

MIN 5100
Master's thesis

How is the innovation process developed in traditional companies by combining the plan-oriented and flexible process models, and in which situations is it utilized?

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Preface

This master's thesis marks the end of two insightful and exciting years as students at Kristiania University College in innovation management.

We wish to direct a huge thank you to our two professors who have helped us, guided us and encouraged us through this final and vital semester. They have given us the motivation to aim high, both academically and in our jobs after the study's end. Your critical eye has made these past few months tough, but fun. Resulting in a master's thesis we can say that we are proud of, and the process of writing it has been more rewarding than we thought in April when the first extensive feedback arrived. This threw us for a loop, but we are glad it did.

Thank you to all our professors throughout the last two years for showing us what it means to focus on how to use the different approaches to innovation in a practical manner. This has given us tremendous knowledge for our future careers and will be the pillar of how to incorporate an innovative mindset, no matter the company we end up working in.

We also want to thank all nine interviewees for taking their time for both interviews, follow-up interviews and observations. Without the openness and willingness from you, this research would not be as exciting to write as it has been. All of you have made us even more sure about innovation being the right choice of profession, and we look forward to seeing you, hopefully, soon.

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Abstract

This paper analyzes how the innovation process is developed in traditional companies by combining the plan-oriented and flexible process models, and in which situations it is utilized. To answer the research question, a multiple case study was selected. This research compared three traditional manufacturing companies within the same industry with in-depth interviews, follow-up interviews, observations, and secondary research. Traditional manufacturing companies today have begun to focus more on innovations, even so, how they organize for innovation differ amongst the companies. Five out of the eight boundary conditions presented by Paluch et al., (2019), proved highly important for the traditional companies researched, but the findings revealed investment and time influence, strategic fit and willingness to change and mindset to be of equal importance for selecting the general Hybrid innovation process. Nevertheless, three separate situations were revealed to affect the development of the combined process in traditional manufacturing companies. These situations were then based on four out of nine conditions initially found through both expected and observed pattern matching during the analysis; investment, consumer preferences, managerial control, and approach to risk. The different combination of the conditions resulted in three situation-based approaches to the Hybrid process model: short-term incremental-, short-term radical- and long-term radical innovations. From a theoretical perspective, this study emphasizes a need for a combined process. When considering large traditional manufacturing companies' approach to innovation and how the degree of leaning towards the Agile or Stage-Gate method, whilst still being a Hybrid process, highly varies based on the innovational situation related to time and radicality. From a practical perspective, the three combined processes developed through research can serve as a guideline for innovation managers and help simplify the practice for mutual understanding of how to organize the innovation process based on three separate situations.

Sammendrag

Denne studien analyserer hvordan innovasjonsprosessen utvikles i tradisjonelle selskaper ved å kombinere de plan-orienterte og fleksible prosessmodellene, og i hvilke situasjoner de blir benyttet. En case studie med fokus på tre bedrifter ble valgt for å kunne besvare forskningsspørsmålet. Studien sammenlignet tre tradisjonelle produksjonsselskaper innen samme bransje, ved å utføre dybdeintervjuer, oppfølgingsintervjuer, samt ved bruk av observasjoner og sekundærdata. Tradisjonelle produksjonsselskaper har i dag begynt å legge mer vekt på innovasjoner, likevel, hvordan de organiserer for innovasjon varierer i stor grad. Fem av de åtte betingelsene presentert av Paluch et al., (2019), viste seg å være svært relevante for selskapene som ble undersøkt. I tillegg avslørte funnene at investeringer og tid, strategisk overensstemmelse og endringsvillighet, samt holdninger var like viktig for å kunne fatte en beslutning om hvilken innovasjonsprosess som egnet seg best. Videre ble det identifisert tre separate situasjoner som påvirket utviklingen av kombinerte prosesser i tradisjonelle produksjonsselskaper. Disse situasjonene ble basert på fire av ni betingelser tuftet på både forventninger knyttet til teori og funn fra primærdata; investeringer, forbrukerpreferanser, leder-kontroll og deres tilnærming til risiko. De ulike kombinasjonene av betingelsene resulterte i tre situasjon-baserte Hybridmodeller; kortsiktig inkrementell-, kortsiktig radikal- and langsiktig radikal innovasjon. Fra et teoretisk perspektiv fremhever denne studien et behov for en kombinert prosess. Hvordan store tradisjonelle produksjonsselskaper tilnærmer seg kombinasjonen av en Agile og Stage-Gate prosess og hvorvidt de lener seg mot det fleksible eller plan-orienterte, har stor tilknytning til både grad av radikalitet og tid. Fra et praktisk perspektiv, kan de tre utviklede kombinerte prosessene opptre som retningslinjer for innovasjonsledere i et tradisjonelt selskap, og i tillegg forenkle den felles forståelsen for hvordan organisasjonen best kan tilnærme seg innovasjon basert på tre ulike situasjoner.

1.0 Part I — Introduction paragraph

1.1 Introduction

There is no secret that larger and more traditional manufacturing companies often *have* the resources to stay on top of trending innovation, but how organizations choose to organize for innovation can differ depending on the situations and different boundary conditions. In the earlier days, organizing in organizations was mostly connected to economic production of material goods. In the research done by Paluch et al., (2019) it is revealed how traditional companies have begun to investigate how IT is organizing for value creation. This has resulted in multiple traditional companies across the world starting to resemble software development with a more Agile approach (Cram & Newell, 2016). On the other hand, the Stage-Gate process is still well-established in traditional companies due to the strategic handling of risk through rigid go/kill gates. Cooper et al., (2020) has given focus to agility in physical products in relation to new-product portfolio management, to explore solutions and challenges emerging in connection to the portfolio and projects. For this research area the portfolio management will not be discussed, nonetheless, the portfolio as a barrier of entry will be included as a factor affecting why traditional companies select their innovation process.

The research has revealed that traditional companies are considering the Agile methods complementary to Stage-Gate as a Hybrid model, to meet the rapidly changing demands in the market. Cooper (2017) has previously investigated incorporating Agile methods to the traditional Stage-Gate process. He expressed that there is ‘no one size fits all’, and that companies need to evaluate which Agile elements best suit their practice, strategy, and industry. This study dives further into this, by examining which elements of Agile practices are chosen for different situations within the same industry. In relation to the new product development (NPD), Paluch et al. (2020) examined which conditions to consider when distinguishing between the plan-oriented Stage-Gate process and the flexible Agile method, whereas how the combined approach is developed to which situations has not yet been addressed, which will be the focal point of this research. The backbone throughout this research will be the article by Paluch, Antons, Brettel, Hopp, Salge, Pillar and Wentzel

(2019), and because of the maturity of the research on innovation processes, the flexible pattern matching approach (FPMA) will be utilized to uncover (in)consistencies between prior theory and new findings. Lastly, in this study, the use of the word “flexibility” refers to Agile methods, “plan-oriented” is used to describe Stage-Gate as a process and “combined” relates to the Hybrid process model.

1.2 Reason for chosen research area

Traditional companies often struggle to come up with highly innovative solutions since their innovation process usually reflects the need for detailed and upfront planning, making it difficult to handle an innovative project as its requirements are complex, the solution is undefined and there is a lack of information available from similar projects (Davies & Brady, 2016; Paluch et al., 2019). Complex and traditional companies are said to lean in favor of the more profitable, stable, and efficient (Gebhardt, Riel & Maes, 2019), but contingencies such as the uncertainty in the environment, organizational size and strategy affects the organization (Donaldson, 2001). Ettie and Elsenbach (2007) mentions how companies today often utilize Stage-Gate as a plan-oriented process, which can be seen to manage risk of innovation due to the immense corroboration. Conforto and Amaral (2016) addresses the high need for simplicity and flexibility in businesses' new product development strategies and their framework.

In recent years the demand has shifted from the traditional incremental innovation aspect to a more radical innovation orientation (Salomo, Gemunden & Leifer, 2007), which challenges the NPD theory. Already in 2008, Cooper expressed the importance of integrating agility and flexibility to the Stage-Gate model to manage the vastly dynamic environment connected to certain projects. On that note, Lee, DeLone and Espinosa (2006) argued that traditional NPD processes, such as Stage-Gate, are best suited for large and complex programs, and Boehm and Turner (2004) highlight the difficulty of balancing regulation and agility. Considering prior theory connected to the flexible Agile and plan-oriented Stage-Gate approach to innovation processes, scholars have explored the option of combining these approaches in a Hybrid process model (Conforto & Amaral, 2016). Nevertheless, large and established firms commonly rely on the use of functional departments compared to the more ‘learn as you go’ mindset which is often adapted in early-stage firms (Marion, Friar & Simpson, 2012). Cooper (2008) addressed how there is recognized a need for higher flexibility and agility in a

combined process such as a Hybrid model in traditional companies. The following research question has its basis in the information presented above and will be the focal point for the study.

Research question: *How is the innovation process developed in traditional companies by combining the plan-oriented and flexible process models, and in which situations is it utilized?*

1.3 Delimitations

The research question in this study examines how the traditional companies organize their combined innovation process in relation to Paluch et al., (2019) contingencies, seen as boundary conditions for choosing to work closer to either a Stage-Gate or an Agile approach. However, out of the eight contingencies presented in the article, three will not be included in the research; task modularity, customer willingness to interact and customers approach to products. To narrow down the research (Silverman, 2014, p.35), the main focus will be what affects the choice of combined innovation process, and not the general innovation process in its entirety. The study focuses on large traditional companies within the manufacturing industry in possession of a department for innovation, thereby excluding the often smaller, less traditional companies without the resources to uphold a separate innovation department.

2.0 Part II — Theory

2.1 The innovation process

Being innovative requires the ability to spot opportunities and see connections that can be taken advantage of. Innovation can take form in several ways, such as finding a new market to serve or serving an established market in new ways (Tidd & Bessant 2020, p. 6). In retrospect, companies have always had to consider changing their current practice and offer, to survive and grow (Tidd & Bessant 2020, p. 15). For a company to be innovative they need to have an idea to put into the world, and one of the key lessons within innovation is that knowledge sharing needs a form of demand. This is called the need-pull effect. It will not be enough to simply have an idea if there is no need for it (Tidd & Bessant 2020, p. 220). This is where the process of innovation begins — identifying an opportunity. Opportunities can vary

and will also be dependent on the industry in which a company operates. To paint a picture of the general practice of organizational behavior and development, Tidd & Bessant (2020) explained how the first thing that has to be done, after finding an opportunity to exploit, is to assemble a team working innovatively. This team can be either functional, cross-functional or a matrix of the two, meaning the degree of collaboration can vary between the different departments in the company.

The process of NPD takes a product from an idea and turns it into a success with a gradual process which includes reducing the uncertainty by taking the project through a series of stages. Tidd and Bessant (2020) identified four key phases forming the innovation process; Search, Select, Implement and Capture. Within these it is known to arise certain challenges that the company has to deal with, such as choosing what ideas to proceed with or not (Tidd & Bessant, 2020, p. 22). Furthermore, an innovation will only be successful if the company is able to tackle each phase. During these four phases it is important to keep an eye on the market and technology related streams at all times (Tidd & Bessant, 2020, p. 220). Their model for innovation can be seen as a linear, plan-oriented process, monitoring the development as it unfolds. One of the main issues with this type of process is that it becomes increasingly difficult to change direction once investments are made (Tidd & Bessant, 2020, p. 351). For most, managing NPD is about finding the balance between the cost of proceeding with a project that might not be profitable, and closing other projects down too soon and thereby eliminating potential opportunities (Tidd & Bessant, 2020, 351). However, before deciding on an innovative approach, managers are also obliged to evaluate different conditions such as the strategic objectives and the environment of their company (Mills, Berthon, and Pitt, 2019). By having a framework that combines plan-orientation and flexibility, there is a higher chance of obtaining the balance (Du Preez & Louw, 2008). Three different ways of organizing for innovation will be given a further elaboration in the sections below.

2.1.1 The Stage-Gate process

The plan-oriented Stage-Gate process framework serves as a map for conceptualization of projects from idea to launch (Cooper, 2008). The framework provides an overview of the operation when working with NPD (Cooper, 2013). The model displays the different stages and gates a company must go through and is commonly used among companies today (Ettlie

& Elsenbach, 2007). The stages have a planned set-up, including preliminary assessment, detailed investigation, development, testing & validation, and full production & market launch. Alongside these stages there are decision-making points, also referred to as 'gates', in a linear process where extensive documentation is needed across different activities in the NPD (Cooper, 1979). These gates include initial screen, second screen, decision on business case, post development preview and pre-commercialization analysis (Cooper, 1990). For the gates to work efficiently they need a set of criterias that are set to make a Go/Kill decision, for giving an overview of the operation in a structured manner from idea to launch. (Cooper, Edgett & kleinschmidt, 2002b)

In most companies, decisions engage the senior management as they often are known as the 'gatekeepers' (Cooper et al., 2002b). These gatekeepers must be allowed to approve and disapprove the allocation of resources to enable tending of the gates (Cooper, Edgett & Kleinschmidt, 2002a). A common issue refers to how too many senior managers view themselves as gatekeepers, resulting in an abundance of 'gate-keepers' and too slow go/kill decisions (Cooper, 2008). According to Cooper et al., (2002a), research often entails working closely with the customers, listening to their problems, and understanding their operations. By building the voice of the customer into the Stage-Gate process' detailed investigation stage, unmet needs and unarticulated needs can be identified (Cooper et al., 2002a). Without understanding the customer problem, even the most skilled engineers and scientists have been shown to work on the wrong problem and more technical solutions.

