in organization were closely similar to ones presented in initial framework by Smith et al. (2008). Only factor that was not mentioned by informants was *technology*, which was therefore replaced with *internal relationships* mentioned by informants. *Organizational culture* was highlighted as also high emphasis was placed on this factor by informants. Organizational culture was described to be supportive and collaborative, where communication flows through whole organization. This type of culture also supports efficient knowledge management. Type- and nature of innovation bar was switched to state the nature of innovation in Company X, being incremental or disruptive. This framework is built as a pyramid, in order to demonstrate the factors involved in innovation management wholeness and should not be mistaken to be apart from innovation management block.

Further, management control systems existing in Company X were listed in the right-up hand side. All type of controls from the framework of Malmi and Brown (2008) were found to exist in the company. Cultural controls as well as reward and compensation were recognized to have enabling design, whereas planning, cybernetic controls and administrative controls had enabling and coercive designs. Company X uses their management control systems to measure innovation performance, therefore that section was left as in initial framework. Informants described the situations where innovation strategy have moved between all strategic options provided by Davila (2005), therefore requiring diverse usage of management control systems.

To sum up, the empirical findings of this study support the theoretical framework of this thesis and do not disprove the literature. Empirical findings and changes made to revised framework complement it, which is visible in revised theoretical framework presented in this section.

5 CONCLUSION

This section is divided in two parts. First part is theoretical contribution that discusses the empirical research findings and compares them to the previous research literature. The second part is managerial recommendations. At the end of this section, the limitations of this study and suggestions for future research are discussed.

5.1 Theoretical contribution

As innovation is considered a central driver of economic growth and sustainability in the corporate and in the public worlds (Pfister 2014, 134) and previous literature agrees on, that creating innovations is vital for organizations to survive in the long run perspective (Bessant & Tidd 2011) it is important for organizations to be able to manage their innovation activities and ensure that investments made for innovation are correctly measured (Gama et al. 2007). Thus, this study advanced the understanding of the controls in innovation regarding the use and features of management control systems when enhancing innovation in organization. Therefore, also reducing a gap between management control theory and practice by producing research that have practical relevance. As most of the previous research has been built on Simons' (1995) framework, in which the different control systems are not considered separately, it leaves many factors related to innovation process unnoticed. This study applied MCS as a package framework by Malmi and Brown (2008) to comprehensively review separate control components, therefore increasing the knowledge on how separate management control practices can provide information that is able to support innovation. Additionally, this study considered research areas of innovation management, innovation performance and innovation strategy, in order to verify correct measurements for managing innovation efficiently and successfully in organization as well as reviewing the base for control systems.

The importance of innovation has been noted in today´s organizations (Du Preez & Louw 2008) and organizations have therefore invested in variety types of innovation, since different types of innovation influence organizations in different ways and generate divergent outcomes and impacts (Rowley et al. 2011). Previous research has offered various ways to categorize innovations in different types (Rowley et al. 2011; Keeley et al. 2013; Hilmarsson et al. 2014; Tidd & Bessant 2018) and according to their nature

(Henderson & Clark 1990; Christensen & Raynor 2003; Pisano 2015). This study regards the division of innovations as incremental (Okuyama 2017) and disruptive (OECD 2005; Kawamoto & Giovinazzo Spers 2019). Increasing innovation activities have created the need for organizations to have procedures that enable an efficient control of their processes and management of their limited resources (Haustein et al. 2014). Previous research regarding innovation management has its basis on two assumptions: innovation is a process, and this process can be influenced (Tidd & Bessant 2013). Process view has been supported by many researchers (Tidd et al. 2005; Cooper 2008; Smith 2010) even this type of linear innovation process models has been recently criticized as outdated and the new knowledge-driven economy (Hidalgo & Albors 2008) have created the rise to new concepts such as total innovation management (Xu et al. 2007) and holistic innovation management (Chen et al. 2018). Innovation process in this study advocate process view that comprehensively considers various aspects of value chain as well as internal and external factors related to innovation.

