Investigating Strategic Agility and Business Model Innovation Practices in the Digital Transformation Context

PhD dissertation

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ABSTRACT

The past decade has witnessed how digitalization has affected well-established companies across different industries, causing highly turbulent and complex environments, while increasing the need for agility. Current research argues that the increased application and advancements of digital technologies coupled with effective business models from new entrants are undermining existing business models and strategies, leaving well-established companies exposed to disruption and discontinuity. Research is equally emphasizing the need for companies to become more adaptive in terms of increasing the speed and capability of adjusting their existing business models and strategies, which explains the increasing interest and popularity on the research concept of strategic agility as a means for companies to achieve such flexibility. Nevertheless, many aspects of strategic agility are not yet well defined. Relatively few studies address the drivers and challenges of how companies achieve strategic agility through business model innovation. However, to the author's knowledge, no studies explore these two concepts combined in the context of digital transformation of companies. Therefore, the objective of this research study is to advance theory and our knowledge of how companies can apply strategic agility and business model innovation in the context of digital transformation. In terms of theoretical contributions, the research aim is twofold: 1) to identify the core elements underpinning strategic agility and business model innovation practices during digital transformation and 2) to define types of strategic agility and business model innovation practices. In relation to empirical contributions and managerial implications, the research study aims at: 1) identifying benefits and challenges of practicing strategic agility and business model innovation in a digital transformation context, 2) defining a continuum model to guide managers in practicing strategic agility and 3) identifying types of business model innovation activities that are essential in the initiation phase of digital transformation.

Consequently, this research aims at filling this gap by providing a study immersed in a digital transformation context with particular focus on the ways that companies practice strategic agility and business model innovation to contribute to the development of both research fields. In the exploratory scientific tradition, each of the three papers included in this dissertation incorporates these aims, is warranted by theoretical gaps, and aims to contribute theoretically and empirically and as a useful guidance to managers.

The first paper investigates how strategic agility influences business model innovation through a case study of a company undergoing digital transformation. Drawing on existing literature on strategic agility and business model innovation as theoretical lenses, the paper study drivers and inhibitors when adapting to new and agile strategies during digital business model innovation. The findings reveal four strategic agility dimensions that demonstrate how dynamic capabilities are managed and support the process of business model innovation. In particular, drivers show the increased awareness and visibility of identifying new opportunities and revenue

streams by analyzing the business environment for technological trends and customer preferences. Moreover, strategic agility actions spearheaded the initiation of the digital transformation process. For inhibitors, some of the results pointed to managerial bias between exploring and exploiting new business models and the misguided priority of resources in terms of lack of clarity in governance between control vs. flexibility, which warrants further studies.

The second paper investigates how companies across different industries leverage strategic agility through managerial implications of strategic tensions, actions and capabilities. In particular, it starts where the first paper ended on further investigating the inhibitors there exists when practicing strategic agility. The paper proposes a model for recognizing the strategic agility conundrum during digital transformation and subsequently how companies practice and balance between strategic commitments and organizational renewal, while pursuing agility through strategic flexibility to conduct quick responses in high-turbulence environments. This paper testifies to what constitutes the strategic agility conundrum in the balance between two contrasting positions (the rigidly of planning through structure versus flexibility through no structure), and what the managerial implications are hereof in relation to strategic tensions, actions and capabilities, pursuing the identified three strategic agility practices (no planning, planning for near future and planning for future).

The third paper investigates the business model innovation processes that companies undertake to achieve digitalization and competitive advantage. Specifically, the paper identifies four critical business model innovation activities that companies undertake in terms of: 1) scanning the business environment, 2) conveying a sense of urgency, 3) experimenting with digital innovation and 4) shifting decision-making from intuition and data. Subsequently, findings reveal the mindsets, actions and value processes of business model innovation during the companies' digital development. However, there are several managerial dilemmas between: a) prognosis and scenario-driven search myopia, b) timing and sustainability, c) radical shift in experimentation methods and d) using intuition versus data-driven decision-making.

ABSTRAKT

Digitalisering har over det seneste årti påvirket etablerede virksomheder i forskellige industrier ved at skabe høj-turbulente og komplekse forretningsmarkeder, og derved et øget behov for agilitet og omstillingsparathed.

Nuværende forskning argumenterer for at indførelse af avancerede digitale teknologier sammenholdt med nye indtrængende virksomheders effektive forretningsmodeller underminerer eksisterende etablerede virksomheders forretningsmodeller og -strategier, hvilket udsætter etablerede virksomheder for disruption og diskontinuitet.

Forskningen fremhæver ligeledes et behov for, at virksomheder bliver mere fleksible og forøger deres evne til hurtig tilpasning og justering af deres eksisterende forretningsmodeller og strategier, hvilket forklarer den øgede interesse for strategisk agilitet som middel til at opnå denne fleksibilitet. Dog er der stadig mange aspekter indenfor strategisk agilitet, som endnu ikke er veldefineret. Der findes relativt få studier, som kortlægger drivkræfter og udfordringer for, hvordan virksomheder opnår strategisk agilitet igennem forretningsmodel innovation. Ingen studier ud fra forfatterens kendskab udforsker kombinationen af begge koncepter i konteksten af virksomheders digitale transformation.

Formålet med dette forskningsstudie er derfor at forøge teori og viden omkring hvordan virksomheder kan anvende strategisk agilitet og innovative forretningsmodeller i digitale transformationsprocesser.

I forhold til det teoretiske bidrag, er forskningsmålet opdelt i to:

1) At identificere de grundlæggende elementer, som er fundamentet for strategisk agilitet og praksis indenfor forretningsmodel innovation under en digital transformationsproces.
2) At definere typer af strategisk agilitet samt forretningsmodel innovations praksis

I forhold til empiriske bidrag og ledelsesmæssige implikationer, er forskningsmålet følgende:

1) at identificere fordele og udfordringer ved at praktisere strategisk agilitet og forretningsmodel innovation i forbindelse med digitale transformationsprocesser,
2) at definere en kontinuerlig model til at guide ledere i at praktisere strategisk agilitet og
3) at identificere typer af forretningsmodel innovations aktiviteter som er essentielle i den begyndende fase af digital transformation.

Forskningsmålet er som følge heraf at udfylde denne forskningskløft ved med udgangspunkt i konteksten, digital transformation, at undersøge hvordan virksomheder praktiserer strategisk agilitet og forretningsmodel innovation, og derved at bidrage til videreudvikling af begge forskningsområder. De tre forskningsartikler,

som er inkluderet i denne afhandling, inkorporerer dette forskningsmål gennem den udforskende videnskabelige tradition og tager udgangspunkt i konkrete teoretiske kløfter, for herved at bidrage konkret til teori og empiri, og med konstruktion af en brugbar viden for ledelse.

Den første artikel undersøger hvordan strategisk agilitet påvirker forretningsmodel innovation gennem et casestudie af en virksomhed som gennemgår en digital transformation. Ved at trække på eksisterende litteratur om strategisk agilitet og forretningsmodel innovation som teoretiske perspektiv, studerer denne artikel de drivkræfter og barrierer som opstår i tilpasningen til nye og agile strategier gennem en digital forretningsmodel innovations proces. Resultater viser fire strategiske agilitets dimensioner som demonstrerer hvordan dynamisk kapabilitet styres og yder support til forretningsmodel innovation processen. Drivkræfter viser sig især i en øget opmærksomhed og synliggørelse i identifikationen af nye muligheder og indtægtskilder ved at analysere forretningsmiljøet for teknologiske trends og kundepræferencer. Ligeledes, viste det sig at handlinger som følge af strategiske agilitet var afgørende for at initiere den digitale transformationsproces. Nogle af resultaterne pegede i retningen af ledelsesmæssige fordomme mellem at udforske og udnytte nye forretningsmodeller og en dårligt styret prioritet af ressourcer i forhold til manglende klarhed i forvaltningen af kontrol versus fleksibilitet, som berettiger mere forskning på dette område.

Den anden artikel undersøger hvordan virksomheder på tværs af forskellige industrier udnytter strategisk agilitet gennem ledelsesmæssige implikationer så som kompromisser, handlinger og kapabilitet. Denne artikel starter hvor den første sluttede i forhold til at undersøge de eksisterende barrierer i praktiseringen af strategisk agilitet. Denne artikel foreslår en model til at anerkende strategiske agilitetsproblematikker i en digital transformationsproces og hvorledes virksomheder praktiserer og balancerer mellem strategiske forpligtelser og organisatoriske fornyelser, samtidigt med at de forfølger agilitet ved at blive strategisk fleksible for at kunne agere hurtigt i et høj-turbulent marked. Denne artikel bekræfter problematikken i strategisk agilitet der består i at finde balancen mellem to modstridende strategiske tilgange (masser af planlægning gennem struktur versus fleksibilitet gennem ingen struktur), og hvilke ledelsesmæssige implikationer som medfølger i relation til strategiske kompromisser, handlinger og kapabilitet ved at forfølge de tre identificerede strategiske agilitets praksisser (ingen planlægning, planlægning for den nærmeste fremtid og planlægning for fremtiden).

Den tredje artikel undersøger de forretningsmodel innovations processer som virksomheder gennemgår for at opnå digitalisering og konkurrencemæssige fordele. Specifikt, identificerer denne artikel fire kritiske forretningsmodel innovations aktiviteter som virksomheder foretager sig: 1) vurdering af forretningsmiljøet i opsøgning af nye muligheder, 2) hurtigt reaktion, 3) undersøgelse og tests af digital innovation, og 4) skift i beslutningsprocessen fra intuition til data. Resultaterne viser tankegange, handlinger og værdiskabende processer i forretningsmodel innovation gennem virksomheders digitale udvikling. Men der findes også flere

ledelsesmæssige dilemmaer i processen: a) prognose og scenarie-drevet nærsynethed på søgning, b) timing og bæredygtighed, c) radikalt skift i eksperimenterende metoder, og d) brug af intuition versus data-drevet beslutningsgrundlag.

LIST OF APPENDED PUBLICATIONS

Publication 1:

Andersen, T., Aagaard, A., 2018. Exploring the role of strategic agility in business model innovation during digital transformation.

- The publication is under second review at the *European Journal of Innovation Management* (BFI 1)
- Impact factor 2017: 1,385.

Publication 2:

Andersen, T., Aagaard, A., 2019. Investigating the managerial implications of leveraging strategic agility: strategic tensions, actions and capabilities.

- The publication has been submitted to the *Journal of World Business* (BFI 2).
- Impact factor 2017: 3,993.

Publication 3:

Andersen, T., Aagaard, A., 2019. Building business models in SMEs in a digital context: Organizing search behaviors, experimentation and decision-making.

- The publication is under third review at the *Journal of Business Research* (BFI 2).
- Impact factor 2017: 2,509.

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PART 1

1. INTRODUCTION

This chapter provides an overview of the dissertation. First, the study context of digital transformation in companies is introduced. Secondly, the studied phenomena, strategic agility and business model innovation, are explained. Third, the identified research gaps that serve as the base for the investigation of the study are presented. Finally, the research questions as well as the conceptualization of the research are identified.

1.1 The context: digital transformation of companies

Digital transformation, which describes the significant shift in business operations, products and services, processes and organizational structure of a company, is accompanied by the company's initiatives to make use of digital technologies – (Basole, 2016). Recent research on digital transformation has shown a variety of mechanisms that comprise relevant business model practices and strategies (Vagnoni et al., 2016). The most prominent findings on digital transformation shows it as a context and important factor of change (Hess et al., 2016), which entails the process of transforming the core business logics of companies (Bharadwaj et al., 2013, Kane et al., 2015, Dobusch and Kapeller, 2018).

Existing studies reveal the increasing number of incumbent companies across different industries as affected by high-turbulence and complex environments, which is generated from digitalization (Oliver and Parrett, 2017). In particular, researchers argue that the use and advancement of digital technologies are rapidly changing and undermining existing business models and strategies, leaving companies exposed to disruptions and discontinuities from new types of competition (Lucas and Goh, 2009, Weill and Woerner, 2013). For this reason, companies are now increasing their investments of resources into their transformation processes to comply with the requirements of the digital age and to reap the strategic advantages of staying relevant and competitive (Ross et al., 2016). This also challenges well-established companies to rethink their strategies and to transform parts or the entirety of their business models (Weill and Woerner, 2013).

Even though digital transformation has increased in popularity among practitioners and scholars alike, there are several challenges to consider in terms of how incumbent companies organize their business model innovation processes (Yoo et al., 2012, Holmström and Partanen, 2014). Such digital transformation challenges bring up competing priorities in companies' capabilities, focus, collaboration and governance (Svahn et al., 2017). Furthermore, we know very little of how digital transformation is associated with and fundamentally changes business model innovation and the need for strategic agility and how it affects multiple business units within the organization from product innovation to strategy to cultural and leadership aspects (Fitzgerald et al., 2014).

Reviewing past literature on digital transformation reveals its profound impact on customers' preferences, industries and companies (Vagnoni et al., 2016). This transformation subsequently leads to changes in products and processes toward reconfiguring organizational structure (Remane et al., 2017). It involves reshaping and replacing parts or entire business models, as a result (Weill and Woerner, 2013). Moreover, companies seek to adapt digital technologies into their strategies, business models and organizational capabilities with the purpose of achieving agility and sustainability from external threats (Vagnoni et al., 2016, Nambisan et al., 2017). Nevertheless, we still need to understand how companies' advancement of digital technologies initiates organizational change and how managers increase agility of the company through managerial practices of strategic agility and business model innovation (Yoo et al., 2012, Holmström and Partanen, 2014, Remane et al., 2017). Recent contributions expect digital technologies to play an active role to facilitate business model innovation (Nambisan et al., 2017, Li, 2018), yet we know very little of how they are interlinked and managed by companies in different sectors.

1.2 The phenomenon: strategic agility and business model innovation

The concept of a business model entails the embodiment and logic of how a company creates, delivers and captures value from its customers and partners (Teece, 2010, Zott et al., 2011, Foss and Saebi, 2017). The innovation of business models is believed to be superior to that of other types of innovation in terms of leading to greater competitive advantage than product or service innovations. A study on IBM confirm that companies that focus on business model innovations increase their operating margins at a much faster rate than those who are driven by product and service logics (Chesbrough and Appleyard, 2007). In addition, well-established companies still struggle with business model innovation, and only a few have successfully managed to totally transform their existing business models through digitalization. A case example hereof is Apple. Apple was a former hardware manufacturer of personal computers, and it struggled with some product failures that resulted in a decrease of market share. However, a successful commercialization of MP3 technology made Apple able to launch their iPod and iTunes business model, which revolutionized the music industry (Abel, 2008). To this day, Apple represents one of the largest music distributors worldwide. Another example is IBM, which managed to reinvent their business model as well. IBM was faced with significant losses in the early 1990s that brought the company to the brink of collapse. At that time IBM was a hardware manufacturer of semiconductors and started to build a service business and from this leveraged its IT expertise to offer its customers a variety of services to handle their IT demands (Chesbrough and Appleyard, 2007). Today, almost half of IBM revenue can be accounted from service, primarily made possible through business model innovation, in which IBM created digital-driven business models on top of their digital technologies. Hence, it wasn't business model innovation in itself, but such innovation in the context of digitalization that made it possible for IBM to regain their competitive advantage.

In contrary to the success stories of the above examples, well-established companies all have in common that it was only when they were faced with severe challenges that they started to innovate new business models. There are also companies who completely missed the chance to adapt their business models in terms of future challenges and therefore failed, which caused them painful cutbacks, transformations or even bankruptcy. A popular company, Kodak, missed the adoption to digital photography and filed for bankruptcy (Schmitt et al., 2016). Blockbuster lost to Netflix and had to close all its video rental stores because it missed the digital opportunities from the Internet (Teece, 2010). Some companies were saved at the very last minute, like Motorola, who failed to switch its focus from hardware sales to innovative software applications but was luckily bought by Google. Some would argue this was only because Google was interested in their large portfolio of remaining patents.

The questions are, first, why do companies only start to innovate their business models in dire circumstances? And second, why can't they adopt to their surroundings? Are companies blind to what is happening in their environments, or are companies so arrogant to believe that nothing can overthrow their success? One aspect could be that traditional ways of strategic practices simply do not work anymore and that we need a new approach to strategy (Chesbrough and Appleyard, 2007) that can account for doing business in a digital context.

An area that has recently received increasing interest is the strategic agility concept that suggests that strategically agile companies are those who can achieve success in this new high-turbulence competitive landscape caused by digitalization (Lewis et al., 2014, Weber and Tarba, 2014, Vagnoni et al., 2016). These companies have achieved strategic agility through the ability of continuously sensing and responding to emerging opportunities and threats (Doz and Kosonen, 2010, Battistella et al., 2017). Current research defines such companies via their unique ability to remain flexible through strategic direction, meanwhile constantly adapting new innovative ways to create value (Weber and Tarba, 2014). It might appear that strategic agility in such disruptive and high-turbulence situations could be the elegant answer for companies to adapt their strategies to gain competitive advantages or even to survive (Lewis et al., 2014). However, despite two decades of research on strategic agility, it is still an ill-defined concept with room for more theoretical contributions (Weber and Tarba, 2014). According to Hemmati (2016), the development of how companies achieve strategic agility calls for more empirical evidence of the phenomenon, especially how companies leverage strategic agility between strategic and business model renewal practices. In fact, this dissertation is focused on exploring the nature of strategic agility and its direct influence on business renewal during digital transformation of companies.

It is equally emphasized that BMs need to change over time (Doz and Kosonen, 2010) and that it is the ability to reconfigure BMs that can determine a company's survival and success (Achtenhagen et al., 2013, Battistella

et al., 2017). Consequently, what we know about companies in terms of how we create, deliver and capture values through BMs is changing as more BMs are being built on digital platforms such as social, mobile analytics and cloud-based solutions (Kane et al., 2015, Nambisan et al., 2017). It is the increased interest and adaption of digital transformation that has today become a reality for companies in all types of industries (Nambisan et al., 2017, Li, 2018). Yet, the concept of business model innovation (BMI) is still ill defined despite its increased popularity among practitioners and scholars (Foss and Saebi, 2017, Li, 2018). In particular, there is a lack of empirical evidence in research regarding the process of how BMs are developed to create, deliver and capture values in the context of digitalization (Achtenhagen et al., 2013, Li, 2018).

Hence, the research study of this dissertation is focused on understanding the digital transformation of companies through the theoretical lenses of strategic agility and business model innovation. It is through these theoretical perspectives that the author would like to contribute to a better understanding of how companies achieve flexibility through strategic agility and business model innovation practices during digital transformation.

1.3 Research gaps and research questions

As uncovered earlier, the most prominent research on digital transformation involves changes to a company's strategy and business model (Vagnoni et al., 2016). Thus, it appears that there exists a gap between strategy (strategic agility) and the concept of business model innovation that does not account for the way of doing business today in a digital context. Thus, through this dissertation, the author would like to contribute to both the strategy and business model innovation literature by developing a better understanding of how companies venture into the context of digital transformation through the application of strategic agility and business model innovation practices. However, the literature review related to digital transformation (context) and strategic agility and business model innovation practices (the phenomenon) revealed: 1) calls for empirical evidence, 2) that research has not examined how strategic agility enables companies to develop business model innovation in a digital transformation context (Schneider and Spieth, 2013), 3) a lack of research on how companies achieve strategic agility (Schneider and Spieth, 2013, Hemmati et al., 2016), 4) research on business models as a unit of innovation and its process is sparse (Foss and Saebi, 2017) and 5) a question of whether or not business model innovation can increase agility for companies in the digital transformation context (Bock et al., 2012).

Thus, the research objective is to investigate the role of strategic agility and business model innovation during digital transformation and positions itself across the three concepts, as illustrated in Figure 1.

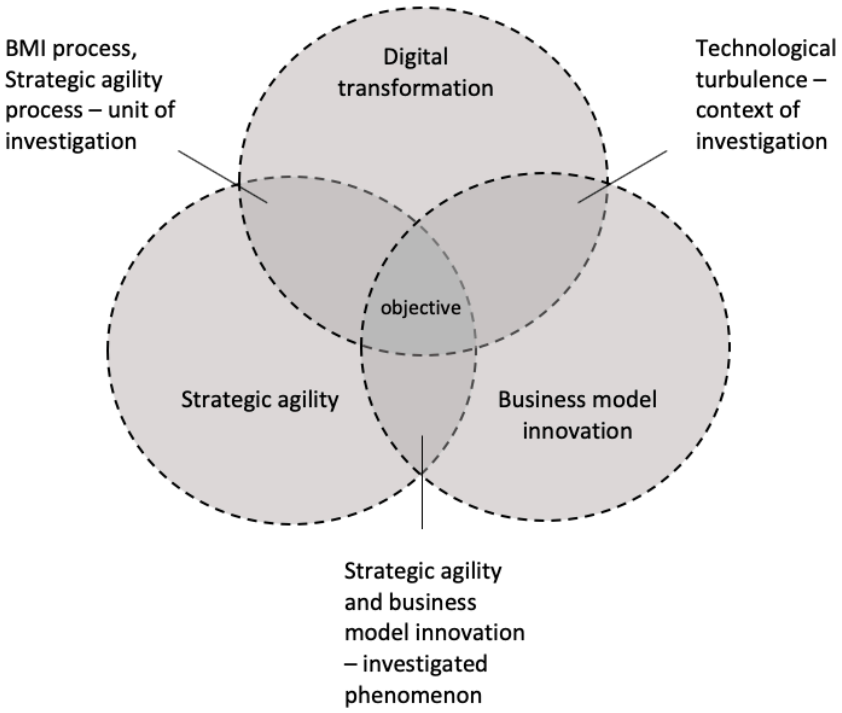

Figure 1 - The research objective of the dissertation

Consequently, this study aims at enhancing strategic agility and business model innovation literature through empirical evidence, and it is guided by three research questions explored by the three papers included in the dissertation, as presented below:

- **Paper 1: Exploring the role of strategic agility in business model innovation during digital transformation**.
  RQ: What drives and inhibits the process of business model innovation in cultivating agility during digital transformation?

- **Paper 2**: **Investigating the managerial implications of leveraging strategic agility: tradeoffs, actions and capabilities**.
  RQ: How do companies leverage strategic agility and what are the managerial implications, strategic tensions, actions and necessary capabilities during digital transformation?

- **Paper 3: Building business models in SMEs in a digital context: Organizing search behaviors, experimentation and decision-making**.
  RQ: How do Small and medium-sized enterprises pursue business model innovation and manage business model innovation activities during digital transformation?

1.4 Conceptual structure of the dissertation

This dissertation consists of three research papers, which are connected through the overall research objective.

The first paper explores the relation between strategic agility and business model innovation to understand what drivers and inhibitors exists when adapting to new, agile strategies. The second paper investigates how companies achieve strategic agility during their digital transformation. Finally, the third paper investigates business model innovation activities that companies undertake to achieve agility through digitalization.

Their conceptual relationship is displayed in Figure 2. The figure shows three digital transformation activities and represents the relation between each research paper in terms of:
1) initiating digital transformation—*the reasoning of companies engaged with digital transformation* (Basole, 2016, Hess et al., 2016)
2) managing strategic change—*changes to the business model and strategy of companies* (Vagnoni et al., 2016), and 3) the business model innovation process—*how companies create, deliver and capture values in the digital context* (Achtenhagen et al., 2013, Li, 2018).

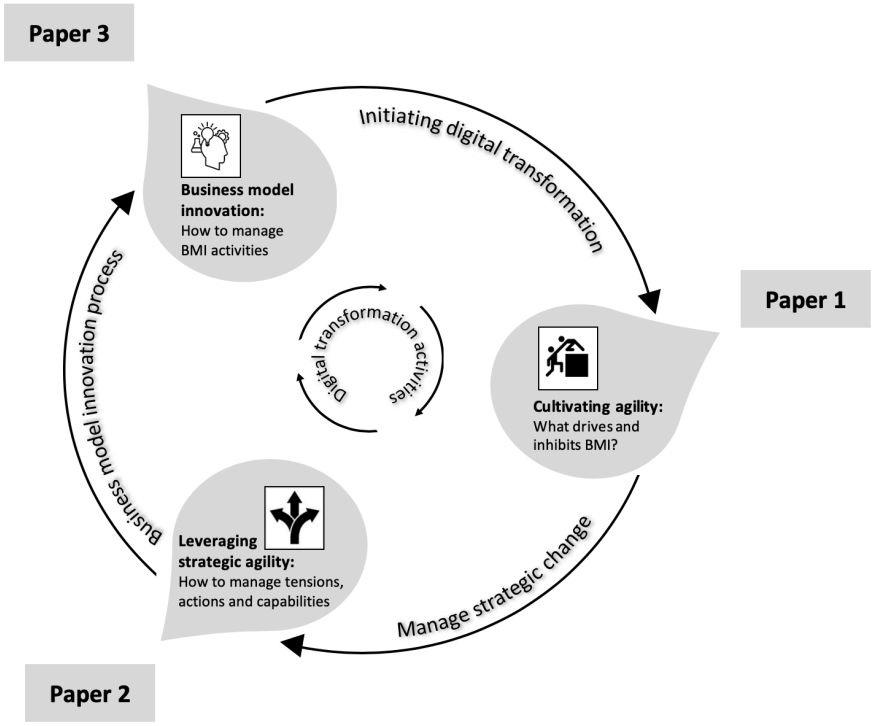

Figure 2 - The conceptual relationships between the papers in the dissertation

The overall research design contains a combination of systematic literature search, a case study design and grounded theory elements, as well as cross-case comparison study as explained in detail in each of the three papers. Table 1 presents the overview of the research questions, theoretical perspectives and methods applied in the appended research papers of this dissertation.

Table 1 - Overview of research papers

Article number and questions	Purpose	Methodology	Contribution and answer
1. What drives and inhibits the process of digital transformation	The aim of the paper is to investigate how strategic agility is cultivated during digital	The first appended paper follows a single case study design of an SME undergoing a digital transformation.	This paper contributes to the strategic management and BMI literature by exploring the concepts of strategic agility and digital transformation as means for managers to practice parallel BMs in

in cultivating strategic agility?	transformation. Drawing on strategic agility and BMI as theoretical lenses, we study the drivers and inhibitors when adapting to new, agile strategies during digital BMI processes through a manufacturing SME.	Data sources: 10 semi-structured interviews with managers and 6 semi-structured interviews with customers. Respondents were CEOs, managing directors and project managers. Data analysis: The analysis was conducted in two steps. First, the interviews were coded deductively. Second, the methodology of (Gioia et al., 2013) was applied to code inductively into first order concepts, second-order themes and finally aggregated dimensions.	creating, delivering and capturing value in a competitive way. The findings reveal four strategic agility dimensions: 1) the need for increased agility through digital transformation, 2) embedding service-driven capabilities into the organization, 3) change in BM logic and 4) customers co-creation and co-development that demonstrate how strategic agility influences BMI during the digital transformation process of a case company.
2. How do companies leverage strategic agility, and what are the managerial implications, strategic tensions, actions and necessary capabilities during digital transformation?	It is expected that digitalization will theoretically change the role (the nature) of strategy. We investigate companies from different industries and affected into a different extent of digitalization. We start our investigation from two	The second appended paper follows a multiple case study research design in order to make cross-case analysis and comparison between 15 companies undergoing digital transformation. Data sources: 31 semi-structured interviews, secondary data review on annual reports. Respondents were CEOs, managing directors, project managers and project employees.	We confirm that all strategists in companies expect the role and nature of strategy to change in digital environments. We detect in our interviews that strategists follow the agility maximizations and building lasting competitive advantage paradigms simultaneously, creating an unsolvable paradox for many strategist teams. We trace this phenomenon to its constituting elements and suggest three types of strategic agility practices in balancing between strategic commitment and strategic agility through digital transformation: 1) no planning, 2) planning for near future and 3) planning based on future. Each contains key managerial implications related to strategic tensions,

	contrasting theoretical positions: 1) strategy is needed to build a lasting and exploitable competitive advantage (expectation that planning yields high rents), and 2) strategic decision-making relies on simple rules when applied in dynamic environments (expectation is agility yields high rents).	Data analysis: The analysis was done in two parts. The first part involved the coding of interviews into first and second order themes and aggregated dimensions. The second part consisted of mapping the process of managerial implications of strategic agility practices as the aggregated dimensions and the theoretical constructs of the paper.	actions and capabilities necessary in leveraging the full business potential of strategic agility.
3. How do SMEs perform BMI and manage the BMI activities during digital transformation?	The aim of this research paper is to investigate the business model innovation processes that SMEs undertake to achieve digitalization and competitive advantage. Little is known of how SMEs go through such BMI practices and how	The third appended paper follows a multiple case study research design applied on 12 SMEs in different industries and to make cross-case analysis and comparisons. Data sources: 16 semi-structured interviews, secondary annual reports from the case companies. Respondents were CEOs, managing directors,	The study identifies four BMI activities: 1) assessing the environment in search of new opportunities, 2) conveying a sense of urgency, 3) exploring and testing new opportunities through experimentation and 4) handling decision-making between a combination of intuition and data. The findings also reveal the mindsets, specific action taken and the value processes of BMI during the companies' digital development. Finally, the findings identify several managerial dilemmas between: a) prognosis and scenario-driven search myopia, b) timing and sustainability, c) radical shift in experimentation methods

	they search, decide and experiment during their digital venturing. This paper examines how 12 SMEs across different industries have used BMI to develop and adapt BMs to facilitate digital transformation. The identification and the development of BMs in a digital reality can be a challenging task for SMEs. In the context of this article, the focus will be on the identification by business managers of BMI activities that consolidates into new BMs, and to identify the level of adaptiveness as outcome of the process by a sample of managers. The identified BMI	project managers and project employees. Data analysis: The analysis was done in two parts. The first part involved the coding of interviews into first and second order themes and aggregated dimensions. The second part involved mapping the BMI process as representing the aggregated dimensions and the theoretical constructs of the paper.	and d) using gut feeling versus data-driven decision-making.

	activities were categorized into search behavior, experimentation and decision-making, identified by the managers who participated in the study.	

PART 2

2. LITERATURE REVIEW

This chapter seeks to uncover current understandings of the above conceptualized research scope by which establishing strategic agility and business model innovation practices during digital transformation is one way of increasing the agility of companies operating in high-turbulence environments, and thus contributing to the strategic agility development. This chapter encompasses the key theoretical perspectives of the three appended papers that were part of the analytical theory unfolding process. At the beginning, it presents a systematic literature search for strategic agility and its affiliated theoretical perspectives. The results of this literature search are then discussed in terms of the theoretical positioning between strategic agility and business model innovation to the section of strategic agility definitions, which is followed by the theoretical affiliations of strategic agility. Afterward, the author presents the emergence of the business model concept as well as business models as a unit of innovation. Following this, an overview of digital transformation as the context of investigation is provided as a specific type of organizational change and its impact on management practices. The chapter concludes with a description of the strategic agility and business model innovation phenomenon of this research study and as the theoretical underpinning of each appended publication.

2.1 Systematic literature search on strategic agility and its affiliations

The concept of strategic agility is neither well defined nor well established. Following the statements in the research gap in the introduction, it was deemed necessary to uncover the current body of knowledge within the research field of strategic agility. To the best of the author's knowledge, there is still no form of literature review on strategic agility. According to Weber and Tarba (2014), despite its existence over the past two decades, it is still an ill-defined concept that is in need of a stronger theoretical foundation, while also lacking empirical evidence (Hemmati et al., 2016). In order to contribute to current understanding of strategic agility and to secure the research gap is still relevant, the author conducted a systematic literature search. The process began by searching in useful contributions (Doz and Kosonen, 2008, Doz and Kosonen, 2010, Weber and Tarba, 2014). Next, a search of entrepreneurship and management literature aimed at finding valuable cues. This attempt produced 21 papers that aided to synthesize definitions of strategic agility and its affiliated theoretical perspectives. It also included some aspects of business models and business model innovation, which is discussed in this chapter. The literature review was used for the theoretical background in each appended paper.

The systematic literature search was then conducted for additional insights to uncover what may already be known about the concept of strategic agility and its possible relation to business model innovation. The Web of Science (WoS) and Business Source Complete databases were used in the search. The queries (see Table 2) included common synonyms for strategic agility and business model innovation as well as digital

transformation in combinations with the processes that the author considered to be similar to or of relevance to strategic agility and business model innovation. The publication outlets were limited to peer-reviewed literature only, the publication language to English, and searches were done only in titles, abstracts and keywords for the relation between topics. For the synonyms the author searched titles, abstracts and keywords in order to find all plausible contributions to the topics.

Table 2 - Search queries

Search	Key Words Strings	Total WoS	Total Business Source Complete	Total excluding proceedings	Records without duplicates	Total records without duplicates
1	(strategic* AND agility*)	281	235	160	157	332
2	(strategic* agil* AND business* model*)	103	5	60		
3	(strategic* agil* AND business* model* innovat*)	21	3	15		
4	(strategic* agil* AND digital* transform*)	6	3	2		
5	(strategic agil* AND business* change*)	54	11	25	293	
6	(strategic* agil* AND business* renew*)	5	5	4		
7	(strateg* agil* AND business* model*)	216	22	117		
8	(strateg* agil* AND business* innovat*)	83	22	57		
9	(strateg* agil* AND renew*)	12	9	5		
10	(strateg* agil* AND transform* AND adapt*)	13	6	6		
11	(strateg* agil* AND capabilit*)	325	77	167		
12	(strateg* agil* AND aware*)	37	9	10		

13	(strateg* agil* AND flexibilit*)	266	52	107		
14	(strateg* agil* AND digital*)	55	23	13		
15	(strategic* agility* NOT business* model*)	214	168	121	159	
16	(strategic* agility* NOT digital*)	270	174	157		
Total		**1961**	**824**	**1026**	**609**	**332**
		(2785)				

*last updated on September 12, 2018

2.1.1 Data categorization

In order to get the most relevant results, the author conducted the following three rounds of searches:

The core search (searches 1–4), which resulted in a total of 157 different entries.

The supporting searches (searches 5–14), which totaled 293 entries.

The saturation searches (searches 15–16), which totaled 159 entries, but only gave the author 3 additional core articles.

The total number of returned entries from both databases was 2,785 (see Table 2). The extracted references were imported into the Endnote reference management software, which automatically detected and eliminated identical entries. As a result, the author started with a database of 609 papers.

The database was then cleaned by scrutinizing paper titles and their publication outlets and deleting irrelevant entries. The selection criterion for core papers (first round) was that papers must be about strategic agility and/or its relation to business models and/or business model innovation and/or digital transformation. The selection criterion for supporting papers (second round) was the affiliations from the core papers that the author found of relevance from titles, abstracts and keywords. The final criterion for saturation papers (third round) was the exclusion of the first two criteria in order to find papers only dealing with strategic agility. This search process reduced the reference database to 332 entries. Finally, the author read all abstracts and removed the papers that did not correspond to the selection criteria above. The final database shrank to 39 papers, which subsequently underwent careful examination for conceptualization of strategic agility and its relation to business model innovation and digital transformation.

The following sections review the results from the systematic literature search and start by presenting a theoretical positioning in the relation between strategic agility and business model innovation.