According to Cooper (et al., 2002a), some of the benefits of utilizing the Stage-Gate method include increased development speed, better discipline, good quality and an overall improved performance compared to less formal development processes. Else on, in line with Cooper (2008), not all companies manage to execute the different stages correctly. This entails missing steps in the process, leadership or organizational design, which can increase the risk and uncertainty of a project. Handling risks in the Stage-Gate process are often done through the above-mentioned 'gate-keepers'. However, if there are too many projects in the portfolio, the access to resources may be limited (Dye & Pennypacker, 2000). Even though risk is a crucial aspect for innovation, not all companies are able to manage these risks explicitly (Bowers & Kharkian, 2014). Hence, there can be a need for 'tough gates' in between the different stages to manage the necessary risk, by determining which product to continue with

and which to uphold. Each step of the framework proceeds the next and is constructed to gather key information.

The ‘gate-keepers’ aid in selecting go/kill ideas through these tough gates (Cooper et al., 2002b), and not all projects are brought through all stages and can be bypassed based on their performance and costs (Cooper, 2008). The senior gatekeepers meet more frequently when the projects are complex, to make sure the project can continue without contradicting the business strategy or rendering too large of a revenue loss (Cooper et al., 2002b). Each stage closer to launch increases in project costs and is described as an incremental commitment (Cooper, 2008). Cooper et al. (2002a) explains how the best practice firms are looking into ways of improving their initial Stage-Gate approach by improving speed and effectiveness. On the other hand, Cooper and Sommer (2020) highlights the rigidity of the Stage-Gate process in terms of having defined timelines and clear tasks and gate definitions, in comparison to the Agile-Stage-Gate hybrid framework.

2.1.2 The Agile process

The Agile method was first introduced among the software business back in 1990, making it possible to produce initial prototypes in rapid motions (Cooper, 2016). The core of the Agile manifesto underscores the need for customer collaboration, flexibility, adaptiveness to change and tangible prototypes (Beck, Beedle, Van Bennekum, Cockburn, Cunningham, Fowler & Thomas, 2001). Working with Agile methods requires a mindset in line with the Agile values, promoting knowledge sharing and acceptance of change as an embedded part of the process (Sommer, Hedegaard, Dukovska-Popovska & Steger-Jensen, 2015). In addition, companies should not use the Agile methods solely for the purpose of creating new innovative ideas, but to establish a learning environment within the company (Fecher, Winding, Hutter & Füller, 2019).

As opposed to more traditional innovation processes, the flexible Agile method facilitates agility, adaptability and speed when working with a project. It claims to be built upon and embraces risk (Moran, 2014), as the process aims to gain advantages from the risks within a project. Risk management in Agile projects is often treated in an implicit manner, and is sorted into two categories: negative risk and positive risk. Positive risk refers to turning risk into opportunities, whereas the negative risk addresses the possibility of failure by creating

something of low value. Compared to plan-oriented processes, working with an Agile method can be described as a more lightweight process with rapid and nimbler phases (Abrahamsson Warsta, Siponen & Ronkainen, 2003). In general, the method consists of multiple short iterations called ‘sprints’ and are carried out by a dedicated team where they are able to produce a working prototype (Cooper & Sommer, 2016). The prototypes provide essential first-hand information regarding consumer needs, and are listed as a helping hand for creating innovative ideas and products, as well as providing valuable feedback on an idea or product (Enkel et al., 2005; Bruce and Biemans, 1995)

The Agile method is often seen as a more dynamic process in the way the process itself facilitates continuous updates throughout the project (Sommer et al., 2015). The main sprints are broken down into daily sprints with a maximum of two days to complete (Schwaber & Sutherland, 2013). The sprint ends when the time is up, regardless of whether the task has been fully completed or not. A Scrum Guide is often utilized, which consists of three iterative stages: development of product backlog, main sprint, and daily sprints. To keep the Scrum guide method organized, several roles are delegated: The product owner, the Scrum master, and the Scrum-team. The product owner is responsible for return on investment (ROI), making sure that the product meets market demands and approving or rejecting the results after a finished sprint (Koi-Akorofi, Koi-Akorofi & Matey, 2019). The Scrum-master is the one responsible for keeping the Agile mindset alive by making sure the team is working productively, removes obstacles for finishing a sprint, protects the team from other distractions and holds daily scrum meetings. In these meetings the interactions are reviewed, and new iterations are planned. The Scrum-team is made from a cross-functional team, where the leadership varies depending on the different sprints being carried out, and who are able to take charge within a certain area (Koi-Akorofi et al. 2019). In most cases, the team has a high flexibility with a lot of freedom regarding how they wish to work with the sprint, in order to achieve the set goals.

According to Nelson, Taran and Lascurain Hinojosa (2008), the Agile method lacks risk management in the form of not having defined processes or guidelines, strategies for mitigation, repositories for tracking risk and not defining triggers that indicate the need for change within the strategies. The Agile model is also seen to have a insufficient explicit definition of risk, thereby increasing the difficulty of setting risk management into a system (Nelson et al., 2008). Cohn (2010) argued that by handling the riskiest tasks at first, they are

able to eliminate the possible negative risks at an early stage. In general, the individuals working with Agile methods argue that because of the constant feedback within the iterations, they are able to reduce risk before becoming a negative outcome (Moran, 2014).

2.1.3 The Agile-Stage-Gate hybrid process

As companies are facing a fluid market with rapid changes, many manufacturers have started to opt for a more adaptive development method that allows for faster response to sudden changes in customer demands (Cooper, 2017). Some companies have started to adopt the Agile-Stage-Gate Hybrid process, where the two methods are combined to handle bolder and riskier projects in a more dynamic and entrepreneurial way (Cooper, 2011). Some of the benefits for traditional companies using a Hybrid model during NPD includes faster product releases, the ability to respond faster to changes in the market and improved communication among the team (Cooper, 2017). When working with a combined process model, the Agile method is usually incorporated during the development and testing stages within the Stage-Gate process and is normally used most by the team working on the actual development of the product or service (Cooper, 2016).

There is known to arise some challenges for companies adopting flexible process practices into their plan-oriented approach (Cooper, 2008). These include a lack of scalability, the increase in daily meetings and a lack of approval from managers, as a result of unfamiliarity with the new system (Cooper 2016). This was also implied during a study conducted by Sommer et al., (2015) of five companies that implemented the Hybrid model. The findings suggested problems related to delays, resource distribution, fit between the reward system and the methods, and the lack of support towards the Agile mindset among the employees in the company (Sommer et al. 2015). On the other hand, Cooper (2017) mentions tendencies to traditional manufacturing companies adopting the Hybrid approach after reviewing the positive results achieved by software companies. When utilizing a combined method, the process becomes more fluid, meaning that the product is loosely defined, as well as the information around it. Resulting in making investment decisions more difficult in comparison to a purely plan-oriented approach (Cooper & Sommer, 2020).

However, the Hybrid model enables companies to uphold fast paced product releases adapted to the changing customer requirements and intercommunication, which help being certain of

the choices made (Cooper, 2017). Furthermore, it becomes arduous to estimate how many resources the project will need, but by having improved feedback from the customers alongside efficient planning, companies are able to conduct focused editing, thereby handling necessary risk in a manner of confidence towards customer desire (Cooper, 2016).

Additionally, the timed cycle adds a way of handling risk by not allowing the process to get out of hand, but with a lack of a solid foundation to base evaluations on, the Hybrid model creates uncertainty around the project. If so, it makes the Hybrid approach riskier in the eyes of a manager, as opposed to a traditional approach such as Stage-Gate (Cooper & Sommer, 2020). This is due to the need for investing resources in fast prototypes, in order to present a tangible product after each iteration. Contrastingly, there are also benefits to incorporating the Hybrid model, allowing management to keep control where it is necessary to incorporate 'tough gates', but at the same time new challenges arise and are handled during iterative cycles that are used during the new product development process. Cooper (2016) concluded with five bullet points highlighting the Stage-Gate-Agile method accomplishments; ensuring that the product meets the market demand, facing uncertainty, making the development more efficient as well as making the employees more focused and improving the communication within the team.

2.2 Boundary conditions for selecting between Stage-Gate or Agile based on Paluch et al., (2019)

Traditional companies tend to think of innovation as something that can be planned and executed accordingly (Paluch et al., 2019). Agile, on the other hand, is based upon a process with flexible iterative cycles where the planning for the next phase comes from the outcomes of the previous phase. Dziallas (2019) looked into the planned phases for an incremental product and discovered a potential in product development process that was incremental in its nature, to be more explorative and find unique challenges in addition to the repetitive customer requirements. Furthermore, Ghezzi and Cavallo (2020) argued that Agile methods could be applied in companies where the customer requirements and the value proposition are changing continuously. Moreover, in companies where the environmental dynamism is considered moderate, there should be a focus on capturing value through the Stage-Gate approach.

If the environmental dynamism is high, then the company should put their efforts into value creation and value delivery through an Agile process to capture new customer segments (Paluch et al., 2019). Working with uncertain projects with Stage-Gate principles in mind will be arduous as the tasks are unclear and unstable, making it difficult to plan ahead. Similarly, Agile methods might not either be the best fit for all. Bianchi, Marzi and Guerine (2019) explained that if a new product development is more incremental, then using a combination of the plan-oriented Stage-Gate and flexible Agile model might give the best results, because the process becomes iterative, yet time-boxed, and thereby upholding the control of the owners. Should the new product development be more radical in its nature, leaning towards the Agile approach might soothe better for being able to tackle the task ahead. In other words, if the degree of uncertainty is moderate, a combination of the two methods is recognized to be most helpful. If the degree of uncertainty is high, an Agile method is argued to be the best model based on rapid prototype testing and continuous pivots after the iterations (Paluch et al., 2019). There seems to be a choice between efficiency and flexibility in deciding whether or not a Stage-Gate or Agile innovation process is best suited (Paluch et al., 2019). As an example, it is typical for incremental innovations to be managed in pre-planned stages to enhance efficiency, whereas more radical innovations need a more explorative and flexible approach to change.

Selecting when to work Agile or Stage-Gate can also be dependent on the time (Paluch et al., 2020), which can be separated into two different categories: sequential and opportune (Hopp and Greene, 2018). This refers to the choice of organizing for innovation or being an innovative organization. Annosi, Martini, Brunetta & Marchegiani (2020) looked into how organizations not only organize for innovation, but become an innovative organization by making use of the momentum and not following sequential time. It is questioned how organizations can find a way to routinely be innovative regardless of which type of innovation they are looking to develop. For companies today, it is important to be able to know when to switch between the two time-categories. As mentioned, Agile and Stage-Gate tend to vary in how they are suited for different projects (Paluch et al., 2019). The summarization of Pauch et al., (2019) findings can be seen as the boundary conditions for whether or not a company chooses to work with a Stage-Gate, Agile or Hybrid approach to the innovation process. It is argued that there is not 'one size fits all', and that companies have to evaluate their environment and strategic objectives in order to choose what approach might benefit their innovation development (Paluch et al. 2019). According to Paluch (2019)

there are eight contingency factors mentioned to be important in order to understand and explain why a company chooses Stage Gate or Agile:

Technical dynamism deals with the rapid changes in use and incorporation of technology. In a company where the technological dynamism is high, there is a wide use of technical advances in both product development and processes. It is common to make changes in the technical operations, as well as having employees which embrace, and are highly skilled in, using new technologies (Covin, Slevin, & Heeley, 2001).

Solution space refers to the innovation in a process, and how much is possible to plan and execute. If there is a low uncertainty regarding i.g. the product development, customer needs and market trends, then it is possible to plan and execute the process. If there is a high uncertainty, however, planning and controlling the outcome will be more difficult to obtain. (Bianchi et al., 2019)

Customer preferences are important when developing new products. In many traditional companies, incremental innovations are commonly based on repetitive customer requirements (Dziallas, 2019). Contrastingly, customer preferences can also be unknown, thereby increasing the uncertainty which is more common among radical innovations (Ghezzi and Cavallo, 2019). Agile methods place an emphasis on customer feedback, including this as an important part of working Agile.

Customer willingness to interact. For an Agile method to work, by continuously including the customers, there also must be people willing to interact with the development of the product. In product development where Stage-Gate is used, the continuous incorporation of customers might not be as vital regarding extensions of current products (Paluch et al., 2019).