Organizations need to manage and measure their innovation capability and related processes actively and, in a result-oriented way (Saunila & Mäkimattila 2018) hence organizations need to have knowledge regarding the main factors affecting their innovation management. Smith et al. (2008) recognized nine factors that influence the organizations' ability to manage innovation, including management style and leadership, resources, organizational structure, corporate strategy, and technology as a foundation factor that define the organization, as well as knowledge management, employees, innovation process and organizational culture. This study does not differ from these findings, except for the technology factor being replaced with internal relationships factor. Organizational culture plays a pervasive role in the management of innovation characterized with open collaboration and communication through the organization (Davila 2000) generating efficient grounds for knowledge management. Thus, *according to this study, management style and leadership, resources, organizational structure, corporate strategy, internal relationships, knowledge management, employees, innovation process and organizational culture influences the organizations' ability to manage innovation, in which organizational culture with open collaboration and communication through the whole organization has a significant role that acts as a ground for successful knowledge management. This study suggests organizations to consider these factors as mostly influencing their ability to manage innovation.*

Earlier research has stated that control restrict employees' autonomy and their capability to be creative and causes hindrance to innovation (Amabile 1998). The main challenges regarding managing innovation stated by the four interviewed participants related to balancing between the need for creativity and control (Werner & Tang 2017) and maintaining flexibility within innovation control (Lukka & Granlund 2003; Burgers et al. 2008). Also, the complexity of innovation (Smith 2010) and the high degree of uncertainty (Ahrens & Chapman 2004) related to it were considered challenging. Hence, within rapidly changing and uncertain environment, management controls were found to be important and useful tools in order to manage innovation (Davila 2000; Bisbe & Otley 2004; Eldridge 2014; Grabner & Speckbacher 2016). *According to this study, management control systems are useful in innovative setting with uncertain and changing environment.*

Innovation management requires clearly defined goals and control mechanisms for timing, resources, and quality (Saunila & Mäkimattila 2018) as well as good innovation metrics (Gama et al. 2007) in order to reach organizational goals and provide help for opportunity search and problem solution (Mundy 2010). Previous research has noted that management and control of innovation depends on the specificities of innovation, which varies between different organizations and projects (Fried et al. 2017). Different types of innovation require different control mechanisms (Davila et al. 2009; Chenhall & Moers 2015) as well as different times require distinct controls and divergent usage (Barros & Ferreira 2019). *The findings of this study show that various different control mechanisms are applied to innovation supporting divergent areas in organization.* However, showing inconsistent findings whether different innovation requires different controls. Separate phases of the innovation process have distinct demands regarding innovation control (Saunila & Mäkimattila 2018) and different project stages require evolvement from MCSs as the information needs changes (Chiesa et al. 2009). *This study suggests that MCSs can enhance innovation process by applying right controls to different innovation process stages.* Opportunity recognition stage in innovation process benefits from indirect type of controls, such as cultural control that advances cross-functional information sharing and acquiring, whereas idea generation stage benefits from controls that are able to integrate ideas around the organization allowing participation of all organizational participant. Controls applied to idea evaluation stage should perform evaluation in cross-functional teams and verify suitability for organizational strategy. Also, systems

advancing the knowledge regarding customer- and market needs are valuable. Experiment and productization phases should have more direct mechanisms, such as budgets, that are able to control execution costs and resources allocation. Whereas controls applied to product to market stage, should be able to measure customer satisfaction, compare gains and possible profit to costs of innovation, as well as share the learnings in organization.

As well managed innovation is an integral part of an organization's strategy and activities (Gama et al. 2007, 418). In most cases, organizations have defined separate innovation strategy in order to define how different types of innovations and the associated patterns of resource have been allocated (Varadarajan et al. 2018; Pisano 2015). The use and design of the management control system varies and depends on aspects such as type of innovation and locus of innovation and therefore the role of the MCS differs between the different innovation strategies. Radical innovation redefines the company's future strategy in a significant way, whereas incremental innovation modifies it slightly (Pisano 2015). This study was not able to define how the role of MCS differs between the different innovation strategies, due to lack of redefined strategy. Therefore*, this study suggest that innovation strategy should be aligned with the organization´s strategy that defines "guidelines" for innovation but is also able to challenge the overall strategy.*