2.2 Theoretical positioning: relating strategic agility and business model innovation

The use of the term business model innovation (BMI) has increased dramatically within the last two decades (Osterwalder et al., 2005, Chesbrough and Appleyard, 2007, Teece, 2010, Zott et al., 2011). Businesses are reactively trying to adjust toward changes on market, industries or ecosystems influenced by, e.g., globalization, change of business modeling and technology advancement (Doz and Kosonen, 2010, Spieth et al., 2016). Hence, businesses are forced to rethink not only their leadership positions (Chesbrough and Appleyard, 2007, Casadesus-Masanell and Ricart, 2010), but also the understanding of and approach toward surviving new forms of competition (Arbussa et al., 2017). Parallel to this, business strategies are not following the same trends, such as adopting the principles from business model concept into businesses, leaving gaps or diffusion between traditional academic strategy thinking and the business model concept (Massa et al., 2016).

In the business model literature, the debate about the difference between strategy and business models reveals widely differing perspectives, thus neglecting the relation between business model and strategy while using these terms interchangeably (Massa et al., 2016, Foss and Saebi, 2017). The authors who only deal with the relation between these terms can be divided into three groups: those who recognize a relationship with a clear distinction between the two terms, those who support business model uniting the finer aspects of strategy and those for whom strategy and business model are interchangeable and differences cannot be made. (Seddon et al., 2004) have identified many overlapping definitions of business model and strategy and are frustrated to acknowledge that “we don’t clearly understand the difference between these terms” (p. 428).

(Magretta, 2002) considers competition to be a strategy’s job. The business model is not the same as a strategy, she argues, and the dimension of competition is exactly what separates the two. The business model can be identical for several businesses, but they will need a strategy to differentiate themselves in terms of the dimensions of each business model—value proposition, users and customers, value chain functions, competences, collaboration with network partners, value streams inside and outside of the business, and the BMI process. Hence, the complexity for a business to handle business models simultaneously only advocates the necessity of strategy and its importance regarding BMI process (Chesbrough and Rosenbloom, 2002, Markides and Charitou, 2004, Chesbrough and Appleyard, 2007, Casadesus-Masanell and Ricart, 2010, Osterwalder et al., 2010, Massa et al., 2016).

(Chesbrough and Appleyard, 2007) suggest that the business model is a relatively new concept within the strategy literature. In the article on open innovation and strategy, they argue that traditional academic strategy such as Porter's Five Forces, Kotler's Competitive Strategy model, the Ansoff Matrix and the Andrews' Strategy framework advocates a reactive and defensive way of approaching the market toward a leading position. This traditional way of thinking business strategy does not comply with the market today due to the vast amount of technology development (Magretta, 2002, Mitchell and Coles, 2003, Teece, 2010) that has changed the way of doing business. In accordance with this, (Zott et al., 2011) argue that there are similarities between the emergence of the business model concept and the emergence of technology change, such as the Internet boom, hence e-business has changed the way of understanding how businesses can function by creating and delivering value in new ways that compete with existing business models (e.g., eBay, Google, Tesla, YouTube, Ryanair, etc.). This evolution of technology and globalization has therefore evolved business models to become a more important part of the development of businesses (Morris et al., 2005, Drakulevski and Mijoska, 2008, Johnson et al., 2008b, Lee et al., 2012). Companies are not only facing challenges on the need to renew their BMs, but also in terms of establishing the means of becoming flexible and agile organizations that can allow for adaptation to occur within short periods of time (Lewis et al., 2014). In addition, research suggests that companies are finding it increasingly difficult to respond to changes in high-turbulence environments (Bock et al., 2012, Weber and Tarba, 2014).

Strategic agility has, as one of the many enablers of business model innovation, been regarded as a crucial prerequisite and central principle to the innovative business model (Doz and Kosonen, 2010, Schneider and Spieth, 2013). Strategic agility permits management to initiate the business model reconfigurations that are necessary to sustain in the competitive market. Fundamentally, it exhibits the presence of organizational flexibility and stability. Lewis et al. (2014, p. 60) state that strategic agility "enables companies to flexibly respond to complex, global, and dynamic environments." According to Lewis (2014), the absence of strategic agility is a barrier for business model innovation, because managers will become confined to a system that cannot adapt to its surroundings and may not survive in highly competitive and dynamic landscapes. In addition to this, scholars argue that strategic agility is the crucial prerequisite for business model innovation (Doz and Kosonen, 2010, Schneider and Spieth, 2013). However, (Schneider and Spieth, 2013) state that researchers have not thoroughly examined how strategic agility enables managers to facilitate business model innovation.

2.3 Business model emergence

Today, the business model concept is widely known in the business communities as a means of structuring one's business within a framework and in that process receiving a better understanding of what the business is and how it actually works. The terminology of business model as a concept originated in the mid-1990s

parallel to the emergence of the Internet boom and has since evolved into a phenomenon of sorts as a way of visualizing how businesses conducts their activities (Osterwalder et al., 2005). However, despite the sensation of the Internet boom, many businesses continued to follow their trajectory by offering the same products and services to their customers (Magretta, 2002).

The development of the business model concept over the years has left the research field with many variations and definitions toward explaining and forming the business model language (Morris et al., 2005, Teece, 2010, George and Bock, 2011, Foss and Saebi, 2017). The research field has been a subject of indifference, where it seems that scholars follows different paths and perspectives to reach a true and clear definition of how a business actually functions (Foss and Saebi, 2017). A research study conducted by (Osterwalder et al., 2005) prompted the question of defining what a business model is: 62 respondents came up with 54 definitions. The results indicated some confusion, not only in academia, but also in practice. Recent literature also confirm the indifference and confusion as to identify a common ground and convergence on the business model language (George and Bock, 2011, Zott et al., 2011). The development and behavior of the research field indicates the effort to reach consensus among publications, but tends to overwrite past and current definitions of the business model language (Bock et al., 2012) that seems to foster more divergent research, rather than convergence. This is caused by the many different perspectives on the roles that business models should fulfill (George and Bock, 2011). (George and Bock, 2011) summarize the different business model themes (perspectives and definitions) from their literature review (e.g., Design, RBV, Narrative, Innovation Transactive and Opportunity). Table 3 provides an overview of the most significant contributions to the research field: business model concept, adopted from George et al.'s 2011 article (George and Bock, 2011), used as a means to categorize the literature review on the business model concept, under business model themes.

Table 3 - Overview of selected business model literature

Business model themes	Author(s), Year	Definition(s)
Design *"Agent-driven or emergent configuration*	Timmers (1998)	The business model is an architecture of the product, service and information flows, including a description of the various businesses actors and their roles; a description of the potential benefits for the various business actors; and a description of the sources of revenue.

of company characteristics"	Osterwalder et al. (2005)	A blueprint of how a company does business. It is a conceptual tool that contains a set of elements and their relationships and allows expressing a company's logic of earning money. It is the description of the value a company offers to one or several segments of customers and the architecture of the company and its network of partners for creating, marketing and delivering this value and relationship capital, in order to generate profitable and sustainable revenue stream.
Narrative *"Subjective, descriptive, emergent story of logic of key drivers of organizational outcomes."*	Magretta (2002)	Business models are at heart stories that explain how enterprises work.
Innovation *"Processual configuration linked to the evolution or application of company technology."*	Chesbrough and Rosenbloom (2002)	The business model is the heuristic logic that connects technical potential with the realization of economic value.
Transactive *"Configuration of bounty-spanning transactions."*	Amit and Zott (2001), Zott et al. (2011)	The business model depicts the content, structure, and governance of transactions designed so as to create value through the exploitation of business opportunities.

The term business model represents the business structure and logic to create, deliver and capture value from and for its stakeholders (Chesbrough and Rosenbloom, 2002, Magretta, 2002, Zott et al., 2011, Foss and Saebi, 2017). The contribution from (Osterwalder et al., 2005) explained business models as how organizations do business, hence how they create and capture value as the rationale of fulfilling the needs and desires of its customers (Johnson et al., 2008b). Moreover, the business model represents the business perspective on what it believes their customers want, how they want it, how the business should reorganize itself to meet the customers' needs, and in turn, how it can generate revenue doing so (Johnson et al., 2008b, Teece, 2010). Another perspective comes from (Magretta, 2002), who believes business models represent

telling the good story on how the business can influence its customers to pay for the created value and how to convert this into profit.

The business model represents a systematic view on how the business creates, delivers and captures value, through their activity systems (Zott et al., 2011, Foss and Saebi, 2017).

Yet another perspective describes the business model boundaries as transcending the business to include external actors or stakeholders (e.g., customers, partners and investors), hence the network perspective as part of the business model concept (Zott et al., 2011).

2.3.1 Business model as unit of innovation

Business model innovation in its simplicity can be described as a change in or of the business model. According to Linder and Cantrell (2001), the business model as a concept refers to the basic logic of how companies do business. Specifically, the concept is often associated with the conceptual tool containing different building blocks, dimensions or components (Osterwalder et al., 2005). For this research study, business models are viewed as representing the simplification and aggregating relevant activities of a business (Wirtz et al., 2010), and define the business's value proposition and its approach to creating, delivering and capturing values (Velu and Stiles, 2013).

In Foss and Saebi's (2017) systematic literature review of business model innovation, the evolution of the business model literature can be categorized into three streams of research: 1) business models as classification of business, 2) business models as antecedents of businesses performances and 3) business models as units of innovation. This research study follows the latter, business models as units of innovation, in which business models are regarded as novel units of analysis due to fast-changing business environments (Amit and Zott, 2001, Massa et al., 2016). However, over the past decade, a number of contributions have attempted to address the process of business model innovation. For example, (Morris et al., 2005), envision of a business model life cycle with the periods of specification, refinement, adaptation, revision and reformulation of the business model. A business model has to be adopted and innovated to respond to changes in the market or the technology or to leverage new opportunities (Hedman and Kalling, 2003). These changes require continuous business model innovation. Taking into account different and partially contradictory definitions (Hamel, 1998, Amit and Zott, 2001, Venkatraman and Henderson, 2008), this research study follows the business model innovation definition by (Frankenberger et al., 2013, p. 251) of "a process that deliberately changes the core elements of a company and its business logic."

In summary, transforming the business model through business model innovation is a subject of research debate and practical application. Research studies suggested the three meta-capabilities as a starting point for professional and practical induction (Doz and Kosonen, 2008, Doz and Kosonen, 2010). Yet, we know very

little about the business model innovation process, its definition and how it is actually practiced in the process. Equally important and in line with this research study is how companies practice business model innovation activities in order to achieve agility during digital transformation.

2.4 Definitions of strategic agility

According to Doz and Kosonen (2008), digitalization has affected the way that companies in all industries manage their operations and has redefined the mix of assets and capabilities needed as well as eliminated longstanding barriers to entry. The business environment has become more volatile, fast changing and difficult to predict, which among many things has resulted in the increase of uncertainty (Doz and Kosonen, 2008, Bock et al., 2012, Achtenhagen et al., 2013, Franken and Thomsett, 2013). This means that strategic agility has, for most knowledge-intensive companies that operate in the rapidly changing environment of digitalization, globalization and deregulation, become a vital mechanism for gaining competitive advantage or even for survival (Brown and Eisenhardt, 1997, Doz and Kosonen, 2008). In addition, Amit and Schoemaker (1993) argue that fast-changing environments require the ability to reconfigure the company's asset structure and accomplish the necessary internal and external transformation. Strategic agility in such environments can be used as the method and mindset of how companies reinvent and transform their business model and strategy to unforeseen changes (Weber and Tarba, 2014, Vagnoni et al., 2016). One of the main characteristics of strategic agility can be described as how companies should be organized to do effective business in high-turbulence environments (Weber and Tarba, 2014, Vagnoni et al., 2016) in the balance between efficiency and flexibility (Eisenhardt and Brown, 1998). The notion of strategic agility is described as the flexibility (Bock et al., 2012) and speed (Kotter, 2014) that give organizations the ability to change the business in order to respond to changes in their markets (Brown and Eisenhardt, 1997). Strategic agility underpinning a business transformation can typically involve the introduction of new concepts concerning strategies, organization, people and technologies (Doz and Kosonen, 2008, Bock et al., 2012, Arbussa et al., 2017). In addition, it can imply a paradigm shift in terms of old ideas needing to be re-evaluated, modified and in some cases abandoned, in order to find new avenues to create value for stakeholders (Doz and Kosonen, 2008, Doz and Kosonen, 2010, Weber and Tarba, 2014). Such a paradigm shift can foster many challenges in terms of tensions (Fourné et al., 2014) or paradoxical leadership (Lewis et al., 2014) that managers need to overcome in order to successfully increase agility (Doz and Kosonen, 2008, Doz and Kosonen, 2010).

As companies grow and become successful, they typically lose some of their adaptive capability, and change and renewal become difficult, painful and periodic exercises (Teece et al., 1997, Doz and Kosonen, 2008). The solution to this dilemma is to be not just agile, but strategically agile by maintaining the flexibility to respond quickly to changing circumstances and emerging opportunities, but also concentrating on a clear strategic

purpose and direction (French et al., 2004). In addition, strategically agile companies that operate in high-turbulence environments are in many cases able to capitalize on emerging changes (Morgan and Page, 2008). However, strategic agility is not an easy task to manage (Doz and Kosonen, 2010). It requires superior information, strong real-time insight and good judgment (Doz and Kosonen, 2008). It relies on the proper execution of strategic decisions that is eased by high-resource governance and permitting the unity between managers and resources. Moreover, opportunities may be realized through open dialogue between internal external stakeholders (e.g., customers, employees, vendors and competitors) (Teece, 2010), in which it is not only managers that are the force of innovative opportunities.

According to Doz and Kosonen (2008), strategic agility consists of the combination of three meta-capabilities (strategic sensitivity, leadership unity and resource fluidity).

The first capability involves the ability to sense the environment, which (Doz and Kosonen, 2008) refer to as strategic sensitivity. It involves the combination of foresight, insight and simple probing of the environment in order to gain the necessary awareness on future trends and direction of markets to support strategic decision-making (Doz and Kosonen, 2008). According to Pohle and Chapman (2006), in their study of 765 leaders across sectors, the sensitivity and flexibility was acknowledged as the second highest benefit from business model innovation. Doz and Kosonen (2008) make the point of distinguishing insight from foresight in order to avoid creeping commitments in the decision-making process. As such, leaders should engage in the following activities: anticipating (sharpening foresight), experimenting (gaining insight, probing, discovering lead locations and innovation hot spots), distancing (gaining perspective), abstracting (gaining generality), and reframing (seeing the need for business model renewal) (Doz and Kosonen, 2010).

The second capability is leadership unity, or collective commitment, in which (Doz and Kosonen, 2008) emphasized making decisions together to increase the commitment of team members by promoting collective success, which is also referred to as homogenous perspectives by (Lewis et al., 2014) opposite promoting personal agendas. This is no easy task (Lewis et al., 2014). It prompts specific challenges that companies need to overcome, and according to Doz and Kosonen (2008), there are three challenges in particular: 1) decisions need to be fast, but they face high uncertainty and interdependency, 2) strategic agility calls for the design and development of new ecosystems, business models and activity systems, which management in well-established companies are often ill-prepared to undertake and 3) the usual face-to-face models between CEO and the executive team do not mobilize the energy toward collective commitments. Decisions are typically made in fast-changing, complex, and dynamic environments with high degrees of uncertainty and risks that are rarely fully interpreted by managers. According to Doz and Kosonen (2010) and Battistella (2017), strategically agile companies are those that possess the type of people that catalyze decisions when confronted with high uncertainty and are more likely to possess the strategic enabler to foster business model innovation.

Finally, resource fluidity is the third capability without which strategic sensitivity and leadership unity will be useless. Managing resource fluidity means being able to flexibly redeploy resources as necessary (Hamel, 2007, Doz and Kosonen, 2008, Sull, 2009). It is the nimble and quick reconfiguration, recombination and procurement of people, processes and ideas. Doing so requires disciplined processes and to establish dynamic governance mechanisms (Sull, 2009) in order to know where to allocate resources and reassign responsibilities in a fast and flexible manner, as well as set common rules for resource allocation (Doz and Kosonen, 2008). Doz and Kosonen (2010) suggested that companies lacking resource fluidity should start to decouple (gaining flexibility), modularize (assemble and disassemble business systems), dissociate (separating resource use from resource ownership and negotiating resource access and allocation), switch (using multiple business models) and graft (acquiring to transform oneself). In order to avoid the waste of valuable resources, the leadership should develop strategies that coincide with the business processes.

Looking into comparable research of strategic inertia or strategic inaction (advanced by research on strategic agility studies) that are polar opposite of strategic agility, companies like Nokia were strategically inert until the practice of strategic agility was assimilated. However, only few contributions to strategic agility theory investigate the process by which companies practice strategic agility. There are, however, other avenues of research on strategic agility, some of which build upon the above theoretical foundation, such as paradoxical leadership (Lewis et al., 2014), flexibility (Bock et al., 2012), mergers and acquisitions (Brueller et al., 2014), business model renewal (Arbussa et al., 2017), competitive activity (Vagnoni et al., 2016), strategic agility capabilities (Battistella et al., 2017) and managing tensions (Fourné et al., 2014).

Current definitions of strategic agility are presented in Table 4.

Table 4 - Selected strategic agility definitions and their dynamic capability view

Author(s), Year	Definition(s)	Dynamic capability view	Journal(s)
Weill et al. (2002)	Strategic agility is defined by the set of business initiatives an enterprise can readily implement. Many elements contribute to agility, including customer base, brand, core competence, infrastructure and employees' ability to change.	IT- infrastructure capability: fusion of technology, processes and human assets. Strategic decision-making to utilize capabilities across business units to increase agility.	MIT Sloan Management Review
Sull (2009)	The ability to spot and decisively seize the last kind of opportunity, the game changers, is the essence of strategic agility.	Utilize the agile absorption capability: the ability to consistently identify and seize opportunities, while retaining the	Harvard Business Review

	Such opportunities usually entail rapidly scaling up a new business, aggressively entering a new market, betting heavily on a new technology or making significant investments in capacity.	structural characteristics to withstand changes in unstable environments.	
Doz and Kosonen (2008, 2010)	Strategic agility is defined as an organization's capacity to make strategic commitments while staying nimble and flexible and is considered to be a means by which organizations transform and reinvent themselves, adapt and ultimately survive. Developing strategic agility as a process of building three types of dynamic capabilities: strategic sensitivity, resource fluidity and leadership unity.	The ability to react to changes in the business environment through a balance in real-time strategic sensitivity (perception, awareness and attention), collective commitment (organizational objective) and resource fluidity (reconfiguration and redeployment of people and structures), which allows for a rapid and responsive strategy to meet changes.	California Management Review
Franken and Thomsett (2013)	At the operational level, this adaptive ability is referred to as "strategic flexibility." It focuses on an organization's ability to respond to a variety of requirements, which exist within defined constraints, either rapidly (e.g., quickly increasing or decreasing production volumes) or flexibly (e.g., switching from producing one option to another) or both. At the strategic level (organization and network), this ability is referred to as "strategic agility," and it focuses on the ability to adapt rapidly and flexibly to unforeseen changes in the external environment.	The use of meta-capabilities that when in place, an organization or network is able to recognize when events render original plans obsolete (sensitivity), to decide how best to adapt (unity), and is motivated to move forward (fluidity). The motivation for these meta-capabilities is laid during the planning stages, which re-establishes the connection between strategy planning and execution.	California Management Review
Brueller et al. (2014)	Strategic agility as the capacity of making knowledgeable, nimble, rapid strategic moves with a high level of precision.	*"Conceptualize agility as a capability to notice an opportunity and make rapid yet precise move using extraordinary accelerating power", which entails: knowledgeable sensemaking, nimble decision-making and rapid resource re-deployment.*	California Management Review

Fourné et al. (2014)	Strategic agility is a meta-capability that enables companies to create and deploy these three dynamic capabilities over time.	Three dynamic capabilities: sensing local opportunities, enacting global complementarities and appropriating local value.	California Management Review
Lewis et al. (2014)	Strategic agility enables a company to effectively switch the course of action to remain competitive.	Core capabilities to overcome tensions: Capabilities of leadership: a dynamic competence and a rational process. Leadership entails the ability to identify and leverage opportunities and threats, and to exploit intern and external competencies.	California Management Review
Di Minin et al. (2014)	A company-level ability to continuously adjust and adapt key decisions to the changing circumstances of the external environment and thus nurture value creation and ensure long-term survival even in highly competitive environments.	Strategic agility is acknowledged as a critical dynamic capability consistent with (Teece, 2007) to achieve long term competitiveness.	European Management Journal
Weber and Tarba (2014)	Strategic agility as the ability of management to constantly and rapidly sense and respond to a changing environment by intentionally making strategic moves and consequently adapting the necessary organizational configuration for successful implementation.	Strategic agility consists of dual major capabilities: 1) Leadership – sensing direction for a need to change and resource allocation for strategic execution. 2) organizational design – structural adaptation and mechanism to implement the course of action.	California Management Review
Vagnoni et. al. (2016)	Strategic agility as a way to manage unforeseen changes and risks faced by organizations.	Strategic agility capability: the systematic insight – "*the ability to investigate the feasibility of opportunities in the specific context of the company; and the ability to develop mutual relationships between different capabilities of the company and vital opportunities of market".*	Foresight
Battistella et al. (2017)	Strategic agility is defined as "the ability to dynamically revise or reinvent the company and its strategy" by adapting to unforeseen changes in the business environment, moving quickly and in an easy fashion.	Three macro-capabilities for business model reconfiguration to enable strategic agility: 1) strategy innovation capabilities, 2) resource capitalization capabilities, and 3) Networking capabilities.	Journal of Business Research

Because of the variations in definition, numerous interpretations of the core constructs of strategic agility exists. According to Fourné (2014), the strategic agility concept: *"has remained an elusive term with many definitions across various situations".* However, there are significant commonalities in terms of their view on organizational capabilities among most of the selected definitions of strategic agility literature. In order to build, achieve, sustain or apply strategic agility, as suggested by the selected strategic agility definitions in Table 4, companies need to utilize three dynamic capabilities, which generalized from the reviewed literature can be described as: "to make sense quickly, make decision nimbly, and redeploy resources rapidly".

Commonalities among definitions are that strategic agility is about responding to changes in dynamic environments through the process of developing dynamic capabilities, although from different viewpoints such as:

- the ability-view (strategic agility as companies' ability to respond to changes through the utilization of dynamic capabilities) (Weill et al., 2002, Sull, 2009; Franken and Thomsett, 2013); Di Minin, 2014, Weber and Tarba, 2014, Vagnoni et. al., 2016, Battistella et al., 2017),
- the enabler-view (strategic agility as enabling companies to respond to changes through the utilization of dynamic capabilities) (Fourné et al. 2014, Lewis et al., 2014),
- the capacity-view (strategic agility as companies capacity between strategic commitment and organizational flexibility to responding to changes through the utilization of dynamic capabilities) Doz and Kosonen, 2008, 2010, Brueller et al., 2014),
- and the meta-capability-view (strategic agility as the meta-capability to respond to changes through the utilization of dynamic capabilities) (Doz and kosonen, 2008, 2010, Fourné et al., 2014).

Nevertheless, literature on strategic agility do agree on dynamic capabilities that companies utilize to build response options, and can be viewed as the underlying mechanism (ability, enabler, capacity or meta-capability) of a strategic agility process. Therefore, following the definition by (Doz and kosonen, 2008 p. 96) that consider developing strategic agility as a process of building three types of dynamic capabilities: strategic sensitivity, resource fluidity and leadership unity, and if combined and utilized successfully over time, referred to as meta-capabilities, has been chosen as a useful definition for the research study of this dissertation.

Although, previous studies have deepened our understanding of building strategic agility, these discussions seem too general to demonstrate how companies can actually develop innovative approaches to build strategic agility and also deal with key issues that might emerge at the micro-foundation level, during such process. Hence, acquiring strategic agility might require new ways of conducting organizational value creation activities and developing key dynamic capabilities needed to accelerate organizational strategic renewal (Eisenhardt and Martin, 2000, Doz and Kosonen, 2010, Fourné et al., 2014, Teece, 2014, Weber and Tarba, 2014).

2.5 Strategic agility affiliated theories

In this section, the author presents brief underpinning theory of strategic agility, which includes reviewing the relation between the two terms of flexibility and agility, the resource-based view of strategy, its affiliation to dynamic capability theory, the micro-foundation view of dynamic capabilities, and finally strategic tensions as a consequence of strategic agility. These theories support the appended research papers of this dissertation.

2.5.1 Reviewing the relation between two terms: flexibility and agility

The systematic literature review revealed inconsistencies between flexibility and agility terms. These terms are often used interchangeably and it is not always clear whether they are synonyms or if they should be treated as separate concepts. According to Baker (2006), the distinction of agility as a term at an organizational level compared to flexibility as a term for lower level. The author argues that agility term places greater focus on strategic levels, while flexibility is more commonly associated with the operational level. Agility covers both range and response dimensions, while flexibility can be one or another. The notion of agility and flexibility applying to different organizational levels is continued by (Tsourveloudis and Valavanis, 2002), where flexibility refers to product range using particular production strategies, while agility is about quick movement and change of the whole organization to a certain direction.

Wadhawa (2003) argues that the main difference between agility and flexibility is the character of the situations that need to be changed and adapted to. Flexibility refers to responses to the anticipated events when the procedures are already in place to manage the change. According to Bernardes and Hanna (2009), flexibility has ex-ante relation with change, where the organization is prepared, anticipates the changes and has capabilities to do things differently when the need arises. Thus, flexibility is a capability to change status within a limited scope, utilizing existing and pre-established organizational resources.

Agility, on the other hand, refers to unplanned changes and organizational ability to respond fast to these changes in a fundamental scope. Flexibility allows the organization to absorb environmental changes in predefined parameters, while agility is supported by flexibility and helps the organization to reorganize fast without knowing the end result. Flexibility is inherent system property, while agility is an approach to organize the system or organization (Bernardes and Hanna, 2009).

According to Bahrami (1992), the term flexibility has been used rather loosely over time and refer to the capabilities of an organization to facilitate adjustments to change. The author, goes on to explain that flexibility means: *"being agile" – fast on one's feet, able to move rapidly, change course to take advantage of an opportunity or to side-step a threat".* In addition, the term flexibility describes the combination of enablers or capabilities to adapt to internal or external changes. The concept of flexibility in an organizational dimension refers to a company's ability to change the course of action, adapt to changes in the environment. The wide nature of the flexibility term implies its many uses in different contexts. Flexibility covers both offensive and defensive attributes (Bahrami, 1992). Offensive, being able to proactively see opportunities in the environment and take advantages of them, by utilizing different company's capabilities. It can also be used defensively, when adjusting to shrinking markets, absorbing shocks or withstanding new negative changes.

In summary of above, there are found to be both distinctions (agility associates itself at strategic and organizational level and flexibility associates itself at the operation level) and similarities between the two terms of flexibility and agility (being mutually co-inherent to each other). The definition on flexibility by (Bahrami, 1992) is surprisingly very familiar to the concept of strategic agility, which is mainly viewed as a proactive approach to changing circumstances (Doz and Kosonen, 2008, Vagnoni et al., 2016). Especially, regarding companies use of capabilities to shift between offensive and defensive approaches that can change the strategic direction.

For the purposes of this dissertation, the concept of agility opens wider scope of dimensions compared to flexibility. However, the definition of flexibility as presented by (Bahrami, 1992, Bock et al., 2012) are associated with the concept of strategic agility throughout this dissertation.

2.5.2 Resource-based view of strategy

From a strategic agility point of view, a company's resources should enable and promote the sensing and responding options to emerging changes in the environment. The resource-based view explores research avenues on understandings companies' ability to effectively and efficiently utilize resources that provide a significant impact on the competitive advantages of the company. In fact, the ability to change and create strategic fit with the environment is deeply rooted in a company's available resources in terms of sensing and responding to emerging threats and opportunities. This ability is imperative for companies and enables them to analyze their current resources in order to determine what possible strategic agility actions exists.

The resource-based view is normally used as a tool to analyze the potential of a broad range of companies' resources (Barney, 1991) to respond to the external environment. Barney (1991, p. 101) suggests that companies' resources included "all assets, capabilities, organizational processes, companies' attributes, information, knowledge that companies control, in which enables the company to consider of and implement strategies that can improve on efficiency and effectiveness." Moreover, Barney (1991) argues that a valuable resource enables the company to implement strategies that improve its efficiency and effectiveness and that resources are of more strategic importance if they are rare, that is, few or no competitors or potential competitors have them. Companies should take note of valuable and rare resources that cannot easily be imitated by their competitors, as such resources offer competitive advantage. The valuable, rare and difficult-to-imitate resources should be utilized effectively in order to be sources of competitive advantage for the company.

2.5.3 Dynamic capabilities

The dynamic capabilities approach is an extension of the resource-based view in dynamic markets. Thus, the dynamic capabilities approach serves companies operating in a competitive environment characterized by continual changes; for example, new innovative products, new regulations, new competitors and new dimensions of the competition that have the constant threats or opportunities. (Teece et al., 1997, p. 516) defined dynamic capabilities as "the company's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments." This research takes dynamic capabilities into consideration from several points of view; for instance, the consideration of both internal and external components is taken into consideration in developing the strategic agility practices and business model innovation activities. There is a debate in the literature on what exactly dynamic capabilities are, leading to research such as by (Wang and Ahmed, 2007) on their review and research agenda on dynamic capabilities, (Eisenhardt and Martin, 2000) paper titled "Dynamic capabilities: what are they?" and (Winter, 2003) on understanding dynamic capabilities. (Wang and Ahmed, 2007, p. 35) suggested that dynamic capabilities relate to ways companies conduct themselves in defining dynamic capabilities as "a company's behavioral orientation to constantly integrate, reconfigure, renew and recreate its resources and capabilities, and most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage." From this definition, it is noted that dynamic capabilities relate to the changing environment and developing companies' strengths in line with changes in the environment. The companies' strengths are reflected by the ability to gain competitive advantage, which happens through the different response actions. Dynamic capabilities are embedded in processing, that is, explicit structures made up of combination of resources that can be readjusted as required by the changing environment (Wang and Ahmed, 2007). Thus, capabilities refer to the companies' capacities (Eisenhardt and Martin, 2000) to

(re)deploy resources and (re)develop processes in integration and adapting to the environment. Eisenhardt and Martin (2000) argue that dynamic capabilities are identifiable processes that are visible; for example, product development, strategic decision-making and alliances. Teece et al. (1997) suggest that processes, positions and paths available to an organization determine its competitive advantage. That is, paths available for an organization depending on the managerial and organizational process mapped by its assets position define the competitive basis of the company. Organizational and managerial processes enable collaboration, and learning is fostered in the experience. In addition, the processes should be reconfigurable due to the required transformational capabilities because of the changing nature of the environment. On defining the strategic posture of the company, Teece et al. (1997, p. 521) suggested that "the strategic posture of a company is determined not only by its learning processes and by the coherence of its internal and external processes and incentives, but also by its specific assets."

Theoretical research by (Teece et al., 1997) indicates that dynamic capabilities should be built in the companies' activity system. Teece (2010) argues that three dynamic capabilities: sensing (capability to identify external opportunities), seizing new opportunities (capability to grasp and convert new opportunities) and the ability of reconfiguring resources (physical and human assets), are necessary capabilities to adjust and innovate the business model. Building on the theory by (Teece et al., 1997), (Doz and Kosonen, 2010) provide a theoretical agenda for accelerating innovations within the business model. Based on a prior study of companies that were engaged in transforming their business model, they develop a theoretical foundation for the capabilities necessary for continuous change. They conceptualize a framework consisting of three meta-capabilities: strategic sensitivity (the ability to sense the environment), leadership unity (making decisions together to increase commitment) and resource fluidity (the flexibility to re-deploy resources), which in sum is referred to as strategic agility.

In review of the above literature it is evident that there are striking resemblance between Teece's dynamic capabilities and Doz and Kosonen's meta-capabilities in terms of 1) sensing the environment to increase awareness on opportunities, 2) evoking leadership to gain commitment and make decisions on new opportunities, and 3) the ability to reallocate resources as necessary. This also corresponds to the above commonalities found between strategic agility publications.

2.5.4 Micro foundations of dynamic capabilities

The micro foundations of dynamic capabilities are here mainly linked to the individual or group of people inside of the organization that are able to identify the nature of dynamic capabilities. In addition, (Teece, 2007) found that the success of companies no longer depends on maximizing efficiency in production and economics of scale, but finding and nurturing opportunities. Often combinations of internal and external

creations, opportunities also require good knowledge transfer and intellectual property protection. Following information flows in one very demanding thing due to the huge amounts available today. All statistics, conversations, field publications and customer feedback are vital and it actually depends partially on individual capabilities on how well this all can be utilized.

(Gavetti, 2005) continue the argument from (Winter, 2003) that hierarchy and recognition of assets and attributes internally is strongly linked to dynamic capability development. This choice and combination and rearranging is argued to be especially valid in new beginnings e.g. market entry. In addition, (Gavetti, 2005), goes on to suggest that causalities which result from hierarchy, management and reliance on routines within an organization are micro foundations which adjust of the idea of dynamic capability and could help articulate the base of dynamic capability research.

According to Teece (2007), the micro foundations of dynamic capabilities could be considered in general terms as such: the specific organizational skills, processes, procedures and structures, and the decision regulations and orders. These types of micro foundations influence sensing and cognition reconfiguration capabilities in the organization, which (Teece, 2007) acknowledges are very difficult to improve and utilize. Strong dynamic capabilities often stem from entrepreneurial attitude, which is a relation towards agility (Teece, 2007) that incumbent companies do not often focus on as much as efficiency (Doz and Kosonen, 2008). This is understandable in the way that agile companies would be likely to need to make more and smaller strategic moves than larger ones and even when there is entrepreneurship in larger companies, they can lack the flexibility to make moves due to structures that are in place more formally.

Teece (2007) identifies phases of analyzing, utilizing and managing changing resources. Companies establish a set of routines for analysis which lay the foundations of dynamic capabilities. These include processes in internal research and design, supplier innovations, tapping to developments in science communities and market and customer analysis. From this the company should adjust their organizational structure and processes, for example to utilize opportunities. This includes selecting business models, developing functional decision-making rules, and general building commitment and awareness on drawing company boundaries. Finally managing assets in terms of continuous reviewing of these assets and overall management, decomposition of processes and the aforementioned knowledge management.

(Abell and Foss, 2008) emphasized routines and capabilities for maintaining the importance of knowing the boundaries of these, when looking at business opportunities. According to Winter (2003), utilizing dynamic capabilities is more costly than a normal problem solving, which takes money to create and maintain routines, for example in product development. Therefore, dynamic capabilities must largely arise from actions and leadership of the company's management (Eisenhardt and Martin, 2000, Teece, 2007)

2.5.5 Strategic tensions between exploration and exploitation

Research on strategic agility theory have contended that managers and organizations are intertwined in the complexity of repeatedly balancing opposing forces that ultimately create strategic tensions (Doz and Kosonen, 2008, Fourné et al., 2014, Lewis et al., 2014). The concept of strategic agility is often referred to as contradictory to its own nature, because the way of achieving it is rooted between pursuing planning by establishing strategic commitments for organizational renewal, meanwhile pursuing agility to conduct quick responses in the dynamic environment (Doz and Kosonen, 2008, Lewis et al., 2014). Consequently, this is what (Doz and Kosonen, 2008) refers to as the strategic agility conundrum, in which strategic tensions can emerge.