Customer approach to product. Seeing how the Agile method highlights the importance of failure, their customers also have to be willing to interact with beta-products and have a high tolerance for unfinished products and interim failure (Rigby et al., 2016). In other circumstances, customers might not be willing to engage with a try and fail approach, instead they require a fully specified product (Paluch et al. 2019).

Task modularity is often a result of the complexity of the task ahead. In an Agile approach it is typical to divide large tasks into smaller tasks. Working with a more Stage-Gate approach, predefined tasks often dominate the plan for execution.

Tolerance for interim failure might be one of the clearest differences between the Stage-Gate and the Agile methods. As previously mentioned, Stage-Gate aims to minimize risk by incorporating gates with checkpoints to ensure that all aspects of failure are reassessed, and that there are not any mistakes made. In contrast, the Agile approach embraces risk, and has a strong focus on learning from mistakes that have been made.

Managerial control can vary depending on both the company and the project. Paluch et al. (2019) believes that the choice depends on the managements' desire for control during the NPD. Those in favor of control tend to go with a stage gate approach. Those who can accept a moderate level of risk will choose a hybrid model. Lastly, those who are able to let go of the need for control will opt for an Agile approach.

2.3 Assumptions

Five assumptions have been formed based on expected patterns from the information gathered in the theory chapter, to organize for further insight related to the research question.

When a company decides how their resources are divided, many managers have rigid decision-making points and can serve as gatekeepers. According to prior theory, the link between allocation of resources and reassurance is prominent and can be seen in relation to tough gates in some parts of the innovation process (Cooper, 2008). However, the cost and performance of the project affect whether the managers are certain of a successful outcome. Therefore, it seems relevant to explore assumption 1:

Assumption 1: *The fear of wrongful use of resources reflects how the combination of innovation processes is incorporated*

Paluch et al., (2019) highlights how high managerial control is referred to as a plan-oriented Stage-Gate approach, whereas low managerial control is linked to a flexible Agile method. To support the research question for combined flexible and plan-oriented innovation

processes, it is therefore highly relevant to shed light to not only the purely Agile or Stage-Gate processes in terms of managerial control, but how the degree of control is affected in a combined process:

Assumption 2: *Managerial control differ based on the degree of flexible versus plan-oriented focus in a combined innovation process*

Traditionally, plan-oriented processes, such as Stage-Gate are argued to uphold the balance of risk of an innovation project. Agile on the other hand, has a embracing mindset towards risk in terms of distinguishing between the negative and positive risks. The combination approach is often utilized to maintain a balance between the necessary risk and desired reward, but an important factor to consider paved the way for the following assumption:

Assumption 3: *The degree of a project's risk affects to which extent the flexible processes are combined with the plan-oriented approach*

Incremental innovations are often related to traditional companies due to the need for core strategy products for a continuous and stable source of income. These projects do often have a known customer preference, which according to Paluch et al., (2019) is related to the Stage-Gate method. Contrastingly, projects with unknown preferences such as radical new innovations are seen as an Agile approach with rapid prototype testing towards the consumer. With a combination of the flexible and pre-oriented process methods, it will be important to review how the radicality will affect inclusion of the consumer, laying the basis for the fourth assumption:

Assumption 4: *Organizing the combined innovation process for including the consumer will be affected by the radicality of the project*

In prior theory, researchers have suggested that Stage-Gate is suitable for projects involving low uncertainty, whereas high uncertainty were usually linked to Agile approaches. If the uncertainty is at a moderate level, then companies can utilize a Hybrid model. However, there is no one size fits all, and the way a company combines the plan-oriented and the flexible processes will vary depending on different factors:

Assumption 5: *There is more than one way of combining the flexible and plan-oriented process models within the same company, depending on certain situations*

3.0 Part III — Methodology

3.1 Reason for chosen method

Silverman (2014, p. 18) presents an advantage of qualitative methodology as a way to discover naturally occurring data in which the ‘why’ can be examined in a wider context compared to quantitative methods. To obtain a deeper understanding of a specific area for traditional manufacturing companies within the same industry, the qualitative method seemed the better choice due to the in-depth insight and higher extent of personal contact possible, in contrast to a quantitative approach to methodology (Silverman, 2014, p.17). Thereafter, a choice between an inductive and deductive approach usually must be selected. As a consequence of the maturity of the research area and well-established ongoing debate, the choice was proven difficult. To enhance the possibility of incorporating prior theory and matching it with collected data, the flexible pattern matching approach was selected. This included both expected pattern and observed pattern from the research. Bouncken, Qiu, Sinkovics & Kursten (2021a) highlights the opportunities for extension of theory and initiates a process for theorizing new findings within mature research, combining the inductive and deductive methods. By combining these, instead of selecting one, it allows for a wider interpretation of the data rather than solely conceptualization (Bouncken et al., 2021a).

3.2 Inductive-deductive Flexible pattern matching approach

The FPMA is organized into separate iteration categories based on the extent of which the pattern matching is integrated into the methodology (Bouncken, et al., 2021a). Due to the maturity of the Agile and Stage-Gate theory, in combination with the need for exploration within the field, the methodology of FPMA was chosen. Existing theory was utilized as an initial template for establishing what is known today and which new findings can be built on (Sinkovics, 2018; King, 2014). The FMPA focuses on the connection and (in)consistencies between existing theory and collected empirical evidence in qualitative studies (Bouncken, Qiu & García 2021b; Bouncken and Barwinski, 2021). It involves expected patterns based on

literature matched with empirical patterns observed in the data collection (Sinkovics 2018), which are seen as describable and consistent enough to be arranged (Trochim, 1989). Therefore, it falls under the combined category of an inductive-deductive research design and has been increasingly recognized according to Bouncken et al., (2021b). The deduction aspect derives from prior theory related to the study with the inclusion of exploratory induction from emerging patterns where a comparison is made (Gatignon and Capron, 2020). Bouncken et al., (2021b) addresses flexible pattern matching as a logic rather than exclusively a way of analyzing data. Logic relates to how theories are developed from contrasting preceding theory with empirical observations, because lessons are learned from prior experiences relatively to new knowledge gathered (Bouncken et al., 2021b; Sinkovics, 2018).

3.3 Data collection — Primary research

This thesis is based on a multiple case study, whereas the aim was to gain a deep understanding of each of the cases. An empirical study on three large traditional manufacturing companies was conducted to gain insight for the research question. A case study is normally used to research a modern topic in its natural habitat and when the research question addresses a topic that does not have a huge amount of prior research available (Yin, 2014). However, even though the theory on innovation processes is well-established, the theory in relation to the specific researched companies has yet to be addressed. Therefore, in this method both deductive and inductive research is the focal point through the use of flexible pattern matching. The empirical study aims at using initial theory as a framework for the data collected through in-depth interviews, observations and mini interviews during company visits.

3.3.1 Theoretical sampling adding on snowball sampling

Theoretical sampling aims to examine a case based on whether or not it is relevant for the theory that is being studied. In this study, the theoretical sampling established a link between prior theory and current innovation practices (Bouncken et al., 2021a; Eisenhardt 1989; Eisenhardt and Graebner 2007; Yin 1994a). When selecting which companies to be suitable for the study to interview for examining the topic further, a focus-industry was firstly chosen. Based on the anonymity needed, the industry will not be revealed, because within the chosen

industry there are few large companies with the majority of the market shares and if revealed, the anonymity might not be upheld. Out of these large businesses, three were chosen for in-depth interviews, as these could provide information that would extend the scope of the prior theory. Multiple case studies were selected to achieve the possibility of replication, diverse profiles, alternative explanations and extensions of theory. The interviewees were selected out of relevance for the research problem related to innovation. Therefore, all informants were either managers, middle managers or employees within the department of innovation in their respected company. By including several seniority levels, the insight came from different viewpoints regarding how innovation is practiced today and what should or could be changed.

As mentioned above, the preliminary interviews laid the basis for the follow-up interviews, but to gain a broader comprehension, both re-interviews and snowball sampling were utilized. Snowball sampling refers to a method where participants, already enrolled in a study, suggest other individuals for the researcher to gain valuable insight from (Thompson, 2002). To obtain a better comprehension of the researched companies, the first interviewees were asked to refer to other individuals they knew could be helpful in conducting the research within the innovation department. This then became a snowball sampling based on their colleagues. Whether a follow-up interview with the same or a new individual was the best approach depended on the willingness to share information valuable for the research area. The snowball sampling served as a continuation of engaging even more individuals with an important point of view regarding the current innovation process in the companies.

3.3.2 Semi-structured interviews

The questions were based on the semi-structured approach where some probing is integrated into the interview guide (Silverman, 2014, p. 166). Semi-structured interviews are often used as an exploratory approach for different research areas and are highly qualitative in its nature (George, 2022). These interview guides have a less strict setup and are often not asked in a specific order or with an exact phrasing every time. The method is a combination of unstructured and structured questions and were utilized by combining predetermined and unplanned questions based on the replies during the interviews. When conducting the interviews, the questions were not asked in a particular order, to accommodate appearing follow-up questions to arise at multiple occasions. This gave room for a higher flexibility and

increased the opportunity to maintain a fluent dialog. The semi-structured interviews, as a consequence, opened up for the participants to include new subjects and topics as part of the research at a later stage. All companies were asked the same questions based on a semi-structured interview guide, with a variance of supplementary questions formed through conversation.

3.4 Interviews first round

3.4.1 Interview-guide

The first interview guide had its basis in established theory built on the existing Stage-Gate, Agile and Agile-Stage-Gate Hybrid research conducted, as well as portfolio management. Thereby, the basis for the preliminary data collection came from existing knowledge and theory while reviewing patterns.

Table 1: *First interview guide*

Innovation	Decision-making	Process	Prototype testing	Customers/consumers	Risk
What is your relationship to innovation?	How do you select which idea to continue with and which to eliminate?	Do you have a way of maintaining an overview of the ongoing projects within the organization?	Do you do prototype testing? If yes, how and how often?	Who do you consider to be your primary customer and consumer?	Are there any active measures taken to balance risk?
How does the innovation process look like in your organization today?	Is there a specific system for selecting ideas?	If portfolio is not mentioned. Do you have a relation to portfolio management?	Could you give an example when you have not used prototype testing?	Are the customers included in the innovation process prior to launch? If yes, why how? If not, why not?	Which measures are the most important one to balance risk?
Do you have a system for collecting new ideas for innovation?	Who has the deciding voice of continuation?	If yes, how do you utilize portfolio management?	Do you include the customer or consumer in the testing? Why or why not?	In which stage of the process of development is the customer included?	To which degree do you think risk is necessary for innovation?
What do you see as the pros and cons related to innovation in a large company?	How often are the ideas/projects up for new evaluation of continuation?	How do you see yourself in relation to cross-functional teams?		Which pros and cons do you see in including the customer into the innovation process?	How does the management position themselves to radical innovation?

Are there any departments which have a higher focus on innovation compared to others? If yes, which and how?	How often do you test a product or idea during the innovation process prior to launch?	How is the communication between the different departments?			
Are there any market trends which you have to take into consideration when it comes to your innovation process today? If yes, Which?	Do you have a percentage of projects and/or resources which are allocated to innovation? If yes, how is it divided between radical and incremental innovation?	Is cross-functional information sharing something the organization focuses on? If yes, how? If not, why?			
	Are there any projects or ideas that have been difficult to eliminate? If yes, why?	How does hierarchy affect the communication within the organization?			

3.4.2 How round one of the interviews were conducted

The first round was conducted between early January and early February. The preliminary interviews consisted of three two-to-two and one two-to-one digital interviews, resulting in insight from seven individuals. From company A, two people working with both short-term and long-term innovations within the department were interviewed at the same time, lasting for 69 minutes. Two respondents participated together from the long-term division of the department of innovation in Company B, lasting for 67 minutes in which one of the two respondents had to leave the meeting 20 minutes prior to the interview's end. The short-term division was also included in a separate 43-minute interview with two new interviewees. In the final company, C, one participant from the long-term division, attended for 47 minutes. Every interview began with an important introduction phase of both interviewees and interviewers to establish viewpoints, interest and enthusiasm. From prior experience, the mutual enthusiasm for the topic such as innovation processes, can increase the willingness to share truthful information. The respondents had a high willingness to share, which contributed well to the preliminary data collection. The answers became less overthought and more honest, giving the insight a higher credibility. In combination, due to the maturity of the prior theoretical knowledge, the primary in-depth interviews gave enough comprehension for an initial evaluation of the in(consistencies) with current theory and the empirical data. The

maturity of the theory related to the research area made it possible for the first round of interviews to be quite specific, to eliminate topics which did not serve the right purpose of the on-going debate surrounding the research area such as portfolio management.