Different control mechanisms can function in enabling or coercive ways (Adler & Borys 1996). Today´s controls can be directing, guiding, enabling and supportive at the same time leaving space for creativity and innovation (Pfister 2014). The use of the enabling formalization approach has been brought up by researchers as supporting the innovation process and being more suitable for innovation (Davenport 1993; Davila et al. 2009; Jørgensen & Messner 2009; Guo et al. 2019; Beuren & Bernd 2021). The balance can be found when formal procedures are designed and implemented as enabling rather than coercive measures (Adler & Borys 1996) and by designing MCSs that fosters creativity and simultaneously provides boundaries and information (Speklé et al. 2017). Nature of MCS being either enabling or coercive depends primarily on an optimal fit (Fried 2017). *The finding of this study show that innovation requires enabling- and coercive controls, depending on the best organizational and situational fit. This study supports the view of favouring enabling design in controls in innovative set-up and have coercive design in controls that necessarily need it.*

This study´s findings regarding the purpose of MCS were in line with McCarthy and Gordon (2011), who stated that MCSs should offer freedom within boundaries in innovative set-up. Nowadays control systems contribute mainly to flexibility and autonomy and the scope includes strategy and aspects of value creation, such as identification, measurement, and management of value drivers that guarantee customer satisfaction, investor return and organisational innovation (Barros & Ferreira 2019). Control systems advance decision-making across the innovation process (Pfister 2014) and smooth information flows (Lopez-Valeiras et al. 2016). *This study shows that the role of MCS in innovation enhancement is in providing help in opportunity search, problem solution, task assignments, for critical thinking, and aligning with strategy, as well as to provide limits to activity and visibility through organization. MCS can also increase knowledge and visibility, and enable, follow and track activities, enable research and innovation culture, as well as exercise control to reach goals, facilitate information flows, improve compliance, ensure and improve quality, contribute to flexibility and autonomy, offer transparency and maintain business. This study confirms that in order to enhance innovation in organization, MCS needs to be flexible to use and easy to access. It should not be too bureaucratic nor time consuming to use, and not involve too many reporting requirements. It would be beneficial for the MCS to gather most of the information in same space, include metrics applicable to innovation and focus on right objects and measurements.*

Regarding management control systems research, vast majority of previous research defines MCS as system that managers use (Anthony 1965; Merchant & Van der Stede 2012). Participants of the entire organization are often encouraged to take part in innovation and innovation management is not limited to the activity of managers only. This study showed that management control systems are used by other participants in organization in addition to managers and therefore *this study suggest considering definition to describe MCS, that covers other organizational members on top of the managers.* The previous evidence in management control systems research has disregarded the fact that control components are part of a more extensive control system whole and connected to each other as well as impacted by other MCSs (Abernethy & Brownell 1997; Chenhall 2003; Malmi & Brown 2008). When systems are collectively operating together in order to ensure the achievement of organizational goals, they form a MCS package (Bedford et al. 2016). Management control dealing with innovation

cannot be limited to traditional accounting measures (Davila 2000) and must be studied in combination with other management control practices (Pfister et al. 2023). The findings of this study showed that different types of management control systems were applied to innovation and these systems operate collectively to support innovation management practises and ensure the achievement of organizational goals, *hence this study agrees with previous views highlighting the importance of reviewing different control components applied to innovation.* The findings of this study did not reveal any control components in addition to mentioned ones in the framework, *therefore confirming the suitability of framework by Malmi and Brown (2008) in innovation research and suggesting to study management control systems as a collective package within innovative environment.*

Innovation performance in this study is understood as a result that arises from the innovation process, which includes the development and implementation of innovation activities (Robertson et al. 2023). As organizations lack good measurement practices and methods within the innovation management due to the complexity of measuring innovation and inaccessibility (Adams et al. 2006), *this study brings up the possibility to utilize data obtained from organization´s management control systems, in order to generate metrics to demonstrate the value that innovation brings and presents in organization.*

Overall, *the empirical findings of this study support the theoretical framework of this thesis at large extent. The discrepancies between the findings and the theoretical framework does not disprove the previous literature but complements it.* The inconsistencies found are most likely related to the fact that the corrected and supplemented factors in section 4.4.2 are very company-specific and vary depending on which company is being studied. To sum up, management control systems can enhance innovation in organization in many ways as being applied in innovation management. Organizations can enhance innovation by MCS by considering the different factors within their innovation management and verifying suitable control for different factors by favouring enabling design but based on optimal fit. MCS should be studied as a combination in organization and systems should have specific features in order to enhance innovation. MCS can also advance the discovery of suitable innovation performance measurements.