Research on strategic tensions have been described in varies studies, for example, from flexibility and focus (Smith and Tushman, 2005), sustainability (Van der Byl and Slawinski, 2015) to exploration and exploitation challenges (Lewis et al., 2009), the latter encompasses similarities to the strategic agility conundrum. Looking at the exploration and exploitation literature reveals a different kind of strategic management (Smith and Tushman, 2005). Formal processes enable disciplined resource commitments for exploitation. On the other hand, fast-paced and decisive efforts can help to anticipate change. Excessive strategic planning has the risk of creating inertia and inhibits responsiveness to changes in the environment as the sources of competitive advantage of a company become entrenched. In addition, too excessive focus on change can harm the development of a company's core competences and capabilities, which are key mechanisms for adaptation and learning. Managers must recognize these tensions and have the skills to cope with them (Lewis et al., 2014). The exploration and exploitation might create contradictory demands to a company and thus create strategic tensions (Putnam et al., 2016). Exploitation activities seek incremental innovations to existing knowledge and capabilities by increasing efficiency and continuous improvements to existing products. Exploration activities seek radical innovations through experiments and research and development activities to create new knowledge, markets and opportunities (Benner and Tushman, 2003, Lewis et al., 2014). Even though both exploitation and exploration seek innovations, they require conflicting processes and mindsets (Lewis et al., 2014). Exploration needs flexibility, decentralization and loose cultures, whereas exploitation requires efficiency, centralization and tight culture (Benner and Tushman, 2003). According to Doz and Kosonen (2008), companies that harness value from their growth initiatives are those that found the right balance between high-level flexibility of their core business merged with standard procedures. Furthermore, companies that operates within mature industries might expect long-range stability and rely on traditional strategic planning (Davis et al, 2009). According to Eisenhardt and Sull (2001), companies that operate in fast-changing dynamic environments can learn much from entrepreneurial companies that usually adopts an opportunity-driven approach to strategizing.

Equally to the exploration and exploitation issue, the process of achieving strategic agility, often faces inherent contradictions, such as strategic tensions in terms of: *Paradoxes* – contradictory and interrelated elements with both/and solution (Smith and Tushman, 2005, Lewis et al., 2014), *Win-wins* – avoiding tensions by achieving mutually complimentary alignment between interrelated elements (Van der Byl and Slawinski, 2015), *Tradeoffs* – competing choices by weighting advantages and disadvantages between contradictory elements (Lewis et al., 2014, Van der Byl and Slawinski, 2015), and *Compromises* - looking for resolving contradictory elements through integration (Lewis et al., 2014, Weber and Tarba, 2014, Van der Byl and Slawinski, 2015). Likewise, organizational tensions, such as "conflicting interests, mindsets and propositions" or "conflicting strategic logics and goals" might also emerge (Fourné et al., 2014 p. 25). Specific managerial and organizational responses, in terms of organizational systems, leadership attributes and human resource systems, are considered crucial to resolve these issues (Fourné et al., 2014). In particular, these contradicting efforts and trade-off between the utilization of resources for both routine activities and new ways of value creation call for leaders' commitment of balancing explorative and exploitative knowledge sharing to create new and agile innovation (Hitt et al., 1998, Weber and Tarba, 2014). Equally important, is the ability for managers to identify and engage with contradictory demands as strategic tensions in order to successfully achieve strategic agility (Fourné et al., 2014, Lewis et al., 2014). Finally, Teece (2014) argues that companies must address tensions and pressures both from internal processes and from the environment to embrace dynamic capabilities.

It is arguably within the process of strategic agility that its nature can be found and might determine how companies leverages strategic agility and what managerial implications that might exist during such strategic tensions, if any. Equally interesting is uncovering dynamic capabilities and their utilization of companies leveraging strategic agility practices.

2.6 Digital transformation as context for organizational change

Digital transformation is described as a significant shift in the business operations, products and organizational structure of a company which accompanies its initiatives to make use of digital technologies (Matt et al., 2015). The change of a set of business processes from digital technologies to organizational change is closely related to digital transformation. Evidently, digital transformation is a key concern of many contemporary managers (Fitzgerald, 2013, Kappelman, 2018). The literature on digital innovation, distinguish between digitization and digitalization: digitization as the substitution of an analog artifact with a digital component, whereas digitalization goes a step further and refers to the utilization of digital technologies in order to create value or change a business model (Gobble, 2018). The latter being digital transformation, builds on the relationship between technology and fundamental organizational change with issues and

practical approaches to handle them (Li, 2018). In addition, research on digital transformation primarily emphasizes its inputs and outputs by focusing on mapping casual relationships on broad categories of digital technology and specific organizational change, between organizational structure and management leadership (Basole, 2016, Hess et al., 2016). For instance, the relation between specific digital technologies and organizational change have focused on the impact of big data capabilities on business models (Woerner and Wixom, 2015, Ismail et al., 2017) or building dynamic capabilities for digital transformation (Warner, 2019). Other literature, focus on areas within the organization that are important to consider in terms of changes during digital transformation (Matt et al,, 2015), the managerial challenges associated with digital transformation (Kane et al., 2015, Westerman and Bonnet, 2015), and factors affecting the success of digital transformation, such as organizational competences (Alexander and Lyytinen, 2017) and organizational culture (Hartl and Hess, 2017). These have been important in building an initial body of knowledge on digital transformation and have raised awareness of some of the opportunities and challenges it encompasses (Von Leipzig et al., 2017).

The study by (Li, 2018), investigated digital transformation of seven SMEs that operated on the Alibaba digital platform. Findings from the study suggests that digital transformation is likely to be an iterative process that are initiated from managerial capability-building with the purpose of increasing awareness on digital opportunities, based on learning and cognitive renewal. In addition, the investigated SMEs revealed that their organizational structure and resources were altered to accommodate for the realization of innovation during their digital transformation process. Finally, the study suggests that strategic change is a continuous process of iteration between change and renewals, which leads to the identification of new opportunities. This indicates that the interaction and relation between technology and the business environment might enable digital transformation and simultaneously pressure organization towards continuous transforming. For instance, the authors observe that companies are likely to continuously transform themselves to market and technology change leading them to "*emphasize that digital transformation…is likely a never-ending iterative process"* (Li, 2018 p.16).

New digital technologies, such as analytic frameworks or machine learning are increasingly fulfilling more cognitive tasks that traditionally have been part of the knowledge workers job (Loebbecke and Picot, 2015). While digital transformation in a sense of process automation primarily affected manufacturing workers, now, other job profiles are more deeply impacted through digital technologies than before, with a potentially disruptive effect on employment and society. The association between technology and the business environment is often emphasized as a source of opportunities and resources that enable companies to improve and adjust their value offerings, which triggers and enables digital transformation (Haffke et al., 2016): *"the pressure to include digital elements in a company's business strategy is primarily driven by the external environment. Changes in customer behavior and needs, competitors' demonstration of digital*

advances, new market entrants with disruptive digital business models, and the technological progress in general create opportunities and threats to established companies"- (Haffke et al., 2016, p. 11).

According to (Hinnings et al., 2016, Kiron et al., 2016), companies seek alignment with the dynamic environment as support to their digital innovation and forms business networks that span organizational and industrial boundaries to drive the digital transformation. The interesting aspect of the external environment in digital transformation literature is often inspired by how digital technology is altering industries and markets by overruling boundaries that causes shifts in the basics of competition from individual products and services to complex digital platforms. This shift is generating more open environments for innovation (Woerner and Wixom, 2015). These digital transformations of the external environment have been argued to be generated by challenges and opportunities that motivated the redesign of value propositions with digital technologies in mind (Matt et al., 2015, Hartl and Hess, 2017). In terms of challenges (Hinnings et al., 2016 p. 56) argue that digital transformation *"starts when there is disruption and destruction of established business models, value chains and organizational processes"* and proposed to explain how this may be brought about through new digital technologies and associated actors emerging in an organization's environment. The digital business and technology environments are likely to change with the entrance of new actors with digital innovations that build and promote new relationships and business conditions that are often difficult for incumbent companies to respond to, which is often captured by the term digital disruption (Dery et al., 2017). It is further argued that consumer behaviors, preferences and expectations are becoming increasingly dynamic due to the rapid diffusion of digital consumer products and services, and that organizations need to engage in digital transformation to improve and increase their ability to respond through digital solutions (Henriette et al., 2016, Hinnings et al., 2016, Vagnoni et al., 2016).

2.6.1 Digital transformation onto strategy onto business models

As previously stated in the introduction, digital transformation involves changes to a company's strategy and business model (Vagnoni et al., 2016). That change is often viewed as an element to organizational development, in which organizational change can be triggered and accelerated by external factors, such as technological developments or from the changing environment (Putnam et al., 2016). In addition, companies might also experience change processes initiated from within the organization that are often intended and managed from strategic planning, while some changes emerge unintended (Balogun and Johnson, 2005). In most cases, organizational change refers to small adjustments to processes, structures, or technologies, but also to transformational changes that are associated with fundamentally altering the organization at its core (Weick and Quinn, 1999). However, in order to gain success, the traditional organizational procedures must

be unfrozen for company's ability to adapt to faster-paced change (Weick and Quinn, 1999). For example, by gaining commitment in the organization for continuous change (Weick and Quinn, 1999), which is similar to dynamic capabilities (Teece, 2007) as mechanism for successfully achieving strategic agility (Doz and Kosonen, 2008).

The term transformation highlights the complexity, scope, and impact of such a fundamental change. In this dissertation, the interest lays on organizational change, which is a transformative, rather than a smaller adjustment, and mainly on change initiatives that are planned through a strategic plan and/or from emerged change. The consequences of organizational change may vary depending on the impact of organizational change. Incremental and radical change innovation require different structure, strategy, and procedures for incorporating this change in the organization (Ettlie, Bridges and O'keefe, 1984). Following the idea of continuous change, incorporating change is perceived as a natural element to the manager's tendency of seeking structure and planning. Therefore, change is not necessarily occurring in a deliberate fashion and disrupting regular operations, but is initiated more subtly by small changes, experiments, and unintended consequences carried out in organizational work routines that although being minimal, may have a significant impact on the organization (Orlikowski, 1996). Opposite, change can also be perceived as radical or disruptive to the organization and results in a state that is significant different to the original state. This state is more often found where organizational change is induced by external, technological innovations rather than a planned process initiated by the management (Lyytinen and Rose, 2003). In addition, organizational change arises the challenge for employees as well as strategic decision makers to interpret, explain, and construct a narrative about the new unknown, unexpected and fuzzy situation, which is the process of sensemaking and sensegiving. Managers may form new ideas about potential opportunities either from the environment or from their own knowledge (Sherpherd, McMullen and Ocasio, 2017).

Organizations increasingly open organizational boundaries and form innovation networks by turning to external partners and tools in order to assess external, heterogeneous knowledge (Nambisan, 2017). Different innovation practices require a different type of agency with different processes, participant, and tools to orchestrate the innovation process (Nambisan, 2017). As a consequence, managers have begun to create a dedicated digital transformation strategy to actively advance the change process in their organization. The view on IT-strategy has emerged from a purely functional strategy to an alignment with business strategy, to a fully integrated digital business strategy (Bharadwaj, 2013). As a basis for digital business models, the digital business strategy focusses on customer experience of digitized solutions (Ross et al., 2016) and includes aspects such as culture, leadership, customer experience, vision and organizational capabilities. Recently, researchers have also been interested in the formulation of a digital transformation strategy that is explicitly directed towards systematically defining the transformation of an organization towards the digital age. (Matt et al., 2015), included dimensions use of technology, changes in value creation, structural changes, and

financial aspects and therefore provide a holistic approach to a company-wide transformation that is approached in a structured and strategic way (Hess et al., 2016). On the other hand, digital transformation may also arise bottom-up from diverse activities in separate organizational units and only be aligned in a unified digital transformation strategy at a later point in time (Chanias and Hess, 2016).

Summarizing, the above studies direct attention to different aspects on digital transformation, while indicating its complex nature to generate iterative processes as a result of several digital innovations (Hinnings et al., 2018). The observation by (Li, 2018), concerning the nature of digital transformation as a never-ending process inherently dependent on environmental factors deserves further attention. In addition, it has also been argued that digital transformation is a continuous undertaking (Matt et al., 2015) and since dynamic environments will change and generate new opportunities and challenges over time, digital transformation trajectories will likely have to be continuously adjusted (Matt et al., 2015).

Even though organizational change is a natural part of an organization's life, managers struggle with initiating a profound and transformational change in the digital age (Hess et al., 2016, Vey and Schneider, 2017). The challenges that emerge through digitization are similar in most industries, yet when managers sense that technological change may affect their organizational structures, product offering or business model, they do not know how to approach this phenomenon (Vagnoni et al., 2016, Vey and Schneider, 2017. That is – while being theoretically well explored – new to them and requires a different collaborative approach (Spee and Jarzabkowski, 2017). Managers fail to recognize the potential impact or lack imagination for a new strategic vision (Vey and Schneider, 2017). The exact processes how digital transformation strategies form in organization are less researched, an exception being the study of (Hess et al., 2016) in the automotive industry.

Organizational change in general is a well-researched field. However, in digital transformation, there are some changes in this perspective. The classic strategic planning process bears some challenges for digital transformation. First, in the dynamic development of digitization, the planning cycles becomes much shorter than before. With regards to digital transformation planning for more than two years onwards is less effective since many relevant developments cannot be foreseen that far into the future. Second, the team responsible for strategic planning may be different and involve different people outside the usual strategy department (Higgins et al., 2012, Spee and Jarzabkowski, 2017, such as IT. In order to survive, the technological advancement, it is deemed necessary for companies to synchronize to the speed of change occurring in their competitive environment (Battistella et al., 2017). Researchers suggest that strategic agile companies achieve success in this new competitive landscape by facing such technological challenges through the ability of continuously sensing and responding to emerging opportunities and threats (Teece et al., 1997, Doz and Kosonen, 2008, Battistella et al., 2017).

PART 3

3. METHODOLOGY

This chapter encompasses the overview of the philosophical standpoint of this research along with applied methodology and particular methods used to collect and analyze empirical evidence. The chapter concludes with the discussion of the trustworthiness of this research.

3.1 Philosophical positioning of this research

Ontologically this research study started with a holistic perspective, with the main focus on companies as well as the nature of their actions. In line with this approach, the process of strategic agility and business model innovation were perceived as the units of investigation. This macro-level perspective taken at the starting point of the investigation led to the consideration of the multiple layers of data within the process from individuals to the company level to the environmental perspective as well as their importance relation that emerged from the research. Nevertheless, the main focus remains on a macro level of analysis with embedded micro-elements. The precise version of engaged scholarship adopted in this research is in the terms of the idealist (see Table 5 for coherence between assumptions). This perspective is based on an interpretivism paradigm in which the social reality is interpreted by the meanings the respondents produce. This is aligned with the idealist ontology, in which the objective knowledge is created by the science of the subjective that constitutes meaning in the social world where it is produced (Blaikie, 2010).

Because the underlying epistemological assumption is that of knowledge as the objective matter, the key point is to explore and gain understanding of observed social phenomena along with the underlying reasons, opinions and motivations of the involved actors. That is why the methods of data collection center on semi-structured interview techniques as these interviews represents informants view of reality (Blaikie, 2010). The knowledge is therefore the outcome of the social actors within each case study—making sense of their surroundings—hence the epistemological assumptions follow the constructionism. Given that there are always context and dependent factors, no single theory can explain all the phenomena in every empirical context. This research study uses data to analyze existing phenomena, and conceptualizes them in comparison to existing theory to contribute to the literature.

Table 5 - Coherence between ontological and epistemological assumptions

Ontological assumption	Epistemological assumption	View of reality	Paradigm	Unit of analysis	View on the solution
Idealist	Constructionism	Reality is perceived from multiple mental constructs; the truth is not absolute.	Interpretivism	The business model innovation and the strategic agility process.	The pursued truth is represented by data from the informants view of reality.

3.2 Research aim

Building on the literature review, the research aims can be further specified. These aims can be divided into aspects with the purpose of advancing theory and aspects with the purpose of advancing management practice.

To contribute to advancing theory, this research pursues two aims:

- Identify the core elements underpinning strategic agility and business model innovation practices during digital transformation by building on previous research as theoretical lenses to analyze data, find patterns in the data and relate these with theoretical lenses, and extending the core elements in which practitioners have found gaps.
- Define types of strategic agility and business model innovation practices by identifying elements within the patterns and combining them.

Management practices should be advanced by three additional aims:

- Identify benefits and challenges within the elements of practicing strategic agility and business model innovation, especially in a digital transformation context.
- Define a continuum model to guide managers in terms of practicing strategic agility during digital transformation.
- Identify types of business model innovation activities that are essential in the initiation phase of digital transformation.

In addition to the aims for advancing theory and management practice, this research aims to overcome methodological shortcomings of past research by:

- Using a sample with multiple industries, to enhance the generalizability of the findings and to provide empirical evidence across industries and different types of companies.
- Using multiple data collection instruments, to ensure sufficient triangulation of data.

3.3 Research strategy

The overall methodological approach of this dissertation is the case study design to explore research fields that are relatively new (Eisenhardt, 1989, Yin, 2014). The research field of strategic agility and business model innovation is nascent and therefore with a limited amount of knowledge about how it is practiced (the phenomenon), and equally important how it relates to the digital transformation of companies (the context). In such situations, it can be necessary to investigate the phenomenon through exploratory methods such as case studies that allow the researcher to create in-depth understanding of the reality, social setting and organizational processes that lead to a strong and reliable theory contribution (Blaikie, 2010). The case study research method is particularly useful to identify the boundaries between the phenomenon and its context especially when these are not clearly defined (Blaikie, 2010, Yin, 2014).

Even though case studies have been recognized as a valid research method in the social sciences, some question their usefulness. According to Yin (2014), the argument against case studies is believed to be their lack of systematic procedures, leading to concerns about subjectivity. On the other hand, Eisenhardt and Graebner (2007) argue that theory building from case studies is "surprisingly objective" and that keeping researchers close to data is what keeps them "honest." It is therefore an important method for empirical investigation and theory building (Blaikie, 2010).

The single case study method is a strong approach in exploring a phenomenon in its context while maintaining its richness of the phenomenon and its context (Eisenhardt, 1989). The multiple case study might sacrifice some richness but will typically be able to develop theory that is more robust, more generalizable and better representable (Eisenhardt, 1989). This study has applied both methods. The single case study was applied in the first paper over a duration of 7 months to create knowledge about benefits and challenges when practicing strategic agility–driven business model innovation in the context of digital transformation. The second and third paper apply the multiple case study method with different theoretical lenses. The second paper investigates the strategic agility practices of 15 companies during digital transformation. The third paper investigates the business model innovation activities of 12 companies during digital transformation. In

addition, it was important to use different perspectives in order to ensure the identification of the widest possible scope of aspects.

The overall development of this dissertation follows an combination between inductive and deductive research logic. Eisenhardt (1989) advises engaging in inductive research without assumptions or predefined hypotheses, but instead with defined constructs that may be tested within the research. Conversely, others argue that some theoretical background should help focus and direct the research as well as ensure that all data is collected and is relevant to answering the research question (Yin, 2014).

As shown in the literature review, strategic agility and business model innovation has different research streams on which to build and which can be used to guide new research. In consequence, this research aimed to build upon prior knowledge, use available constructs and use original empirical data to fill in the gaps and enhance the understanding where needed.

Consequently, there are two steps in this study:

1. This study will first create in-depth knowledge and clarity on the phenomenon using independent single case studies.
2. Following this, a multiple case study is applied as means to create a comparison analysis on the single case studies in order to identify common patterns. This is done to generalize theory and build the foundations for future testing.

The research strategy will follow an inductive and deductive logic by determining patterns of the investigated phenomena characteristics to generalize this into theory. It is a prerequisite that in this case, the researcher does not enter the field with prior knowledge or assumptions about the phenomena of study (Blaikie, 2010, Yin, 2014). (Blaikie, 2010) argues that in reality, things work differently from the ideal setting and that it is unavoidable for the researcher to bring a part of his or her background into the field of study, including knowledge and assumptions, that determines and shapes the research focus. This study follows such an approach and logic. The question of subjectivity and bias is carefully considered (so as to avoid it) throughout the empirical analysis in order to ensure high-quality research.

3.4 Methodological approach

Although the first actual literature review of this research project was related to the context of the study, which is digital transformation, the systematic literature search outlined in the theoretical background focuses on mapping the concept of strategic agility, which is then followed by a brief description of the business model emergence and business models as unit of innovation, and their relation to digital

transformation. In order to answer the research questions outlined in Chapter 1, this dissertation engaged into a systematic literature search of strategic agility and business model innovation literature (as the theoretical background for each appended research paper), and three papers, which combine the same methodological approach using the case study design. The research overview is presented in Table 6

The theoretical background is directed toward exploring the results of prior research on strategic agility and business model innovation through a systematic literature search of leading management journals. The goal of the literature review is to understand to what extent the concepts of strategic agility and business model innovation had been developed, and if any of these are related to digital transformation.

To investigate research question 1 (*What drives and inhibits the process of business model innovation in cultivating agility during digital transformation?*), a single case study of an SME undergoing digital transformation was carried out.

To investigate research question 2 (*How do companies leverage strategic agility and what are the managerial implications, strategic tensions, actions and necessary capabilities during digital transformation?*), a multiple case study design was conducted to make cross-case analysis and comparisons of 15 companies in different industries undergoing digital transformation.

To investigate research question 3 (*How do small and medium-sized enterprises perform business model innovation and manage business model innovation activities during digital transformation?*), a multiple case study design was applied on 12 SMEs in different industries to make cross-case analysis and comparisons.

Table 6 Research overview

Research questions	Data	Methods	Data sources	Data analysis
Paper 1: What drives and inhibits the process of business model innovation in cultivating agility during digital transformation?	How the case company made use of strategic agility to initiate BMI to create digital business models; how specific strategic agility actions were made to support the BMI process; how dynamic capabilities are used as managerial levers in advancing BMI	10 semi-structured interviews with managers, 6 semi-structured interviews with customers	Respondents: CEOs, managing directors, project managers	Each interview was coded deductively; second analysis followed the methodology of (Gioia et al., 2013) by coding inductively into first-order concepts, second-order themes leading into aggregated dimensions

Paper 2: How do companies leverage strategic agility and what are the managerial implications, strategic tensions, actions and necessary capabilities during digital transformation?	How companies have used BMI to develop and adapt BMs to facilitate digital transformation; how BMI activities consolidates into new BMs that increased agility	31 semi-structured interviews; secondary data review on annual reports from the company used as reference point to provide additional information on the business environment related to strategic agility practices	Respondents: CEOs, managing directors, project managers, project employee	The analysis was done in two parts. The first part involved the coding of interviews into first- and second-order themes and aggregated dimensions. The second part consisted of mapping the process of managerial implications of strategic agility practices represented by each aggregated dimension in relation to the theoretical constructs of the paper
Paper 3: How do SMEs perform BMI and manage the BMI activities during digital transformation?	When strategic agility is desired; how strategic agility is pursued; how strategic agility practices is balanced between strategic commitment and strategic agility through digital transformation; what managerial implications exists when pursuing strategic agility practices	16 semi-structured interviews; secondary data review annual reports from the company used as reference point to provide additional information on the business environment related to business model innovation activities	Respondents: CEOs, managing directors, project managers, project employee	The analysis was done in two parts. The first part involved the coding of interviews into first- and second-order themes and aggregated dimensions. The second part consisted of mapping the BMI process representing each aggregated dimension in relation to the theoretical constructs of the paper

3.5 Research setting and case selection

As the literature review in the previous chapter showed, the concepts of strategic agility and business model innovation are currently understudied areas of potentially high practical relevance. In regard to strategic agility, it lacks more empirical evidence in terms of what mechanisms and processes companies undertake to achieve agility during digital transformation. For the concept of business models, it is the lack of empirical evidence suggesting business models as a unit of innovation, thus the application of business models in the innovation process is neither defined or discussed. Hence, an empirical study was conducted to get valuable insights on both research fields and their relationship in the context of digital transformation. Applying an exploratory case study design made it possible to shed light into specific areas characterized by a lack of existing theory (Eisenhardt, 1989, Yin, 2014). It therefore appropriate to start with an individual case study and gradually derive more abstracted conceptual levels and categories in order to understand the patterns and their relationships within them (Gioia et al., 2013). In order to compile a representative sample, the leading criteria for the cases to be included in the research study were that the case companies had to be 1) established companies in their respective industries and 2) undergoing a digital transformation with the purpose to adapt parts or the entirety of their business model. The case companies selected for this study were part of a research project called DABAI (Danish Center for Big Data Analytics driven Innovation), the aim of which was to pioneer Danish companies to exploit the full potential of big data.[1] The key informants chosen for this study were CEOs and managers responsible for the digital transformation process, which had knowledge both in terms of the business development and the technological development for each company.

The informants were in some cases represented with a manager and a pre-selected project employee (chosen by the manager). In this case, managers provided with the overall organizational change, strategy and business model innovation insights, whereas project employees provided with detailed technological developments, as well as accounting their experience during the process.

Specific for the single-case study represented in the first appended paper of this study, the interviews conducted also involved customers that were chosen by the managers from the case company. However, the overall theme for each interview were to provide a business and a technological perspective in order to unveil findings related to the phenomenon of this study.

The sample consisted of 15 companies, which are illustrated in Table 7, followed by their case description.

[1] https://dabai.dk/en/results

Table 7 Overview of case companies

Case	Business areas	Informants	Employees	Description of core business	Toward digitalization
M1	Textile Manufacturing	1 CEO	20–49	This company manufactures design shoes through 18 months of research, design development and testing before each product launch. Customers are able to within different projects make inputs/ideas to the research process.	*Challenge:* Necessary to be present on all types of platforms today in order to survive in the game.
M2	Lifestyle Manufacturing	1 CEO	10–19	This company produces automatic and electric-driven window shades, which are customized in high design quality.	*Challenge:* Improving logistics issues with customers through a digital solution.
M3	Textile Manufacturing	1 manager	20–49	This company has turned customized tailoring of suits into an easy practice that involves 3D body scanning to ensure a personal and quick fitting process.	*Challenge:* Wanting to optimize the business to enable data-driven processes.
M4	Textile Manufacturing	1 manager 1 employee	50–99	This is a company that manufacturers innovative furniture solutions for everyday use.	*Challenge:* Looking for new opportunities through digitalization to optimize internal processes.
M5	Lifestyle Manufacturing	1 manager 1 employee	50–199	This company provides customized bathroom and kitchen solutions for people with reduced functional capacities.	*Challenge:* Looking for alternative business models through digital technologies that enables a closer and continuous interaction with customers.
M6	Lifestyle Manufacturing	1 CEO	10–19	This company produces high-end coffee machines and is recognized for its unique design and features.	*Challenge:* Digitalizing parts of the business to optimize current products through digital technologies that provide more user interaction.

M7	Lifestyle Manufacturing	1 CEO	0–9	This company is a lightning manufacturer dedicated to designing innovative solutions for home and office applications.	*Challenge:* Building digital business models on top of the data that is already collected.
M8	Textile Manufacturing	1 CEO	10–19	This clothing company manufactures clothes out of sustainable material and has patented fitting technologies to optimize the design of their products.	*Challenge:* Minimizing cost on production and increasing quality inspections through digitalization.
M9	Electronic manufacturing	10 managers	500+	This company manufactures power unit controllers for power plants, ships and wind turbines.	*Challenge:* Differentiating in a saturated market through service and establishing a technological foundation for data gathering and analysis.
M10	Food processing Manufacturing	1 CDO 1 manager 1 consultant	500+	One of the world's leading food-processing manufacturers with a highly efficient and automated process line.	*Challenge:* Making future decisions based on data and predicted industry development.
S11	Healthcare and defense services	1 manager 1 employee	50-199	Providing engineering solutions for optimizing processes in hospitals and defense departments.	*Challenge:* Building a business intelligence organization that drives future development of the business.
S12	Urban development services	1 CEO	0–9	The companies provide flood-risk analysis for municipalities through geographically scanning systems available on a remote desktop platform.	*Challenge:* Formalizing growth strategies that expand the business into other industries based on current big-data platform. Providing data-driven decision-making for customers as service.
S13	Public education services	1 CEO	10–19	This company provides digital data categorization systems for public educations.	*Challenge:* Developing the business into more digital options to avoid future disruptions.

S14	Financial services	2 managers	50-99	The company developed the mobile payment system with peer-to-peer transactions for customers, including outside of their own bank.	*Challenge:* Building data lakes for big data platform that enables fully automated decision-making on new avenues for development.
P15	Public government services	2 managers	500+	Governing business authority to make it easy and attractive to run a business through digital solutions and interaction systems for all users in terms of registering business information and taxation.	*Challenge:* Building digital business models using machine learning and future AI to fully automated interaction with users, network partners and stakeholders of the company.

3.5.6 Case M1: A community based digital platform solution

As with many other industries, the textile industry is currently experiencing the effects of digitalization – increasing individualization, networking of devices and people as well as progressive automation of production and logistic processes are increasingly coming into focus. Technological innovation and changing customer expectations require new business models and organizational principles in the textile industry, which according to the company has unknown consequences on customers, sales channels, textile products and value chain of companies. The case company experienced that the future trend is focusing on customer needs in terms of moving away from standard solutions as people are increasingly influenced by devices that allow access to the digital world at all times. This not only impacts the communication behavior, but also a major impact on consumer behavior. The demands of customers are becoming more and more individual, with textile products and services that are adapted to changing customer needs and even after the purchase. However, as explained by the case company, this requires a good knowledge of the customers values and consumer behavior, which the case company didn't have at that point in time. The case company had to take differentiation analysis of customer groups into account taking digitalization and development of up-to-date marketing concepts as vital parts of the change. The case company initiated their digital transformation journey as they experienced a massive decrease of customers purchasing though their physical stores and because of this had to find a new avenue and different approach to their customers. The market discontinuity

also meant that the case company was facing the risk of foreclosure. It was therefore deemed a necessity to radically change their business model within a short-period of time to survive.

The case company then started developing an online platform in which the digital profile of their customers became the central element of their business model. In doing so, the case company designed the platform as a community of customers that could correspond with the company and each other. Using data and clever CMS systems they achieved the basis for customer transparency with the company. The technology embedded into the digital profile application also included automatic camera recognition of customers feet, their form and size into a 2D model, which was done through interactive guides in the mobile application.

The digital transformation resulted in a community based online platform in which the customers became part of the research and development process. In fact, the customers role changed to act as co-designer of the shoes that were manufactured either for series production or individual purchases. In addition, the case company provided customization of each shoe as the customer could choose to add more design elements, colors and choice of materials to their purchase. Shoes that are chosen for series production goes through a voting process in the community of more than 50.000 customers world-wide and customers are rewarded by receiving a percentage of sales made on the voted design.

The development process of their digital driven business model was described as adaptive in its nature due to the involvement of a large community of customers that are inclusive part of the future development of the case company. Managers within the case company believes strongly in following an intuitive development process and relies much upon the random behaviors of their customers in the community. However, future development is likely to include data-driven algorithms based on predicting patterns for customer behavior to change their business model and avoid the same situation what initiated the transformation in the first place. However, the case company points out that they are not following any form of strategic planning, not does it provide their business model with any added-value. Such value is driven by the customers, not the case company, as one manager explained.

3.5.7 Case M2: Creating a customer-driven flexible production

As well as the above industry, the case company of M2 has experienced an increasing demand to align and engage with their customers through digital solutions. M2 is a manufacturer of customized automated and electronic window shades and was struggling to respond to challenging market dynamics, particularly in terms

of competing new entrants with similar solutions that are born digital while providing interactive online customer platform. The case company was challenged to re-think their market approach as customers started complaining over a lack of insight into customer processes, especially regarding the installment of the products at customer sites. A manager clarified that over 20 percent of their installments needed to be retrofitted from measurement issues to technical failures at the expense of the case company. These issues often resulted in bad customer experience, because the case company had to investigate each complaint to place responsibility. Furthermore, most of their customers place new orders in the last minute before they are to be installed at the end-user site, which places great demand at flexibility for the case company to adjust their production planning, while complying to ad-hoc tasks. The lack of traceability within the organization and ad-hoc customer orders were a time-consuming process, pressured the production, prolonged the delivery of products, and their installment. Meanwhile, new entrants started to gain significant market shares over period of six months, which drove the decision to initiate the digital transformation process within the company.

The digital process was initiated to create traceability and a digital customer-driven platform were the user could interact with the support function, purchase new products, which included a guide for providing measurements and other inputs related to the installment process, through a mobile application. The customer could also view available time-slots in the case company's production planning schedule to estimate when they could place their order and time of delivery. This resulted in an automated administrative process within the organization, which could optimize the flexibility of the production planning in the form of make-to-order principle. The platform was co-funded with a selected customer that also was part of the development process and testing of the prototype. The digital transformation process was initiated as a way of supporting managers to interact with their customers based on the data and insights from the digital solution. The digital solution also freed up the time for managers to initiate collaborative development projects with customers based on the data gathering, which provided more insights into their customers processes.

3.5.8 Case M3: Building 3D body scan to digitize the customer shopping journey

The case company of M3 had experienced their tailoring industry as being disrupted by technology. As their competition of fashion brands gain more market share, the case company had to focus on providing a better customer journey and positive experience of shopping, which could lead to a customer loyalty program. Leveraging the precision technology to make custom-fit appeal in shorter period is the competitive edge in the fashion industry. The whole process of tailoring involves local and custom tailoring stores, in which

customers consult with a professional on fabrics selections, style choices and body measurements. After the garment returns from the making, customers visit the store a few more times for fittings. This process could take a week or longer to complete before customers are satisfied with the clothing. The case company makes made-to-order fashion and customized tailored suits and wanted to shorten the process time and labor involved in order to gain a competitive advantage in their niche market. Instead of measuring the customer with a measuring tape, the technology, such as 3D body scanning could capture the customers body measurements at the storefront. Each scan takes a few seconds to complete. The software then visualizes the data gathered from the scan to render a 2D or 3D outline of a customer. The customers data and the software algorithm then generate a unique pattern for printing in seconds. The piece of customized-fit garment goes into production through machine sewing. This automated process bypasses a human pattern-maker to draft a different pattern caters to a new customer every time. It also reduces the number of fitting and alterations after the garment is made. In small-scale production like the case companies, computerizing the tailoring process frees up time for designers to focus on the creative side of the business, like design new appeals, advise customers and style the attire. The case company initiated the digital transformation to enable their designers to use the technology to visualize their designs for each customer. It also allowed for digital made-to-order tailoring, which made the easy transitioning into e-commerce. The customer only needed to be scanned once for the body measurements data, assuming the customer doesn't change their body size drastically over time. The customer creates a profile with the body measurement at the store and can access it at the online store, using their own web-account. The customer can shop and customize their appeal such as sleeve design, the color of the coat and more. They place the order and patiently waits for the shipment.