3.4.3 Transcriptions and analysis first round

Round one of the first four interviews resulted in 71 pages of transcriptions based on meetings ranging from 50 to 70 minutes. Starting out, the collected data was compared to Paluch's model, where she had identified eight different boundary conditions for companies working with a Stage-Gate approach and eight for the companies that used an Agile method while developing new products (Attachment 1). After the conduction of the interviews, the transcriptions were thoroughly analyzed by reading the information and placing them in the suited categories from Paluch's model. Firstly, all the important information from the 71 pages of transcriptions were divided into the sixteen different categories in an excel sheet with distinct color-codes to gain a proper overview. See *figure 1* below for a visual demonstration of the utilized excel sheet. Thereafter, the findings revealed new characteristics contributing to explaining why the companies chose to work with a certain method. There were four new indicators in addition to Paluch's current model: strategic fit, investment, cross-functional teams and how time influences innovation. These were all factors the three companies kept mentioning as an important part of why they were working Agile or leaning more towards a Stage-Gate approach. There were distinct patterns found throughout the interviews with slight differences. These differences created the basis for further narrowing of the research area and additional important factors came to light. These indicators proved useful for sorting the data from the first round, where the companies gave voice to how they work with the innovation processes and their mindset. This created an opportunity for revealing (in)consistencies, both related to prior theory and between the different companies (Sinkovics, 2018), which it did.

Table 2: *Coding sheet*

Stage-Gate	Company A	Company B	Company C
Low technical dynamism			
Solution space defined			
Stable and known customer preferences:			
Limited customer willingness to interact			

Customer in need of fully specified product			
Low task modularity			
Low tolerance for interim failure			
Strong need for managerial control			
Agile	Company A	Company B	Company C
High technological dynamism			
Solution space undefined			
Changing or (and) customer preferences			
High customer willingness to interact			
Customer open to engage with interim products			
High task modularity			
High tolerance for interim failure			
Weak need for managerial control			
New findings	Company A	Company B	Company C

3.5 Interview second round

3.5.1 Interview-guide

The first round of interviews contributed to the development of interview guide two, in combination with existing theory regarding Agile, Stage-Gate and the Hybrid model. Even though the information obtained in the first round was highly valuable, certain areas had to be examined at a different scope in the second round of interviews due to a narrowing of the research area. An exclusion of the portfolio aspect was made following the findings showing a high combination of Stage-Gate and Agile as a Hybrid model. The focus then shifted to discovering how and why the models were combined and which differences were prominent between the researched companies.

Table 3: *Second interview guide*

Short-term versus long-term innovation	New technologies	Consumer involvement	Change
Would say short-term innovation leans towards the incremental and long-term innovation leans more towards	How do the organizations position themselves in relation to incorporation of new technology?	What is your relation to open innovation?	How would you rate the management's degree of willingness to change?

radical innovation in your company? If yes, why? If not, why not?			
What is the main difference to how you work short-term versus long-term?	What if a large investment has to be made?	Is this something your company does today? If yes, how? If not, do you think it should be integrated?	How would you rate the employees' degree of willingness to change?
How far from the core strategy can a short-term innovation be?	How is it done?	How could it be incorporated at a higher degree?	How quickly are changes incorporated?
Do singular tasks get divided into smaller tasks during short-term innovations? If yes, how?	Who decides whether it should be incorporated and invested in?	During a sprint/stage, do you have a finished prototype to test on the consumer? If yes, can you give an example? If not, why?	What is done to help adapt to the changes made?
If you work long-term, what could make you have to move on to a short-term project?		How does the organization react to changes in the innovation process if there is a shift in consumer behavior?	Are there any projects where the management does not take part in the decision? If yes, can you give examples? If not, what do you think the reason is?
Is there a special time of the year when there are more short-term projects in focus? If yes, when? If not, how do you avoid shifting the focus?		How often do you change the product idea based on shifting consumer behavior and needs?	
How do you combine short-term and long-term innovations?			
During the launch window, do you work short-term and long-term parallel or do the long-term projects get put on hold?			

3.5.2 How round two of the interviews were conducted

For round two, four two-to-one interviews were conducted to gain insight to much more specific questions. These questions did not include, but were built on, prior insight in combination with theory. In this round, one of the participants from company A returned for a follow-up interview, with a duration of 48 minutes. Similarly, one of the participants from company B's long-term division also participated in a second round of questioning lasting 55 minutes. A 26-minute follow-up interview with one of the individuals from the short-term

from Company B was conducted. Since only one participant from the long-term division attended the last round, a new individual with high relevance was located which resulted in an insightful 34-minute-long interview. There was noticeably a larger variety in which aspects of the innovation process they had thought of and not, how they operated today and not, and how they *wanted* innovation to be prioritized in the company versus how it actually *was* prioritized today. The second round of interviews were based on the desire of the respondents' continuation of digital interviews, the meetings were therefore held digitally.

3.5.3 Transcriptions and analysis (coding)

Round two of the four interviews, ranging from 25 to 55 minutes, resulted in 75 pages of transcriptions. The data was color-coded with the same indicators from Paluch's model as the first round, but in a new excel sheet. Since the second round of interviews were even more specific, the data gathered contributed to the prior research with new findings and the primary focus for the follow-up interviews were the aspects of what was discovered and learnt from the first round. The focal point therefore became long-term versus short-term innovations, new technologies, consumer involvement and change. When sorting the transcriptions into codes in the excel sheet, the companies demonstrated both similarities and differences in the way they currently operated and how they thought about innovation. It began to show clearly what the main differences were related to how they incorporated an Agile or Stage-Gate approach to innovation. Even though the data revealed the use of a Hybrid model, all companies had distinctive contrasts as to how the Hybrid model was utilized.

3.6 Observations

To gain additional insight to how the businesses practice their innovation craft, there were conducted observations through company visits. The main reason was the possibility of experiencing a natural environment, in which their initial ideas were formed and shaped into potential products for launch. Due to rearrangements within the third company, it was not possible to conduct the last company visit, and therefore, only two of the three companies being studied in this research paper were available for observations. These observations fall under the ethnography category (Baker, 2006), and are a part of the methodology that led to revelations about how the different companies and their employees acted in a social setting. In addition, being on scene and participating in their actions, also opened for talking to new people that had not been interviewed previously. During the visits to the companies,

observations of moderate participation were conducted. Becker and Geer (1970) explained how observations can be done both as a covert or overt activity. In this case, it was done as an overt activity with no hidden agenda, other than seeing how the companies carried out their work. During the observations, it was important to listen, ask questions and observe what was going on. Notes were taken to enable the use of allocated information in combination with the responses from the previous interviews. Further on, for this research design it utilized one type of observation: moderate membership.

3.6.1 Moderate membership

When visiting company B, there was no participation in core activities, and the research was based on observing the surroundings, the people and the processes. To gain a broader understanding, the employees were however asked semi-structured questions with an informal approach. During the visit to company A and B, the method for observing had a resemblance to the moderate membership introduced by Adler & Adler in 1994 (Baker, 2006). Unlike participants as observers, the purpose of this observation was to keep a balance between being an insider and an outsider, as well as the balance between participation and observation (Spradley, 1980, p. 60). The aim was therefore to hold back, rather than being a part of the action taking place. However, there were still interactions with the company and the employees. During this visit, the host was a new interviewer who had previously not been questioned. Therefore, the observation tour also gave new interpretations regarding the company's innovation process.

The visit to company A involved getting a tour of the place where the company had its own area called the 'greenhouse' for exchanging and growing ideas, having workshops, and creating draft boards where creativity was the main focus and goal. The plan was to participate in a workshop with company A, however, due to an overload of projects currently it was not possible until the fall. The invitation for the workshop was received and the invite list included individuals from other departments within the organization to obtain different viewpoints and ideas. Nevertheless, during the observation it came to surface how product ideas created in the greenhouse are then tested by an inhouse innovation chef for fast prototyping, which can be tested on the consumers for rapid and valuable feedback. Even though the innovation department collaborated cross-functional with other departments they also had their offices on different floors, suggesting a barricade in relation to more

continuous feedback throughout the day. On the other hand, since the company opted for monthly workshops, they create a pool of ideas and a safe space where everyone can come with input and suggestions.

3.7 Secondary data collection

Throughout the interview, all three companies provided additional internal data displaying how their processes were managed. Additionally, searches were conducted to find supplementary information in forms of reports, articles, evaluations and videos. This was undertaken through both searches in Atekst and Google, but company A had a very low frequency of information on the Google search engine platform in comparison to Atekst related to innovation. Company A had 314 hits, Company B had 12.057 and Company C had 4.059 when applying “innovation” and the name of the company. The issue when Google was utilized was the high number of irrelevant articles and reports which were included due to the Norwegian names of the companies. The results were more specific and relevant in Atekst compared to Google; it was therefore the main source of secondary research. Out of all the results, the information was narrowed down to 4 main categories as presented below

Table 4: *Secondary data*

Company A	Company B	Company C
2 reports on sustainability, growth and innovation	5 reports on sustainability, growth and innovation	3 reports on sustainability, growth and innovation
10 articles at their website about how the organization refers to innovation where the focal point lie	20 articles at their website about how the organization refers to innovation where the focal point lie	19 articles at their website about how the organization refers to innovation where the focal point lie
2 newspaper articles related to measures and innovations done by the company	9 newspaper articles related to measures and innovations done by the company	11 newspaper articles related to measures and innovations done by the company
5 innovation related work advertisements	4 innovation related work advertisements	2 innovation related work
1 Videos about innovation in the organization	2 videos about innovation in the organization	1 video about innovation in the organization

3.8 Credibility, validity and reliability

3.8.1 Credibility

An issue important to consider is how the respondents may seek to give you the answers they think you wish to hear. During the first round of interviews, some of the companies demonstrated tendencies to this by wanting to prepare for the interview. The individuals who asked were sent the research questions beforehand, making it possible for them to interpret and come up with answers they thought would suit the research. Conducting the second round of interviews the participants were not given the questions beforehand, and thereby they lost potential time to prepare. On the other hand, the researcher can also be a part of the issue since the findings included are hand-picked out of all the gathered qualitative data (Silverman, 2014; Mehan, 1979, p.15). Thereby, the conception of the researcher and the selection of data can be altered to match each other (Fielding & Fielding, 1986). This can result in a too abstract interpretation of the findings, creating a barrier for others to conduct further interpretation. Seeing how this research is based upon existing theory, the data gathered were collected with specific codes in mind and it is believed that the data is fairly picked and sorted.

3.8.2 Reliability

Hammersley (1992, p. 57-58) refers to reliability of findings as a consistency degree between various research or repeatedly by the same individual. Dependence of replicability is an important characteristic for reliability to enable future researchers to reproduce homogeneous results, similar interpretations, or claims (Silverman, 2014, p. 83). Within a similar manufacturing industry there is a potential for upholding reliability based on the traditional and organizational size aspect of the research businesses. In contradiction, it is argued by qualitative researchers that the world is constantly changing making the concept of replication difficult (Marshall & Rossmann, 2014), and all the researched companies are currently undergoing organizational changes which can affect the reliability of the study. Benesh, Suomalainen, Valtonen & Tirola (2006) describes being transparent to make research more reliable. Transparency related to reporting the conduct of the research and the stance of theory it is based on, because it demonstrates how the interpretations are done and what are excluded. By including accurate data, instead of reconstructions and retelling of

what the interviewees said, Seale (1999) says it to be a way to uphold a higher reliability with lower influence on the results.

To present as accurate data as possible, the interviews conducted were taped and thereby transcribed both by hand and using a program. After using the program to transcribe the recordings, the transcriptions were then run through while listening to the original recording, to ensure avoidance of mistakes and incorporate important details where necessary. Even though these measures help uphold reliability, there are still some issues worth considering. The placement of the camera and when to stop or start recording are important for a natural setting and fluent interview. The recording of the interviews conducted was carried out without the use of a camera, however the record button was sometimes not pressed before after the introduction had been made. This resulted in losing some of the words said at the beginning of the conversation, but this was not considered as vital for the data collection. Regarding transcriptions, trivial pauses and overlaps can be misinterpreted, forgotten or at least weakened (Silverman, 2014, p. 88). Throughout the transcription of the interviews, pauses were not included and thereby some degree of reliability has been lost in relation to the accuracy of retelling what has been said.

3.8.3 Validity

According to Hammersley (1990, p. 57), validity refers to how accurately an account represents the social phenomena that is being studied. Johannesen et al. (2016, p. 232) contributes to this interpretation of validity by referring to the concept; internal and external validity.