5.2 Managerial recommendations

For organizations, this study provides evidence that management control systems can be applied in innovation management to enhance innovation in organization. Enhancing does not necessarily mean to increase the amount of innovation, but also improve ways of working with innovation to be more effective and efficient. Innovation management is an important area that requires careful consideration, as the results rising from that defines organization´s innovation performance. The findings of this study shows that many organizational participants use different control systems in their daily work. By applying suitable controls with correct features to different areas of innovation management, employees working with innovation can benefit from these systems in their work significantly, which in itself already enhances innovation. Related to the control in innovation, managers should note that the findings of this study showed that employees working with the innovation views controls as a way to "set boundaries that defines the direction". Innovation control should not be too controlling but completely free hands is also not an optimal situation.

This study highlights the importance of organizational culture in innovation management for managers. Organizational culture and structure that provides and supports open communication through the whole organization, as well as value collaboration and knowledge sharing have very important effect on innovation management. The culture must also be able to offer atmosphere where everyone can afford to fail. When innovation culture is spread through whole organization, it influences the attitudes of employees, which can generate valuable ideas coming from various locations of the company. Innovation benefits from perspectives that come from all levels of the entire organization, and not just from those employees who are working directly with it. The importance of the number of ideas in the innovation funnel was very much emphasized factor. Management style that provides good conditions for innovation is supportive, ready to take actions, courageous and has good risk tolerance. The participants of this study emphasized the importance of challenging their opinions and actions by management and other organizational participants, and also highlighted the importance of understanding that not all innovations are "superstars" and many won´t fly.

The final suggestion for management involved with innovation is related to innovation measuring. Managers should note that innovation cannot be measured by profit and loss

way of thinking. Innovation requires carefully planned and designed ways to measure it. Tools, such as innovation scorecard could offer framework to work with innovation, where internal and external factors would be comprehensively considered. One interviewee of this study also made an interesting observation regarding reward control. Reward control can strongly support the achievement of the goals, if they are well planned and correctly set within the team, because the employees have been especially very goal-oriented in order to achieve their own goals set as short-term incentives. When the separate goals of individuals are planned as together to form team's key performance indicator targets for the year, the probability of achieving these goals is very high.

5.3 Limitations and future research suggestions

Limitations of the study are following. First, this study is based on an assumption that management control systems support innovation instead of restricting them. Specific control systems have not been verified related to which kind of impact they have on innovation. Second, this study is limited to a single case study of one business unit within one company in order to keep the research scope reasonable. As this study uses qualitative research methods in order to research how management controls systems can enhance innovation in organization in a case company, its research findings are limited to theoretical generalization. In case the other organizations have similar components, than used in the case company, the findings of this study may be reflected to apply to different situations. Alternative way to conduct this study, could have been to conduct a multiple case study or a comparative case study including several business units in a same company, entire company, or several separate companies from the same industry. These alternative methods could have enabled to do a comparison and get more empirical evidence for the analysis and to base the findings of the study. Additionally, the results of this study might not be straight comparable to other studies, in case the environment of the comparable company is different. Fourth, this research focuses on management control systems and innovation, and how MCSs can enhance innovation in organization, all being wide concepts including many aspects and components. This might lead to situation, where some parts of the processes and activities related to concepts have been missed or they are not described well in detail. As innovation appears in many forms, this study focuses only on the type of innovation that appears within the case company´s context. Fifth, the definition on management control systems used in this study is not

limited to management actions, but includes all organizational participants, which should be considered when comparing the findings of this research.

Based on this study, the future research could continue to explore how different controls based on management control system package appear in various innovative environments in practice. This would generate more insightful theory focusing on how different management controls are implied in innovation as well as show how the innovation could be enhanced with the support of controls. Moreover, future research could study different type of organizations including large and small to medium sized and generate more comparable findings. Additionally, the future research could consider the users of management control systems to contain all organizational participants at larger extent, instead of focusing on managers only.