This approach is meant to reduce the returns, as the customer is the forefront of choosing the style and the fitting process is customized to themselves. The case company guarantees the quality and if there are issues with either fitting that could happen from a technical error, the fee is covered by the company.

3.5.9 Case M4: Augmented reality change customer purchase experience

The increase of digitization in stationary furniture trade is primarily driven by the behavior of customers, who today not only use the internet as a convenient source of information, but are also increasingly making their purchases in online stores. Therefore, new strategies and business models in modern marketing channels are increasingly becoming a question of survival for the stationary furniture trade, as well as for the case company M4. According to a manager, one of the case companies' biggest challenges are the mobile shift of furniture trade, in which more customers are looking for suitable furniture on smartphones or tablets. Decision are made before the furniture store is visited, unless the order is placed on the internet. Mobile, attractively designed websites, multi-channel strategies and attractive digital marketing concepts are

becoming more important for the company. The case company provides innovative furniture solution for everyday use. Each innovation process is driven by the owner or the designer's intuitive decision and goes into production and out to stores. However, as their environment are increasingly adapting to digital solutions, it was apparent that something needed to be done to change their market approach and internally processes.

The digital transformation process was initiated as a way of rethinking the customers experiences interacting with and purchasing furniture today, which also means the organizations needs to adapt to fulfill this. The started working on the idea of how furniture could be presented differently. The augmented reality was one way of connecting the real-world with endless possibilities in the virtual world. The customer simply loads an app onto his smartphone or tablet and can then look through the camera at the environment in which the new pieces of furniture are to be placed. Here it is possible to insert virtual objects such as sofas, tables or chairs on the screen and can immediately see how the piece of furniture looks in their own environment, without visiting any stores. This mean that the customer could comfortably choose the right pieces of furniture from home and the furniture dealer can save expensive returns. According to the case company, augmented reality application of this kind fundamentally changed the way furniture was purchased. However, this solution meant that the case company needed to be digitalized as well, including products, and administrative processes to align the organization with the new way of marketing their products. The case company had produced furniture for a long period of time following a more traditional approach, which meant that the digitalization was never on leaders' agenda, before they experienced the trend fundamentally changing their costumer's behavior, which meant that they needed to adapt quickly before it was too late. The change met internal resistance, because the digital solution radically changed some employees' routines, if not for most. Sales and marketing had to adopt their traditional approach of selling furniture through catalogs towards understanding the way technology works in AR for mainly stores. The next step was to include user-driven innovation approach into their mobile application, in which the customers had the opportunities to choose between design elements, such as fabrics, colors, and size, that would create unique piece of furniture for the customers, thus customize their purchase experiences. This then changed the production setup from series production to just-in-time approach, which required the production planning management system to be digitized and integrated with the application.

3.5.10 Case M5: Digital and data-driven welfare solution

The case company M5 primarily provides solutions in the health-care sector, which according to the case company is now subject of technology-driven optimization for diagnosis, treatment, and management. Each project is through public procurement and the case company experiences a lot of competition on providing

care solutions for municipalities. As explained by a manager, it is about the race of technology – those that provides a more integrated system solution at best pricing wins. Furthermore, companies are evaluated on new digital solutions on quality care and in terms of adding more measurement on treatment processes, and the ability to provide data security. This industry was described by the case company as turbulent in terms of changing technology and regulations from government is particularly increasing for patient treatments. The digital transformation was initiated as a way to provide more adaptive business models that could be customized for each project depending on technology and patients' needs. The case company offers user-friendly welfare solutions for people with reduced functionality mainly for institutions, such as hospitals and care centers. This means fully functional solutions for kitchens and bathrooms which is designed to compensate for the maximum number of physical limitations. The case company primarily focusses on bathroom products for elderly and disabled care homes. The care solutions can be installed in elderly and care homes and can be adapted for multiple users e.g. visually impaired, wheelchair users, the walking impaired etc. However, the main challenge for the case company is two-folded. First, they produce great quality with approximately 15-20-year life-cycle, which means they often only have one-time transactions with customers. Second, they find it difficult to do aftersales with their customers, which leads none-existing continuous interaction with customers in municipalities. The case company therefore looked for alternative business models to include technology that would allow for a new approach to their customers. Using sensors and digitized products in their bathroom solutions they were able to provide monitoring of movement and heat-signature to register distress signature of users at elderly homes and hospitals. This would enable their customers to more efficiently help and provide support for their users, especially for emergencies. This also included digital solutions that would automate products like toilet flush and lids that could open/close through motion-sensors. The case companies' new value-offering consisted of a total care-solution with automated monitoring systems that could be integrated into customers IT-systems. Instead of one-time transactions, these care-solutions was offered through subscription with customers for each project. The case company had direct access to the data logs in real-time to make sure their products was consistently functioning, which was a guarantee made in the value-offer.

3.5.11 Case M6: Digital-driven coffee machines though network analysis

The case company of M6 manufactures professional automatic coffee machines and has set itself the objective of creating the digital movement in the coffee machine sector. The company has been working on the digitalization of automatic coffee machines, and now connecting their products through digital solutions, using IoT solutions with the aim of working in a partnership with customers to ensure they have all the tools they need for lucrative future proof business model. The digital transformation offers enormous potential as the case company can expand their portfolio with applications to link all of their machines on a network as

standard. This lets customers keep track of all coffee machines at their locations in real time. The coffee link application can accelerate and optimize all processes that are relevant to value creation. This begins with the purchase and setup of the machine, and encompasses management of the entire fleet of coffee machines, right through to delegation of tasks. Even handling machine and performance data in the right way has a sustainable impact on increasing sales by analyzing unit sales of coffee and coffee quality, it is possible to react to losses in sales in real-time, through targeted use of promotional offers, for example, which are shown directly on the display of individual machines.

It is no longer necessary to call out a service technician to change recipes, prices, or to perform a software update. In the long-term any downtime would be minimized by means of intelligent algorithms, which identify correlations between the use and wear and predicts failures in good time. All these functions ensure the machine is available for a greater proportion of the time, thereby increasing the profitability of the coffee business.

Their solution provides free-of-charge functions included with the Freemium variant allow user to view such functions as the maintenance status of the machine.
The case company uses the collected data for business analytics and assesses the starting position of customers, working with them in one-to-one consultations to define the customers economic potential in relation to service, sales or procurement processes. This is where the case companies' years of coffee expertise and insights from the data join together allowing managers to give customers practical recommendation for actions to make their business model even more profitable. The idea is to help customers to optimize their sales and support their business transformation, thus transitioning from the coffee manufacturer to a provider of complete solutions and services. In doing so, the case company develops through use cases of customers and work out which functions and services are required from the customers perspective, to ease the installment process. The manufacturing of coffee machines is now developed with additional functions of digital solutions, such as installment of extra sensors.

When looking into the future, the logical development of digital solutions offers the opportunity of connecting the case company to customers other systems, and opening them up to external data sources to achieve greater leverage from the digital transformation.

Case M7: Smart system infrastructure for LED lighting

M7 operates in the lighting industry, which according to the case company is undergoing a rapid transformation driven by technological change were the rules of the game continue to change for companies across the industry. The turbulence stems from two powerful shifts: the move towards light emitting-diode

(LED) lighting and the growing adoption of connected lighting systems. These trends, which reinforce one another, are fundamentally altering the underlying economics and dynamics of the market. This results in companies across the complex lighting ecosystem must evaluate where and how they can compete effectively, amid the changes and adopt new business models to win. According to the company, the shift towards LED technology is likely to accelerate for two key reasons. First, although LED technology is still more expensive than conventional lights, the price is falling. The decline is due to technological advances in manufacturing and increasing LED efficiency. Second, there is an increasing focus on the total cost of ownership of lighting, which includes not only the initial cost of lamps and luminaries but also the expense of replacing lamps and costs for energy.

The case companies initially provide LED lighting for homes and office applications. However, soon realized the above trend was a possible avenue for new opportunities. The case company was able to collect and store customer data from old projects in terms of energy usage, customer preferences, design integration and already installed systems etc. The digital transformation was initiated based on gathered data as driver for digital development. The result was through connected lighting, which due to the increase popularity of LED gives momentum to adopt connected lighting systems, also called smart systems. Their digital transformation expanded the smart system in order to reach new markets and customers. Using mobile application, customers could easily manage connected lighting systems, which make those systems increasingly accessible to a broader group of customers as an ongoing process of replacing services and products with current and evolving technology that improved the lighting environment, whilst making the space safer and more efficient. The case company soon reached new customers by connecting their smart system lighting to emergency control of buildings, which allowed to change the colors of LEDs in terms of fire and the sound system. Thus, their solution became more expanded, which through visualization of emergency alertness attracted attention from the public sector, such as hospitals and schools. The digital transformation allowed the company to adaptively expand their initial solution to incorporate other products and technologies and reached new markets.

3.5.12 Case M8: Fast fashion through automated production

The case company of M8 experienced the pace of industrial development as increasing and for the case companies' traditional textile industry wants to catch the global trend for fast fashion. According to the case company, the textile manufacturers and fabric mills needed to accelerate their upgrade roadmap to get to market faster. In traditional textile industries, design, selection, spinning, weaving, sewing and finishing, all consume a lot of resource and time. For example, it takes several days or weeks to manually identify the right

types of fabrics and quality materials. This is the specific challenge for the case company that are in a niche market of tailoring suits by physical measurements in which the speed of manufacturing from measurements, production to the customers, is essential for the customer experience. Furthermore, as explained above, the production processes require a lot of resources, which induces a lot of waste material. Indeed, the heavy resource is man-hours in doing quality check on the production line, making sure there aren't any faults in the fabric and in the sewing process. If a mistake occurs, it will take weeks to get the suit finalized, as one will have to restart the process. The company initiated a digital transformation process of their production line and customers interaction part. They first introduced robotics into the sewing part of the production and industrial cameras for quality checks on fabric, through high-speed raw imaging, which shortened their production time to market from weeks to hours. They completed the transformation with a fully automated production system that only had manual inspection before entering the stores. The development process of integrating robotics and quality management programs into the production was outsourced to a developing partner. Furthermore, the case company co-developed the production process with their suppliers of fabric to ensure the by integrating supplier systems with the production management program to fully automate orders.

Managers within the organization had a difficult time finding new ways of improving their value offering in terms of providing unique digital solutions to optimize their processes to become more data-driven. Finally, it was difficult for managers to understand how to utilize the data from the production to further optimize their innovation processes.

3.5.13 Case M9 "DEMtech": smart monitoring through service-driven digital business model

The case company of M9 is the single-case study of DEMtech which is described further in appended paper 1. M9 is an electronic manufacturer of power-management systems for land, ships and wind-turbines. Their digital transformational journey was initiated by fear from the commodity challenge. This resulted in a transformational change in the organization towards providing smart monitoring (remote monitoring) of their products at customer sites, which enable new types of services to emerge. Their digital transformation entailed several dimension: 1) the need for increased agility through digital transformation to create a business development process to increase visibility and awareness on new opportunities and challenges at customer sites, 2) change in the business model logic to incorporate service-driven business models, such as smart monitoring, digital smart service as a system and digital smart store as a platform, 3) embedding service-driven capabilities into the organization to enable and support the service-driven business models,

and 4) customer co-creation and co-development to involve customers as a new role in terms of developing new digital solutions, and as a vital part of gathering data.

3.5.14 Case M10: Adaptiveness through digital solutions: from planning system to automated production

The case company of M10 is in the food-processing industry, which has been characterized as increasingly investing in fully automated production systems. However, the case company points out that there are great digital potential in the industry, as many processes still very much depended on manual work. The challenge is the standardization as foundation for the digitalization and the importance to be specific about how the technology affects employees work routines.

The industry was described as having low margins and tough competition, which meant that the case company needed to prioritize efficiency, productivity and economy in all innovation processes. The mantra within the company is on result-oriented action-culture, where everything should be measurable and to have clear business focus.

The standardization is the foundation for the digital transformation of the case company as the organization is implementing digital solutions it must be centralized, because there are cultural differences which makes it hard to implement a new technology. Historically, the organization has been decentralized for many years, but within later years, the digital transformation has focused on centralizing many of the departments through a shared digital platform and infrastructure in order to standardize work- routines. The case company is working actively on standardizing KPIs and data sources across the business units, because this is the foundation for automatization and digital scaling of the organization. The case company recognized that their organizational costs are much higher than their competitors and in order to have a competitive advantage, the automatization approach is one way to effectively minimize costs.

In order to break the culture barriers, the implementation of digital solutions has focused on synchronizing the different business units together and to remove the different levels of IT maturity in the organization.

The case company embodies agile projects in order to minimize the resource allocation for different business units by introducing new planning systems for management that are built around the principle of “small steps can steer the big boat” approach. It is important to communicate how the new digital solutions can affect the administrative processes for employees in order to successfully get engagement in the development process.

The case company reached out into their network in order to receive support and be inspired during the digital transformation process, as it was important to have expertise and knowledge available for each part of

the development. In doing so, the case company uses a new technology or functionality through alliance with external partners to boost the project and increase the chance of success through knowledge, tools and understanding the topic.

It was important for the case company that automatization of robots happens with the idea of man and machine working side-by-side. The quality inspection should be done by AI though picture recognizing software to evaluate different cuts of the food, and to accommodate operators with bonuses for quality inspection and productivity.

The case companies think agility in the moment as they need to make continuous changes to gain market advantages and increase efficiency of their production and time-to-market. However, the case company also looks into the near future by understanding it is becoming even more difficult to attract employees to production, and therefore must invest now on atomization of parts of the production. The case company is using demand-driven planning system to develop agile methods for their value-chain optimization. It is functioning as a shared platform and provides data on input and output of their products.

3.5.15 Case S11: Building a business intelligence organization

The case company of S11 provides engineering and intelligence solutions for the healthcare and defense sector with the purpose of optimizing, for instance hospital processes. The case company describe their environment as being stable, however, with an increasing demand for digital solutions, especially within healthcare, which historically has experienced downscaling over a long period of time. Meanwhile, hospitals are experiencing great day-to-day variation in demand and capacity at emergency departments, wards and other service functions in general. That leads to overflow situations, which are handled locally at the hospital with patients in hallways and patients in borrowed beds. The administrative process at hospitals is currently consisting of manually registrations, from patient logs, operation schedules to logics of patientcare. Consequently, patients experience less attention and prolonged waiting time that are caused by understaffing issues and inefficient patient logistics, which is due to the complexity of patient registrations and lack of capacity. In turn, hospitals seek digital solutions to optimize their process, which includes minimizing operation costs for solving daily logistics and operation issues.

With the lack of a data-driven digital platform, the demand from hospitals challenges the case company to deliver sustainable intelligence-based solutions. Managers within the case companies emphasize that it requires data and statistical-analytics and long-term investments to establish data-driven platforms that are able to optimize the complexity of hospital processes at this scale. However, such data-driven platform could also potentially forecast future development opportunities.

The case company then initiated the digital transformation process with the purpose of finding a solution to solve these issues by *building a business intelligence organization that drives future development of the business*.

The digital transformation focusses on building the intelligence unit within the case company to manage the data-driven platform. the solutions are IT supported with training data generating forecasts in order to deliver trustworthy predictions of workload and insights in “surplus” and “shortage”. The predictions of workload give the hospital staff the necessary overview that enables them to diminish wait time and to place patience correctly. The solution is based on machine learning, and the applied method is a model that is able to make forecasts, classifications, predictions about the workload on various hospital departments. Training data and historical data and algorithms, as well as new unknown data, provide the statistical foundation that enables the model to find patterns automatically from the historical data. These patterns then turn into trustworthy prediction of workload. However, this is an ongoing development process, in which the case company introduced the industrial prototype system and integrated it into the hospital operational processes, in order to retrieve data from the administrative processes.

3.5.16 Case S12: Real-time flood risk analysis through a remote desktop platform

S12 operates within the urban development sector predicting the possibility of flood risk before or during a concrete extreme weather event. The case company provided simple geographic measurements using a mixture between traditional manual tools and drone technology of limited small areas for flood risks to municipalities, before their digital transformation was initiated. However, in order to make predictions on flood risks of larger areas, big data was needed in such prediction, which is to a large extent available. For example, a detailed grid terrain model with more than 200 billion measurements across Denmark is available as part of the governments basic data program. This also includes detailed rain and sea level forecast and real time event data are available from the Danish meteorological institute (DMI). However, most flood risk assessment is currently only done off-line on models of extreme events, such as uniform rain or sea-level rise events, or prediction of 50-100-year events, and not real-time forecast. One of the main reasons for this is that current flood risk models cannot be run fast enough in order to be relevant for real-time data.

The case company then decided to digital transform this practice of geographic measurement, in which the technology consists of sensor and mapping technology providing an unprecedented opportunity to create high-resolution 3-dimensional maps of the surface of the earth. These maps are already being created for entire countries in which the case companies believe the future of these maps are not just available for most

countries, but also regularly updated to reflect surface changing activities and processes such as urban development and natural erosion. With large-scale access to updated and high-resolution maps, it is possible to instantly deliver accurate data and analysis for any area of interest. This has fundamental transformed how current customers and users, such as engineers, urban planners, architects and government administrators work with geographical information by providing them with innovative digital tools and custom analysis based on the cutting-edge algorithm technology. The case company is on continuous basis researching new algorithm and data-processing technology and constantly working to collect, organize and analyze 3-diemnsional maps on countries where they are already available.

The case companies developed algorithms and systems for online flood risk assessment based on forecasting of real-time data, that is, for fast prediction of flood risk for real events. The new digital web-based platform provides different modules that customers and users can interact with and receive real-time analysis. Most precisely, the technology for screening of risk from rising sea levels had to be connected to a lot of network sources in order to collect enough data, which allows for it to predict down hourly and accurate precisions within a seven-day forecast. Using simple user interface, customers and users are able to evaluate the overall effects of terrain changes such as canals and houses in terms of flood risk. The platform can also be used for emergency management of situations or to work proactively with emergency planning by investigating the damage of potential levee breach or the effect of a mobile flood barrier.

The current challenge is formalizing their growth strategies to expand the business into other industries based on current big-data platform and to provide data-driven decision-making for customers as a future service option.

3.5.17 Case S13: Digital platform with data categorization systems and adaptive learning algorithms

The case company S13 operates within the public education service sector providing digital platform solutions for public schools and universities alike. With more than 100.000 students using the online platform every day, their log files contain insightful data about student's behavior, results and learning progression. Efficient algorithms and analytical tools provide the teachers and schools with this information based on the lessons assigned to the students. The environment is described as turbulent driven by political agendas that can force new types of regulations within the education sector that the case company must adhere to. Given that the case company use data categorization systems to provide a digital platform were students and teachers can

communicate, categorize and share data with each other, they are specific vulnerable to, for example the General Data Protection Regulation (GDPR) law and other forms of data security regulations.

The case company emphasized that their business model is under constant pressure from external factors and that they must make continuous adjustments to their system in order to be approved as a public accessible digital platform in the education sector. Furthermore, the case company has experienced an increased competition from other competing educational and learning platforms available, and especially in the public procurement process. The business model is primarily data-driven given that their value offering is based on algorithms and analytical tools that provides not only knowledge sharing but insights into learning patterns that could improve the teaching approach, as well as students learning. The system is able to predict student performance based on analytical methods from data on student's interaction with the web-based digital solution, such as quizzes or exercises. The digital transformation involves experiments with different approaches to utilize the categorization of data to make state-of-the-art adaptive algorithms were the solution can be tailored based on the learning patterns. The case company follows an adaptive nature in terms of continuously adapting their business model to changes from the environment, while encouraging their employees to seek new opportunities using data analysis to find improvements or new solutions to their customers. The company also probes the market through lobbying to gather insights and influence the political field as a response mechanism. On the other hand, the case company makes strategic commitment to long-term investments into resources by developing artificial intelligence system for predicting future market conditions to avoid future disruptions.

3.5.18 Case S14: mobile payment system with peer-to-peer transactions

S14 operates within the financial sector providing a free to use peer-to-peer transaction solution for their customers, including outside of their own bank. The digitalization has brought the banking sector the need to become more customer-oriented. Improving customer experience is one the of the most important elements. Due to continuous development and improvement of technology and security of mobile phones, many banks have created mobile applications to facilitate the methods of payment. This digital trend is not limited to just banks, but also large technological companies are interested. Large IT companies, such as Apple and Google, are also interested in the development of mobile payment method. This opens the business model to competitors outside of the normal banking sector. The case company provides a mobile application created by the bank in order to improve customers abilities to transact money and therefore reduce the need to interact between bank and customers. The mobile payment solution could potentially decrease the costs and

improve their customer experiences with the bank. It is developed so that customers easily transact small amounts of money between their friends and families through a phone number. The mobile application can also be used as a contactless payment card in cooperation partner businesses, such as shops and cafeterias and it is accepted as a payment method in several different internet retailers. In Denmark, the mobile application has been a huge success and more than 3.2 million personnel use it frequently and it can be used as a payment method in over 35.000 shops.
Through improvements to technology, security and internet banking, the case companies have created a possibility of internet meeting with the bank's customers. Because of the mobile application, bank employees can be closer to customers more than ever as loan negotiations and personal investments can be settles from home through a phone, computer or tablet device with a working internet connection.

Like any other industry, the financial sector and commercial banks are rapidly molding into a new shape due to fast improvements to technology and digitalization. The trends of digitalization in the financial sector and commercial banking is impacting heavily on cost-saving potential and even creating new revenue streams. The improvements that digitalization has had on financial sector so for are mainly to daily banking services and to no-knowledge-intensive services, such as internet banking and payment solutions. According to the case company, have digitalized up to 40 percent of their processes. The case company has invested huge amounts of money and resources into their digital transformation process, which was developed around the mobile payment application. The current challenge for this case company is building data lakes for big data platform that enables fully automated decision-making on new avenues for development.

3.5.19 Case P15: building digital business models using machine learning and future AI

The case company of P15 operates under the Danish government as part of the Danish Business Authority with the purpose of managing the public administration of rules, regulations and deadlines for Danish SMEs in order to prevent fraud. The case company manage the administration of 11 million online forms from Danish SMEs through a digital self-service platform at a yearly basis, which is viewed by managers as an impossible feat to manually audit. Meanwhile, the increase of digitalization in the Danish public sector is on the forefront agenda from the Danish government, both in terms of Danish SMEs, but also for public administration platforms. Consequently, the digital technologies and solutions available has increased the administrative burden for the case company in terms of traceability demands on audits from the Danish government, and the increase use and registration from Danish SMEs to comply with the traceability of rules, regulations and deadlines.

From the organizational perspective, change was inescapable for the case company in terms of aligning its systems, processes and people to the increased digitalization development in the public sector.

The case company then initiated the digital transformation process with the purpose of finding a solution to solve these issues by *building digital business models using machine learning and future AI to fully automated interaction with users (Danish SMEs), network partners (other public platforms such as Borger.dk and VIRK.dk) and stakeholders (Danish government) of the company.*

The overall mindset of the case company was explained as the public administration duties should also be transitioning from a burden to a support function for SMEs, as well as for the case company. With a high-quality company registration, data was viewed as a resource to predict which companies are in risk of bankruptcy, are attempting fraud, or have special potentials for growth. Such predictions on one hand could save society for losses and on the other hand could target support for companies in risk or growth zones. However, more importantly it could also automate the administration process for the case company.

The digital transformation activities provided new data analytics methods and tool prototypes that managers with the case company used to increase quality and efficiency of their audits and supervision to Danish SMEs, using machine-learning system to collect, categorize and analyze data. In doing so, the machine-learning system provided methods for securing high quality data registration by real time consistency checks of the data at entry time. The managers used the machine-learning system to highlight potential risks or growth initiatives that were further collected, refined and distributed.

The methods applied were data cleaning methods, network analysis methods, machine-learning and visual analytics. In particular, the tools for the domain experts at Danish Business Authority were based on a combination of machine learning and visual analytics. Managers were provided with interactive visual analytics tools to enable them to iteratively develop the optimal feature selection and labelling of data for machine learning based clustering. The case company analyzed such data for relationships, patterns and outliers in order to support evidence-based prediction of bankruptcy, fraud and growth potentials.

The case company initiated the digital transformation as a long-term strategy to build a fully automated machine-learning and AI system in terms of increasing their response options through digital solutions. Dynamic capabilities were built to: increase the speed and accuracy of decision-making processes e.g. audits and future developments, to enable traceability on Danish SMEs data to support classification of companies in terms of growth, profitability and risk of bankruptcy, and to free man-hours on audits for development purposes, using machine-learning and AI solutions.

3.6 Data collection

For the data collection we used three sources. First, we interviewed 8 top executives, 19 managers and 3 employees that were directly involved with each case company's digital transformation strategy and business model innovation management.

The semi-structured interviews followed the nature of "guided conversations" (Yin, 2014). This approach allowed for adapting questions to the experts' knowledge. In doing so, the questions were shortened in certain fields and further elaborated on in others where it was expected to gain further knowledge for the investigation. Nevertheless, it was still possible to keep enough structure to ensure the comparability of the cases (Blaikie, 2010). In addition, the interview guide was sent in advance to each respondent, comprising an introduction and the aim of the field of investigation as well as a mix of open and closed questions, to allow the respondents to prepare accordingly. Each interview lasted two hours on average. At the start of each interview, the respondents were asked for permission to record the conversation to prevent data loss and increase validity (Gillham, 2000, Blaikie, 2010). All interviews were recorded and later transcribed. In each interview, the research objective, research framework and key concepts were described in order to avoid misunderstanding. The interview guide consisted of two parts, each with three sections. The business-oriented interview guide covered (1) the environment, (2) the business model and (3) business model innovation. The data-oriented interview guide covered (1) resources, (2) context and (3) activities.

In addition to the interviews, the author collected publicly available company information in terms of annual reports, press releases and other published documentations, which allowed for a sharpened understanding of each company under investigation. Finally, the collected data was compared with existing literature in order to match empirical findings with theoretical conceptualizations. This enabled for a triangulation of data, which helped substantiate findings (Eisenhardt, 1989) for each paper. The study was conducted in 2017.

3.7 Data analysis

In order to grasp the amount of data collected through the case studies, it was necessary to use the qualitative research tool NVIVO 11 software. The data needed to be reduced in order to make it possible to derive focused conclusions (Lee, 1999). However, the data needed to be rich and extensive enough to allow for an adequate account of contextual information. In this study, the transcripts alone run to more than 800 pages, and additional data from internal presentations, publications and templates adds another 300 pages. To handle so much data, electronic text-analysis software was deemed necessary for the author to systematically find relevant patterns to produce conceptualization of theory.

To be able to store and manage this amount of data, the computer-based qualitative research tool NVIVO 11 was used. This software made it possible to store any kind of document and audio file and organize it by information source and content.

To make sense of the data, it is recommended to use a category system for coding the data—a process that involves attaching keywords (the codes) to words, sentences, or diagrams in the documents (Saunders and Lewis, 2012). In this study, the system of codes was created, both deductively from literature and inductively from collected data (defining new codes for interesting aspects that are identified while reading the documents).

The data reduction follows a focused coding process using pre-interviews to identify significant codes (key topics/keywords) with the outcome of establishing an abstract form of categorization. This is then used as the search filter in NVIVO by attaching codes to words and sentences from interview transcripts, workshop memos and internal documents, which allows for further data reduction. Subsequently, new codes can be selectively added, and the consolidation of sub-categories and categories can be further refined.

The (Gioia et al., 2013) methodology was used as the coding process for each paper, in which the author was looking for patterns to suggest empirical evidence of both strategic agility practices and business model innovation activities during digital transformation. The coding process involves three steps: first-order concepts (groupings of quotes) derived from inductive coding in NVIVO 11, second-order themes (theoretical perspectives) derived from deductive coding in NVIVIO 11, and finally the aggregated dimensions identified through the data analysis.

This is done to ensure a systematic data reduction and to draw appropriate conclusions from the data (Bazeley and Jackson, 2014).

Following the suggestions of Gioia, (2013) and using the informants' descriptions, the analysis was conducted to identify patterns and build a data-structure that progressively aggregated first-level codes into categories, themes, and finally aggregated dimensions. This approach not only helped build the data structure, but also provided a visual guide of the progression from raw data to identified themes demonstrating the analytical rigour of this qualitative research (Gioia et al., 2013). The analysis process involved constantly moving back and forth between the entire data sets, the coded extracts that were being analysed, and the analysis of the data that were being produced (Gioia et al., 2013). The analysis also involved engaging with the literature to help discern the emerging constructs at various stage of the process (Eisenhardt, 1989, Gioia et al., 2013). In the three papers, the literature engagement typically began once the aggregated second-order themes had been described (Gioia et al., 2013). Therefore, the data analysis was iterative. This type of inductive analysis

process shows the path from first-order codes to high-order themes and aggregated dimensions (Gioia et al., 2013). Furthermore, two data analysis steps were taken.

In the first step, the author attempted to identify how informants understand digital transformation in their companies, which included the relation between the role of strategic agility (dimensions and practices), and business model innovation activities through first-order analysis. The analysis is similar to Strauss and Corbin's (1998) notion of open coding (Gioia et al., 2013). The author repeatedly read the interview transcripts to capture the informants' meanings. During this process, the NVIVO coding was conducted and compiled into initial coding tables. Thus, the derived set of first-order concepts that represented informants' views of what was going on in each case setting.

In the second step, the second-order analysis was conducted by the author to find theoretical interpretations for the first-order concepts derived in step 1. The author shifted back and forth between the derived concepts, the themes emerging from the concepts, and extant literature on digital transformation, strategic agility and business model innovation for theories that could help the author better understand the concepts and themes. Step 2 is iterative in nature. the author engaged in repeated comparison and contrast of the first-order concepts, looking for both similarities between the first-order concepts and differences. The author made conscious efforts to identify theoretical difference between the concepts so that the author could group and congregate similar first-order concepts to allow second-order themes to emerge. Consequently, these second-order themes became the notions the author used to "explain the patterning of the first-order data". As the second-order themes emerged and the author gained a better understanding of the digital transformation, strategic agility and business model innovation under study and the relevant literature supporting these. For instance, strategic planning and organizational change. The author began to see if the second-order themes could be associated into aggregated dimensions. As Gioia, (2013) noted, this is when our research transited from inductive to deductive in that "data and existing theory are now considered in tandem". For the purpose of this study, the author was open to using concepts identified in previous research to summarize the second-order themes into aggregate dimensions, a practice also embraced by (Pan and Tan, 2011).

3.8 Trustworthiness

In order to ensure the reliability and internal and external validity, the data collection protocols were carefully designed with the triangulation criteria in mind. These include applied methods, interviewers and data triangulation and subsequently aligned with: 1) formally developed interview guidelines; 2) feedback collected to interview transcripts as well as preliminary findings (Eisenhardt, 1989, Yin, 2014). The primary respondents were all involved in the company's decision-making process in terms of the digital transformation strategy and business model innovation.

Reliability: It is especially difficult to ensure a high level of reliability when conducting case study research, because every drawn conclusion from collected data is interpreted by the researcher and therefore of subjective nature. However, through thorough documentation of the research process (Blaikie, 2010, Yin, 2014), the researcher can take precautions to ensure that the process can be reproduced by others. The documentation of semi-structured interviews, workshops and internal documents, including transcribing in NVIVO 11, allows the researcher to visualize and explain each choice and steps in the coding process. In addition, the researcher created memos after each session and during the research process that further added to the reliability of the study.

Construct validity: First, in order to limit subjectivity from research findings, a triangulation of sources will be used, including annual reports, journal articles, interviews and workshops to assure the construct validity (Yin, 2014). Second, a clear chain of evidence between the interview questions asked, the data collected and the conclusion drawn will be established using a matrix.

External validity: The findings from each single independent case study from different industries is to be generalized through comparison analysis with the outcome of identifying similar patterns.

PART 4

4 APPENDED PUBLICATIONS

Publication 1

Exploring the role of strategic agility in business model innovation during digital transformation

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ABSTRACT

Purpose—Digital transformation entails high levels of uncertainty and requires the ability of companies to quickly adapt strategies and business models (BMs) for a successful transformation. However, the literature reveals research gaps on the relationship between strategic agility and business model innovation (BMI). Thus, the purpose of this paper is to understand how strategic agility influences BMI through a case study of a company undergoing a digital transformation**.**

Design/methodology/approach—Drawing on strategic agility and BMI as theoretical lenses, we study the drivers and inhibitors when adapting to new, agile strategies during digital BMI processes through a manufacturing case company in which data is collected through interviews with 16 managerial respondents.

Findings—The findings reveal four strategic agility dimensions: 1) The need for increased agility through digital transformation, 2) embedding service-driven capabilities into the organization, 3) change in BM logic and 4) customer co-creation and co-development, that demonstrates how strategic agility influences BMI during the digital transformation process of a case company.

Originality/value—This paper contributes to the strategic management and BMI literature by exploring the concepts of strategic agility and digital BMI as means for managers to practice parallel BMs in creating, delivering and capturing value in a competitive way.

Managerial implications—The study indicates a change in the managerial understanding of how to develop strategic initiatives during digital transformation and how to initiate and develop strategic agility actions into digital BMs throughout the BMI process.

Keywords— *strategic agility, business model innovation, digital transformation, digital business models, dynamic capability*

1. Introduction

Strategic agility follows the embodiment and logic of how companies manage unforeseen changes by reinventing and transforming themselves to stay competitive within high-turbulence business environments (Vagnoni et al., 2016). According to Doz and Kosonen (2008), "strategic" means looking into the future, building strategic plans, making strategic choices and reallocating or creating the necessary resources to fulfil them. Meanwhile, "agility" means having an agile organization that is flexible in terms of awareness toward changes in the environment (Battistella et al., 2017), while including willingness to make the necessary changes on the spot and set new strategic directions accordingly to the situation. By merging these aspects into practice has shown that strategic agility is a means to innovate the business model (BM) and influence a company's performance (Shin et al., 2015). Where the BM is the construct of how companies create, deliver and captures values, it is also a reflection of the company's strategy (Arbussa et al., 2017).

It is inherent that companies must learn to become as strategically adaptable as they are operational efficient in order to thrive in an increasingly disruptive world, but this is not without its difficulties (Hamel, 2007). In particular, companies face challenges not only in terms of the need to renew their business models (BMs), but also in terms of establishing the means of becoming flexible and agile organizations that can allow for adaptation to occur within short periods of time (Lewis et al., 2014). For this reason and those above, we choose to look at strategic agility as a way to describe the means of becoming flexible and nimble when adapting the company's BM to changes that occur in the environment (Doz and Kosonen, 2010). Strategic agility can also help explain how to manage capabilities in terms of transforming the organization, BM renewal and ultimately the ability to adopt for survival (Arbussa et al., 2017).

Thus, the aim of the paper is to understand how strategic agility influences BMI through a case study of a company undergoing a digital transformation. The research aim is investigated through a mapping of what initiates and inhibits the BMI process cultivating strategic agility during digital transformation. This will be explored through a case study of a European electronics manufacturing company in the energy sector during their digital transformation. Equally important, we look into the role strategic agility has when adapting to new digital BMs as the result of the initiation of a digital transformation. Through extensive literature reviews, it appears that very little knowledge and very few empirical articles deal with understanding the relationship between strategic agility and BMI during a digital transformation, including its managerial implications.