Internal validity

Internal validity addresses the credibility with the study, meaning to which degree what we are measuring corresponds to the phenomena being studied. According to Bouncken et al., (2021), the method of flexible pattern matching can help strengthen the internal validity based on initial patterns being deduced from prior literature. Johannesen (2016, p.232) still stresses how it is possible to have a perfect execution of the research, but if the questions being asked are in fact not answering the research question, then the findings have no validity. Since the FPMA has its basis in solid theories and on-going debates, it helped legitimize the findings through guiding the questions with a basis on patterns from prior

collected data (Bouncken et al., 2021). This made it more apprehendable to uphold relevance of the semi-structured questions, even if the terminology differed and the understanding of the research area was well-established. When researchers make a statement, there are two errors which may occur; either believing that a statement the respondent makes is true when it is not, or rejecting a statement from the respondent when it is true (Kirk & Miller, 1986, p. 29-30). Therefore, it was important to establish trust and openness from the beginning to gain valid information from the respondents. As researchers, it is also important to consider whether or not the respondents are telling the truth (Silverman, 2014, p. 91), which came across as clear since the response was not all in favor of the current practice of the company, rather against established customs compared to the ideal concept of innovation. There were also brought up examples, videos and charts to demonstrate how they operated within the department of innovation. There is still the possibility that what the respondents showed is in fact not true to practice, however, the respondents indicated a desire to learn from this study. Therefore, they would not gain the opportunity to learn if they were not being truthful and honest with their responses.

External validity

The external validity deals with the ability to generalize the findings from a study. It brings up the question of whether or not the findings can be representable for areas different than the one being studied (Jacobsen, 2015, p. 239). This research was conducted on three of the largest companies within a certain industry and their NPD process. Findings and results from this study might therefore be representative for other companies dealing with NPD in similar traditional product manufacturing environments. Additionally, it is believed that the general findings produced from this research can be relevant for other industries outside the more traditional environment working with NPD, based on the used flexible pattern matching to build upon existing theory surrounding the debate of innovation processes. Therefore, multiple industries have already taken part in studies regarding the same topic, indicating that NPD processes do have multiple similarities despite being used in different industries.

4.0 Part IV — Analysis and findings

This chapter entails an analysis of the most important observed patterns collected through in-depth interviews and observations which was carried out with individuals of different seniority levels within the department of innovation in the selected traditional companies. Additionally, secondary research has been included in the analysis. The study began with the focus of risk management through portfolio management and chosen innovation process, but evolved, through learning from the findings to how traditional companies combine the Stage-Gate and Agile approach to innovation in certain situations. The analysis was done by incorporating the FPMA based on Paluch's model (2019), however, new factors arised and will be included as additional findings. In such a way (in)consistencies were found between prior empirical knowledge and the data collection. Preceding the significant distinction between customer and consumer presented by the companies, it is important to distinguish that hereafter, the use of the word "customer" from the theory, are related to the companies' consumers. Therefore, where the theory uses the term *customers*, this study refers to the term *consumers*.

4.1 Findings based on Paluch (et al., 2019) boundary conditions

The findings have its basis in prior theory regarding which boundary conditions pose the largest significance in selecting an innovation process approach, which was found during the primary research. Even though all had circumstances that were alike, their practice varied.

4.1.1 Customer preferences

Overall, the changing consumer preferences related to aspects such as sustainability, trends and digitization forces the companies to adapt more rapidly and experiment further from their core strategy than before. Even though these tendencies are present, all the companies, to some extent, try to manage the risk of change through testing and analysis prior to entering the portfolio and thereafter launch. Company B and C highlighted the low risk related to their short-term incremental products where the consumer preference is stable and known, in which the testing, consumer inclusion and analysis frequency is significantly lower. The reason being a secure and well-established source of income with little to none changing preferences based on carefully constructed prior analysis of the segment. Company B expressed a need for minor adjustments short-term at times, but not radical, time consuming

and high-cost changes. This, however, dealt with the importance of being able to have a long-term mindset. Company B and C in this study mostly linked radical innovation to long-term projects and the ability to bring real change to the organization with a plan for looking forward to at least 2030. Therefore, both companies which spoke of this underscored the importance of following trends and being able to foresee large changes coming.

Sudden changes during an incremental project seems more unlikely and would in fact be harder to adapt to in terms of changing an ongoing project with short notice. Company A, which had a different way of distributing projects, was clear that they incorporated the consumers to a wide extent during their ideation phase of radical new products. This was said to enable them to make both sudden changes and more slowly developing changes throughout the project. When the project has stable and known consumer preferences there is a less frequent inclusion of the consumers when developing a project for ideas to launch. If the problem and solution related to the consumer preferences are unknown on long-term projects, Company C relies on frequent experiments and tests evaluated through weekly scaling meetings prior to continuation of the project. During these meetings, potential changes and go/kill decisions are made and continued throughout the process to some extent. Regarding short-term projects, company C puts emphasis on the lower degree of testing based on a well-known consumer segment with minimal risk. When asked if there were any projects in the long-term department that did not include the users, company C responded that they always incorporated the users somewhere along the product development. Similarly, Company B undertakes Agile experiments when the consumer preferences are undefined in order to gain constant and vital feedback and knowledge. However, upholding adjustments during physical testing were underscored as difficult, time consuming and expensive.

4.1.2 Tolerance for interim failure

Choosing to work with innovative projects often entails high risk, and findings from the study shows three different approaches to how the companies balance risk associated with new product development. In all three companies, the tolerance for interim failure was dependent on the management. Company A found that by increasing the number of ongoing projects, they would spread the risk and thereby have a higher chance of success with one of the ongoing projects. However, considering investments in certain projects, this proved difficult without proof and feedback stating a positive outcome. Company B had its focus on

minimizing the amount of long-term projects for the portfolio, by incorporating an Agile process. This method provided a possibility for allocating resources to projects with a higher success-rate. Company C mentioned an integrated long-term policy, which involved spending the smallest amount possible, before being certain that the project would bring ROI. It is demonstrated how company C is highly concerned with keeping a consistent income, and taking measures to ensure the farmers' and the company's development along with increasing competition

The distribution between short-term and long-term projects also demonstrated that the tolerance for interim failure differed amongst the organizations. Company B and C separated their short and long-term projects and the management relied on their short-term projects to uphold revenue. Therefore, it was expressed as harder to take more risk regarding short-term projects. This was also dependent on the three yearly launch-windows, creating a need for the companies to be ready with new products at a certain time. Company A talked about how the short-term incremental projects were almost automatic, and therefore hard to change ones the project had entered the portfolio. As for the long-term and radical short-term projects, it was said to be more acceptable to experiment with new temporary ideas and solutions.

Whether to proceed or not is put into a risk matrix and evaluated by the management to avoid failure, but the employees of the department of innovation in all companies highlight the need for allocating several resources, which the organization should be willing to lose to be innovative. Company B mentioned how there have been few large and risky projects during the last decade, but that it is currently changing due to a top-management shift currently unfolding. Nonetheless, there is still a need for thorough evaluation of ideas and projects prior to investment for failure avoidance. The biggest difference between short- and long-term projects in Company B, is how the further away from the core strategy of the organization the project or idea is, the more difficult it is to gain approval from the management. The tolerance for interim failure of Company C relates to the focus of spending the least number of resources and money possible, but still maintain a high ROI. An example given was how a trend twenty years ago was indicated, however, the trend wave did not move upwards until now. Therefore, organization C waited until the trend included enough consumers to have a high success rate and a better chance of providing a new source of income.

4.1.3 Need for managerial control

In the matter of the need for managerial control, it was clear that the management was an important part of getting projects approved in all three companies. During the initial phases of the short-term projects, company A and B had a higher degree of autonomy for making decisions without management taking part. These decisions usually had to do with small changes in incremental processes, rather than large investment projects. Even so, all companies had strict rules regarding getting approval for the project before entering the portfolio. Company B expressed having an eager lead-employee for the project as essential for the success rate of the idea, but that if the management did not approve, the project would move on to elimination regardless.

If the guidelines for the project were followed and could be shown through evidence, small changes could be made to allow continuation. However, this would gradually change as they moved further into the process of the project. As soon as a project is approved to enter the portfolio, the management maintains a close eye on what is being done. In company C, no small changes were to be made on an ongoing project without approval from management. Instead, they had weekly scale-up meetings where adjustments were discussed and approved in agreement. The need for managerial control also varied from short-term projects and long-term projects, whereas long-term projects had a higher degree of freedom to conduct new research. Company B and C, who had their own division for long-term projects, also had their own funds to do long-term research. On the other hand, company A did not divide between long-term and short-term, yet had their own budget for radical innovations. This shows how the management does not need to control the allocation of all resources, and the teams are given more freedom to choose how they want to work. Additionally, the companies underscored the importance of having a close connection to the management, and thereby increasing the opportunity for influencing the manager's decision.

4.1.4 Technical dynamism

Looking at the different companies' level of technical dynamism, some differences were discovered. In company B it was difficult to gain approval to invest in new technology for radical projects as their production was placed at different locations, demanding a huge investment if they were to incorporate a new technology. Nevertheless, there was a higher willingness to acquire and adapt to new technologies being used in relation to the products

near the company's core strategy, which was seen in all three companies. Company B utilized outsourcing to some degree, but emphasized the desire for it to be of higher focus in the future. They also mentioned that whenever they could see a high return on investment, faster and more seamless adaptations of new technologies were present. When asked how quick they were to incorporate new technologies short-term, company A viewed their process as quite rapid, company B said it went slow and company C would not normally include new technology for their short-term projects, except if it was to enhance an already used technology or core strategy projects. The basis was problems convincing the management that they should be doing completely new alterations to their core processes short-term.

Company C stated that because the organization is currently upholding revenue, the management feels that there is really no need to expand even further. It was expressed as a question about wanting to and not as much having to. Therefore, it was hard to gain investment acceptance for projects and ideas in need of new technologies when the management did not deem it necessary. New technology, in relation to the more radical long-term projects could, however, be outsourced. Currently, to avoid unsuccessful investment in new technologies related to radical projects, company A often uses sourcing partners which are in possession of needed technology to evaluate the results, thereafter, deciding the worth of investing in their own equipment. Company C highlights how the organization utilizes sourcing partners with a different approach. Instead of making use of it to evaluate the potential for purchase, they take advantage of knowledge of technology not located in-house. Company B mentions a low degree of outsourcing related to new technologies today for radical projects, new technologies are primarily focused on the core strategy and incremental products with need of little to no change of the day-to-day practice.

4.1.5 Solution space

The solution space is separated into defined, otherwise seen as close to the core of the company with current or incremental innovation, and undefined with a higher focus on radical and completely new innovations (Paluch et al., 2019). It became clear in both the first and second round of interviews that all the companies were, to some degree, all dependent on similar conditions in relation to incremental and current products, such as the level of uncertainty. Two of the companies had a clear separation of their short- and long-term projects depending on the solution space. Company B had a vision of 70 percent core related

and 30 percent leaning towards the radical. Yet, they mentioned that this was probably more like 80/20, or even 90/10 depending on the available resources allocated to long-term radical projects. Company C had a strict 70/20/10, whereas 70 percent was connected to the core strategy, 20 percent to incremental innovations and only 10 percent were allocated to innovation outside the core of the company. Even though this was the intended allocation, it was revealed that resources meant for radical long-term projects often were closer to 5 percent. An interesting finding, however, had to do with company A who had no pre-decided allocation of projects depending on its length of process such as the two others. This company aimed at ‘betting on more than one horse’, and at the moment when the interviews occurred, 40 percent of their projects were seen as radical. An additional finding during the observations with company A was how their access to prototyping was in the building, thereby making it easy to undertake fast prototyping.

After reviewing the responses from the different companies, some variations were demonstrated of how they worked with projects with and without a defined solution space. The separation between incremental and radical did not really depend on timelines for company A, but rather the circumstances, needs and demands. Preferred methods were neither determined by whether they had a defined solution space or not. It was discovered that they chose to work with a Stage-Gate approach throughout the development of a project after entering the portfolio, regardless of it being radical or incremental. Even so, they would incorporate techniques similar to the famous ‘sprint’ from the Agile approach, during the ideation phase when the solution space is undefined. When looking into company B and C, both companies had a much more undefined way of working with radical projects as opposed to the more incremental ones, whereas both companies had this approach to new long-term projects. Similar to the techniques utilized by company A, the two other companies tended to use sprints during the ideation phase. The use of sprints during the test-to-market phase was seen within company B, however, these Agile sprints were merely incorporated in phases prior to the portfolio.

According to all the companies, immediately after a project is approved for the portfolio the stakes are higher, and having a flexible Agile mindset proves more demanding as well as obtaining approval for the development of radical projects. A reason addressed by company A was the ability to predict the ROI of the incremental projects, and both company B and C added on the lower need requirement of investing time and resources into projects which are

not deemed radical. Nonetheless, the companies are currently looking to expand their long-term sources of income to areas where they are not present today, but at the same time focus on the well-planned and defined solution spaces of the organization. Research reveals Company C's new initiatives to be innovative in both existing portfolios, and with new long-term activities, being more experimental, creating new long-term business opportunities. However, in their digital report from 2018, it is shown that their main focus revolves around the core products and categories. Company B talks about the need for shifting focus to riskier projects, but that there are some hesitations from both management and the organization as a whole related to change.