6 SUMMARY

Innovation is significantly important to organization's success in today's highly competitive and constantly changing business environment. Organizations need to drive value creating activities in order to ensure their long-term success and improve their performance, which generates many opportunities and possibilities for businesses to renew themselves. However, innovation is a complex phenomenon, that involves high degree of uncertainty and requires high investments and long-term approach. This has created a need for organizations to re-think their procedures and systems to be able to control their operations and ensure the efficient use of their limited resources and investments in innovation. The need for control creates tensions when applied to innovation, which requires certain level of flexibility and space for creativity, as control has seen hindrance to creativity and therefore restricting innovation.

Recently, management control systems have been found to be useful tools in uncertain environments and their suitability for innovation has raised an interest of organizational participants and researchers. Thus, motivating to conduct this study aiming to explore how management control systems can enhance innovation in organization. Three sub-objects were generated in order to understand, how innovation is managed, how management control systems are applied in innovation and what kind of features are required from management control systems to enhance innovation. The initial framework was built based on factors appearing from existing literature regarding innovation management, innovation performance, innovation strategy, management control systems and different usage of controls.

Qualitative research method was applied to this study and the data was collected by conducting semi-structured interviews. Open-ended interview questions were generated from theoretical framework. Four informants were interviewed from one company´s innovation unit. All informants were working with innovation in their daily role. Interviews were recorded and further transcripted into text format for the purpose of data analysis. The data was coded according to themes visible in the operationalization table of this study. This study is based on the assumption, that management control systems support innovation in organizational set-up and controls applied to innovation may have enabling and coercive design. Additionally, the use of management control systems is not limited to management but covers all organizational participants. Management control

systems were studied as a package according to framework by Malmi and Brown (2008) as suggested by recent research.

This study's empirical findings support the theoretical framework of this study at large extent. Factors affecting innovation management were mostly in line with the previous literature and almost all different controls existing in MCS package framework were found from the case company. The controls of case company were mostly designed with enabling features. However, some controls such as governance structure, organization structure and financial measurements requires coercive control characteristics. Understandably, when the Company X is a public organization, the operation obliges certain coercive controls. However, these were not seen as limiting the actions of informants.

According to findings of this study, organizations could benefit from comparing their MCS package to factors affecting and involved in their innovation management practises and balance the usage of enabling and coercive forms of control on them. Especially, different innovation process stages benefit from divergent control systems. Innovation is favouring the use of enabling control, but the balance is based on optimal fit. MCS applied to innovation should offer advanced visibility, communication, information sharing and collaboration, which are characteristics supported by enabling design of MCS. The role of coercive controls is providing necessary limits to action and compliance. MCS package can also be applied to advance measuring of innovation performance and generate metrics for assessing the value of innovation, which have been considered challenging tasks.

The results of this study are beneficial for organizational participants working with the innovation. The results provide insights how management control systems can be used in innovation management in order to enhance innovation in organization. This study might also offer valuable information for people working with innovation and interested to gain more knowledge on possibilities of management control systems when applied to innovation.

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Appendices

Appendix 1 Interview guide

Introduction

-Could you tell briefly about your background and current position?

-How long have you been with the company?

-What type of innovation are you working with?

Theme 1: Innovation in organization

- How would you describe innovation in your organization?
- How important is innovation to the organization that you work for? Why?
- What are the most important conditions for innovation in organizational?
- How organizational structure supports innovation in company that you work for?
- What kind of innovation strategy does your company have? How does it link to the overall strategy of the organization?
- How is your organization coping with the uncertainty related to innovations?
- How do you see your organization working with the innovation in the near future?

Theme 2: Innovation Management

- How do you think that innovation needs to be managed and/or controlled? Why?
- What are the main challenges for managing and/or controlling innovation?
- How is innovation managed and/or controlled in your organization?
- How is innovation performance measured in your organization?
- In your opinion, what are the key elements needed to enhance innovation in organizations?
- How is your organization trying to enhance innovation within the organization?

- Could you provide some examples of the situations, when the innovation was successfully enhanced in organization and when not? What could have been the reasons for success and failure?