This paper contributes to the extant body of knowledge through three identified research gaps. First, we provide empirical evidence as to how the case company made use of strategic agility to initiate their BMI to create digital BMs. In essence, we identify four dimensions that demonstrate how strategic agility influenced BMI during the digital transformation process. Second, we clarify how specific strategic agility actions were made to support the BMI process in terms of value create, deliver and capture of digital BMs. Third, we identify dynamic capabilities as managerial levers in advancing BMI. Lastly, we show that by initiating digital transformation actually increases the use of strategic agility and BMI, which in turn allowed for continuous adjustments of the digital BMs.

Our results show that strategic agility has a positive effect on digital transformation in the form of dynamic capabilities that support the process of BMI. We find that strategic sensitivity, resource fluidity and leadership unity increased not only awareness and visibility in terms of identifying new business opportunities, but also new revenue streams by analyzing the business environment for technological trends and customer preferences. Moreover, we identify the drivers and inhibitors through four dimensions: the need for increased agility through digital transformation, change in BM logic, embedding service-driven capabilities and customer co-creation and co-development in the organization. Findings also reveal specific strategic agility actions that were created in the initiation phase of the digital transformation process. However, results also indicate challenges in the form of managerial bias between exploring and exploiting new BMs. The paper is structured as follows: Section 2 reviews the relevant literature, Section 3 explains the methodology, Section 4 presents the main findings of the analysis and Section 5 discusses and draws conclusions.

2. Digital transformation

Digital transformation is today a reality for incumbent companies in all types of industries (Basole, 2016, Hess et al., 2016, Remane et al., 2017). Digital technologies have created a highly turbulent business environment and changed the competitive landscape by creating new competitors, new customer preferences and innovation and technological disruptions (Vagnoni et al., 2016, Oliver and Parrett, 2017). Consequently, what we know about businesses in terms of how we create, deliver and capture values through BMs is changing as more BMs are being built on digital platforms such as social, mobile, analytics and cloud-based solutions (Kane et al., 2015, Nambisan et al., 2017). As a result, incumbent companies are challenged to rethink their strategies and to transform parts (Berman, 2012) or the entirety of their BMs (Weill and Woerner, 2013, Basole, 2016, Ismail et al., 2017). Incumbent companies that respond to these technological trends and actively change their BMs, as well as their innovation processes, are those that survive, while others don't (Hess et al., 2016, Vagnoni et al., 2016).

According to Ismail (2017), digital transformation can be viewed as the use of technologies to impact three organizational dimensions: "externally (focus on digital enhancing customer experience and altering its life-cycle), internally (affecting business operations, decision-making and organisational structure) and holistically (affecting all business segments and functions leading to new BMs)." In essence, digital transformation is a significant shift in the business operations, products and services, processes and organizational structure of a company, accompanied by the company's initiatives to make use of digital technologies (Basole, 2016, Hess et al., 2016). The literature on digital transformation emphasizes its strategic nature, or "the ability to digitally reimagine the business" (Kane et al., 2015). Transforming the business as a whole, as opposed to focusing on single technologies, is what distinguishes digitally mature companies from companies in early stages of digital maturity (Kane et al., 2015). Research reveals that digital transformation is of paramount importance for companies to adopt. However, there are still many challenges for companies to overcome, business benefits being one of them (von Leipzig et al., 2017). These challenges can be classified into leadership (difficulty in creating urgency, vision and direction for the digital transformation) and institutional (resistance to change in the form of attitudes of old employees, legacy technology, innovation fatigue and politics) (Fitzgerald et al., 2014). Digital transformation clearly indicates that its nature (e.g. the changes that digital technologies has on the business model, products, processes and organizational structure) and context (e.g. environmental changes from the perspectives of individual and/or organizational contexts) is complex for companies to endeavour (Kane et al., 2015, Hess et al., 2016, Remane et al., 2017), which increases the need to address the role of strategy and how it can influence the capabilities necessary for companies to create new BMs that lead

to successful digital transformation (Ismail et al., 2017). In this paper, we make use of the concept of BMI as a means to classify drivers and inhibitors in the form of organizational change, and the concept of strategic agility as a means to characterize the strategic actions companies are facing in the digital transformation of a case company.

To summarize, digital transformation has increasingly been of interest in the research community. It is, however, also nascent and understudied with a few exceptions of empirical evidence on its relation to BMs and strategy, suggesting its complexity and companies' struggle to realize its execution (Fitzgerald et al., 2014, Saebi et al., 2017, Schallmo et al., 2017). This is one of the research gaps that this study aims to explore, while bridging the gap between strategic agility and BMI practices in the context of digital transformation in order to contribute to the body of knowledge on these research perspectives.

3. Business model innovation and digital transformation

The current high-level turbulence in the business environment has created a difficult situation for companies seeking to build long-term strategic planning due to digital technological changes and fierce competition that places great demands on companies to apply, adopt or transform their BMs faster and more frequently than in the past (Vagnoni et al., 2016). According to Teece (2010), e-commerce has changed the way companies can create, deliver and capture value(s) through BMs more conveniently than in the past. So, what has changed? E-commerce has eased companies' access to large amounts of information and data, and through that to deliver former physical products in a digital format e.g. how Netflix reformed the video rental industry through exposure to digital access (Teece, 2010, p. 174).

Amit and Zott (2012, p. 3) have in the pursue to identify the importance of creating value through business model innovation; surveyed 4,000 executives and found that 54 percent favored "new BMs over new products and services as a source of future competitive advantages." Further, research by (Foss and Saebi, 2017) shows that BM literature converges into the same three BM dimensions: 1) value proposition and market segments, 2) the structure of the value chain required for realizing the value proposition and 3) the mechanisms of value capture that the company deploys, and how these elements are linked together in an architecture. This paper adopts such definitions to explain and structure parts of the applied case company's digital transformation by 1) providing empirical evidence on the current research of BMI and 2) identifying elements that explain the level of BM adaptation that is occurring in the digital transformation process.

To summarize, despite the increased use and interest in the adaptation and advancement of research on BMs, there are still unexplored research avenues about the concept of BMs and the development of new BMs (Wirtz et al., 2016). Through their extensive literature review, (Foss and Saebi, 2017) argue that clarity is needed to determine the initiation of BMI as the effect of strategic discontinuities and disruptions caused by change in the environment, which is the second research gap explored through this study.

4. Strategic agility and digital transformation

Recent literature indicates the need to investigate what role strategy has in terms of achieving a successful digital transformation (Hess et al., 2016, Remane et al., 2017). The growth in digital technologies and the increasing digitalization of innovation processes (Brem et al., 2016) emphasize significant improvements in various business and innovation processes (Yoo et al., 2012, Holmström and Partanen, 2014). Recent examples hereof show when companies fail to adopt digital technologies into their BM and lack awareness of the possibilities that follow, e.g., the case of the movie-rental company Blockbuster going bankrupt. However, companies are still faced with challenges in which managers lack clarity of strategic decision-making about the many variations of BMs occurring during the digital transformation endeavour (Berman, 2012, Ismail et al., 2017). Even the nature of digital transformation is complex for companies to manage, as it involves changes in most parts of the organization. This includes managers continuously balancing the exploration and exploitation of resources to achieve and sustain agility during constant and rapid organizational changes (Smith et al., 2010, Hess et al., 2016).

In this context, digitalization may serve as a way to reduce uncertainty in strategic decision-making processes- through the introduction of digital tools to be managed either within the company or pushed further down the value chain (Franklin et al., 2013). According to Lewis *et al.* (2014, p. 60), the purpose of strategic agility is to "enable companies to respond to complex, global and dynamic environments", which is supported by (Achtenhagen et al., 2013) that provides strong evidence on how BM changes over time through strategic actions and capabilities.

Strategic agility refers to companies' ability to create fast turns during unforeseen changes in the environment while being able to transform and renew the organization without losing opportunities (Doz and Kosonen, 2008). Research on the concept of strategic agility is relatively new and has been assessed in few

studies (Arbussa et al., 2017) dealing with different theoretical lenses, such as paradoxical leadership (Lewis et al., 2014), flexibility (Bock et al., 2012), BM renewal (Arbussa et al., 2017), competitive activity (Vagnoni et al., 2016) and managing tensions (Fourné et al., 2014). These papers refer to the founders of strategic agility (Doz and Kosonen, 2008, Doz and Kosonen, 2010) as the driving force of the concept's emergence in management literature, including the relationship between strategic agility and BM evolution.

The papers on strategic agility by (Doz and Kosonen, 2008) explain strategic agility as "how to prevent stagnation and painful transformation so that companies do not become elephants that need to learn to dance." Yet maintaining flexibility may well prevent companies from making the kinds of commitments that build strong strategic advantages, and may relegate them to permanent mediocrity and decline, thus referring to the strategic agility conundrum. So, in other words, the authors refer to strategic agility as a branch of dynamic capabilities (Arbussa et al., 2017), explained through two aspects. The first refers to the elements that shape strategic agility, hence strategic sensitivity, leadership unity and resource fluidity (Doz and Kosonen, 2010). Strategic sensitivity refers to "the sharpness of perception and the intensity of awareness and attention," leadership unity refers to "the ability of the top team to make bold decisions fast, without being bogged down in 'win-lose' politics" and resource fluidity refers to "the internal capability to reconfigure business systems and redeploy resources rapidly" (Doz and Kosonen, 2010, p. 371). The second aspect refers to when a company is truly being strategically agile, and, according to the authors, this is only possible when all three dynamic capabilities are combined. This paper adapts such a definition of strategic agility with focus on investigating how dynamic capabilities relate to BMI in the context of digital transformation. As such, very few articles provide empirical evidence on how these dynamic capabilities influences BMI and none in the context of digital transformation. This is therefore the third research gap to be explored in this study.

Building on the above theoretical foundation of this paper, the following research question is identified in answering the apparent research gaps:

RQ. *What drives and inhibits the BMI process cultivating strategic agility during digital transformation?*

5. Methodology

5.1 Case study design

This paper aims at investigating strategic agility during BMI in the context of a digital transformation from manufacturing of products toward providing services through digital BMs. However, as both strategic agility and BMI research fields are relatively nascent with limited knowledge on how they are practiced, it is necessary to investigate the phenomena through qualitative and exploratory methods such as case studies that allow the researcher to create in-depth understanding of the reality, social setting and organizational processes that lead to a strong and reliable theory contribution (Yin, 2014). The case study research method is particularly useful to identify the boundaries between the phenomena and its context, especially when these are not clearly defined (Blaikie, 2010). Further, qualitative methodology such as retrieving data through case study analyses is common practice in the study of strategic agility (Doz and Kosonen, 2008, Doz and Kosonen, 2010, Fourné et al., 2014, Lewis et al., 2014, Arbussa et al., 2017). Moreover, the case study design has been chosen for this paper as it allows the author to conduct research on the complex processes, observed through the participants' experiences (Eisenhardt, 1989).

5.2 Case selection and company background

The manufacturing industry was selected because of the industry's digital transformation and interests in pursuing digital technologies and establishing digital-driven platforms in response to high uncertainty and change in their business environment. The selected case company, DEMtech, was selected as it represents a good example of the digital transformation processes that many manufacturing companies are currently undergoing, and as the case company had transformed parts of their BMs, as well as changed their strategies and adapted to new digital BMs in a recent digital transformation project. Thus, data could be acquired regarding the specific managerial drivers, challenges and experiences in managing strategies and BMs within the digital change process. The case company was founded in 1930 and has since developed into a world-leading company in the market for advanced power management solutions, power control units and protection equipment for generators. Today, DEMtech employs over 600 employees in 11 subsidiaries with a turnover of €85 million euro. However, the competitive situation on the market is changing, and new and emerging manufacturing organizations from developing countries are beginning to create matching products for power management solutions—some have even started to expand service as a new business area. Already

in 2015, during the annual executive meeting, several managers discussed challenges, opportunities and issues regarding commoditization, and this led to an agreement to create initiatives for a new service business area. As a result, DEMtech initiated a BMI process with the purpose of incorporating new digital BMs as part of their new strategy for the upcoming year that would involve most of the organization's capacity

5.3 Data collection and analysis

For this study, the main subjects of interest are the managers responsible for strategy planning, strategic decision-making, organizational processes and building the capabilities that drive BMs through the digital transformation, both individually and interdisciplinary. In order to empirically investigate the relationships between strategic agility and BMI during the digital transformation, an in-depth case study research approach was applied, where 10 senior managers (e.g., general managers and CEOs) in DEMtech were interviewed about their participation within the past two years in a digital transformation journey. Interviews were also conducted with 6 customers (mid-level management) who had experienced DEMtech's transformation in validation of the data and improved understanding of the internal and external digital transformation.

The primary data collection was structured as exploratory, with a focus on the transformation process of DEMtech, specific to the BM. The participants were interviewed using a semi-structured guide of questions, which was applied in conducting face-to-face interviews. The interviews lasted 1–2 hours, and the research objective and key concepts were described before each interview in order to avoid misunderstandings. Hereafter the interviews were transcribed and validated by the respondents to ensure validity and a proper understanding of the managerial drivers (objective) and inhibitors (subjective) in the digital transformation. In addition, primary and secondary data from observations during company established workshops, websites and company reports were applied in order to triangulate the data (Yin, 2014) and enhance data validity. The secondary data consists of 21 documents, comprising annual reports, industry studies and company presentations.

We adopted the Gioia et al. (2013) method for data analysis. This method is inductive in nature and allowed researchers to iterate between data and theories. Three data analysis steps were undertaken. The first step represents first-order analysis, in which each interview was coded using the software program NVIVO, where we looked for evidence of how informants understand digital transformation and how the company had made use of strategic agility to initiate their BMI to create digital BMs. As a result, we derived the first-order concepts that represents informants' views on their experience on what drivers and inhibitors exits during the

digital transformation of DEMtech. The second step represents the second-order analysis, in which we looked for theoretical interpretations of the first-order concepts. The themes emerged from the concepts, and extant literature on digital transformation, strategic agility and BMI for theories that could help us better understand the concepts and themes. Consequently, the second-order themes became the strategic agility actions that we use to explain the patterning of first-order data. In the last step, we derived the second-order themes into aggregated dimensions as we got a better understanding of the study and relevant literature. In doing so, we discovered that the second-order themes could be further categorized into strategic agility dimensions.

The results of our analysis are shown in Table 1. The table presents three steps of the conducted analysis in which the 1st order concepts (quotes) are divided into two BM perspectives: internal and external. Each quote derived from the conducted interviews has been grouped together based on similarities and placed into the according BM perspectives. Further, each group is represented as either an opportunity (black box) or challenge (grey box) in relation to the BM perspectives. The 2nd order themes represents the given theoretical concepts or label that helps explain the nature for each group. Lastly, the aggregated dimensions are shown as converged by the relations (arrows) from the 2nd order themes into theoretical elements. For example, the 2nd order theme "visibility and awareness on opportunities and challenges" shows the relation between DEMtech having awareness of future threads (driver), their poor understanding and structure of service (inhibitor) and knowledge from the interaction with customers about new possible business relations. These are then converged into the need for increased agility through digital innovation that DEMtech initiated to accommodate for the opportunities and challenges presented.

6. Results and analysis

In the following sections, the specific managerial actions carried out to support digital transformation through adaptive BMI and strategic agility are explained more thoroughly. We set out with the purpose to investigate what drives and inhibits the BMI process in cultivating strategic agility during digital transformation embedding three strategic agility capabilities (leadership unity, resource fluidity and strategic sensitivity) through various strategic agility actions. In order to identify such relationships, we draw on the process of conducted observations and interviews with participants. Our findings revealed that on the mission to pursue the initiatives presented by top management, a commissioned task force within DEMtech had been experimenting with new technologies and services, allowing for data transmission at much higher rates of speed and quality. A technology was developed into a new, advanced power unit controller that was embedded into current offered system solutions. However, the technological performance and potential on

cost savings for customers, including new types of services (e.g., smart monitoring), would open the door to a new business opportunity. The task force soon realized that further pursuit of this new technology would lead to a fundamentally different BM from the perspective of the company's current BM logic. Therefore, executives decided that a new digital BM, detached from any existing structure, was needed.

The findings on the relation between strategic agility and BMI in the digital transformation process of the case company are presented in the 1st order concepts, as revealed in Table 1. With each driver and inhibitor, we have identified the specific dimensions and actions to be carried out to build strategic agility into the organization and business and which dynamic capabilities are required to do so. We identified that the BMI in DEMtech's situation demands great change to their current BM—e.g., change in BM logic (to incorporate digital BMs), which is not new to the industry, but is new to DEMtech.

Table 1: Data structure

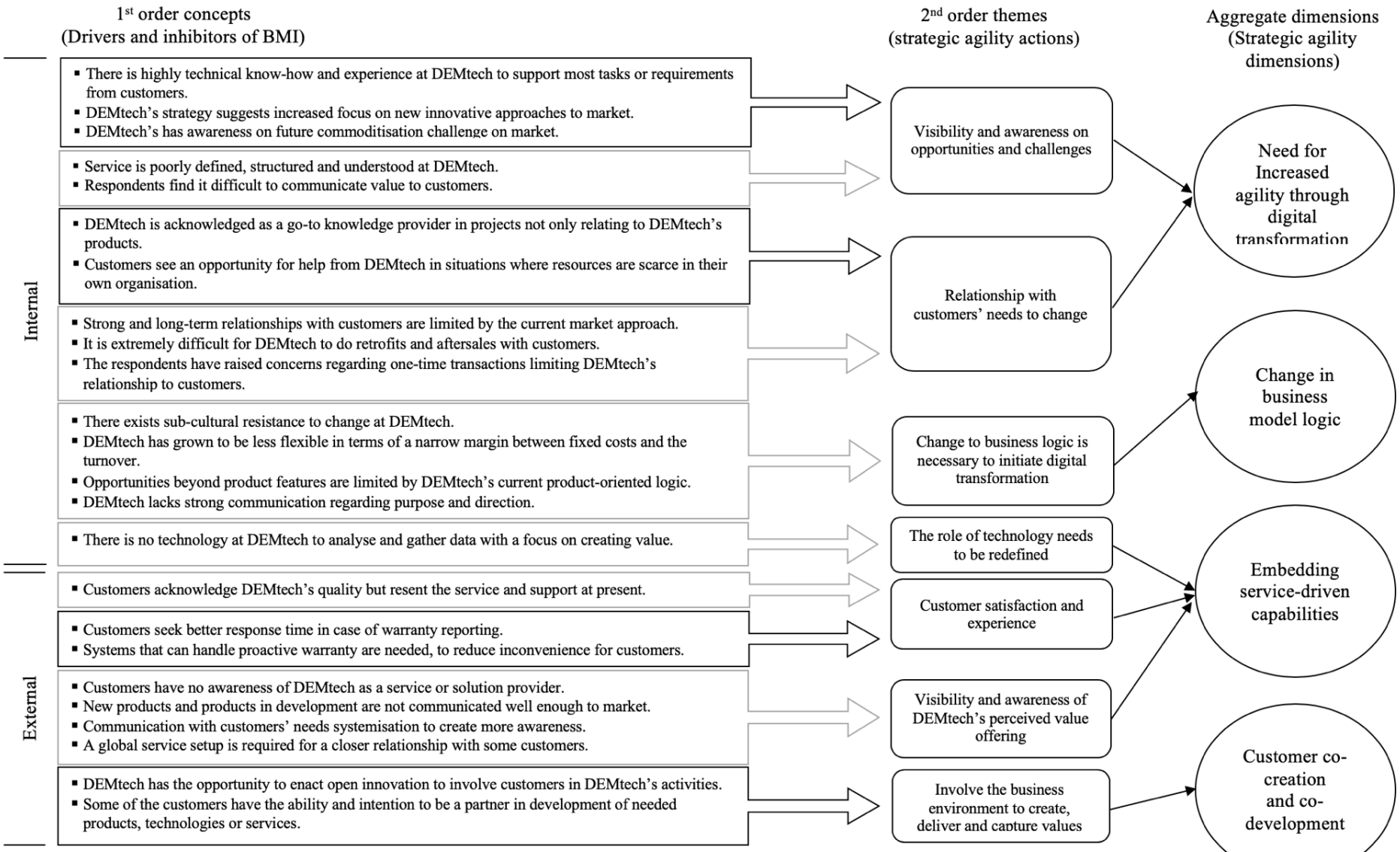

Figure 1 – Drivers and inhibitors of BMI in cultivating strategic agility during digital transformation

6.1 Strategic agility dimension 1: Need for increased agility through digital transformation

In 2015, the management board launched a project to assess and evaluate the opportunity for building a new digital BM with service as a product. In doing so, the management initiated the project as part of their differentiation strategy with a focus on exploring digital solutions on current and new markets in order to avoid the commoditization trap on their current product portfolio, as explained by the CEO: *"We are concerned about the future of our business—especially against new entrants that in reality can deliver the same products but cheaper—we lose that game, if we do nothing".*

In order to achieve this from an organizational perspective, a new ambidextrous organizational unit had to be established with the potential to create spin-offs BMs. However, the key challenge was on the new technology already embedded in both products and system solutions and introduced to the market. It was therefore more difficult to argue that these two business units needed to be independent of each other, as they overlapped in several dimensions (value proposition, value chain and revenue model) of the BM already. It was deemed necessary to create a business development process (BMI) to increase the visibility and awareness on opportunities and challenges, in which different workshops and seminars were to be established in order to work with a new concept, namely service through digital BMs. Several events were facilitated by mid-level managers at DEMtech - to create knowledge-sharing platforms across business units that worked on the concept of service as a product through digital solutions within the initial stages of the project. This was done to create alignment between their technological knowledge, experience and potential service solutions matching customer requirements, and with the purpose to sustain long-term relations with their customers. At this point, digital BMs and even service—beyond spare parts and maintenance—were new territory for DEMtech. As a manager pointed out, *"Service as a product or even as a business model is not utilized and common knowledge in our organization."* Results from the knowledge-sharing events also emphasized the challenge to communicate added value to the customers in terms of offering retrofits and aftersales, especially beyond one-time transactions. On the other hand, it was also apparent from business unit examples that opportunities exist for DEMtech to increase focus on offering consulting components for customer-driven projects.

6.2 Strategic agility dimension 2: Change in the business model logic

As explained above, DEMtech recognized that it was evident that changes needed to happen, not just in terms of their customer approach, but also to their business model logic. Managers acknowledged that

DEMtech has experienced a decrease in turnover due to failed projects and loss of customers. The demand for change in DEMtech was extensive as several managers expressed their concerns on the lack of purpose and directions for future developments. It was apparent that forces of resistance towards change emerged within the organization, which among others was fostered by a product-oriented logic, as stressed by one of the manager respondents: "*we do business as we have always done—because it works.*" The competitive situation was not a concern for most employees due to the mindset that DEMtech provides better services, know-how and quality than its competitors. Opposite, some employees acknowledge that it is only a matter of time before this is no longer the case, and therefore change is necessary for DEMtech to gain a better position on the market. Following this, top management initiated a seminar to establish alignment and purpose within the organization and between business units as well as placing the digital transformation as the highest priority for future development within the company. The results from the workshops and the seminar introduced service as conceptualized into BM concepts, such as smart monitoring, digital smart service as a system and digital smart store as a platform, matching DEMtech's strategic initiatives.

The following elements from the BM dimensions were all conceptualized and structured through the digital BMs.

1) For the value proposition, the main strategic agility actions for DEMtech were to establish awareness of service both internally, in which managers utilize service as a product through the digital BMs, and externally, by offering new service opportunities through smart monitoring. The value proposition supports managers in identifying values as a service provider in terms of providing high-quality solutions for customers as a result of smart monitoring.

The smart service system enables DEMtech to use obtained data from products to improve existing offerings by evolving their portfolio of services to make better recommendations that are perceived as more sustainable. The smart service system is offered through the digital smart store. Both the smart service system and the smart store enable the acceleration, utilization and variation of services, in which customers choose and co-create their own services during their online transactions with DEMtech. The co-creation approach was deemed a necessary initiative to improve the current experiences with some of DEMtechs' customers. As one service manager said, "*We do acknowledge that our customers are not happy about the current service and support that we provide them—we need to think of another way to utilize our know-how and to improve the value offered to our customers.*"

2) For the value chain, the main strategic agility action for DEMtech was to establish a technology platform that supports the smart monitoring system, the smart service system and the smart store by which data is collected and analyzed into providing actual value for the customers in terms of fuel savings, avoidance of system downtime on power management systems, remote security, fast response time, condition-based monitoring, etc.

3) For the revenue model, the main strategic agility actions for DEMtech were to establish new revenue streams in terms of capturing value from the deployed digital BMs, such as new financial models (rental/lease contracts) based on smart monitoring, data on user interference of DEMtech's products and self-service access through the smart store.

6.3 Strategic agility dimension 3: Embedding service-driven capabilities into the organization

The interviews conducted with customers revealed that currently these customers resent the service and support offered by DEMtech. However, this was not related to the overall quality of DEMtechs products, but rather in terms of the relation with customers that have a variety of issues. First, the communication with customers are lacking as DEMtech rarely contacts their customers for follow-ups, aftersales or support in general, which in turn needs more systemisation to minimize the possibility of product failures or other technical issues does not occur. Second, the established warranty system was deemed not to be effective and customers are waiting too long for spare-parts replacements. In addition, customers looked for a better solution that could be better integrated into their own processes, and if possible, through a proactive system that would alert both the customer and DEMtech for technical failures.

In order to make the service tangible, it was promoted within DEMtech's product catalog, with a product number and a price tag that could be invoiced and registered in the service coverage. The price of the service had to be fixed; however, willingness to compromise on both the service and the price did generate a higher success rate. The service being customizable was central to the ability to increase awareness and interest to attract more customers. The intent was to let customers get hands-on experience with the services from DEMtech, which they were not used to. Meanwhile, mid-level management experienced a learning curve for pricing and service development for DEMtech customers. There was empiric evidence for involving all front-line personnel, which in DEMtech's case included everything from sales through service and support that yielded a higher success rate. The service development capability meant not only capturing the basic service

offering. The transformation from the basic service began gradually, in the form of presenting intermediate and advanced services both in the organization and for customers.

The first objective for DEMtech was to develop the service organization to establish an overview of the service capability of existing products: "*We needed to hire new people into the service organization that had ideas, experience and knowledge on service—for us to accommodate for the change in our organization.*" This service presence is also referred to as service coverage and is measured as a percentage of the total customers that receive service from DEMtech. The ambition was to have high-service coverage and to create awareness on service for customers. This was achieved by having dedicated service salesmen (or joint product-service salesmen) in the main service organization, all of whom worked on the frontline contacting, advising and informing the customers about the service available in DEMtech's product catalog.

The service marketing capabilities for achieving service realization were based on the skill set of the service organization, which works both as a mentor for the salespeople and to keep focus on the more advanced services. If this is not present, the sales force will lose interest in the advanced services and focus on selling the basic services, which has always been a recurring challenge for DEMtech.

6.4 Strategic agility dimension 4: Customer co-creation and co-development

The last strategic agility dimension involves a new role for customers in terms of the digital transformation process. Some customers have experienced issued related to their power systems, which includes both DEMtechs products and customers interaction with the company. Occasionally, customers report high technical and complex problems on power systems, that they do not have the necessary competences to solve themselves. This includes relying on service and support from DEMtech to utilize know-how in terms of solving errors that occurs, which did not exist. In fact, as reported earlier, the lack of awareness was related to the problem that no one really knew about DEMtechs products, services and what digital solutions were in development. Other customers suggested an open innovation approach where it was deemed necessary for DEMtech to reach out to the customers to develop new products and digital solutions. It was believed that digital solutions such as remote monitoring could become beneficial for both parties, which include diagnosing problems remotely through location and operation data at customers site. In addition, customers revealed the interest to be a part of the development of digital solutions with the purpose of securing a better installment process and system integration between DEMtechs products and services, and the customers power systems.

6.5 The strategic agility dimensions model

Figure 3 reveals the strategic agility dimensions model of the digital transformation that has been analytically generalized from the case study of DEMtech, and which captures three levels: the strategic agility dimensions, strategic agility actions and dynamic capabilities. In summary of the above results and analysis, the model presents the strategic agility dimensions: 1) Need for increased agility through digital transformation, 2) change in business model logic, 3) embedding service-driven capabilities and 4) customer co-creation and co-development, which may explain how strategic agility has been cultivated through DEMtechs digital transformation. In addition, DEMtechs progression is represented as seven steps of strategic agility actions: 1) establishing a clear focus on the importance of creating visibility and awareness on opportunities and challenges regarding service both internally and externally, 2) creating initiatives to change and optimize current relationships with customers, 3) initiating change to the business logic as an necessity for the digital transformation, 4) redefine the current technology used in the organization to support the development of new digital BMs, 5), improve customer satisfaction and experience through digital solutions, 6) clearly defining and communicating, both internally and externally, the values and benefits of using DEMtech as the service provider, and 7) establishing initiatives for customer relationships utilizing network resources for co-creation of values.

These strategic agility actions defined the direction and purpose of DEMtechs' digital transformation process. This meant that the company could start a meaningful transition to respond to the commoditization challenge that they were facing by communicating internally the need for increased agility in the organization, using service as a meaningful and untapped business opportunity. This was partly due to the acknowledgement that DEMtech didn't have the necessary capabilities to undergo such a transition, because most of their knowledge resided in the technological arena and not on exploring new and fuzzy business opportunities, hence new service capabilities were insourced to the organization. The change in their current BM logic came from the incorporation of new processes and services that became a part of their daily work activity and from the well-communicated BMI agenda. Yet, through the combination of leadership, resource fluidity and strategic sensitivity, DEMtech was able to effectively initiate and execute their digital transformation.

DEMtech started to immediately identify and adapt sub-components of each strategic agility dimension, and to act upon these as utilizing their dynamic capabilities in the following ways: 1) Awareness and visibility (strategic sensitivity)—identified new business opportunities and new revenue streams through strategic awareness in the environment and from findings in the research study, thus enabling DEMtech to establish demand for service through the digital BMs during the transformation process. 2) Resource management (resource fluidity)—identified and utilized technical know-how within the organization by using the appointed

task force to create the smart monitoring system and new digital BMs through workshops during the transformation process. 3) Building the service organization (leadership unity)—concerns from the research study were acknowledged and addressed through the developed initiatives. The management communicated the changes within the organization and initiated the digital transformation toward enabling new BMs to be created and implemented. As a manager said, "*Our current issues are well-known in terms of lack of purpose and direction on how we can change our current BM. At that time, we simply did not know how to gain business benefits from digital technologies.*" The specific managerial actions and their impact on the digital transformation are identified in terms of creating leadership unity with the purpose of securing continuous progression in the digital transformation.

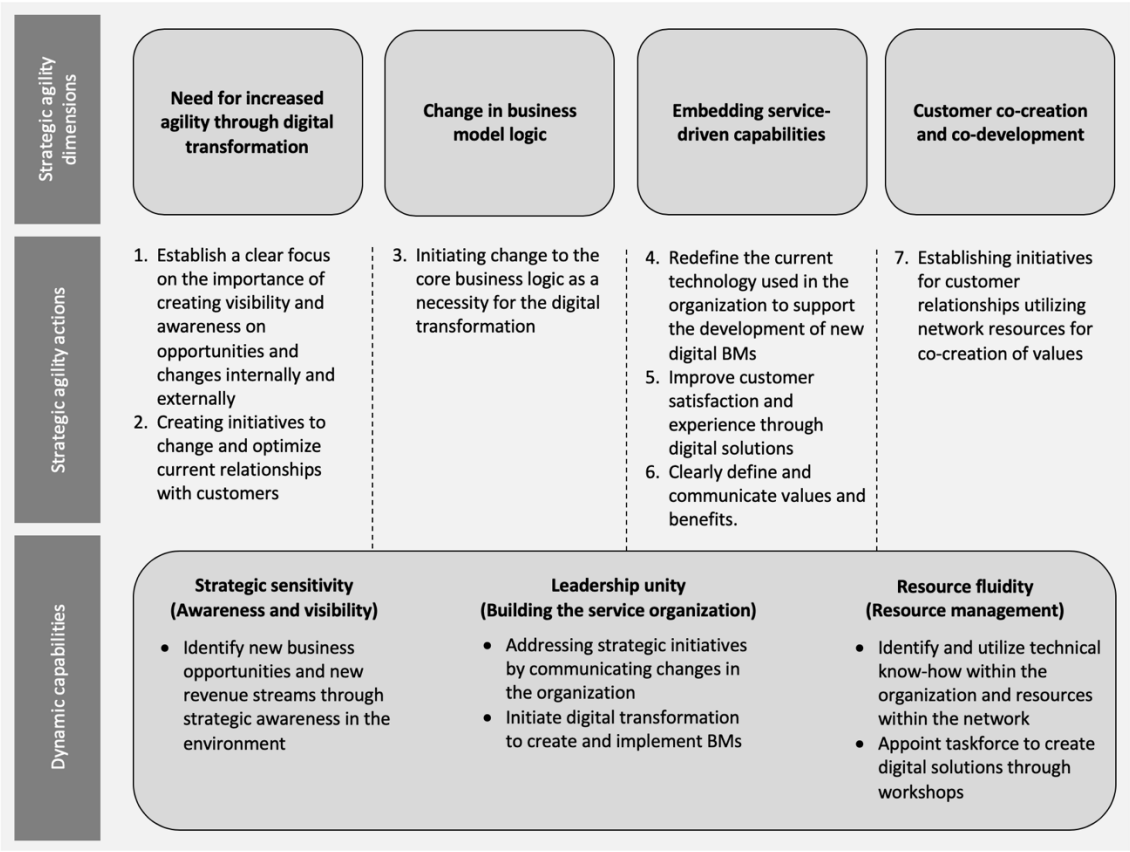

Figure 3 - Addressing strategic agility dimensions, strategic agility actions and dynamic capabilities in initiating digital transformation

7. Discussion and conclusion

So far, we have presented drivers and inhibitors of the process of BMI in cultivating strategic agility during the digital transformation of a case company. This study analyzes the role of strategy (strategic agility) during BMI and how these are managed simultaneously (Berman, 2012), an overlooked phenomenon in the literature of strategic management and BMI as stressed by a number of authors. In addition, recent contributions to the field of digital transformation underline the need to "address the strategic roles of new technologies and capabilities for successful digital innovation in the digital world" (Ismail et al., 2017). However, not only is digital transformation complex in size and scope, it also lacks clear guidance for managers to approach in terms of initiation, implementation and execution (Hess et al., 2016). Based on this paper's theoretical foundation, we were able to identify several research gaps in current literature streams of strategic agility and BMI in the context of digital transformation. We first identify that there is a lack of empirical evidence suggesting the relation between strategic agility and BMI for companies undergoing a digital transformation (Fitzgerald et al., 2014). Second, we identify the fuzziness on the concept of BMI related to the development of strategy and BMs (Foss and Saebi, 2017). Third, we identify the lack of clarity on how dynamic capabilities relates to BMI in the digital transformation context.

This paper addresses these research gaps by providing clear evidence on the relation between the three dynamic capabilities (strategic agility) and how the case company has created, delivered and captured value (BMI) as well as describing how this has affected their digital transformation process. We accumulate four dimensions to explain how strategic agility relates to BMI during the digital transformation process and how the case company has dealt with these through strategic agility actions and from that initiated the BMI to explore avenues of digital BMs for service.