4.2 Additional findings

The primary research revealed additional factors important for selection of innovations processes related to the traditional companies researched. The supplementary findings discovered will be presented below.

4.2.1 Strategic fit and willingness to change

Strategic fit and willingness to change were two of the additional findings discovered through the coding of the primary data collection. What came forth was how the difference between short-term and long-term innovation related to change was prominent. The overall willingness to change is seen as higher long-term in two out of the three companies, with certain distinctions. The management in company A and C sees the need for change long-term, but there is a short-term resistance from the organization as a whole and individuals within departments outside the department of innovation. Company B highlights the new leader as willing to change both long- and short-term, but the organization itself serves as a slight hindrance. The strategic fit is a key element to how change is embraced. Company C specified how not all ideas went further than being an idea due to the brand profile and strategy. When the ideas challenge the strategic fit, the change willingness is significantly lower, and the focus is shifted to ideas related to current or incremental projects in order to not compete with the brand.

Currently, a restructure of organization B and C is happening, pushing forward high expectations to a change of mindset related to the strategy. Company A has allocated resources earmarked for innovation, but it relies on cost, brand and capacity of the workforce.

In Company B there are some dependencies in which the more radical projects are brought to the fore to reach new long-term business areas. Short-term, the focus is highly strategic and incrementally focused by delivering and extending current products to consumers to keep a stable income. The reason being a desire to be unique and new, but keeping the current products and consumers to sell enough volume to be profitable, weighs heavier. Changing the long-term strategy is expressed as easier compared to the short-term projects. Contrastingly, Company A has a changing strategy with its focal point being entering new areas of the market where they are yet to be prominent. Here, the management has gone against the previous brand strategy to strengthen the new path of the company, launching new lower scoring products to support and match the new plan of action for the company, outside of the core product-line.

4.2.2 Time and investment

When it comes to investment, all companies have allocated resources for innovation to some degree, even though there are some limitations. On a general basis for all organizations, the management has a lower willingness to invest the further away from the core strategy of the company an idea is and vice versa. Because of the industry that the companies are in, there are always projects needing attention along the three yearly release windows. When this window is prominent, organization A highlights how all the stages of the Stage-Gate process in the portfolio are not strictly followed. At times, it skips to the launch decision, which separate them from the two others. Company A also specified how their management often agrees to large technological equipment investments if the project and idea fits the brand strategy, but that the degree of which the idea is different from the core strategy, does not have any connection to whether the project is short or long-term. On the other hand, for company B and C, these large investments are often focused on incremental, often referred to as short-term, projects. These two businesses express how sometimes long-term projects are the first ones to be killed if the company goes into recession, because long-term projects are often related to radical products.

The general investment of an idea is set in motion once the idea enters the portfolio. Due to risk being prominent at this stage of the process, one company calls it 'eye of the needle' and many ideas do not surpass this stage. A higher barrier of investment often related to long-term projects, due to the larger number of pressing short-term projects. Nonetheless,

company B and C expressed how separating those working short and long-term into two different teams within the department of innovation, has increased the focus on long-term projects within the organization. Company C still highlights how short-term projects often gain a higher organizational priority, whereas long-term projects are at times placed on hold to uphold the momentum short-term. Company B, which separates the innovations, has rapid incremental innovations short-term in combination with radical long-term innovations and few radical short-term projects. To avoid delays in long-term projects, there is a clear distinction between the projects in Company B where team members do not shift focus from short-term to long-term or vice versa. Lastly, Company A does not divide their department of innovation into short- and long-term focused teams and have fewer distinctions between who is working on radical and incremental projects to launch. Even though the companies have a different approach to short-term and long-term products, the overall finding is that the risk of unsuccessful investment of resources plays a significant role in which projects move towards elimination and continuation.

4.2.3 Cross-functional

All companies have procedures for working cross functional at this time, but the approach has been shown to uphold certain similarities and differences. The similarity relates to apprehension of needed knowledge from outside the innovation department. All three share the need and desire, for drawing competence from in-house departments outside innovation such as product development, sales and marketing. It was expressed as highly important when considering the entire journey of exploration, especially when the intangible capabilities are beyond the scope of the department of innovation. In company A there is a distinct division of departments sitting in separate floors, which sometimes increases the difficulty of locating desired knowledge in an unconnected in-house department.

Nonetheless, company A has regular workshops including individuals both in- and outside the innovation department. The space was created for exploring, uncovering, and unfolding ideas for new concepts and the workshops are held multiple times throughout the year. In this organization, the management has expressed how not all ideas have to be communicated to the rest of the organization, to either avoid unnecessary resistance or delays, prior to entering the portfolio.

Company C explained the first stage of the process as giving attention to communicating with the highest number of people possible in- and outside the organization as an open phase of idea generation. The workshops are not as prominent as desired, but it has been put on the agenda as an area of possible improvement. Company C also expressed how oversharing was preferred to withholding information from the rest of the company. The findings demonstrated an incorporation of a new system for sharing of information, contributing to digitization of the entire organization.

Company B focuses on integrating individuals across the organization and business areas when developing ideas. However, the innovation team has installed oneself in a close perimeter to the sales apartment, which is approximately made up of 70 people, while the innovation team itself consists of eight. This gives an indication of the innovative mindset not being incorporated throughout the organization yet. Even so, the mindset is laid to cross-functional knowledge sharing, it is not always the competence that is applied. Such an example given was when the competence fits an idea too far from the organizational strategy, thereby the idea does not move on to the portfolio. The sales team and the innovation team in company B are separated during the idea phase of a project. Else on, when deciding on packaging and similar activities, other departments would be brought in to consolidate on areas where the innovation team lacked the knowledge and experience to finish the development on their own.

5.0 Part V — Discussion

This section will include five separate propositions, each referring to an assumption made prior to the conduction of primary and secondary research.

5.1 Proposition 1

Traditional companies combine the flexible and plan-oriented processes by incorporating the Agile approach prior to investments, and switches to the Stage-Gate approach when the investments are made

As argued by Sommer et al., (2015) the Stage-Gate approach is commonly utilized among companies today. Findings from the study shows that Stage-Gate is both mentioned and

incorporated across all the companies. It became clear that all the companies, up until recently, have relied heavily on tradition, with little room for radical changes after entering the portfolio which has resulted in leaning towards the Stage-Gate approach. The Agile approach is often considered difficult to incorporate in product manufacturing as opposed to software, because of the high need for control to have a continuous delivery of current product. In line with previous research surrounding the incorporation of the Agile method in traditional manufacturing companies, this study has revealed that an Agile approach often is used in the ideation phase, and foregoing launch. Done correctly, the Agile method can open the door for adaptability, agility, and speed, in comparison to the more traditional Stage-Gate process, thereby aiding companies to excel the timeline of radical innovations.

After entering the portfolio, the companies rely on set deadlines, and a higher degree of difficulty related to change has been expressed, due to the companies having physical products which cannot be changed before launched to the consumers and consumers. Therefore, in the initial phase of the product development, a process leaning towards the Agile approach has been shown to be utilized and once the product enters the portfolio, where change is difficult, the more rigid Stage-Gate process is currently preferred. Agility in the initial phase enhances the flexibility because the swift phases increase the possibility of meeting the rapidly changing demand of the consumer and taking advantage of the momentum. The researched companies vary in their current degree of adaptability and agility, reflected in the need for managerial control, as will be discussed later. Similar to what the theory addresses, company A utilizes a more Agile method prior to a project entering the portfolio and at this stage, missteps and failure are accepted and almost encouraged for the sake of learning. This mentality can promote a sense of being allowed to try, test, and change according to the results along the way, thereby opening for autonomy, a feeling of being seen and a willingness to change which are highly important factors to consider regarding innovation. These efforts were unlike the rest of the process and involved both rapid changes and consumer inclusion to a high degree. Such as their downstairs prototype development area allows them easy access to the testing area, which can be a contributor to why company A is also the one looking into short-term radical innovations.

Both Company B are currently learning about the Agile approaches to incorporate this mindset to their day-to-day operations as a long-term strategy, and to limit their amount of projects. On the other hand, company C has begun to incorporate an Agile process into the

department of long-term innovations. However, sprints are currently focused on the initial phase of the process, but are slowly being incorporated throughout the process, in combination with more traditional methods, to keep track of the investments. If properly incorporated throughout the process, these Agile sprints can help the organization balance risk without taking too much time, thereby increasing the possibility of changing according to the market trends and consumer preferences without losing momentum. The Agile values and mindset encourage knowledge sharing and to embrace change as a part of the innovation process and all companies either said they focused on or wanted to focus more on cross-functional knowledge sharing. If the three companies were to adopt the Agile method as a process in combination with Stage-Gate, instead of separating between prior and after entering the portfolio, cross-functional knowledge sharing should be incorporated along the entire innovation process in such a way that the organization feels like a unity rather than separated departments. This can contribute to a sense of participation and pride, thereby possibly encouraging a mentality of innovation in- and outside the department of innovation.

Such can be established by integrating Scrum roles, where a Scrum master has a leading role on the project together with the product-owner. Although, since the product-owner has the leading charge of ROI and making sure the product meets market demands through go/kill decisions, the mentality of the product owner must be within the Agile mindset to avoid serving as a hindrance for the agility of the innovation process. The same is true regarding the Scrum master. If the Scrum master does not embody the innovative mentality, a genuine passion for the project or is too rigid, it can negatively affect the rest of the team, thereby lowering the possibility for innovation and adaptability. Having the mentality of accepting failure and change is vital for a successful outcome and complex product development, such as the researched companies undertake, are argued to have unavoidable change iterations during an Agile innovation process. For the companies to adapt to a more Agile-Stage-Gate approach, there is also a need for a lower degree of control. Seeing how the companies are dependent on management to make decisions, the change has to come from the management if they wish to lean more towards the Agile method than what they do today.

5.2 Proposition 2

A stronger need for managerial control is seen when the combination of the innovation processes has a higher plan-oriented focus

The participants explained how the management's approval for radical projects proved rather difficult to obtain. The management opted for a high degree of control, therefore, almost everything had to be given the green light prior to both investment and launch in the innovation process. The process can include adaptation of new ways of working with a project, which again can result in a need for investing in new technologies. New technologies are rarely utilized in incremental innovations as the processes are meant to act as automatic, with predefined and planned tasks. Having plan-oriented tasks requires little to no experiments with new technologies and can potentially serve as a hindrance in short-term product development because the need for control is too large. It is commonly known that the use of digitization and new technologies are constantly increasing. Nonetheless, the management's overall willingness to let go of control and incorporate new technologies for radical innovations, within their short-term projects, has been revealed as low to moderate for the three researched companies. Whether or not to incorporate and invest in new technologies lies in the hands of the management, which can be seen as the gatekeepers. These gatekeepers serve as a measure to eliminate the potential for wrongful investment for the three organizations, but having to rely on the management to make the decisions on every large investment makes the probability of obtaining innovation lower than it could have been.

When there are utilized Scrum masters in the department of innovation, they should have the authority to make decisions after entering the portfolio without management needing to enter the decision-making process. By including the Scrum master there is a lower need for top-management control without being too exposed to negative risk. The mindset of the Scrum master creates the opportunity for affecting the entire organization, upholding the velocity of the innovation, and managing the risks without hindrance. The management in company B and C tends to take the project through tough gates, when aiming for an innovative approach. This can hinder potentially successful projects. Avoiding tough gates, but upholding the customary gates, leaves room for flexibility as meant for the Agile process in a structured way without obstructing innovation, and decisions can be made more rapidly. On the other hand, company A revealed how the management sometimes pushed for continuation even

though the team recommended postponing because the product did not score well enough yet. Nevertheless, the management voted for continuance to launch, thereby demonstrating the high current control of the management in the organization. Brought to the fore by company A and B, at times management did not wish to risk the failure of launch, and therefore utilized their authority to kill a project which was recommended for continuation by the department of innovation. In such projects, which are seen as highly demanding, to minimize the risk of doing something wrong, additional check points could be added for management approval along the innovation process. Even though all the companies find some flexibility in how their innovation process is tackled, the need for managerial control seems to have a dominant presence in the factors determining how they work with new product development.

It has been argued that a plan-oriented approach to the innovation process is often preferred to management, due to the control enhanced through set stages for decisions. Throughout the interviews, it became clear that the companies often used Stage-Gate as the plan-oriented approach when developing their core strategy products, to keep control of the resources put in the projects. In all three companies, the decisions throughout the innovation process, after entering the portfolio, often involve the management. However, both companies A and B highlighted that prior to being a part of the portfolio, it was seen as a less risky and automatic process, whereas the need for managerial control was lower and the teams working on the project had a higher degree of autonomy related to making decisions. During the ideation phase in company A and B, the process was made more automatic with the teams working on the project having the ability to make alterations to the product if they saw it necessary, enhancing the possibility of rapid change according to shifting market trends to reduce failure. In company C they followed strict guidelines with low task modularity, meaning the tasks are not divided into smaller tasks and resolved in different ways. Instead, there are predefined conditions that the teams follow, which can create an obstacle for rapid necessary changes to be made along the process. Company C has a higher degree of managerial control of short-term projects, where constant evaluation and provision of proof is paramount. The larger freedom of decision-making in the initial stage of projects, as seen in company A and B, can promote innovative thinking and a sense of ownership to the projects. Having this proprietorship of an idea or project can give a positive effect regarding employees believing in the product, thereby giving the extra effort to create a new and successful source of income through the project.