Theme 3: Management control systems

- Which kind of management control systems you are using? Could you give some examples on what kind of purposes these systems are used and how they are formed?
- Which management control systems do you consider to be particularly important for you? Why?
- Do you consider that some management control systems are not particularly important for you? Which ones? Why?

Theme 4: Innovation enhancement by Management control systems

- How management control systems impact innovation?
- How have management control systems helped you working with innovation? Could you provide some examples?
- Do you feel that different types of innovations require different types of management control systems? Could you provide some examples?
- How would you describe the role of management control systems, when enhancing innovation in organization?
- In your opinion, what are the key features that management control system should have in order to enhance innovation in organizations?
- Which management control systems you would find important for enhancing innovation within your organization, that does not currently exist in your organization? Why you find them important?

-Does anything else come to your mind that you would like to share?

Appendix 2 Data management plan

ENHANCING INNOVATION IN ORGANIZATION BY MANAGEMENT CONTROL SYSTEMS

Research data

List of research data:

Research data type	Contains minimal personal information (names, roles, career background information)	I will gather/produce the data myself
Recorded interviews	Yes	Yes
Transcribed recordings into the text for analysis	Yes	Yes

Processing personal data in research

Does your data contain personal data?

- My data contains personal data

My data contains minimal personal identifiers such as names, roles and career background information. In order to comply with the EU's General Data Protection Regulation (GDPR) and the Finnish Data Protection Act., the participants are provided with a Data Protection Notice.

Who is the data controller?

- Student

I am solely responsible for controlling the data in this research.

Permissions and rights related to the use of data

Who has collected the data you use in your research?

- I have collected the data

Data collected in this research is primary data. The researcher handles the data confidentially and uses pseudonyms, so individual persons cannot be identified. The code key for name data is in the possession of the researcher. The interview material is stored pseudonymized (using pseudonyms) in the online database of the University of Turku, where only the researcher has access. She undertakes not to disclose confidential, personal information to outsiders.

If you use data that you have collected by yourself you may need separate permissions to use the data you collect or produce, both in research and in publishing the results. If you are archiving your data, remember to ask the research participants for the necessary permissions for archiving and further use of the data. Also, find out if the repository/archive you have selected requires written permissions from the participants.

Research participants are provided with the consent form for collection, storage and use of data, as well as with data protection notice before the interviews. Participant´s consent will be confirmed and recorded orally at the beginning of the interview.

If you use data that someone else has collected: do you have the necessary permissions to use the data in your research and to publish the results? Are there copyright or licencing issues involved in the use of the data? Note, for example, that you may need permission to use the images or graphs you have found in publications.

Secondary data used in this research contains publicly available academic articles and publications. There are not copyright or licensing issues involved in the use of that data.

Storing the data during the research process

Where will you store your data during the research process?

- In the university-provided Seafile Cloud Service

Interviews are recorded by using case company provided Microsoft Teams conference tool. For the purpose of data analysis, interview recordings are converted to text format reports, using Teams transcript tool. Recordings and transcriptions will be set to expire in 1 day after the interview in company provided Teams program and will be moved immediately to Seafile Cloud service. Transcripts are analyzed in NVIVO software. These university provided programs operate in line with GDPR requirements and are authorized to be used in research.

If you don't use University's data storage services tell, where are you going to store your data and specify how you will ensure data security and file backups?

Question not answered.

Documenting the data and metadata

Can you describe what has happened to your research data during the research process? Data documentation is essential when you try to track any changes made to the data.

- To document the data, I will use A separate document where I will record the main points of the data, such as changes made, phases of analysis, and significance of variables

If you don't use any of the above mentioned, describe, how you document your research process?

Question not answered.

How will you keep your data in order and intact, as well as prevent any accidental changes to it?

- Version control: I will plan before starting the research how I will name the different data versions and I will adhere to the plan consistently
- I will keep the original data files separate from the data I am using in the research process, so that I can always revert back to the original, if need be

Metadata is a description of you research data. Based on metadata someone unfamiliar with your data will understand what it consists of. Metadata should include, among others, the file name, location, file size, and information about the producer of the data. Will you require metadata?

- I will not store my data into a public archive/repository, and therefore I will not need to create any metadata.

Data after completing the research

What happens to your research data, when the research is completed?