According to the above, the key findings that we are able to draw from the analysis on the digital transformation at DEMtech can be summarized as follows.

In answering the research question of the study, "What drives and inhibits the process of BMI in cultivating strategic agility during digital transformation?" we have derived four dimension to explain the relation between strategic agility and BMI in the case of DEMtech's digital transformations: 1) The need for increased agility through digital transformation, 2) embedding service-driven capabilities into the organization, 3) change in BM logic and 4) customer co-creation and co-development.

In our theoretical section, we emphasize that companies are now facing great uncertain times, in which executives are challenged to digitally reimagine and renew their current BMs (Lewis et al., 2014, Vagnoni et al., 2016). In alignment with this, companies may also need to synchronize to the speed of change occurring in their competitive environment—if they are to survive the technological advancement (Battistella et al., 2017). It is further argued that digitalization can help to reduce uncertainty when executives have to make tough strategic choices (Franklin et al., 2013). Consistent with the literature, we find that digital transformation leads to significant changes to the current BM at DEMtech, which indicates a shift toward digital maturity. Even though the company started in the early digital maturity stages with focus on incorporating digital technologies, they managed to embed service-driven capabilities into their organization and created new digital BMs. Yet, it was through external awareness in the early stages that DEMtech recognized the need to adapt to the changes in the environment. We found evidence that the fear of commoditization in the combination of poor customer experiences led to the initiation of the digital transformation. What is not apparent in the extant literature was that through the digital transformation, we found that the company increased their agility by enabling customers to interact with their digital technologies allowing for online self-service that improved not only the BM value through acceleration, utilization and variation of services, but also the relationship with customers. It is also evident that DEMtech balanced the combination between the use of digital technologies, products and services, and BMs during the initiation phase of the BMI process, which was not consistent with the findings from (Amit and Zott, 2012) survey. Further, it is not a choice between focusing on BMs or products/services—it is clearly a combination of these.

We argue that strategic agility is crucial for companies to reform their current BMs or create new business opportunities during turbulent circumstances without losing business opportunities (Vagnoni et al., 2016). It is during such trying times that companies should find ways to create more flexibility in their BMs, and, according to (Lewis (2014), the digital context is no exception. In exploration of this, (Doz and Kosonen, 2010)) assert that true strategic agility is the combination of three dynamic capabilities—strategic sensitivity, leadership unity and resource fluidity—in which all three capabilities must be present to support and drive BMI successfully in terms of transforming the BM. Our research contributes to an understanding of the role of strategic agility during BMI in the context of digital transformation. Indeed, our findings (in Figure 3) from managerial respondents (internal, external and holistically of the BM) reveal that all three dynamic capabilities have a significant role regarding successful initiation, implementation and execution of the digital transformation suggests a significant bond between strategic agility and BMI, which perhaps helps to account for the increasing emphasis that the research field has enjoyed. Our data analysis revealed the role of each capability in terms of BMI as follows:

First, strategic sensitivity was the direct influence for the BMI that initiated the change process and raised both awareness of service as a new business opportunity and customers' awareness of the service utilization gap. It also allowed for DEMtech to adapt their BM toward creating fit with the changes occurring in the environment, hence customer needs (fuel savings, better security and safety of customer products, avoidance of downtime), the utilization of technologies (smart monitoring), new self-service offerings (smart store) and competitive differentiation (avoidance of commoditization).

Second, resource fluidity influenced changes in the organization in terms of establishing the service organization and creating digital BMs by utilizing know-how and reallocating resources to manage new services through the established technology platform (smart service system and smart store).

Third, leadership unity influenced the BMI in terms of creating change management goals to enable management to secure commitment from employees by creating a clear vision and strategy to affect the working culture that accepts each initiative into their daily activities.

With this paper we aim to contribute to the understanding of how strategic agility influences BMI in the context of digital transformation, which previously stated, lacks empirical evidence.

With our findings we contribute to the strategic management and BMI literature by providing empirical evidence on identifying strategic agility actions that supported the process of BMI, showcasing how the drivers and inhibitors were dealt with during the process—explained through four accumulated dimensions—and describing the context of digital BMs for achieving a digital transformation. This also contributes to existing strategic agility (Doz and Kosonen, 2010), BMI (Vagnoni et al., 2016, Foss and Saebi, 2017) and digital transformation (Hess et al., 2016, Ismail et al., 2017) literature, in which our findings indicate that strategic agility is an applicable approach to provide guidance for managers to pursue digital transformation through the use of concrete strategic actions, but there are complications to consider, especially in regard to how to balance the exploration (requisite) and exploitation (existing) of BMs (Nambisan et al., 2017). This indicates a managerial bias toward wanting to seek new opportunities but being limited by traditional values (cultural barriers) of the company or misguided priority of resources in terms of lack of clarity (governance: control vs. flexibility). However, despite DEMtech's success in incorporating digital transformation, we did find that such challenges appear, especially in the initiation phase. Managers who are pro-digital transformation can struggle to find support, not only from top management, but also among mid-level managers and other employees who are afraid of how the digital transformation might affect their positions in the company. We

find that it was difficult for managers to balance resources between the old and new BM and that this might affect both short- and long-term performance.

8. Managerial implications

The managerial implications of the study stress that applying strategic agility in BMI has the potential to act as an effective overview and mindset for mediating the strategic decision-making process in the digital transformation. We find that in order to create a successful initiation, implementation and execution of a digital transformation, managers need to 1) establish visibility and awareness (strategic sensitivity) to foster commitment and understanding on the necessity of change in the organization, 2) prioritize and balance resource management (resource fluidity) to ensure progress and change in BMI and 3) make use of strategic communication (leadership unity) to enact managerial actions necessary to create new digital BMs as a result of BMI. Since both strategic practitioners and business managers have limited experience dealing with both the simultaneous concepts of strategic agility and BMI and what these have to the overall value creation, delivering and capturing of the business, this implies an initial phase of familiarization in order to realize what business benefits might follow. However, our observations indicated that the managers showed legitimacy when working with the BM concept, and also by adding strategy to the process. It is clear that strategic agility and BMI purpose will act more as the mindset for managers who begin with developing and applying new digital BMs on top of their current BM.

The limitations of the study also provide venues for further research. For one, as this is a single case study, it is necessary to conduct further research into this topic in order to generalize the findings. In particular, multiple case studies across different industries and potentially geographic locations should be the next step. This would provide the platform for a more in-depth analysis to map a framework that describes how strategic agility and BMI are related. Furthermore, the concept and impact of digital transformation changes with time and with the growing experience and capabilities of the companies; thus, a longitudinal study of how strategic agility plays a role over time in supporting BMI during digital transformations would be of interest.

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Publication 2

Investigating the managerial implications of leveraging strategic agility: Strategic tensions, actions and capabilities

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Abstract

Rapid digitally-driven business developments force companies to change direction constantly and create a need for agile strategies in being able to pursue the various strategic, digital business opportunities. However, little is known of how strategic agility is pursued and/or of the managerial implications and actions carried out it in building in strategic agility into the strategy and business development of a company. This paper addresses this research gap by investigating 15 companies and how the specifically incorporate strategic agility. The findings from the study identify three types of strategic agility practices in balancing strategic commitment and strategic agility through digital transformation: 1) no planning, 2) planning for the near future and 3) planning based on the future. Each contains key managerial implications related to core strategic tensions to be handled, the specific actions to be taken and the necessary capabilities in leveraging the full business potential of strategic agility.

Keywords: strategic agility, strategic agility practices, digital transformation, strategic tensions, actions, capabilities, strategic planning, case study

1. Introduction

Well-established companies are in an increasing number of industries affected by the high-turbulence and complex environments generated by digitalization. The extensive use of digital technologies in business is rapidly changing and undermining existing business models and strategies, leaving companies exposed to disruptions and discontinuities from new types of competition (Vagnoni et al., 2016, Oliver and Parrett, 2017). Moreover, managers are finding the new complexity of the competitive environments difficult to successfully maneuver through, while using traditional strategic planning in creating sustained competitive advantages (Oliver and Parrett, 2017). Researchers suggest that strategically agile companies achieve success in this new competitive landscape by facing such technological challenges through the ability of continuously sensing and responding to emerging opportunities and threats (Teece et al., 1997, Doz and Kosonen, 2008, Battistella et al., 2017). This is defined as companies' ability to remain flexible in the strategic direction, and to constantly develop innovative ways to create value (Weber and Tarba, 2014).

In particular, researchers argue that digital transformation is critical to the survival of well-established companies that seek alternative ways for leveraging their competitive positioning through a range of emerging opportunities that are derived from digital technologies (Lucas and Goh, 2009, Weill and Woerner, 2013). Digital transformation has been coined by (Hess et al., 2016, p. 339) as the exploration and exploitation of new digital technologies that entails the transformation of "key business operations" that subsequently leads to changes from products and process to management and organizational structure. They call for reshaping and replacing entire business models as a possible result of novel digital innovation. This process is often associated with the term digital transformation. The term digitalization is in itself not a new research topic or challenge, but it is the profound impact on customer preferences, industries and companies that has only within recent years become particularly apparent (Vagnoni et al., 2016). In addition, it has recently been suggested that we are in for a new change in how we think and work with strategy because of digital transformation (Bharadwaj et al., 2013, Kane et al., 2015, Dobusch and Kapeller, 2018). For instance, (Kane et al., 2015) shed light on what barriers companies encounter during digital transformation, and they show that companies at the early and developing stages lack a strategy while also finding it difficult to manage distractions in the form of too many competing priorities, and companies at the maturing stage are mostly concerned with digital security.

It is through opportunities that companies seek to adapt digital technologies into their strategies, business models and organizational capabilities with the outcome of achieving agility and sustainability from external threats (Vagnoni et al., 2016, Nambisan et al., 2017). This is reflected in the condition that academia and companies alike need to explore and exploit what opportunities and challenges exist in the different stages of digital transformation. For this reason, companies are now increasing their investments of resources into their transformation processes to comply with the requirements of the digital age and reap potential benefits of staying relevant and competitive (Ross et al., 2016). This also gives well-established companies the challenge to rethink their strategies and to transform parts or the entirety of their business models (Weill and Woerner, 2013). Consequently, strategic tensions can occur in such situations where companies are balancing strict strategic commitments for organization renewal through strategic planning while pursuing agility by focusing on strategic flexibility to conduct quick responses in the dynamic environment (Lewis et al., 2014).

The strategic agility might appear in such situations as an elegant answer to adapt the company's strategy to the new complexity of change (Lewis et al., 2014). However, its implementation remains a much more complicated issue to manage (Doz and Kosonen, 2010). Companies must be able to strike a tactful balance that prevents stagnation and painful transformation between flexibility and commitment in terms of what Doz and Kosonen (2008) refer to as the strategic agility conundrum. When pursuing too many response options, having a flexible structure might prevent companies from the kind of resource commitments necessary to achieve a significant competitive advantage (Doz and Kosonen, 2008, Vecchiato, 2015). On the other hand, rigid long-term planning can lead companies into strategic inertia and make them particularly vulnerable to discontinuities (Brown and Eisenhardt, 1997, Tripsas and Gavetti, 2000).

We start our investigation from two contrasting theoretical positions: 1) strategy is needed to build a lasting and exploitable competitive advantage (Porter, 1996), with the expectation that planning yields high rents, and 2) strategic decision-making relies on simple rules when applied in dynamic environments (Eisenhardt and Sull, 2001), with the expectation that agility yields high rents. This paper proceeds by setting out the background to the research by reviewing the literature on the concept of strategic agility in terms of the two contrasting theoretical positions—the role of strategic planning versus flexibility and the balancing act between two extremes. The methodology employed is then described, followed by findings and propositions arising from the study. Specifically, we explore how 15 companies across different industries leverage strategic agility through managerial implications of strategic tensions, actions and capabilities. Focusing on strategic agility, the present paper proposes a model for recognizing the strategic agility conundrum during digital

transformation and subsequently how it is associated with the two contrasting theoretical positions. The paper is concluded with a discussion of the implications and limitations of the study, and avenues for future research.

2. Mapping the concept of strategic agility

The concept of "strategic agility" is believed to be the embodiment and logic of how companies reinvent and transform themselves in terms of organization and strategy to unforeseen changes in high-turbulence environments, and with the purpose to stay competitive (Weber and Tarba, 2014, Vagnoni et al., 2016). Strategic agility has emerged in the business environment as a direct response to the difficulty companies have in following the increasing pace and complexity of change (Bock et al., 2012, Weber and Tarba, 2014). This difficulty is further sustained when companies experience success and fall into rigidness through standardization procedures (Brown and Eisenhardt, 1997, Doz and Kosonen, 2008), as their organization keeps growing. This can be explained as companies progressively, for the sake of stability and efficiency, evolve toward complex and highly routine organizations (Doz and Kosonen, 2010, Hopkins et al., 2013) and become blind to significant opportunities that emerge in the short term (Lewis et al., 2014).

Consequently, the rigid planning of their processes and adherence to their resources can become overwhelming barriers to overcome, even though opportunities are clearly identified (Doz and Kosonen, 2010, Eisenhardt, 2013). These barriers foster narrowed objectives and will hinder the ability to make fast moves (Gandossy, 2003, p. 30). According to Doz and Kosonen (2010), it will usually require a strong signal of significant recession before companies understand that their path to success no longer works. Doz and Kosonen (2008) presented the concept of strategic agility as means for protecting companies from these lock-in effects, and it should be understood as the antidote to withhold companies from sticking to what they are used to, but instead keep renewing themselves in terms of changes in the environment. However, speed without some clarity and focus can also promote ill-defined decisions fast, and becoming too agile might move you away from the core business and action (Gandossy, 2003). Being strategically agile is about making the right kind of compromises between quickness and consideration on one hand and flexibility and commitment on the other (Weber and Tarba, 2014).

According to (Doz and Kosonen (2008), "strategic" means looking into the future, building strategic plans, making strategic choices and reallocating or creating the necessary resources to fulfill them. Meanwhile, a company's organizational agility is considered to be the dynamic response mechanism, that is, the process of anticipation and adjustments to environmental changes (Battistella et al.,

2017). This process includes the response in the form of willingness to make the necessary changes on the spot and to set new strategic directions according to each emerged situation (Doz and Kosonen, 2008). Besides willingness, companies must be able to respond to emerging changes by enhancing their strategic sensitivity, build leadership unity and ensure resource fluidity, which in their combination as meta-capabilities establish the ability to become strategically agile (Doz and Kosonen, 2010). However, it is the ability to effectively respond to shifts in the business environment and adapt to radical technological changes that has been recognized as a difficult task for established companies (Tripsas and Gavetti, 2000, Jahanmir and Cavadas, 2018). Tripsas and Gavetti (2000) describe the challenge to adapt as: "Existing explanations for failure to adapt to radically new technology have focused on the nature of a company's capabilities." Companies will be constrained in their ability to create new value propositions if they are not able to recognize existing sets of capabilities that can be reconfigured within the organization (Teece et al., 1997). Moreover, traditional research avenues have focused on technological capabilities in the form of processes, tasks and information processing capabilities of the company (Teece et al., 1997), which in turn limits its adaptive intelligence (Tripsas and Gavetti, 2000).

To date, strategic agility has been assessed in few studies and is considered a relatively new concept in management literature (Arbussa et al., 2017) dealing with different theoretical lenses, such as paradoxical leadership (Lewis et al., 2014), flexibility (Bock et al., 2012), business model renewal (Arbussa et al., 2017), competitive activity (Vagnoni et al., 2016), dynamic capability (Teece et al., 1997), strategic agility capabilities (Battistella et al., 2017), semi-structured organizational agility (Brown and Eisenhardt, 1997), business acceleration (Kotter, 2014) and managing tensions (Fourné et al., 2014). Despite increasing attention on strategic agility among scholars, there is still room for stronger theoretical foundations (Weber and Tarba, 2014) and development of the field in terms of understanding the managerial implications of leveraging strategic agility between strategic commitment and companies renewal, which also calls for more empirical evidence of the phenomenon (Hemmati et al., 2016).

3. Strategic agility: The role of strategic planning versus flexibility

The planning school builds on the premise that competitive advantage is best achieved through a process of detailed long-term planning, which seeks to achieve a "fit" between the strategy of the business and the environment in which it operates (Mintzberg et al., 2008, p. 53). However, strategic planning in turbulent environments entails a level of uncertainty that can be difficult for strategists to predict and understand how a given component might evolve over time (Vecchiato, 2015). In fact,

turbulent environments work against the fundamental principles of strategic planning. If there are no ways of predicting how markets evolve (e.g., prices, customers demand or technological development), it provides a significant challenge to a company's ability to create and execute a plan (Grant, 2003). Most famous among critics of the planning school has been Henry Mintzberg (Mintzberg et al., 2008), who points out that there have been spectacular failures in strategic planning and that there is often significant gap between planned and actual "realized" strategy outcomes, especially in times with rapid and turbulent changes in the environment of study. Within the difficulty lies also the understanding of what response options are available and if these options provide actual value or have dire consequences (Vecchiato, 2015). Companies will need to find the right balance of high-level flexibility in their core business that is merged with the standard procedures in order to harness value from their growth initiatives (Doz and Kosonen, 2008). According to Davis (2009), it is only companies that operate in mature industries that can expect long-range stability and rely on traditional strategic planning to achieve such growth. Further, companies that operate in fast-changing and complex business environments can learn much from entrepreneurs that typically use a more opportunity-driven approach to strategizing (Eisenhardt and Sull, 2001). Those companies seeking to succeed in such environments also need a mindset that is geared toward capturing the unanticipated opportunities (Eisenhardt and Sull, 2001, p. 108).

It is a crucial ability for companies to change within rapidly shifting competitive environments and to survive (Brown and Eisenhardt, 1997). Companies need to explore a balance between having rigid and inflexible plans that prevent quick decision-making and informal processes that do not provide consistency in the decision-making process (French et al., 2004). While some companies probe for the future through structure and rigid strategic planning (Porter, 1996, Brown and Eisenhardt, 1997, Grant, 2003), others react through semi-structured and intuition-based development (Brown and Eisenhardt, 1997, Eisenhardt and Sull, 2001).

4. Strategic agility: The balancing act between two extremes

Some companies are challenged when probing for the future and especially during their strategic renewal process by forces working against their ability to adjust to changes from the external environment (Hopkins et al., 2013). Companies that acquire new technology might fail in the attempt to adopt such technology by not having the necessary scientific discipline to master its properties (Tripsas and Gavetti, 2000). (Huff et al., 1992) would describe such opposing force as strategic inertia of companies attempting to transform themselves, but failing in the process. Moreover, strategic inertia is what inhibits, but not entirely stops, the renewal efforts (Hopkins et

al., 2013). The phenomenon is described as forces one way or another delay a company's adaptive response to changes and thus impair their ability to create a competitive advantage. Such adaptive response in the environment signals a close association with the concept of strategic agility in which (Eisenhardt and Brown, 1998) argue for companies conducting the balancing act between two extremes, the bureaucratic trap (too much structure) and the chaos trap (too little structure), without falling into either extreme. Companies that operate at the edge of chaos are those who proactively look for change and use a variety of low-cost probes to sense opportunities in the business environment (Brown and Eisenhardt, 1997). These companies are known for their adaptive culture and semi-structure to ensure not falling off the edge of chaos (Grant, 2003). Companies that are relatively better at adapting to changing circumstances in the competitive environments are those that tend to be more successful (Teece et al., 2016). Also, practicing strategy as simple rules in complex and turbulent environments might lead to beneficial opportunities, given that managers have the appropriate mindset (Brown and Eisenhardt, 1997).

4.1 Managing strategic tensions

At this point, we summarize that managerial implications can occur in such situations where companies are balancing between strict strategic commitments for organization renewal through the strategic planning, and pursuing agility by focusing on strategic flexibility to conduct quick responses in the dynamic environment (Lewis et al., 2014). As explained in the above conceptualization - it is within this spectrum of balance that strategic agility is rooted. Following the argumentation from (Doz and Konsonen, 2010, Fourne, 2014, Lewis et al., 2014), the strategic agility conundrum also tends to force managers to deal with tensions that emerges, because its nature is in itself contradictory. According to Lewis (2014), companies will often have to attend to multitude and contradictory demands between "*innovation and efficiency, global demands and local markets, and social missions and financial – (Lewis et al., 2014, p.60"*. Equally important, is the ability for managers to identify and engage with contradictory demands as strategic tensions in order to successfully achieve strategic agility (Fourne, 2014, Lewis et al., 2014). These strategic tensions have been assessed and described in a variety of studies on flexibility and change, and exploration and exploitation issues, such as: *Paradoxes* – contradictory and interrelated elements with both/and solution (Smith and Tushman 2005, Lewis et al., 2014), *Win-wins* – avoiding tensions by achieving mutually complimentary alignment between interrelated elements (Van der Byl and Slawinski, 2015), *Tradeoffs* – competing choices by weighting advantages and disadvantages between contradictory elements (Lewis et al., 2014, Van der Byl and Slawinski, 2015), and *Compromises* - looking for resolving contradictory elements through integration (Lewis et al., 2014, Weber and

Tarba, 2014, Van der Byl and Slawinski, 2015). In this paper we investigate the type of strategic tensions that emerges and how companies manage these tensions in different strategic agility practices.

However, very few papers provide empirical research on the specific mechanism and processes in leveraging strategic agility (Lewis et al., 2014, Weber and Tarba, 2014) balancing transformative change by managing strategic tensions (Smith and Tushman, 2005, Fourne, 2014, Lewis et al., 2014), actions (Vagnoni et al., 2016) and capabilities (Teece et al., 1997, Teece, 2007, Teece et al., 2016) and between the rigidity of planning and flexibility in reconfiguring the organization. According to (Teece et al., 2016), research on agility still needs more clarification on when agility is desirable, what is the nature of its foundation and how agility relates to strategy. Following the work of (Doz and Kosonen, 2008) on the strategic agility conundrum, this paper will investigate the managerial implications of companies leveraging strategic agility during digital transformation.

Hence, we need to know more about how companies balance between structure and anarchy at the edge of chaos in turbulent environments, and about what the role of strategic agility is in terms of these contrasting managerial practices. This paper seeks to explore how companies leverage strategic agility through managerial implications of managing strategic tensions, actions and capabilities during digital transformation. Equally important, if strategic agility is in the middle of these contrasting managerial practices, then it is unavoidable that strategic inertia will occur—especially during the emergence of change through digital transformation.

Presently, to the best of the authors' knowledge, there are no existing empirical studies of how companies manage the implications from these strategic tensions, actions and capabilities of leveraging strategic agility during digital transformation, nor is it precisely clear where in the balance between the extremes of managerial practices companies effectively foster strategic agility. Given the diversity of theory streams underpinning the concept of strategic agility, our study is aimed at exploring the managerial implications of leveraging strategic agility in the special context of digital transformation. Thus, our research question is:

How do companies leverage strategic agility, and what are the managerial implications, strategic tensions, actions and necessary capabilities during digital transformation?

5. Research methodology

In our review, we examine two streams of research to explore different, but critical elements underpinning the concept of strategic agility practices: 1) the role of strategic planning versus flexibility, and 2) the balancing act between two extremes, which suggests the strategic agility

conundrum is found in such balance: rigidity of planning (too much structure) versus chaos of reacting (no structure). In conceptualizing the strategic agility practices, we target our analysis to digital transformation, which enforces change to the business logic of strategic planning and organizational renewal. Further, in order to explore the adaptive nature of digital transformation, our conceptualization needed to take into account the managerial implications that occur during such a process, and consequently what high rents might emerge. Thus, our desire was to contribute with empirical evidence of companies from the two contrasting theoretical positions: a) strategic planning yields high rents (Porter, 1996) and b) agility through simple rules in the dynamic environment yields high rents (Eisenhardt and Sull, 2001).

The research design for this paper aims to enrich existing theory with new insights from empirical data gained from case studies (Eisenhardt, 1989). In doing so, we adopted the qualitative research design as an to study the specifics of strategic agility process in companies undergoing digital transformation. It is also acknowledged that a case study methodology is suited for acquiring rich and detailed data (Yin (2014) and to identify emerging themes and patterns (Eisenhardt, 1989). In addition, the case study is a widely used approach to create new knowledge on how and why events occur in situations with scarce theoretical background, as is the case of the strategic agility process during digital transformation of companies across industries. In line with the nature of this research, we used a combination between deductive and inductive coding of our data. Following the deductive coding, we focus on the three strategic agility dimensions: strategic sensitivity, leadership unity and resource fluidity and their related inertia and contradictions of digital transformation. From the inductive perspective, we explored companies' solutions of overcoming strategic tensions, which also included qualitative methods to gain deep understanding of how and why decisions and actions related to digital transformation are taking place in different types and sizes of companies, and across industries. More specifically, our research is based on a multiple case study design that allows for the collection of data and permits cross-case analysis that can lead to the recognition of emerged patterns and their relations among constructs that can contribute to important theoretical insights. As suggested by (Eisenhardt, 1989), theory building aims to identify and describe the key variables, the links among them and why these relationships exist.

5.1 Research setting and case selection

Our research setting is linked to the manufacturing, service and public industries in which the selected case companies engaged into a digital transformation process. The sampling frame of criteria was established setting up the multiple case study (Yin, 2014). Thus, associated with the theoretical background and research interest of this study, the case companies had to comply with

the following case selection criteria: 1) be established companies in their respective industries and be subjects to high-turbulence environments, 2) have managed strategic agility practices as per the above conceptualization during the past few years and 3) be undergoing a digital transformation with the purpose to adapt parts or the entirety of their core business. Fifteen companies meeting these criteria were identified as part of a DABAI (DAnish Center for Big Data Analytics driven Innovation) research project, which aim to pioneer Danish companies to exploit the full potential of big data. Furthermore, the selected cases as portrayed in Table 1 have worked with strategic agility practices to different extents during their digital transformation.

5.2 Data collection

The primary data collection was structured as exploratory, with a focus on strategic agility process, specific to the digital transformation of companies. The exploratory case study included in-depth interviews with 27 key decision-makers of the digital transformation process and 4 business developers from 15 of the companies selected. The study was conducted in September–November 2017.

Table 1: Case company overview

Case	Business areas	Informants	Employees	Drivers for leveraging strategic agility
M1	Textile Manufacturing	1 CEO	20–49	• Necessity to be present on all types of platforms today in order to survive in the industry
M2	Lifestyle Manufacturing	1 CEO	10–19	• *Challenge:* Improving logistics issues with customers through an digital solution.
M3	Textile Manufacturing	1 manager	20–49	• Automated fitting and measurement process of customized clothing to provide sustainable and digital solutions for customers

M4	Textile Manufacturing	1 manager 1 employee	50–99	• Looking for new opportunities through digitalization to optimize internal processes and market approach
M5	Lifestyle Manufacturing	1 manager 1 employee	50-199	• Looking for alternative business models through digital technologies that enable a closer and continuous interaction with customers
M6	Lifestyle Manufacturing	1 CEO	10–19	• Digitalizing parts of the business to optimize current products through digital technologies that provide more user interaction
M7	Lifestyle Manufacturing	1 CEO	0–9	• Building digital business models on top of the data that is already collected
M8	Textile Manufacturing	1 CEO	10–19	• Minimizing cost on production and increasing quality inspections through digitalization.
M9	Electronic manufacturing	10 managers	500+	• Differentiating in a saturated market through service • Establish a technological foundation for data gathering and analysis
M10	Food processing Manufacturing	1 CDO 1 manager 1 consultant	500+	• Making future decisions based on data and predicting industry development
S11	Healthcare and defense services	1 manager 1 employee	50-199	• Building a business intelligence organization that drives future development of the business

S12	Urban development services	1 CEO	0–9	• Formalizing growth strategies that expands the business into other industries based on current big-data platform • Providing data-driven decision-making for customers as service
S13	Public education services	1 CEO	10–19	• Developing the business into more digital options to avoid future disruptions
S14	Financial services	2 managers	50-99	• Building data lakes for big-data platform that enables fully automated decision-making on new avenues for development
P15	Public government services	2 managers	500+	• Building digital business models using machine learning and future AI to fully automated interaction with customers, network partners and stakeholders of the company

We conducted 31 semi-structured interviews of 2–3 hours over two months, interviewing informants responsible for strategic planning, decision-making and capabilities necessary to drive strategic agility practices through the digital transformation. Each informant was interviewed about their participation (past, current and future state) in the companies' digital transformation journey. The research objective and key concepts were described before each interview in order to avoid misunderstandings. Hereafter the interviews were transcribed and validated by the informants to ensure validity and a proper understanding of the strategic agility process, including strategic inertia and contradictions that occurred in the digital transformation process.

The unit of analysis was the entire strategic agility process, with a focus on the strategic planning practices used during digital transformation. Specifically, we have investigated patterns that constitute strategic agility processes used in the developing of BMs for a digital context. In order to handle the research question, for each case:

1) First, we identify the strategic agility practices involved in the digital transformation of selected case companies, using the data analysis methodology of (Gioia et al., 2013).
2) Second, we explore which of the three strategic agility practices each of the case companies apply.
3) Finally, for each of the strategic agility practices identified we present the specific managerial implications in terms of mindsets, strategic tensions, actions and capabilities.

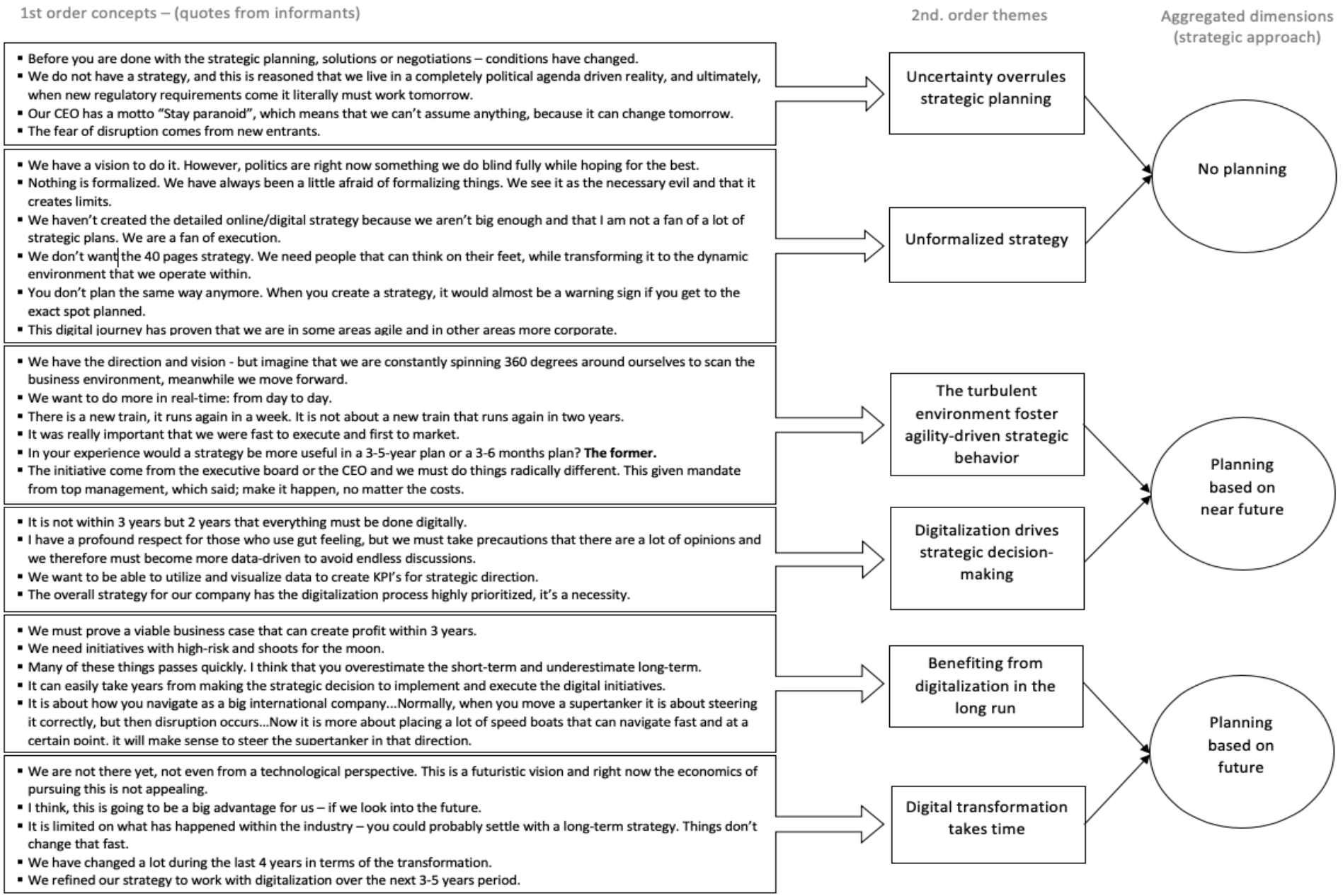
5.3 Data analysis

Each interview was coded deductively using the software program NVIVO, in which we were looking for evidence of strategic agility and how strategic inertia and contradictions affect the process of digital transformation. Following the methodology of (Gioia et al., 2013), we engaged in a second analysis where we coded inductively, looking for patterns that could explain why certain steps or methods contributed to overcoming strategic inertia that underlie the digital transformation process. The results of our analysis are shown in Table 2. The table portrays the data analysis of mapping first-order concepts based on the quotes from the interview sessions and the derived second-order themes, which are leading up to the aggregated dimensions of the strategic practices identified through the data analysis.

6. Results and analysis

The table portrays the data analysis of mapping first-order concepts based on the quotes from the interview sessions and the derived second-order themes, leading up to the aggregated dimensions being the strategic agility practices identified through the data analysis.