5.3 Proposition 3

The incorporation of flexible processes is lower when the degree of risk is high

Innovation involves risk, and the management is expressed to be risk averse in the companies, contradicting the innovative mindset and can decrease the degree of innovation, which thereafter affects the potential new sources of income. Theory often mentions how leaning towards a flexible process is to be recommended when uncertainty is prominent. However, the research revealed tendencies in contrast to prior theory, in which company B and C often aim for the flexible approach but specify it to be difficult to uphold when the risk increases along the innovation process. Resulting in a incorporation of a partly flexible Agile method, but to a lower extent compared to the low risk projects such as prior to investment in the initial stage. Company A has a higher degree of the flexible process in relation to short-term radical projects in the manner of upholding the agility further along in the innovation process. Contrastingly, company B and C expressed how a plan-oriented method was preferred for high-risk short-term projects. Even so, all three companies underscored a significantly more Agile mentality in relation to risk when focusing on long-term innovation projects.

Theoretically, the plan-oriented Stage-Gate method is thought to help minimize risk, even so, the approach has been criticized for being too rigid and risk averse, potentially resulting in a negative effect on the innovation performance. If the management does not allow some risk, as an Agile process promotes, the market may move too quickly, thereby potentially resulting in lost momentum of a profitable project opportunity. Therefore, a need for clearly defined go/kill decisions, such as Stage-Gate traditionally require, can serve as both an obstacle and a balance for innovation. An obstacle because of its rigidity, and balance because of the high degree of continuous evaluation of the project. To keep up with the market, companies today must be able to adapt and be flexible in their product development. By having a higher degree of the flexible process in combination with the plan-oriented method, in advance of the product development, the companies can conduct research surrounding new products. This can then serve as guidelines for the project ahead. In such a way, all within the department of innovation have a clear idea of which guidelines are laid related to qualification for continuation, and thereby help manage the largest risks by having clear go/kill decisions into

a system which is not as prominent in the purely Agile process. As of today, the Agile approach is rarely used in other phases than the ideation phase among the companies, but adapting to the Hybrid approach, rapid and vital decisions can be made based on fast prototype testing in between the stages for continuous evaluation. Thereby, giving an opportunity for the traditional companies to embrace risk related to fast prototyping and market trends. In company A an attempt to minimize risk, by launching multiple projects at once, was made. Company B did the opposite, whereas the goal was to reduce the number of ongoing projects to avoid failure. Company C was mostly similar to company B, but also expressed that the endurance for risk was much higher with their long-term projects, which include a more flexible process. Even though they approach risk in different ways, the overall findings suggest that company B and C will opt for minimal risk, whether it be in relation to investment or product failure in relation to their short-term incremental products. Resulting in the degree of flexible processes being lower when the risk is high.

What should be taken into consideration is how not all risks are seen as negative when incorporating the flexible Agile process, and loss of opportunities may arise if the tests are not done rapidly enough to examine the potential value of the product. On the other hand, it should be noticed how a combination of the processes can enable companies to resolve the riskiest tasks already at the beginning, hence minimizing the rise of negative risks. Projects with a low or moderate degree of risk, some of the stages can be eliminated to enhance the flexibility and fast response to the changing consumer behavior. By combining the stages of the Stage-Gate model with prototype testing from the Agile approach as a Hybrid model, the company can better evaluate the potential for success through regular checkpoints and prototype testing of the product, thereby lowering the risk of loss without hindering innovation. It will be important to go through the steps properly as well as having an integration of the Hybrid model to handle uncertainty and risk. Cohn (2010) suggested that in order to prioritize tasks based on risk, the priority should be high risk and high value, high value and low risk, low value and low risk. By incorporating this mentality through a combined process, the companies can have a higher chance of capturing the positive risk and at the same time avoid the negative unwanted risks, since the risk is no longer seen as something to constantly stay clear of, but rather as a necessary measure for being an innovative organization.

5.4 Proposition 4

Companies organize their short-term and long-term innovation processes based on the degree of radicality which affect the inclusion of consumers

To better understand how the companies organize for innovation, it is important to divide the processes into long-term and short-term projects. For company A, who had no clear distinction between the two, the same principle is used for their incremental and radical projects. In the short-term projects the main approach is viewed as a Stage-Gate process, which helps the management to maintain an overview of the investment and to make strict kill or go decisions for the projects along the innovation process to avoid interim failure. Most commonly seen in company B, the short-term projects are meant as a continuation of their current products, else on, there are also some projects which are meant to be more radical in nature. The same is argued for company C where sprints relate to the long-term projects, where the radical innovations are more prominent, and the launch has a longer timeline. On the other hand, because the sprints are incorporated long-term, there might be a lower barrier for embracing this approach at a short-term level as well, giving room for rapid adoption of ideas thereby promoting radical innovation.

All three companies highlighted the timeline as an issue in relation to having set deadlines short-term, which often reduce the ability to uphold consumer inclusion. This is an important aspect of the Agile methodology and when incorporating a combined Hybrid approach, in order for the teams to have the opportunity to decide how often these testing should occur to preserve momentum and to combine Agile mindset with the stages of the Stage-Gate process. These tendencies were seen in both company B and C during the interviews. Nonetheless, company A expressed how it could differ in terms of following each step and could undertake more or fewer stages depending on the complexity of a project. It was discovered that all three companies would sometimes skip a few steps to get ahead, if management saw it fit to match the core strategy, reducing the extent to which the consumers are integrated. This was often related to timeframes and having to meet a deadline and is often involving short-term incremental products, which demonstrates a potential for faster radical innovations. Even though the potential is there, only company A had a radical approach to short-term innovations today, because of the need for control and risk handling of the current management in company B and C. Having the right tools and techniques integrated into

everyday practice can create an easier transition to having a higher number of radical short-term projects.

Else on, all three companies have a higher degree of consumer inclusion when the radicality is high in long-term innovations, to obtain vital feedback both prior to and after entering the portfolio. Company B and C were said to often use the Agile sprints when working with long-term new product development, especially during the initial phase. This consists of constantly changing the idea as it develops, with new changes determining the next step. Giving an indication that the Hybrid model is prominent in the innovation department of these two companies. In company A, their radical products would rely more on continuous testing with focus groups and the consumer in the center where small changes would then be added to the product along the ideation phase. The long-term projects often face a higher uncertainty as the market is ever evolving and can be completely different within a few years. It is therefore important that the companies keep utilizing a combined model that allows them to be more flexible in comparison to the more traditional Stage-Gate approach which is the most prominent today.

Another known factor to consider regarding the differences between short- and long-term projects is the depth and breadth of how much the consumers are included during the product development. An integration of the consumer is often seen as a contributor to upholding an organizations' potential for innovation, but not all companies actually integrate them for every product release. For the researched companies, all three mentions core strategy products or incremental products as something they would not usually include the consumer in through testing. The reason being a well-known, analyzed, and defined consumer preference, need and behavior, hence lowering the risk of failure and wrongful investment. Company B and C specified these projects to be short-term innovations, whereas long-term innovations refer to the radical project with a significantly higher focus on inclusion and integration of the consumer to avoid wrongful investment, gain insight and learn from the user. However, company A specified that when the problem and solution is undefined or unknown, not affected by the timeline of the project, the innovation process has a higher focus on consumer testing and hypothesis, which are included in a large scope of the project to verify and collect important data for continuation or elimination. The risk is then balanced through meticulous development of hypotheses, prototypes, and testing to ensure a strategic go/kill decision process. Company A sees their short-term innovations as both radical and

incremental, and has a higher focus on testing short-term, compared to the two others because the problem and solution is often known for company B and C when working short-term. This gives company B and C the opportunity to rapidly launch incremental products, but might hinder capturing vastly changing consumer trends which company A can take advantage of by integrating short-term radicality to the projects.

What makes them similar is how the degree of radicality of the idea or products affects the degree of consumer testing, to avoid expensive and unexpected failure. The higher degree of testing allows the organizations to listen to the problems of the consumers, how to solve them and adjust accordingly along the way of the process. Nevertheless, by not always including the consumer in incremental products, some necessary adjustments could be missed, and potential income might be lost because of the rapidly changing mind of the consumer. Without enough small scale experiments these trivial overlooked adaptations can lead to large loss of revenue, because incremental missteps can be the problem in which minor adjustment might be the answer. Therefore, the companies should include the consumer as much as possible even though it is a short-term incremental innovation, in order to avoid consumers being preferable to a competitor's product based on small, vastly fixable and easily avoidable factors. Even though short-term testing does not have the highest focus on consumer integration, all three companies utilize testing as part of the long-term innovation process, where the products lean towards being radical, to keep up with the shifts in market trends and consumer preferences. Company C highlighted the difficulty with adjusting along the way with in-person testing and emphasized how in the beginning the tests are small in scale to save time and resources, and when the data is sufficient, they move towards larger consumer groups for testing. Long-term projects were expressed to be frequently testing in all three companies, often related to the radicality, which allows the organization to eliminate ideas early at a small scale without making too large of an investment. Including frequent testing, the companies were highly concerned with paying attention to what is going on in the world in terms of regulations and trends with changing consumer preferences always on their radar. Even though the concern is similar, how they tackle the ever-changing trend through a process of innovation is shown to differ.

5.5 Proposition five

There are three different situation-approaches to the combined Hybrid process model for large traditional manufacturing companies

In an ideal world there would be a ‘one size fits all’ recipe to the innovation process, but unfortunately not all markets, companies, strategies, or capabilities are the same. One perfect approach to the Hybrid model for one company might not be suitable for the next organization, even though they operate within the same industry. How the flexible and plan-oriented processes are organized proved to vary based on four conditions, whereas two of the conditions identified in Paluch et al. (2019) study; managerial control and consumer preferences, and two additional findings from the observed pattern throughout this study; approach to risk and investment. The additional findings and prior theory both affect and are included as subcategories in the four conditions that were revealed to be the ones with the highest significance related to different situation-approaches to the combined Hybrid process model. This contributed to showcase the reality of how traditional companies are utilizing different approaches to Hybrid models in their innovation processes. The combined models below are constructed depending on specific situations the researched companies are facing, and not the general approach to the innovation process. Each of the Hybrid models represents findings from all three companies in the same situation and categorizes how the flexible and plan-oriented process is combined based on the specific circumstances.

5.5.1 Hybrid approach 1: Short-term incremental innovations

The first Hybrid model represents a traditional company working with short-term incremental innovation projects. The process demonstrates how the managerial control primarily lies with the top management to maintain an overview of the resources spent. Here, the employees are in need of approval based on evidence for continuation through stages and gates as in the Stage-Gate process. The documentation refers to the market trends, potential ROI and prior success factors of the current and previous products, making the well-known consumer

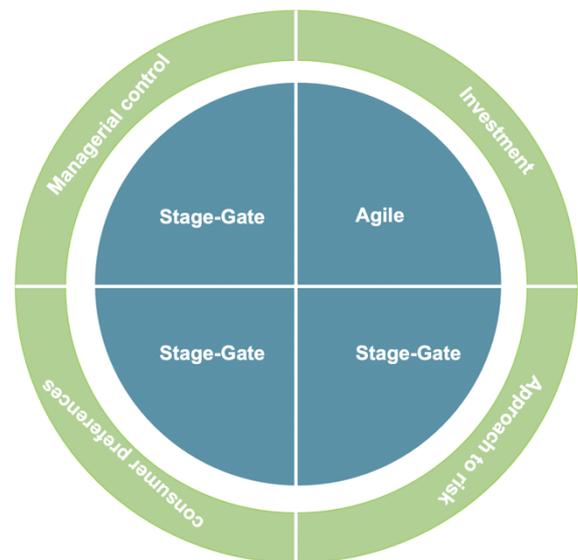


Figure 1: Hybrid model 1

preferences lean towards the category of Stage-Gate. When the consumer preferences are stable and known, there is a lower need for consumer inclusion which reduces the width of experimentation. This again influences their approach to risk, trying to avoid risk as a whole through frequent documentation without including the consumer, resulting in leaning towards the Stage-Gate, more risk averse, perspective. The reason this short-term incremental process is considered a Hybrid, is due to the use of new technology, and the fast pace of incorporating this. If there are changes to the product development requiring an upgrading of the equipment, the management is quick to include new technologies as long as the technology can be used for multiple areas of the assortment. The willingness to invest in new equipment is high for products strengthening the core assortment, nonetheless, they are not willing to invest in short-term tech outside the scope of the strategy. Therefore, three out of the four highlighted categories, which differentiate the Hybrid models, are deemed closer to Stage-Gate for this first approach, with one factor considered more Agile. This gives a demonstration of a Hybrid approach with a higher influence of the plan-oriented process.