I will destroy all data after Master´s thesis has been graded, max 1 year after the collection, because I am not able to confidentially store the data after graduation from University of Turku.

If you will store the data, please identify where and for how long?

Appendix 3 Informed consent

UNIVERSITY OF TURKU

Consent for the Collection, Storage and Use of Data

Date: 4.3.2023

Research topic: Enhancing innovation in organization by management control systems
Responsible researcher: Miia Juottonen

Dear Research Participant,

Thank you for participating in this research.

Enhancing innovation in organization by management control systems forms the master's thesis research of Miia Juottonen, a student at the University of Turku School of Economics. In connection with this, Miia Juottonen conducts interviews with the aim of finding out how management control systems can enhance innovation in organization.

The interviews will be carried out in March 2023 and 4 participants will be invited. The interview lasts about an hour and is recorded with the interviewee's permission. Participation in the interview is completely voluntary and you can withdraw from the study if you wish and cancel your participation in the middle of the research process, without having to give a reason. There is no harm in refusing or withdrawing in the middle of the research process, and any material already collected will be destroyed within a week.

Individual persons are not identified in research reports. The researcher handles the data confidentially and uses pseudonyms, so individual persons cannot be identified. The code key for name data is in the possession of the researcher. The researcher undertakes not to disclose confidential, personal information to outsiders. Interviews will be recorded and transcribed into text format by using case company provided conference tool. Research materials are moved and stored in the online database of the University of Turku, where only the researcher has access and set to be deleted from case company tool in 1 day after collection. Pseudonymized data is further analyzed using authorized research software. Only software's authorized to be used in research and operating in line with GDPR requirements will used in this research. The student destroys all research materials when the master's thesis has been graded, max 1 year after the data collection.

A master's thesis will be published on the research results. In addition, the results obtained from the material are used when looking for opportunities and ways to enhance innovation in the organization. If the material is used for scientific publications more widely than this, permission will be asked separately from the participant. As a risk of the study, the participants may experience sharing personal information with the researcher. I emphasize that the participants' safety, identity, privacy, health and well-being are taken into account and protected in all stages of the research and that the researcher undertakes to follow good scientific practices (https://tenk.fi/en/advice-and-materials/guidelines-ethical-review-human-sciences) and high-quality research ethics.

Participant´s consent will be confirmed and recorded orally at the beginning of the interview. With oral approval, the participants confirms that they have familiarized themself with the above information and that they have received sufficient information about the study and the collection, processing and storage of data in connection with it, as well as that they have received sufficient answers to all questions regarding the study and have had sufficient time to consider participating in the study. By confirming, the participant understands that participation in this study is voluntary. The participant has the right to suspend and cancel participation in the study at any time and without giving a reason.

More information regarding the data protection of University of Turku: tietosuoja@utu.fi

Privacy Notice of University of Turku: https://www.utu.fi/en/privacynotice

Data Security description of University of Turku: https://www.utu.fi/en/privacydata-security-description

In case of the further questions, please contact: miia.a.juottonen@utu.fi

Appendix 4 Privacy notice

Information for participants of the research project "Enhancing innovation in organization by management control systems"

You are taking part in a scientific study conducted at the University of Turku. This notice describes how your personal data will be processed in the study.

1. Data Controller

Researcher: Miia Juottonen

Contact person in matters concerning the project:
Name: Miia Juottonen
Address: Salakkatie 8-12 B 13, 02170 Espoo
Tel.: +358 40 1531 558
E-mail: miia.a.juottonen@utu.fi

2. Description of the study and the purposes of processing personal data

Enhancing innovation in organization by management control systems forms the master's thesis research of Miia Juottonen, a student at the University of Turku School of Economics. In connection with this, Miia Juottonen conducts interviews in order to find out how innovation is managed in organization, which kind of management systems are used for innovation and how management control systems impact innovation, with the aim of finding ways to enhance innovation in organization by management control systems. The collection of personal data will be minimized during interviews. Introduction section of interviews include personal data, such as interviewee´s name, background and work-related info, but individual persons are not identified in research reports.