Table 2: Data structure


1st order concepts – (quotes from informants)
2nd. order themes
Aggregated dimensions (strategic approach)
Before you are done with the strategic planning, solutions or negotiations – conditions have changed.
We do not have a strategy, and this is reasoned that we live in a completely political agenda driven reality, and ultimately, when new regulatory requirements come it literally must work tomorrow.
Our CEO has a motto "Stay paranoid", which means that we can't assume anything, because it can change tomorrow.
The fear of disruption comes from new entrants.
Uncertainty overrules strategic planning
We have a vision to do it. However, politics are right now something we do blind fully while hoping for the best.
Nothing is formalized. We have always been a little afraid of formalizing things. We see it as the necessary evil and that it creates limits.
We haven't created the detailed online/digital strategy because we aren't big enough and that I am not a fan of a lot of strategic plans. We are a fan of execution.
We don't want the 40 pages strategy. We need people that can think on their feet, while transforming it to the dynamic environment that we operate within.
You don't plan the same way anymore. When you create a strategy, it would almost be a warning sign if you get to the exact spot planned.
This digital journey has proven that we are in some areas agile and in other areas more corporate.
Unformalized strategy
No planning
We have the direction and vision - but imagine that we are constantly spinning 360 degrees around ourselves to scan the business environment, meanwhile we move forward.
We want to do more in real-time: from day to day.
There is a new train, it runs again in a week. It is not about a new train that runs again in two years.
It was really important that we were fast to execute and first to market.
In your experience would a strategy be more useful in a 3-5-year plan or a 3-6 months plan? The former.
The initiative come from the executive board or the CEO and we must do things radically different. This given mandate from top management, which said; make it happen, no matter the costs.
The turbulent environment foster agility-driven strategic behavior
It is not within 3 years but 2 years that everything must be done digitally.
I have a profound respect for those who use gut feeling, but we must take precautions that there are a lot of opinions and we therefore must become more data-driven to avoid endless discussions.
We want to be able to utilize and visualize data to create KPI's for strategic direction.
The overall strategy for our company has the digitalization process highly prioritized, it's a necessity.
Digitalization drives strategic decision-making
Planning based on near future
We must prove a viable business case that can create profit within 3 years.
We need initiatives with high-risk and shoots for the moon.
Many of these things passes quickly. I think that you overestimate the short-term and underestimate long-term.
It can easily take years from making the strategic decision to implement and execute the digital initiatives.
It is about how you navigate as a big international company...Normally, when you move a supertanker it is about steering it correctly, but then disruption occurs...Now it is more about placing a lot of speed boats that can navigate fast and at a certain point, it will make sense to steer the supertanker in that direction.
Benefiting from digitalization in the long run
We are not there yet, not even from a technological perspective. This is a futuristic vision and right now the economics of pursuing this is not appealing.
I think, this is going to be a big advantage for us – if we look into the future.
It is limited on what has happened within the industry – you could probably settle with a long-term strategy. Things don't change that fast.
We have changed a lot during the last 4 years in terms of the transformation.
We refined our strategy to work with digitalization over the next 3-5 years period.
Digital transformation takes time
Planning based on future

The data analysis revealed different practices among the case companies in leveraging strategic agility during their digital transformation journey. However, some of these practices carried a number of resemblances, which made it possible to map the practices into three strategic approaches (*1. no planning, 2. planning based on near future and 3. planning based on future*), as illustrated in Table 2 and summarized in Table 3. The study revealed that each strategic agility practice involved a number of common managerial implications in terms of strategic tensions: *tradeoffs and compromises*, specific actions and core capabilities applied by the companies in supporting strategic agility. In the following within-case analysis, we explore in detail how the companies actually leverage strategic agility and detailing the digital transformation activities that occurred during their transformative process. This is summarized in tables, where we provide an overview of managerial implications of strategic agility practices from the strategic tensions (tradeoffs and compromises) addressed, mindsets (thoughts), response options (actions) and capabilities (strategic sensitivity, leadership unity and resource fluidity), as well as the specific managerial implications.

Table 3: Categorization of case companies and their strategic agility practices

Strategic agility practices	**Representation of case companies**
1. No planning: uncertainty overrules strategic planning and having intentionally unformalized strategy	M1, M2, M4, M6, M7, M8
2. Planning based on near future: the turbulent environment fosters agility-driven strategic behavior and digitalization drives strategic decision-making	M3, M5, M9, M10, S12, S13
3. Planning based on future: benefits from digitalization in the long run and digital transformation takes time	S11, S14, P15

First, we illustrate the three strategic agility practices in relations to the strategic agility conundrum (Doz & Konsonen, 2008) and the extremes of strategic practice (Brown & Eisenhardt, 1997), see figure 4. Second, we explain each of the three strategic agility practices in detail and with quotes

from the informants. Finally, for each of the three practices we provide an overview of the managerial decision-making level and how strategic tensions are managed.

The model highlights three strategic agility practices in relation to the two contrasting theoretical positions (anarchy versus structure), as described in the above theoretical section.

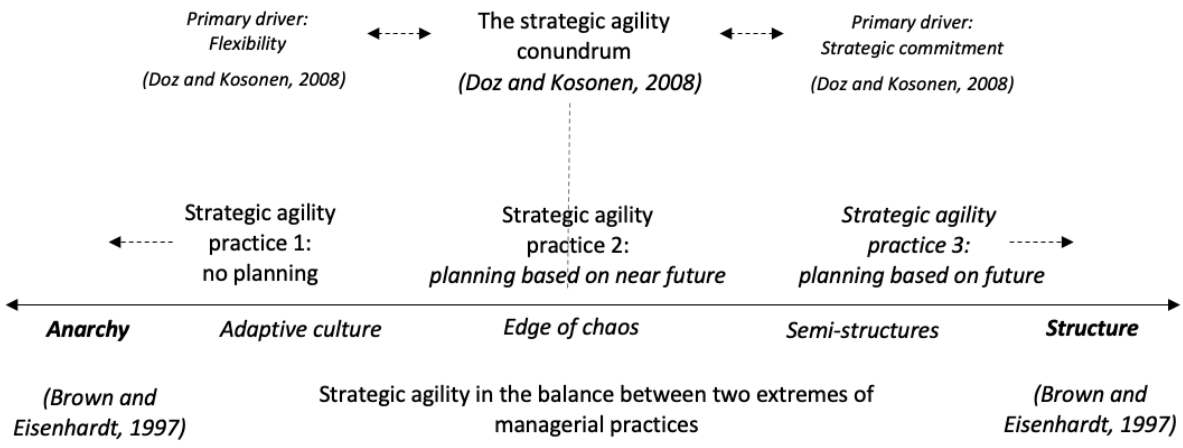


Figure 4 - The strategic agility continuum model

In the midst of the two positions, in what Brown and Eisenhardt (1997) refer to as the edge of chaos, we find the strategic agility conundrum as a constant utilization and balance between the benefits of both flexibility and strategic commitment. The left side of the model represents companies that achieve strategic agility with flexibility as the primary driver. We find that companies operating in practice 1 (between the edge of chaos and anarchy) intentionally do not have a strategic approach and seek to maximize agility while seeking its high rents. On the right side of the model, we find companies that achieve strategic agility through following strategic commitment as the primary driver. Companies operating in practice 3 (between the edge of chaos and structure) tend to rely on long-term strategic approaches while seeking to maximize planning for high rents. Lastly, companies in practice 2 (the strategic agility conundrum) are seeking to achieve high rents from both strategic approaches and in that balance are constantly adjusting to changes, thus operating at the edge of chaos.

6.1 Strategic agility practice 1: No planning—uncertainty overrules strategic planning and having intentionally unformalized strategy

Companies that follow no planning tend to leverage strategic agility by seeking new opportunities through the use of intuition and experience, but at the costs of operating in the dark. As emphasized by informants, these companies rely on enhancing speed and urgency of their reactive response mechanism through digital technologies (see Strategic agility practice 1: Summary of results). In fact, these companies made a conscious strategic choice not to follow any form of strategic planning. Within this practice, companies operate in high-turbulence environments, in which they do not follow any form of strategic approach (no planning) for two reasons: 1) uncertainty overrules strategic planning—*"Before you are done with the strategic planning, solutions or negotiations, conditions have changed,"* and 2) having intentionally unformalized strategy to maximize the agility outcome—*"It is intentional that strategy is in the mindset of managers and that it makes them respond more agile in their decision-making process".* They thrive on operating near the point of anarchy by having no form of structure to guide their digital transformation process. This is in line with the argument by (Weber and Tarba, 2014, p.5) that current concepts such as strategic planning and sustained competitive advantage have been deemed irrelevant for companies operating the high-paced dynamic environments. Instead, one of the determinates of strategic agility is the company's ability to continuously adapt to changes in the environment (Doz and Konsonen, 2008, Weber and Tarba, 2014). However, our findings reveal that these companies do not have the necessary resources to continuously make changes to their core business, which in line with arguments from (Weber and Tarba, 2014) requires extensively amounts of resources to maintain. As a compromise, companies within this practice seek to utilize data as low-cost probes for them to pursue new opportunities in the high-turbulence and uncertain environment. This is also coherent with the study from (Brown and Eisenhardt, 1997) that argue for companies achieving high efficiency and adaptiveness using low-cost probes embedded into the semi-structured approach.

Company following the first reasoning can be described as having a reactive response mechanism to changes occurring in the environment. Companies following the second reasoning have made a specific choice not to follow any formalized strategic approach because they simply do not believe in its benefits. Both groups can be characterized as companies operating between the edge of chaos and total anarchy with no structure to support their digital transformation journey. As expected, some companies find that intuition and experience are better-suited managerial tools for guidance during their digital transformation in high-uncertainty environments. The managers and employees involved with digital transformation are often able to detect opportunities and make decisions to

solve issues (that are constantly appearing) on the spot and based on their intuition and experience. In addition, the mindset of managers working with this strategic approach can be summarized as follows: "*Our CEO has a motto, 'Stay paranoid,' which means that we can't assume anything, because it can change tomorrow.*"

Other companies recognized the disadvantages of following a formalized strategic approach because it would limit their innovative capabilities, as explained by a manager from M7: *"Nothing is formalized. We have always been a little afraid of formalizing things. We see it as the necessary evil and that it creates limits. This is reasoned by how we work as a team. We want to utilize data because it allows us to make smart decisions in the moment and were we can detect new opportunities and from that create ideas that provide actual value to our customers, and this kind of journey has so far worked."* This is also recognized by a manager from M4: *"We don't want the 40-page strategy. We need people that can think on their feet, while transforming it to the dynamic environment that we operate within."*

6.1.1 Managing strategic tensions when no planning

Following the reasoning by (Fourne, 2014, Lewis et al., 2014) companies in this study also deals with a multitude of contradictory demands between *innovation and efficiency,* and therefore have to manage the strategic tensions that emerges during their digital transformation process. Tensions also exists when companies intentionally or out of necessity decide not to follow any form of strategic approach in terms of maximize agility, while seeking its high rents. In some cases, the high-turbulence environment from the company's perspectives demolished the benefits of practicing strategic planning to predict future avenues for their development of digital business models. A variety of managers emphasized the principles of not following any strategic plan—in what was described as predicting the future as the impossible discipline to follow (M1, M2, M4, M6, M8). In doing so, we found that companies in this practice tend to look for compromising solutions between capabilities in order to successfully achieve results from experimenting with digital solutions (See Strategic agility practice 1: summary of results – how strategic tensions are managed). Given that pursuing strategic agility tend to make it difficult for companies to predict changes in the environment, our study shows that companies within this practice have made significant compromises to their innovation approach. For instance, managers have recognized the importance of involving network partners and customers into their development process, which was not apparent before the digital transformation process. In doing so, mid-level managers have broken the dominant logic of following top leaderships intuition-based decision-making as the digital solutions required unique insights into external processes, which could only be integrated through knowledge

sharing across platforms. There are also traces of contradictory statements. On the one hand, managers believe in the notion of operating near the edge of chaos will leave to a better outcome, but, on the other hand, some managers also believe that digital transformation will break that dominant logic and replace intuition with data analysis for future decision-making. This will eventually become a tradeoff decision that the leadership of these companies must face in terms of weighting the advantages and disadvantages of both solutions. Some companies show advantages from the tensions, such as operating near the edge of chaos with little or no structure can be beneficial in terms of responding to changes in the market without exceeding the budget. A clear disadvantage was expressed as companies were increasingly depended on their network partners competences and resources to deliver on those solutions that the customers requested.

6.1.2 Actions when no planning

The response mechanism for these companies can best be described as reactive in which companies seek to create a strategic fit with changes already happening in the environment. A manager from M6 provides an example: They encountered several issues when involved in the digital transformation process, such as new "unpronounced" political regulations that affected certain features in their software, and they were forced to make radical changes in order to legally be represented at customer sites. In this critical situation, they relied on their intuition and external resources (knowledge from experienced customers in the development of a new user interface) to make decisions on the spot and take fast turns within a very narrowed timeframe. The manager explained this with, "*We do not have a strategy, nor do we need one, because changes and decisions are for tomorrow, not in a year.*"

6.1.3 Capabilities when no planning

The companies showed a combination of all three meta-capabilities in our study. The findings revealed that to achieve the digital transformation process without strategic planning, companies must also rely more on the external awareness of leadership in the ability to utilize resources from network partners, customers or other stakeholders in the development process. This is important, as the increased awareness and utilization of resources within and outside of the organization supports managers in making unique and suitable solutions that not only satisfy customer needs, but also secure the survival of the company—as pointed out by one manager: *"We are dependent on external competences to support our digital developments, because we do not have the knowledge ourselves… We are now starting to work with network partners to work out some of the challenges with digital technology that we are facing."*

It was important to get employees on board in terms of providing support in the digital transformation process, but managers also found it difficult to receive support when changes had to be made in the organization (M4, M7, M6, M8), as one informant from M4 explained: *"Digital solutions have their demands to the organizational structure. We needed to adapt and change some of our employee staff and systems towards having the competences and capabilities to work with data. This led to a lot of challenges. One of them was for a period an opposing culture for that change and it took a lot of communication between management and employees to solve."*

For each of the three strategic agility practices, we present the managerial decision-making level, how strategic tensions are managed, the three capabilities (strategic sensitivity, leadership unity, and resource fluidity), which is followed by the conceptualization of theory described.

Strategic agility practice 1: Summary of results

The managerial decision-making level when no planning		
Strategic issue	**Mindset and decision (Thoughts)**	**Specific solution (Actions)**
Companies are subject to rapid technological change in market conditions that enforces high uncertainty for current business trajectory. **Quote: "Before you are done with the strategic planning, solutions or negotiations, conditions have changed."**	• Stay paranoid: can't assume anything, because it can change tomorrow. • Not knowing where the digital transformation leads to. • Strategy is not formalized. • Having intentional agile behavior within the decision-making process. • Creating mindset for change in the organization as evolving towards digital innovation.	• Responding to external changes by revising software, then adapting it to the digital platform within few weeks. • Technology is driven by new challenges, either from the market (competition or customers) or by in-house development. • Digital innovation processes are initiated by how to get value out of existing products. • Using data for optimization and sales. • The digital innovation in the company has moved from idea to a value-adding phase for customers.

How strategic tensions are managed when no planning			
Examples of strategic tensions	**Strategic agility capabilities**		
	Strategic sensitivity	**Leadership unity**	**Resource fluidity**
Compromise: Customers are a close part of the innovation and optimization of products and digital solutions. **Compromise:** Obtaining competences outside of the organization for the digital development. **Compromise:** Initiating communication with network partners in the ecosystem to share data for optimizing products and create new digital solutions. **Future tradeoff:** Mid-level managers want to break the dominant logic in the organization by moving away from gut-feeling decision-making and toward data analysis.	Examples: • Innovating blindly on gut feeling and experience, as it is difficult to predict changes in the environment.	Examples: • Strategy is not formalized in terms of the digital innovation or transformation. It's the owner's intuition that drives development. • It's a lot about feeling what to do at the moment in terms of business development. • Challenge to get employees on board for each change initiated in the organization.	Examples: • The resources, not the strategy, dictate the idea with highest ROI. However, resources are scarce. • Transforming the business into digital platform requires new competences and resources that are not available presently.

6.2 Strategic agility practice 2: Planning based on near future—the turbulent environment fosters agility-driven strategic behavior and digitalization drives strategic decision-making

The second strategic agility practice found companies operating in similar unstable environments that foster an agility-driven strategic behavior by balancing between having strict strategic commitments and the flexibility to adjust as response options to changed conditions in the industry.

This is in coherence with how (Fourne, 2014, p.271) described strategic agility: "*as an organisation's capacity to make strategic commitments while staying nimble and flexible and is considered to be a means by which organisations transform and reinvent themselves, adapt and ultimately survive."* In particularly, our findings reveal that managers within these types of companies thrive making constant adjustments to their business models. As clarified by a manager from M10: *"We have the direction and vision—but imagine that we are constantly spinning 360 degrees around ourselves to scan the business environment; meanwhile, we move forward."* In addition, these companies indicate that digitalization drives their strategic decision-making by prioritizing the above core business logic through utilizing and visualizing data to create KPIs for strategic directions. Managers explicated the need to break the dominant logic of following intuitions and instead suggested that the digital transformation should lead to more decisions made from data analysis out of current products and software, as explained by a manager from M9:

"It is possible for us to obtain data from our products, and from that we can start analyzing the data and in small steps toward providing actual evidence of what we should invest our resources into. We can therefore see data as what could potentially make strategic planning a new option to consider as the data would become the resource for future planning exercises."

A surprising counterargument was made from informants that were concerned about losing the important element of using intuition during the ideation phase (M9, S12):

"It is about making decisions based on data, this is really important, but don't think you should underestimate being close to the customers and to have a gut feeling."

It was also evident that these companies are prioritizing the speed and urgency as vital parts of the digital transformation success into their current practices, as clarified by a manager from S12: "*speed of change and willingness to change are vital for success."* Similar arguments for speed and urgency were made from other companies (M3, M5, S13):

"There is a new train—it runs again in a week. It is not about a new train that runs again in two years."

"In your experience would a strategy be more useful in a 3–5-year plan or a 3–6-month plan? The former."

Findings also showed that there was a willingness to risk failure in the development process that was supported by leadership: *"We are failing half of the time. We don't fail nearly enough."* This group of companies showed both strategic exercises in the form of having direction and vision for their digital transformation, and adaptive behavior in the form of continuously assessing markets and adjusting

their business models towards aligning digital solutions with customers and network partners. This underlie the premise that the embodiment of strategic agility is achieved through the combination between setting new strategic directions and the willingness to continuously adjust the business model to changes in the industry (Doz and Konsonen, 2008, Lewis et al., 2014, Weber and Tarba, 2014, Battistella et al., 2017).

6.2.1 Strategic tensions when planning is based on near future

Companies that practice planning based on near future are those that operate within the strategic agility conundrum (Doz and Konsonen, 2008) and seeks high rents from striking a tactful balance between flexibility and strategic commitment. However, such balance is not an easy process to achieve, because of its contradictory nature (Fourne, 2014, Lewis et al., 2014, Weber and Tarba, 2014). Consequently, companies will have to overcome strategic tensions that emerge between *exploration and exploitation* in order to strike the tactful balance, and especially for two reasons.

First, companies that pursue too many response options while honoring the flexible structure might prevent the kind of resource commitments necessary to achieve competitive advantage (Vecchiato, 2015). Following this, our findings show that companies described the importance and pressure from the industry to initiate their digital transformation process. For instance, being first mover was a tradeoff vital for success for some companies, however it also meant that they needed to reallocate resources from already initiated innovation projects that were immediately discontinued, and into their digital transformation (See Strategic agility practice 2: summary of results - how tensions are managed). This tradeoff was made by top management out of fear of getting disrupted from competing forces in the industry. In doing so, the top management indorsed the digital transformation process by mandating the development without any budget. However, this tradeoff was not without its consequences. These companies experienced problems getting support from mid-level management and employees, because some of these initiated the now discontinued projects and was unhappy with the development. However, compromises were made to integrate solutions from mid-level managers and employees into the process. First, ambassadors were chosen to initiate the process and with the purpose to create engagement through workshops from the rest of the organization. Second, the willingness to fail was created as mantra to support “moon shot” ideas with the purpose to increase the level of innovation. Third, using external resources to create the business case through pre-test development of a machine-learning system and to verify the parameters for integration through inspection of the organization. Compromises were taken in

order to secure the resource commitment and to successfully initiate the digital transformation process.

Second, companies that have rigid long-term planning can lead them to strategic inertia and become vulnerable to discontinuities (Gavetti, 2000). Companies that practice planning based on near future wanted to evolve through the digital transformation process in terms of utilizing data to make strategic decisions that support new directions for developing digital business models, as expressed by a manager from S13: *"I have a profound respect for those who use gut feeling, but we must take precautions that there are a lot of opinions and we therefore must become more data-driven to avoid endless discussions."* Given that these companies operate in dynamic environments, we found that managers compromised using short-term planning in order to create fast response options using data as the driver for the agile development.

6.2.2 Actions taken when planning is based on near future

The response mechanism for these companies relies more on a proactive approach to emerging changes in the environment, in which digitalization plays an important role. Companies emphasized the importance of data in which it allows for a closer interaction with customers through new digital opportunities where companies can offer predictive remote monitoring solutions that solve customers' challenges in real time. Further investment into data-driven platforms is seen as one potential avenue for engaging with more customers and offering new types of solutions relative to what was available before.

6.2.3 Capabilities when planning is based on near future

As expected, companies that balance the practice between strategy and organizational agility are those that combine all three meta-capabilities. A manager from M10 goes on to provide an example: They knew that the company would at some point in the near future be disrupted by competing forces within their industry. Naturally, their survival instincts ignited the agenda from leadership that the company must be first-to-market whatever the cost, as another manager reflected: "*The initiative came from the executive board or the CEO, and we must do things radically different. This given mandate from top management, which said; make it happen, no matter the costs."* This prioritization began a high level of willingness within the organization to work on solving the issue.

The development process from idea, rapid prototyping, testing and to market launch took approximately two months, and the company succeeded in executing their emerging strategy.

Strategic agility practice 2: Summary of results

The managerial decision-making level when planning is based on near future		
Strategic issue	**Mindset and decision (Thoughts)**	**Specific solution (Actions)**
• New paradigm shift in terms of digital transformation within industry. Requires a different approach to customers and network partners. • Digitalization enables seeing mistakes, but not having the resources to fix them. **Quote: "It was really important that we were fast to execute and first to market."**	• Being agile is a core value and strategy to do digital transformation. • Working in dynamic environment where everything constantly changes, and they appreciate it. • It is about making decisions based on data. This is really important, but don't underestimate being close to the customers and to use gut feeling. • Speed of change and willingness to change are vital for success. • Important future options are to have real-time data that allows for continuous update of the digital platforms: "The faster, the better, the more, the better." **Quote: "I have a profound respect for those who use gut feeling, but we must take precautions that there are a lot of opinions and we therefore must become more data-driven to avoid endless discussions."** **Quote: "In your experience, would a strategy be more useful in a 3–5-year plan or a 3–6-month plan? The former."**	• The innovation driver happens from a collective agreement from all employees and not only from top management. • Digitalize as much as possible, including automate the registration processes. • The more data evolves, the more customers will demand updated analysis and the more the company will become uniquely positioned to deliver to those demands. • Initiating data-driven projects on improving user experience. Data can show where to put in control and optimization. • Predicting what the customer wants on a digital webshop and then recommend solutions based on behavioral patterns. • Prioritized agile development to make radical turning points possible. Continuing and constant development/optimization of products, sometimes with 11 software updates per year.

How strategic tensions are managed when planning is based on near future

Examples of strategic tensions	Strategic agility capabilities		
	Strategic sensitivity	**Leadership unity**	**Resource fluidity**
Tradeoff: Prioritizing the digital transformation over all else projects. **Tradeoff:** First mover with the mandate to develop without any budget (seed money). Would not wait to be disrupted by new digital technologies developed in the industry and/or by other competitors. **Compromise:** Engaged in change through workshops on digitalization and picks ambassadors to lead the development and to affect others in the organization. **Compromise:** Willingness to fail is supported by top management in terms of development **Compromise:** Making use of external consultants to help with the pre-test development of the machine-learning system to provide results for management as a business case. **Compromise:** Using consultants to make MVP and budgets to please the executive board and to free	Examples: • Customers and citizens see technology different today than 10 years ago. Must act on that and that's why going digital is crucial. • Constantly assessing new markets and assessing these markets against each other to continuously make the changes in the product portfolio.	Examples: • To stay relevant, it is necessary to align in the company and use the new language of digitalization. • Problem with mid-level management to get them on board on the digital transformation and to use the platform in their departments as well.	Examples: • Achieve teams that uses data analysis as input for moon shot ideas, resulting into business cases.

time to develop the digital platform.

6.3 Strategic agility practice 3: Planning based on future—benefits from digitalization in the long run and digital transformation takes time

Companies that practice long-range planning for digital transformation aims at establishing big-data platforms using data as a resource for fully automated systems that drives future decision-making processes. Their mindsets are built on abandoning intuition and rely upon machine-learning systems to provide directions for new data-driven business models as response options for emerging changes in the environment. These companies differentiated themselves from the rest by acknowledging that the digital transformation requires change to the business logic and that the scope of change would entail the entire core business model of the company. In addition, the results from novel digital solutions could reshape or replace entire business models, which also entails key business operations, as well as the nature of strategic decision-making process (Kane et al., 2015, Hess et al., 2016). For this reason, managers are relying more on structure and long-term strategic planning because digital transformation takes time to accomplish successfully. It requires that the business logic should be built on top of a new technological foundation to collect and analyze data more efficiently, or to even enable the ability to utilize data, as explained by a manager from S11: "*The future managerial task will be to digitalize the business and start analyzing and optimizing data to categorize and use that data."* (see strategic agility practice 3: summary of results).

The mindset of these managers sees the long-term benefits of transforming the organization toward a digital platform within a five-year time period. Their vision on utilizing big data lies in creating a fully automated decision-making process through machine-learning systems (P15). This is seen as the future "response option mechanism" that allows the companies to correct their strategic trajectory and adjust their course more efficiently to increase their flexibility toward threats in the environment. This is in accordance with arguments from (Vagnoni et al., 2016), finds digital solutions as the key driver to increase agility and enable response options to changes in the external environment. As explained by one manager from S14:

"Changing the business logic that is based more on technological foundation to enable big-data lakes with advanced analytics that will provide business insights to new solutions and drive decision-making for the future."

"It is about how to navigate as a big international company… Normally, when moving a supertanker, it is about steering it correctly, but then disruption occurs… Now it is more about placing a lot of speedboats that can navigate fast and at a certain point, it will make sense to steer the supertanker in same direction."

6.3.1 Strategic tensions when planning is based on future

Strategic tensions from contradictory demands between *innovation and efficiency* also exist for companies that seek high rents from long-term planning. We found tradeoffs in terms of companies abandoning intuition and moving towards data-driven decision-making. Findings revealed that the mindset of these managers found the advantages and benefits from the tradeoff as existing in the long-term of pursuing digital transformation. Some argued against the short-term benefits of digital transformation, as clarified by a manager from S11:

"We are not there yet, not even from a technological perspective. This is a futuristic vision and right now the economics of pursuing this are not appealing."

"Many of these things pass quickly. I think that you overestimate the short term and underestimate long term."

Our findings show that managers recognize, the ambition to rely fully on automated systems would take a long time to achieve, as explained by a manager from P15: *"it can easily take years from making the strategic decision to implement and execute digital initiatives."* (see strategic agility practice 3: summary of results – how strategic tensions are managed). There were two apparent reasons for this. First, to secure and establish the technological foundation is fully operational to enable data collection and analysis, demands a lot of resources to complete. These companies made heavy investments as compromises to solve complex technological issues e.g. buying competing businesses for their technological structure or using external network partners as integrators for conceptualizing and installing fully automated machine-learning systems. Second, compromises were made to such network relations for establishing data-sharing platforms. Not only has technology become a complex issue to understand and use, but there are also external issues to consider in the terms of retrieving and securing sensitive data owned by customers and network partners. This required significant negotiations with network partners as their organization structure and processes needed to change as well to become integrated into the company's data-driven business models.

6.3.2 Actions taken when planning is based on future

The response mechanism for these companies is proactive in the fact that they tend to be first-movers on providing more advanced digital solutions to the industry. Most companies rely on collaborations with their network partners to reduce time to market; others choose to acquire capabilities outside of the organization (e.g., buying companies to get ERP systems to support the digital transformation). In addition, those companies chose to refine their strategy for digitalizing parts of the organization in terms of establishing a new business unit to drive the digital transformation process as a project within the organization. A few companies were just started with categorizing big data through the use of machine learning to optimize many of their current processes, such as automating the interaction with customers through user interfaces.

6.3.3 Capabilities needed when planning is based on future

Companies at this stage tend to digitize the entirety of their business model for data as the main driver for future innovation and decision-making processes. There was a clear statement across companies that the basic idea for engaging with digital transformation was to move from intuition to data-driven decision-making, as this was seen to provide more real-time awareness on opportunities in the environment. Some managers argued that the digital transformation process went beyond the organization and involved most of their supply chain, and for that reason it enabled them to cooperate by sharing resources and responsibilities. One company even made use of lobbying within the political arena to proactively seek new opportunities for the company to invest and engage with. Managers also recognized that digitalization was not something that leadership forced down upon the organization but rather encouraged employees to work with.

However, many of these companies are struggling with finding the right competences (data scientist and data engineers) to further develop their digital transformation, especially in regard to building the technological platform for big data. Moreover, digital transformation requires changing a lot of employees' skills in order to successfully execute specific tasks in the future.

Strategic agility practice 3: Summary of results

The managerial decision-making level when planning is based on future		
Strategic issue	**Mindset and decision (Thoughts)**	**Specific solution (Actions)**

• Challenges with regulations, user experience and access to sensitive data/customer data. • Acknowledges that technology has become too complex to understand and handle. • Lack of data engineers to develop data-driven platforms. **Quote: "It can easily take years from making the strategic decision to implement and execute digital initiatives."**	• It is about how to navigate as a big international company. Normally, when moving a supertanker, it is about steering it correctly, but then disruption occurs. Now it is more about placing a lot of speed boats that can navigate fast and at a certain point, it will make sense to steer the supertanker in same direction. • It is important to have the trust from customers, as customers also acts as gatekeepers. • Digitalization is going to be a big advantage when looking 5 years into future.	• Utilizing different sensor technologies in products to acquire data and offer digital business models that optimize processes with the purpose of becoming more efficient and first to market. • Collaborates with network partners with the common goal: shortening time to market. • First-movers in terms of automations of production and technology development in the industry. • Refined the strategy to work with digitalization over the next 3–5-year period. • The future managerial task will be to digitalize the business and start analyzing and optimizing data. • To categorize and use data. • Bought a competing company because it had the needed ERP system, which supported the digital transformation process. • Utilizing and visualizing data to create KPIs for strategic direction.

How strategic tensions are managed when planning is based on future			
Examples of strategic tensions	**Strategic agility capabilities**		
	Strategic sensitivity	**Leadership unity**	**Resource fluidity**

Tradeoffs: Going from intuition-based to data-driven decision making. **Compromise:** Differentiating from easy to copy production setup, however, requires large investments to achieve hard to copy digital platform through network collaboration. **Compromise:** Data scientist from outside the organization are creating the platform to produce business insights out of the data already existing in the organization.	Examples: • The digital transformation goes beyond the company's four walls. It involves the whole supply chain, from supplier and to the company and out to the customer. • Long-term investments and lobbying to ensure alignment with the industry.	Examples: • The business case/strategy dictates each innovation project. • Machine learning is not some new agenda that is forced down upon the organization and steals working hours away from the employees. • The digital transformation requires change to the business logic but also to change employees' skills to handle the challenges that it brings.	Examples: • Only scratches the surface, because of lack of resources allocated to fully advance the development of the digital platform. • Fully automated production system and data collection setup that allows for more time on development. • Data drives future innovation and strategic decisions, in which data scientist are formalizing the digital strategy for data usage. •

7. Discussion and conclusion

In answering the research question (*How do companies leverage strategic agility and what are the managerial implications on strategic tensions, actions and capabilities during digital transformation?*), we find that companies do select between three different strategic agility approaches. And where one of the approaches tries to balance between anarchy and structure at the edge of chaos, the two other approaches show that managers consciously seek the extreme opposites—no planning versus planning for far future. In doing so, managers try to seek competitive advantages either by being able to pursue the immediate opportunities (no planning) or by being guided throughout their digital transformation planning for the far future. Also, it appears that the level of planning has no impact on and is not impacted by the digital maturity of the company. This finding reveals that digitally mature companies do not plan more or less than digitally immature companies. Furthermore, industry does not appear to have an impact of the selected strategic agility approach. Consequently, it appears that the managerial profiles and the unique strategic tensions

and competitive context of the company drive the selection between the three different strategic agility approaches.

Our findings contribute to the strategic agility literature by empirically exploring how companies practice and balance different strategic commitments for organizational renewal, meanwhile pursuing agility through strategic flexibility to conduct quick responses in high-turbulence environments. We testify to what constitutes the strategic agility conundrum in the balance between two contrasting positions (adaptive culture versus semi-structure approach), and what the managerial implications are hereof in relation to strategic tensions (tradeoffs and compromises), actions and capabilities, pursuing the identified three strategic agility practices (no planning, planning for near future and planning for future). Overall, our findings and their interpretation point to the nature of how companies leverage strategic agility during the digital transformation process. We summarize the specific managerial implications of each strategic agility practice activated in the specific digital transformation process in our case study. We argue that managers apply the strategic agility practices in different regimes of strategic beliefs, and with different expectations of high rents, which by itself is an indication that strategists expect the role of strategy to change in the course of digital transformation.

7.1 Theoretical contributions

This paper makes important contributions to existing strategic literature in the following ways.

First, we follow (Hemmati et al., 2016) argumentation that the concept of strategic agility needs more empirical studies looking into practical actions that contribute to create an agile company. In particular, qualitative studies can enable research to explore the nature of strategic agility. We complement the existing literature on showcasing how strategic agility is attained and what managerial implications exist for companies. We investigated how 15 companies have leveraged strategic agility through different strategic approaches to facilitate digital transformation. We also confirm that strategic agility is desired by companies seeking new opportunities in high-turbulence environments, its nature in the digital transformation process, and its relation to strategy (Teece et al., 2016).

We follow the work by (Doz and Kosonen, 2008, p. 115) that “the strategic conundrum is inescapable for companies and must be on leaderships agenda,” and empirically explore how managers balance and handle the “strategic conundrum.” In doing so, we focus on strategic agility practices as the core drivers for leveraging strategic agility and find three strategic agility practices of companies that are balancing strategic commitments with maintaining flexibility toward gaining

competitive advantages in the form of 1) no planning (uncertainty overrules strategic planning and unformalized strategizing), 2) planning for the near future (the turbulent environment fosters agility-driven strategic behavior and digitalization drives strategic decision-making) and 3) planning based on the future (benefits from digitalization in the long run and digital transformation takes time). However, our findings show that some managers tend to thrive in high-turbulence environments, in which they intentionally make the strategic choice to operate near anarchy with no structure or procedures for their innovation and decision-making. For these managers it is not a choice of striking a tactful balance to achieve strategic agility, but a leadership choice.

Second, we contribute to current literature on the strategic agility concept in terms of providing empirical evidence of what managerial implications exist in each strategic agility practices in terms of strategic tensions, actions and capabilities. Especially with tradeoffs we confirm (Lewis et al., 2014, p. 62) argument "that leaders can become mired in either/or tradeoffs, rather than to achieve the flexibility necessary to attend to dynamic and complex environments." We show companies that have made compromises in terms of: no planning (strategy inhibits their innovative capabilities, but at the cost of innovating blindfolded), following planning for the near future (using data to drive decision-making to avoid being bogged down with internal politics and other managerial issues) and planning for future (striving for digital transformation to enable future avenues of growth takes a toll on the organization in terms of high resource costs and a long time span).

On actions, we confirm the argument by Vagnoni et al. (2016, p. 668) that "action efficacy is higher when sensing and responding capabilities are both high." Our findings show that this argument is not the case in all strategic agility practices. In fact, we detect that only companies that strike a tactful balance between strategic commitment and flexibility are those who are able to show heightened senses for new opportunities and can seize on these through quick response options. This is only in regard to companies within the strategic agility practice 2 that operates within the strategic agility conundrum. These companies are constantly adjusting to create strategic fit and changes to their digital business models to maintain their flexibility.