5.5.2 Hybrid approach 2: Short-term radical innovations

The second Hybrid approach shows the use when focusing on short-term radical projects. In this combined process model, the managerial control is divided among the team and the top-management, balancing in between the flexible and plan-oriented processes. The team is given quite a large degree of freedom and the ability to make decisions in the first half of the process, the initial stage. Here, learning by doing and decision autonomy is laid as the

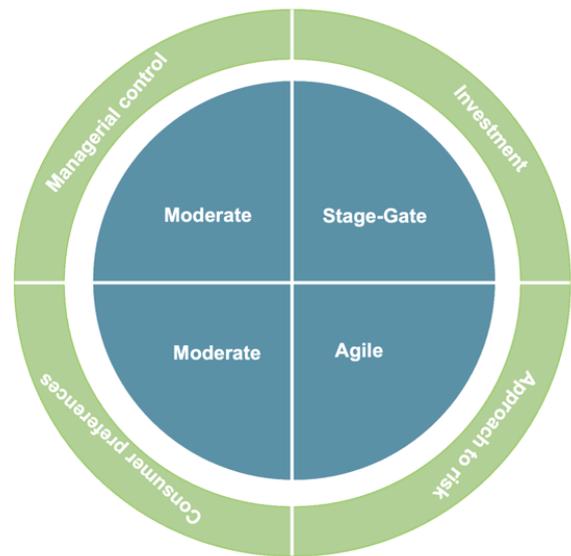


Figure 2: Hybrid model 2

basis for developing the short-term radical projects, to uphold the velocity of the market trends. Thereafter, when entering the portfolio and up until launch, the top management will take the position as the decision-maker. This creates a division of the managerial control; preliminary Agile autonomy for rapid response and moreover a Stage-Gate top-management control approach after entering the portfolio where investments are made. Even though the investments are controlled, there is a high willingness to incorporate new practices. However, new technologies are outsourced rather than a full preliminary investment in order to minimize risk, as seen in a Stage-Gate approach. If the equipment proves worthwhile, the full investment is made, opening the door for current and future projects to make use of the same equipment for both short-term radical-, short-term incremental- and long-term innovations. Else on, the company acknowledges the need for some necessary risk, as emphasized by the Agile method. Therefore, it gives focus to the short-term innovations as something that should embrace the radical and unknown, separating them from many traditional production companies today, but not all. This is linked to the unknown consumer preferences commonly associated with radical new projects where the consumer inclusion reflects the Agile method. Because there is a short timeline for the radical innovation, the consumer is highly involved through prototype testing in the initial stage, where the autonomy of decision is prominent to maintain the rapidness. The most crucial prototypes are carried out prior to entering the portfolio, to obtain fast approvals by the top-management at the later stage to avoid changes after the investments are made in the portfolio. This place the consumer preference at a moderate level.

5.5.3 Hybrid approach 3: Long-term innovations

The third Hybrid model is utilized for long-term, mainly focused on, radical innovations. The model places the managerial control as Agile for this approach, seeing how the team focused on long-term innovation projects are given their own resources, and are also given permission to make decisions regarding the innovation product. Although the innovation process is rather flexible, the investments are still highly dependent on approval from the top management. The investment of new technologies is often outsourced for this

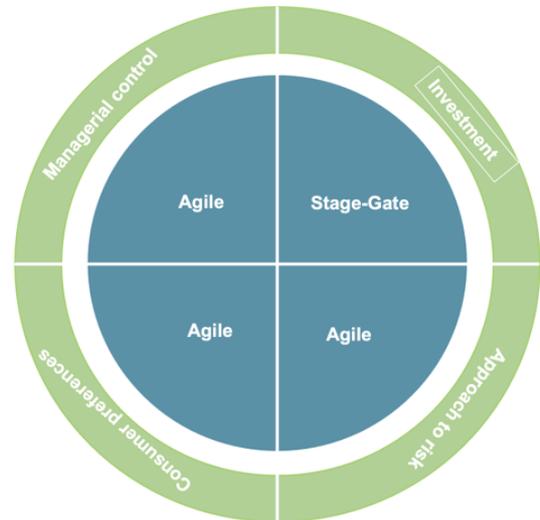


Figure 3: Hybrid model 3

type of innovations, quite similarly to model 2, decreasing the possibility of wrongfully investing in equipment of low value to the company. The long-term innovations in this model take the form of products, and even though the timeframe of the innovations is long-lasting, the market continues to be ever changing. This results in an adaptable and flexible approach to risk where the use of Agile methods is often incorporated. This entails taking risk, and stepping into a new market, which is unknown, and the goal is to find new solutions and opportunities of value. The risk aspects of the innovation process are therefore Agile in both their activities and mindset. This Hybrid model is concerned with the consumer preferences and will include the consumers at multiple steps through the Agile prototype testing methods, during the innovation process. Here, the testing is done rapidly, and changes are taken into consideration for the next phase of the process. The frequent use of consumer inclusion is made possible because of the longer time frame, making it possible to better keep up with the market as it evolves.

6.0 Part VI — Concluding chapter

6.1 Conclusion

This chapter entails the summarizing conclusion based on prior theory and findings, implications, strengths, and weaknesses with the study, as well as suggestions for

future research.

Research question: *How is the innovation process developed in traditional companies by combining the plan-oriented and flexible process models, and in which situations is it utilized?*

The research revealed that traditional companies should aim to have a combined flexible and plan-oriented process of innovation, but whether the Hybrid model should lean more towards Stage-Gate or Agile, but still be a Hybrid process, depends on whether the project is a radical short-term, incremental short-term or long-term innovation. By integrating a Hybrid approach to the innovation process, the companies opt for selecting which parts of the Agile and Stage-Gate processes suit their brand strategy the best in certain situations. If the company is working with incremental short-term projects, the best solution will be to adopt *Hybrid approach 1*, because the incremental innovations are dependent on the launch windows, resulting in the need for smooth, automatic processes where small continuous changes can be made. For this to be possible, the process is built upon plan-oriented phases, where stages can be skipped to get ahead and at the same time incorporating the flexible process to new technology investment supporting the core strategy. The innovations are based on previous knowledge from the current assortment; therefore, the consumers are not involved to a large degree when developing the incremental innovations.

Should the innovation process be short-term radical, the process needs to be flexible, which is why *approach 2* will be best suited. To avoid potential hindrance of innovation, the top management has less decision-power during the initial phases. However, as the information shows, there is less flexibility towards the launch when investments must be made. Here, the management steps in to take more control. The approach opens for embracing the radical and unknown, while still being cautious about spending money after an idea has been approved. Short-term radical innovations will require rapid testing and experimenting. The first half of the process involves the consumers at a large scale, making it possible to discover new areas and entering new markets. If the innovation process in question is seen as long-term radical, the best way to tackle the tasks ahead will be *approach 3*. Here, the Agile methods are used to discover new solutions along with more freedom to make decisions without the management being involved at all times. These projects tend to stick out from the rest of the

portfolio, which often require new technologies. In order to minimize the risk of spending too much on new equipment that won't be used at a later point, the investments are carefully considered, and new technology can be outsourced for the particular project.

The importance of incorporating a routine for being innovative is critical for the organization to keep evolving and learning from past projects. Therefore, the company needs to make sure this is integrated throughout the entire organization and not just among the department of innovation. Even for the more radical projects it seems as if the companies are still organizing for innovation rather than being an innovative organization that captures opportune and critical moments, because they have yet to fully adopt one of the new combined or prior theory's innovation processes. Based on the research, the recommendation is to incorporate the Hybrid approach to fit the situation of the innovation project, however, it will be essential for the entire organization to have a mutual understanding of how the company utilizes the method to drive innovation. Reflecting the situation of the company, a use of three Hybrid processes can be incorporated within the same company to complement the innovation. The model should therefore serve as a guideline for the employees and management in such a way that every individual within the organization works towards the same goal of innovation, and at the same time knows *how* they should work in order to get there!

6.2 Theoretical and practical implications

The research has its basis in Paluch et al., (2019) model selected boundary conditions in selected Stage-Gate and Agile development, and it will contribute to expanding the scope of the conditions in relation to situations faced by traditional manufacturing companies. The research supports part of Paluch's approach but has a deeper focus to the degree of combined flexibility and plan-oriented in certain situations, rather than purely Agile or Stage-Gate. Three situation-based Hybrid process models allows for a concretization of the division between short- and long-term projects, and the utilization of Hybrid Models within these. These models are predominantly a more specific and descriptive contribution to how the Hybrid approach can take various forms. During the study, additional findings played a critical part to developing these approaches, and thereby unlocked new boundary conditions which are essential for traditional manufacturing companies to consider when selecting their process model.

The three Hybrid models contribute to the categorization of the individual processes, where the organization can evaluate and thereafter select which approach(es) are the most suitable to tackle their innovative project. This can make it simpler for the innovation managers to incorporate a mutual understanding of how the processes are constructed based on the situation of the project. By having mutual guidelines in such a large company as the traditional manufacturing organizations are, the Hybrid models can help manage the everyday practice more seamlessly, thereby simplifying the management's role within the department of innovation. The actual integration of either of these approaches will require a management willing to incorporate elements from the flexible Agile methods into their plan-oriented traditional processes. If the willingness to combine the flexible and plan-oriented processes is prominent as a set guideline, the employees have the opportunity of obtaining a higher degree of autonomy without the management having to be frightened, because the 'best-practice' to a certain situation is well-known.

6.3 Strengths and limitations

The limitations of this study can be seen regarding both the practical and theoretical measures. From a practical perspective, the initial plan was to visit one of the companies to participate in their workshop for new releases. This was unfortunately canceled due to limited time on the company's behalf, which weakened the observation to some extent. Even so, it was not significantly weakened since this would have been the second visit. Additionally, Company C was currently undergoing restructuring of the organization and could therefore not offer a physical visit to the company's facilities. Furthermore, to limit the theoretical scope of this research, the portfolio management is not included to a large degree, other than discussing the entry barrier. The research conducted is heavily based on Paluch et al. (2019) previous research, yet not all the contributing factors discussed in Paluch's article are included in this study. The findings are mainly relevant for manufactures of a certain size, which means that a small-medium enterprise will not necessarily have the same prerequisites to succeed if they were to incorporate the Hybrid process models.

A strength of the research is the large amount of prior theory existing surrounding the topic of Stage-Gate, Agile and Agile-Stage-Gate Hybrid approaches to the innovation process, and how this could be analyzed in relation to the information gathered through observation, interviews, and secondary data. There was a high willingness to share from all three

companies, which gave the research both depth and breadth to the research question. Because the companies could gain valuable insight to how their innovation process is today, and as previously mentioned, this resulted in high internal validity based on believed truthfulness of the participants. There is also demonstrated an external validity to the research based on the majority of market shares the three companies have within the chosen industry, making it possible to generalize to a certain extent. Due to this generalization, other similar traditional manufacturing organizations have the opportunity to adopt the Hybrid models to the innovation practice for the same situation-based boundary conditions as the researched companies. Even though there is a maturity to the theory, the research revealed a scope in which the findings can serve as a contribution to existing theory.

6.4 Suggestions for future research

There is still room for future research to be conducted concerning the use of the three combined Hybrid models. To gain a better understanding of how the actual practical implementation of these three models are carried out, future research should aim to examine the approach in a practical context over time, to view the effects of the guidelines. It would be relevant to shift the research from multiple case study to single case study, to obtain even more in-depth insight. Here, the researcher could act as a part of the company to review how they organize the processes in differently focused departments of innovation. This includes participating in workshops and talking to employees, both leaders and operational members, to continue the research which has begun. There is also the possibility for future research to further examine how the portfolio management is handled when one of the three Hybrid models is fully integrated as a part of the day-to-day practice. It is recommended that this should involve a higher focus on how consumer inclusion is seen from a consumer perspective, to gain a broader and more in-depth knowledge of how the organization actually approaches testing. These suggestions for future research can serve as a further development of existing theories complementary to this study.

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8.0 Appendix

8.1 Attachment 1:

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Table 2
Selected boundary conditions of stage-gate and agile development.

	Stage-Gate Development	Agile Development
<i>Technological Characteristics</i>	Low technological dynamism	High technological dynamism
	Solution space defined	Solution space undefined
<i>Customer Characteristics</i>	Stable and known customer preferences	Changing and/or unknown customer preferences
	Limited customer willingness to interact	High customer willingness to interact
	Customer in need of fully specified product	Customer open to engage with interim products (beta versions)
<i>Task Characteristics</i>	Low task modularity	High task modularity
<i>Organizational Characteristics</i>	Low tolerance for interim failure	High tolerance for interim failure
	Strong need for managerial control	Weak need for managerial control