3. Principal investigator or research group

Name: Miia Juottonen
Address: Salakkatie 8-12 B 13, 02170 Espoo
Tel.: +358 40 1531 558
E-mail: miia.a.juottonen@utu.fi

4. Contact details of the Data Protection Officer

The Data Protection Officer of the University of Turku is available at contact address: dpo@utu.fi.

5. Persons processing personal data in the study

Processing of personal data in this study is limited to Miia Juottonen.

6. Name, nature and duration of the study

Name of the study: Enhancing innovation in organization by management control systems

Duration of the processing of personal data: Student destroys all data including personal data after Master´s thesis has been graded, max 1 year after collection.

7. Lawful basis of processing

Personal data is processed on the following basis, which is based on Article 6(1) of the General Data Protection Regulation:

☒ data subject's consent;
☐ processing is based for the performance of a contract;
☐ compliance with a legal obligation to which the controller is subject;
☐ processing is necessary in order to protect the vital interest of the data subject;
☐ performance of a task carried out in the public interest or in the exercise of official authority vested in the controller:
  ☐ scientific or historical research purposes or statistical purposes;
  ☐ archiving of research materials or cultural heritage materials;
☐ legitimate interest pursued by the controller or by a third party.

8. Personal data included in the research materials

Introduction section of interviews include personal data, such as interviewee´s name, background and work-related info, but individual persons are not identified in research reports. The researcher handles the data confidentially and uses pseudonyms, so individual persons cannot be identified. The code key for name data is in the possession of the researcher. The interview material is stored pseudonymized (using pseudonyms) in the online database of the University of Turku, where only the researcher has access. She undertakes not to disclose confidential, personal information to outsiders.

9. Sensitive personal data

There is no sensitive personal data will be processed in the study.

10.Sources of personal data

The personal data is gathered from face-to-face interviews and online interviews. In case additional personal data (not listed in section 8) come up during the interviews, it will be deleted from the research materials before archiving materials for further data analysis and generation of research result.

11. Transfer and disclosure of the personal data to third parties

The personal data will not be transferred to other recipients outside the University of Turku/research group/researcher.

12. Transfer or disclosure of personal data to countries outside the EU/European Economic Area

Personal data will not be transferred outside the EU/ European Economic Area.

13. Automated decisions

No automated decisions are made.

Safeguards to protect the personal data:

☒The data is confidential.
☒ Protection of manual material:
-Interview recordings are stored in university provided Seafile cloud service.
-Text format materials are stored pseudonymized.
-The code key for name data is in the possession of the researcher.
☒ Personal data processed in IT systems:
-Interview recordings are password protected.
-NViVO software is used for the purpose of data analysis. NViVO software is authorized to be used in research and comply with GDPR requirements.

Processing of direct identifiers:

☒ Direct identifiers will be removed in the analysis phase
☐ The material to be analysed includes direct identifiers.
Reason:

14. Processing of personal data after the completion of the study

The research material will be deleted after Master´s thesis has been graded, max 1 year after collection.

15. Your rights as a data subject, and exceptions to these rights

Miia Juottonen can be contacted for more details about rights according to GDPR.

Exceptions to data subject rights

Under the General Data Protection Regulation and the Finnish Data Protection Act, certain exceptions to the rights of data subjects can be made when personal data is processed in scientific research and fulfilling the rights would render impossible or seriously impair the achievement of the objectives of the processing (in this case, scientific research).

The need to make exceptions to the rights of data subjects will always be assessed on a case-by-case basis. It is likely that exceptions to the following rights will be necessary in this study:

☐ Right of access (GDPR Article 15)
☐ Right to rectification (GDPR Article 16)
☐ Right to erasure (GDPR Article 17)
☐ Right to restriction of processing (GDPR Article 18)
☐ Right to data portability (GDPR Article 20)
☐ Right to object (GDPR Article 21)

Reasons and the extend for the exceptions:

Right to lodge a complaint

You have the right to lodge a complaint with the Data Protection Ombudsman if you think your personal data has been processed in violation of applicable data protection laws.

Contact details of Data Protection Ombudsman:

Office of the Data Protection Ombudsman
Visiting address: Lintulahdenkuja 4, 00530 Helsinki
Postal address: P.O. Box 800, 00531 Helsinki, Finland
E-mail: tietosuoja(at)om.fi
Switchboard: +358 (0)29 566 6700