For capabilities we looked at the work by (Doz and Kosonen, 2008), in which the authors argue for three meta-capabilities (strategic sensitivity, leadership unity and resource fluidity) that can make the organization more agile and thus reduce the risk of falling victim to stagnation and rigidity. We confirm that all three strategic agility practices make use of a combination of these meta-capabilities.

Finally, based on the above findings and discussion, we propose a model for leveraging strategic agility in a digital context that recognizes each strategic agility practice as managed in a continuum

with specifics of managerial implications in the form of tradeoffs, compromises, actions and capabilities as underpinning mechanisms. It further illustrates that these practices are placed on the axis between two contrasting positions in terms of the edge of chaos versus the rigidity of planning, and we find the strategic agility conundrum in the middle (see Figure 4). The strategic agility continuum model further elaborates upon (Doz and Konsonen, 2008) argument that strategic agility is conceptualized in the combination between two continuums: the level of flexibility and the level of strategic commitment, which is coherent with the strategic agility practice 2. However, we also found evidence of companies that does not fall into such conceptualization of strategic agility. In fact, our findings show that the digital transformation can enable companies to practice strategic agility from two contrasting positions: seeking high rents from maximizing agility efforts without pursuing strategic commitments to planning, and opposite by pursuing strategic commitments that seeks high rents from long-term planning.

7.2 Managerial implications

In summarizing the above, we find several managerial implications to consider. First, in most cases leadership pushes the innovation process through the organization by following intuition-based logic in reaction to emerging changes from the environment. Second, the digital transformation requires new types of competences, which currently doesn't reside within the organization. Third, companies rely on the external environment in terms of gaining competences and resources to support the transformation process. Fourth, the digitalization leads to new opportunities for optimizing products and services through the use of data analysis.

Each of the companies' strategic agility practices identified in this paper represents a unique combination of companies' strategic tensions, actions and capabilities, and associated mindsets and decision-making fundamental to its execution. We find that managers make certain strategic choices that are in line with the theory about creating a tactful balance toward maximizing agility. However, we also see some managers that intentionally choose to be at the outer edges of the two extremes of strategic practices, hence beyond the edge of chaos, and close to anarchy. These managers thrive in high-turbulence environments with no form of structure or procedures to innovate or take decisions during the digital transformation of their companies.

An interesting observation is that the degree of strategic planning has nothing to do with the digital maturity of companies. We see a mixture of companies with similar planning approaches but at different stages of digital maturity. Companies at the early stages of digital maturity might be a

mixture of different strategic beliefs; some will be committed to a strategy plan, while others have none.

The result of this paper provides managers with guidelines concerning how to leverage their companies' strategic agility by understanding what implications might follow (e.g., strategic tensions, actions and capabilities necessary to gain high rents of agility). Equally important, it shows managers how to tactfully strike a balance between strategic commitment and flexibility. From a rational approach, it also shows managers which capabilities to aim for in the digital transformation process and especially those that can support the adaptation of the business.

The strategic agility practices defined in this study embody essential elements of the characteristics and activities of a strategically agile company. Strategic agility can be used as a managerial tool to diagnose and plan different ways of practicing agility for existing companies, including alternative ways of innovating during a digital transformation process. An understanding of how companies leverage strategic agility practices can identify the potential constructs of their value creation and how this can be accommodated to the digital context in which they operate. The strategic agility practices can in this way aid companies in attaining the tactful balance of flexibility to ensure that they do not fall victim to stagnation and rigidity of standard routines, but instead utilize their tradeoffs, compromises, actions and capabilities to ensure high rents from both planning and agility. If we can identify the conditions under which particular strategic agility practices tend to be adopted, we are in a better position to suggest recipes for managers to follow. This step forward depends on first identifying classes of strategic agility and then accounting for differences between them—as this paper has done.

7.3 Limitations and future research

The limitations of the study also present new venues for further research. For one, the study is conducted through 15 case companies across industries. In drawing industry-specific results on use and integration of strategic agility, a larger study would be required. Second, the case companies all originate from Denmark, which does present limitations in relation to more general recommendations across companies of different nationality. Whether nationality of the company has an impact on the use and balance of strategic agility is therefore unexplored and leaves opportunities for further research through a cross-national case study. Third, only one informant was interviewed from each case company, and multiple interviews from each case company could elaborate on the decision process and potentially reveal how different management profiles impact

the choice and balance of planning and strategic agility. Finally, this study has focused on the choice of strategic agility approach (input) and not on the performance (output) of the selected strategic agility approach. The latter would require a longitudinal study exploring the outcome and performances of the companies using different strategic agility approaches. As the pace of change and level of complexity increases, the need for building in agility in strategy and organizations will grow. Thus, further research is required to fully understand and investigate the most successful strategic agility approaches for companies and managers to pursue and how to implement/facilitate/build in strategic agility in different organizations and across sectors and geographies.

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Publication 3

Building business models in SMEs in a digital context: Organizing search behaviors, experimentation and decision-making

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Abstract

The aim of this research paper is to investigate the business model innovation processes that SMEs undertake to achieve competitive advantage through digitalization. Extant knowledge about the BMI processes and practices SMEs use during their digital venturing is thus far limited. This paper addresses this research gap by investigating 12 case companies and their BMI processes during a digital transformation. The study identifies four critical BMI activities: 1) assessing the environment in search of new opportunities, 2) conveying a sense of urgency, 3) exploring and testing new opportunities through experimentation, and 4) handling decision-making with a combination of intuition and data. Moreover, the findings reveal mindsets, specific actions taken, and value processes of BMI during the companies' digital development. Finally, the findings identify a number of managerial dilemmas between a) prognosis and scenario-driven search myopia, b) timing and sustainability, c) radical shift from traditional experimentation to data-based methods, and d) using gut feeling versus data-driven decision-making.

***Keywords**: business models, business model innovation, SME, digital transformation, search behavior, decision-making*

1. Introduction

In today's turbulent, fast- changing, and highly unpredictive environment, companies are required to become agile in perceiving and developing new business models (BMs) (Battistella et al., 2017). In doing so, companies are challenged to rethink their strategies and to transform parts (Berman, 2012) or the entirety of their BMs (Weill and Woerner, 2013; Basole, 2016). Even though research shows that SMEs can improve the performance by innovating their BMs (Heikkilä et al., 2018), researchers and practitioners are still unclear about how SMEs are developing their BMs (Saebi et al., 2017). In particular, researchers argue that the exploration and exploitation of BMs are critically important for companies to achieve sustained competitive advantage (Teece, 2010). Equally emphasized is that BMs need to change over time (Doz and Kosonen, 2010) and that it is the ability to reconfigure BMs that can determine a company's survival and success (Achtenhagen et al., 2013; Battistella et al., 2017). Yet, it is no secret that digital technologies have created a highly turbulent business environment and changed the competitive landscape by creating new competitors, new customer preferences, and innovation and technological disruptions (Vagnoni et al., 2016; Oliver and Parrett, 2017). The growth in digital technologies and the increasing digitalization of innovation processes (Brem et al., 2016) emphasize significant improvements in various business and innovation processes (Yoo et al., 2012; Holmström and Partanen, 2014) providing new business development opportunities for SMEs as well (Guo et al., 2017).

Recent examples hereof show when companies fail to adopt digital technologies into their BM and lack awareness of the possibilities that follow, e.g., the case of the movie-rental company Blockbuster going bankrupt. Consequently, what we know about businesses in terms of how we create, deliver, and capture values through BMs is changing as more BMs are being built on digital platforms such as social, mobile, analytics and cloud-based solutions (Kane et al., 2015; Nambisan et al., 2017). It is the increased interest in and adoption of digitalization that has today become a reality for companies in all types of industries (Basole, 2016; Remane et al., 2017). This is also true for SMEs that must learn how to seize new BM opportunities in the digitized environment through digital technologies that support intelligence gathering, cost reduction, and an extension of market reach (Müller et al., 2018; Quinton et al., 2018). Yet the concept of Business Model Innovation (BMI) is still ill-defined, despite its increased popularity among practitioners and scholars (Li, 2018). In particular, research regarding the process of how BMs are developed to create, deliver, and capture values in the context of digitalization appears to lack substantial empirical evidence (Achtenhagen et al., 2013; Li, 2018).

Consequently, further research must address the core activities of what constitutes a BMI process to better understand the implications that digitalization has on companies pursuing new ways of creating, delivering, and capturing value through new business models. Therefore, the research aim of this paper is to explore the BMI activities that are consolidated into the BMI process when companies venture into digital transformation.

This study examined 12 SMEs across different industries and their application of BMI to develop and adapt BMs during their digital transformation. The focus of this article will be on the identification by business managers of BMI activities that consolidates into new BMs. The identified BMI activities were categorized into: 1) search behavior, 2) experimentation, 3) conveying a sense of urgency and 4) decision-making identified by the managers who participated in the study.

Specifically, we address the identified research gaps (Achtenhagen et al., 2013; Li, 2018) by offering a conceptualization and overview of the BMI activities involved in how SMEs perform BMI in digital transformation, while pursuing new opportunities, creating new innovations, undertaking risk-driven experimentations, and managing the decision-making process. This paper identifies not only critical BMI activities, but also BM issues that encourage BMI, mindsets and actions of management, and value processes and value outputs of the BM processes. Finally, the study reveals several critical managerial dilemmas that SMEs encounter in the exploration and exploitation of digital opportunities. The article ends with a concluding discussion of the research findings, including the theoretical contributions and managerial implications for building BMs in a digital context in SMEs.

2. Business model design

The concept of BMs is today a popular subject of interpretation and recognized for its strategic importance in businesses (Zott and Amit, 2013). There are many perspectives on what roles BMs should fulfill, such as the BM as a blueprint of how a business creates and captures values (Osterwalder and Pigneur, 2013), the BM as a good story of how enterprises work (Magretta, 2002), the BM as a framework (Chesbrough et al., 2002), and the BM as an architecture and design of the businesses' value-creation mechanisms (Teece, 2010). One of the most commonly accepted features of BMs is how BMs interact with the environment, such as other actors, and equally important how BMs are changed and replaced (Doz and Kosonen, 2010).

A BM represents a simplified aggregation of relevant activities of a business (Wirtz et al., 2010) and defines the business's value proposition and its approach to create, deliver, and capture values (Velu and Stiles, 2013). The business can, through a set of activities, combine its approach that creates BMs, and from that work together in order to execute its strategy (Casadesus-Masanell and Zhu, 2010), which is also in accordance with the value-creation mechanism proposed by Teece (2010). This means that each BM that a company chooses represents a specific way to compete (Velu and Stiles, 2013). It is through a dynamic process of experimentation, reconfiguration, and change in business logic that managers can make use of BMs as a tool to address change and innovation (Demil et al., 2015).

In particular, BMs have to be adopted and innovated to respond to changes in the business environment or new technologies, or to leverage emerging opportunities (Morris et al., 2005). Those changes require a continuation of innovating on existing or new BMs. As Foss and Saebi (2017) point out, the evolution of the BM literature can be categorized into three streams of research: 1) BMs as a classification of business, 2) BMs as an antecedent of businesses performance, and 3) BMs as a unit of innovation. This paper will focus on the latter, namely innovation as the extensional link to the BM literature. In the attempt to understand the innovation process of BMs, we apply the study by Svejenova et al. (2010), as they investigate what triggers, mechanisms, and changes exist at the activity level of the BM of one SME. Their findings identify triggers such as change mechanisms of the BM elements (alertness or intent) and value mechanisms for capturing values (value created for strategic leverage) as levers for transforming the individual BM. However, as it can be expected that a positive relationship between strategic activities targets BM renewal and performance outcome (Teece, 2010), the exploitation of radical BMI often remains an untapped potential (Mitchell and Bruckner Coles, 2004).

2.1 The process of business model innovation

Given that the nature of business modeling is recognized as strategically important to businesses, the process of BMI still remains an ambiguous concept (Bucherer et al., 2012).

However, more recent research has produced contributions addressing the BMI process as a transformational approach (Demil and Lecocq, 2010; Aspara et al., 2011) and describing the business model as taking shape through a process of experimentation (Hayashi, 2009; McGrath, 2010), adaptation, and

learning (Sosna et al., 2010). Yet a majority of these contributions present generic BMI process models and apply macro-level approaches in understanding BMI as a process. Thus, it is more likely that the process of business model innovation will be different for each organization that operates in different types of competitive landscapes (Zott et al., 2011). This stresses the need for micro-level understanding and exploration of how companies conduct BMI processes, and which contextual factors influence the manager's decision-making during the BMI processes.

In exploration of the BMI process, Demil and Lecocq (2010) identify business model evolution as a fine-tuning process of intended and emergent changes between and within its core components. In this study Demil and Lecocq (2010) adapt the RCOV (RC: Resource and Competence; O: Organization; V: Value proposition) framework to reconcile the two approaches. In another study emphasizing knowledge-intensive organizations, Sheehan and Stabell (2007) developed a process for generating a new business model using three steps: 1) identify the type of knowledge intensive organization, 2) plot rivals' competitive positions, and 3) generate new business models. Following this, Morris et al. (2005) envision the business model life cycle with periods specification, refinement, adaptation, revision, and reformulation of the business model. During this time, the business model is still fairly informal or implicit and followed by a process of trial and error that includes a variety of core decisions made to delimit the directions in which the company can evolve. This view is also supported by the case study of Nokia by Aspara et al. (2011), who explain the key mechanism in the business model evolution as the exchange of executives and cognitive mind-sets between business units and corporate HQ. Through a single case study on Spanish dietary products, Sosna et al. (2010) identified business model innovation as a trial-and-error learning process consisting of four stages: 1) exploration—initial business model design and testing, 2) exploration—business model development, 3) exploitation—scaling up the refined business model, and 4) exploitation and further exploration—sustaining growth through organization.

In defining what we mean by BMI processes, we apply the study by Frankenberger et al. (2013), who define the BMI process as one that deliberately changes the core elements of a business and its business logic. In doing so, the authors propose an BMI process framework, which is referred to as the 4-I framework (see Figure 5) that represents a design methodology for companies to systematically innovate their business models (Frankenberger et al., 2013). For example, the 4-I framework is intended as a means to visualize and structure the BMI process at the organizational level through four iterative phases: 1) initiation (develop an understanding of the surrounding environment, such as relating the company to its customers, 2) ideation

(develop and select new business model ideas and compare these with proven successful business models), 3) integration (develop selected business ideas into business models and achieve internal and external alignment), and 4) implementation (investments and pilot projects in test environments through trial-and-error learning, which might lead to redesign of the business model). This process is at the organizational level of analysis and is based on the empirical study of well-established multinational companies designing new business models.

Therefore, research must address both the activity level of the individuals who are designing new business models in the BMI process at SMEs and the implications digitalization have for such processes.

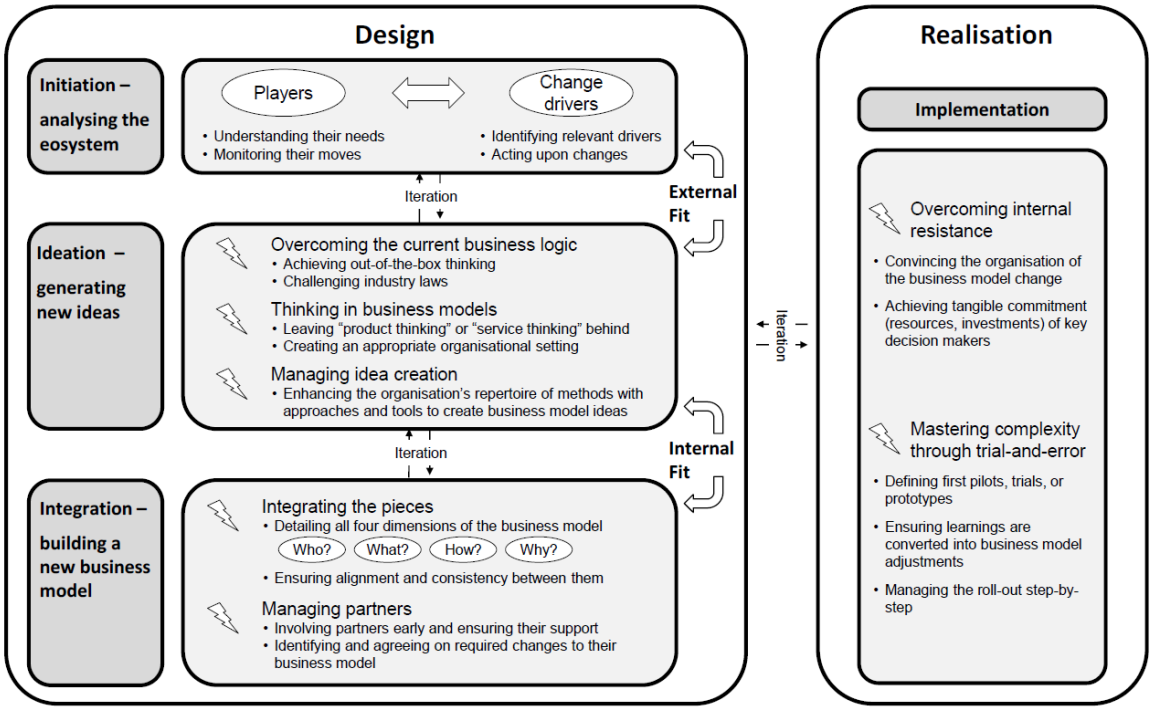


Figure 5 - The 4I-framework—Phases of the business model innovation process and their key (Frankenberger et al., 2013)

Consequently, providing new knowledge and understanding of the experimentation/learning activities, decision-making processes, and mindsets influencing BMI processes becomes key in studying our object of building business models in a digital context. Thus, derived from the identified research gaps, we have identified the research question to be explored as: *How do small and medium-sized enterprises pursue business model innovation in the digital transformation?*

In order to answer this overall research question, we found it necessary to break it into three subquestions to further advance the research on business model innovation and digital transformation. Specifically, we are interested in exploring what happens at the micro level of business model innovation by looking at the individuals/managers operating the process as means to better understand:

1) What are the specific activities taking place in the business model innovation process?

2) What are the drivers and barriers of the business model innovation process?

3) how does digitalization impact SMEs capabilities and resources for their BMI process?

2.2 The impact of digital technologies on BMI

Businesses face challenges not only in terms of the need to renew their BMs, but also in terms of establishing the means of becoming flexible and agile organizations that can allow for adaptation to occur within short periods of time (Lewis et al., 2014). In this context, digitalization may serve as a way to reduce uncertainty in strategic decision-making (Franklin et al., 2013). Today, digital innovation is a subject of scrutiny for businesses to pursue as information is increasingly being digitized and information technology is embedded into physical non-digital products (Yoo et al., 2012). Recent contributions expect digital technologies to play an active role in facilitating BMI (Li, 2018, Nambisan et al., 2017), yet we know very little of how they are interlinked and managed by businesses in different sectors. According to Li et al. (2018), the digital transformation is more about the managerial issues than only focused upon the technical aspects because competing effectively through digital platforms requires more than only adopting technology. In particular, Li et al. (2018) conducted an inductive research study of SMEs undergoing an digital transformation to investigate how entrepreneurs with little to none capabilities and resources managed to digitally transform their companies using third-part digital platform services and functionalities. In line with this, Scuotto et al. (2017) investigated ICTs relation to improve the innovation performance of SMEs in terms of the intra-organizational (in-house research and development) and the inter-organizational (open innovation processes). Their findings showed that by deploying specific ICTs with the purpose of fostering the flow of information, communication, process data, and knowledge (internal and external) of the organization had an positive effect on improving the SMEs innovation performance.

The past couple of decades have shown digital technologies and digital BMs to be of strategic importance for businesses to pursue as a highly relevant method of competitive advantage (Berman, 2012; Fitzgerald et al., 2014). This is also reflected by research that argues for digitalization as the reasoning behind the notion of disruption that leads to an increased fast-paced competitive environment (Jahanmir and Cavadas, 2018).

Hence, many business environments are now experiencing a digital transitioning of the competitive landscape, in which turbulence renders rapid changes and complexity and creates unfamiliar territory for businesses to predict and manage—particularly in the case of incumbent businesses accustomed to operating in stable competitive environments (Foss and Saebi, 2017; Oliver and Parrett, 2017). In such situations, incumbent businesses find themselves facing uncertainty against unforeseen consequential changes that come from digital technologies (e.g., cloud technologies, Internet of Things (IoT), big data, mobile technologies, robotics and artificial intelligence) that are challenging their well-established BMs and strategies—leaving them vulnerable against entrepreneurial new entrants. This in turn places great scrutiny on incumbent businesses that must now figure out how to adapt by proactively anticipating change and use their capabilities and resources to reduce uncertainty and risk in order to regain their competitive advantage (Oliver and Parrett, 2017). For instance, Achtenhagen et al. (2013) provide strong evidence on how BM changes over time through strategic actions and capabilities. Specifically, we are interested in the digital transformation of SMEs in terms of identifying: 3) how does digitalization impact SMEs capabilities and resources for their BMI process?

3. Research method

3.1 Research design

In relation to answering the research question of this paper, the aim is to enrich existing theory with new insights from real-life cases (Eisenhardt, 1989). To understand how BMI activities are practiced in SMEs during their digital transformation, we chose a qualitative research design as advisable to study the phenomenon in detail, using the Gioia et al. (2013) method of data analysis as an inductive approach that allowed the researchers to iterate between data and theory.

The case study methodology is suitable for acquiring rich and detailed data (Yin, 2014) and for identifying emerging themes and patterns (Eisenhardt, 1989). This approach is also appropriate for creating new knowledge on how and why events occur in situation where there is little theoretical background, as is the case of BMI activities of SMEs during digital transformation.

The multiple case study design allows for collecting a wide array of data and permits cross-case comparisons in order to recognize emerging patterns of relationships among constructs that lead to important theoretical insights. This approach also permits a replication logic by testing conclusions that either confirm or negate emerging conceptual insights of a complex phenomenon across contexts. The multiple case research often leads to emerged theory that is typically more generalizable and better grounded than theory from single case studies, thus adding to the validity of the findings (Eisenhardt, 1989). As suggested by Eisenhardt (1989), theory building aims to identify and describe the key variables, the links among them, and why these relationships exist.

3.2 Research setting and case selection

The research setting is linked to the manufacturing and service industries in which the selected case companies engaged into a digital transformation process. The sampling frame of criteria was established, setting up the multiple case study (Yin, 2014) and in line with the theoretical background and research interest of this study: the case companies had to 1) be established SMEs in their respective industries, 2) have managed and implemented BMs as per the above conceptualization during the past few years, and 3) be undergoing a digital transformation with the purpose to adapt parts or the entirety of their BM. Twelve companies meeting these criteria were identified as part of a DABAI (Danish Center for Big Data Analytics driven Innovation) research project, which aims to pioneer Danish companies to exploit the full potential of big data. Furthermore, the selected cases as portrayed in Table 1 have worked with BMI activities at different extents during their digital transformation. We deliberately searched for some variation in the investigated cases in order to allow for identification and exploration of a broader range of activities, which can be seen in Table 2.

3.3 Data sources

The primary data collection was structured as exploratory, with a focus on the BMI activities that occur, specific to the digital transformation process. The exploratory case study included in-depth interviews with

13 key decision-makers of the digital transformation process and 3 business developers from 12 of the companies selected. The study was conducted in September–November 2017.

Table 1: Case company overview

Case	Business areas	Informants	Company size	BMI in the digital transformation
M1	Textile manufacturing	1 CEO	20–49	Digitized business model as a community for shared-economy with customers as central part of the development process.
M2	Lifestyle manufacturing	1 CEO	10–19	Visualizing data obtained from mobile application to drive innovation and to create digital user-experience and interaction with products and services
M3	Textile manufacturing	1 manager	20–49	Automation fitting and measurement process of customized clothing to provide sustainable and digital solutions for customers
M4	Textile manufacturing	1 manager 1 employee	50–99	Digital environment simulator for user experience and user-driven design of furniture
M5	Lifestyle manufacturing	1 manager 1 employee	50–199	Using virtual reality to showcase products and data to revise product offerings
M6	Lifestyle manufacturing	1 CEO	10–19	Using sensors to digitalize products and obtain data to provide add-on services

M7	Lifestyle manufacturing	1 CEO	0–9	Providing smart system for lighting solutiions
M8	Textile manufacturing	1 CEO	10–19	Digitized automatic production system integrated with external suppliers
S9	Financial services	2 managers	50–99	First-mover in digitized payment as a financial service through a mobile application
S10	Healthcare and defense services	1 manager 1 employee	50–199	Providing digital operational processes for customers using data surveillance
S11	Urban development services	1 CEO	0–9	Using data from scanning of geographic areas to analyze risk of flooding
S12	Public education services	1 CEO	10–19	Digitized lecture and examination coordination accessible for students through web-based platform

3.4 Data collection

Over a period of two months, we conducted 16 semi-structured interviews of 2–3 hours, interviewing informants responsible for BMI and the decision-making, organizational processes and capabilities necessary to drive BMI through the digital transformation. Each informant was interviewed about their participation (past, current, and future state) in the companies' BMI and digital transformation journey. The research objective and key concepts were described before each interview in order to avoid

misunderstandings. Thereafter the interviews were transcribed and validated by the informants to ensure validity and a proper understanding of the BMI activities that occurred in the digital transformation process.

The unit of analysis was the entire BMI process, with a focus on the activities used during the digital transformation. Specifically, we have investigated elements that constitute the activities used in the process of developing BMs for a digital context. In order to handle the research question, for each case:

First, we identify the BMI activities involved in the BMI processes of the selected SME case companies, using the data analysis methodology of Gioia et al. (2013).

Second, we present which of the four BMI activities each of the case companies apply.

Finally, for each of the BMI activities identified, we present the specific BMI issues, mindsets, BMI actions taken, and the value processes and output related to each BMI activity.

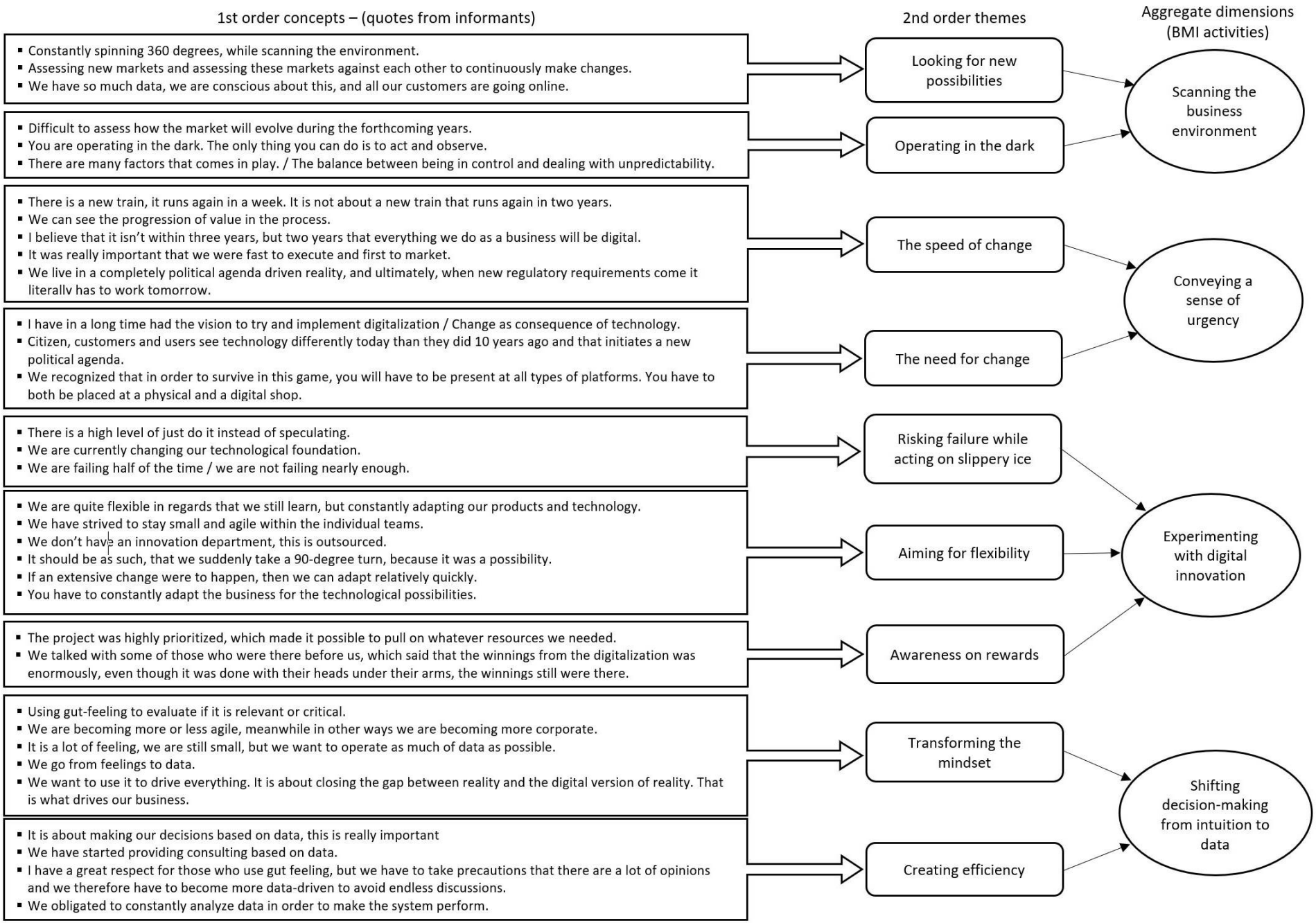
3.5 Data analysis

Each interview was coded deductively using the software program NVIVO in which we were looking for evidence of BMI activities and how they affect the process of digital transformation. Following the methodology of Gioia et al. (2013), we engaged in a second analysis where we coded inductively, looking for patterns that could explain why certain steps or methods contributed to overcoming managerial dilemmas that underlie the digital transformation process. The results of our analysis are shown in Table 2. The sample is heterogeneous since we want to have sufficient variation in our exploratory study. Our study does have limitations in the sense that we do not report frequency and relevance of findings to the specific cases as our study has a clear exploratory focus. It does not aim to understand or test the detailed effects of the observed activities, or propose a clear contingency-based model. The performed in-depth study is far too limited to allow for such generalizations, and we instead suggest that these aspects be followed-up and tested in future studies.

4. Results and analysis

Table 2: Data structure

The table portrays the data analysis of mapping first-order concepts based on the quotes from the interview sessions and the derived second-order themes, leading up to the aggregated dimensions being the BMI activities identified through the data analysis.


1st order concepts – (quotes from informants)
2nd order themes
Aggregate dimensions (BMI activities)
Constantly spinning 360 degrees, while scanning the environment.
Assessing new markets and assessing these markets against each other to continuously make changes.
We have so much data, we are conscious about this, and all our customers are going online.
Looking for new possibilities
Difficult to assess how the market will evolve during the forthcoming years.
You are operating in the dark. The only thing you can do is to act and observe.
There are many factors that comes in play. / The balance between being in control and dealing with unpredictability.
Operating in the dark
Scanning the business environment
There is a new train, it runs again in a week. It is not about a new train that runs again in two years.
We can see the progression of value in the process.
I believe that it isn't within three years, but two years that everything we do as a business will be digital.
It was really important that we were fast to execute and first to market.
We live in a completely political agenda driven reality, and ultimately, when new regulatory requirements come it literally has to work tomorrow.
The speed of change
I have in a long time had the vision to try and implement digitalization / Change as consequence of technology.
Citizen, customers and users see technology differently today than they did 10 years ago and that initiates a new political agenda.
We recognized that in order to survive in this game, you will have to be present at all types of platforms. You have to both be placed at a physical and a digital shop.
The need for change
Conveying a sense of urgency
There is a high level of just do it instead of speculating.
We are currently changing our technological foundation.
We are failing half of the time / we are not failing nearly enough.
Risking failure while acting on slippery ice
We are quite flexible in regards that we still learn, but constantly adapting our products and technology.
We have strived to stay small and agile within the individual teams.
We don't have an innovation department, this is outsourced.
It should be as such, that we suddenly take a 90-degree turn, because it was a possibility.
If an extensive change were to happen, then we can adapt relatively quickly.
You have to constantly adapt the business for the technological possibilities.
Aiming for flexibility
Experimenting with digital innovation
The project was highly prioritized, which made it possible to pull on whatever resources we needed.
We talked with some of those who were there before us, which said that the winnings from the digitalization was enormously, even though it was done with their heads under their arms, the winnings still were there.
Awareness on rewards
Using gut-feeling to evaluate if it is relevant or critical.
We are becoming more or less agile, meanwhile in other ways we are becoming more corporate.
It is a lot of feeling, we are still small, but we want to operate as much of data as possible.
We go from feelings to data.
We want to use it to drive everything. It is about closing the gap between reality and the digital version of reality. That is what drives our business.
Transforming the mindset
Shifting decision-making from intuition to data
It is about making our decisions based on data, this is really important
We have started providing consulting based on data.
I have a great respect for those who use gut feeling, but we have to take precautions that there are a lot of opinions and we therefore have to become more data-driven to avoid endless discussions.
We obligated to constantly analyze data in order to make the system perform.
Creating efficiency

The data analysis revealed that the majority of the SMEs in the study have created successful digital-driven BMs using different sets of the four BMI activities. The roots of activities were found to be embedded in the companies' decision-making process, with a strong emphasis on moving away from intuition-based decision-making while journeying into the digital transformation of the organization.

In the following within-case analysis we explore in detail how the SMEs actually create BMs and detail the BMI activities that occurred during their digital transformation process. This is also illustrated in Model 1 and summarized in each BMI activity table, where we provide an overview of the BMI processes from the BMI issue addressed, the mindset, decisions, and BMI actions taken by the managers and the process of value creation, delivery, and capture, as well as the output of such BMI process.

First we present the identified key BMI activities, and then we provide an overview of the entire BMI process. To do this, we chose to present each BMI activity and its contextual factors as divided into two levels: (1) the managerial decision-making level (BM issues, mindsets and decisions, specific solutions), and (2) the value-creation level (value creation, delivery, and capture).

The findings revealed that all 12 case companies based their new BM during digital transformation on the following BMI activities:

Scanning the business environment

Conveying a sense of urgency

Experimenting with digital innovation

Shifting decision-making from intuition to data

4.1 Drivers for scanning the business environment

In line with Teece (2007) and Doz and Konsonen (2010), the logic of having external awareness was found to be highly relevant for the SMEs. The managers and employees involved in the digital transformation process are often able to detect opportunities and make decisions with their available resources. The findings show that to build BMs in a digital context, SMEs have to gain business insights by increasing their external awareness, allowing them to look for new opportunities on a continuous basis (see BMI activity 1: scanning the business environment). This is important, as the increased awareness provides support for

managers to initiate unique digital solutions for various reasons, such as to satisfy stakeholders and customer needs, to increase market share, or even for survival. Increased awareness is related to the ability to access information in order to identify opportunities that lead to gaining new knowledge to shape these opportunities into viable solutions. Such information can involve new technologies or change in customer needs and competitors.

However, our findings also reveal that in most cases, the SMEs do not know what technologies to adopt and how to access data, when looking for new opportunities in the digital context—as pointed out by managers: "We are operating in the dark." A manager from (SME M3) goes on to provide an example. They encountered several barriers in the beginning of their digital transformation process and were limited by a narrowed search horizon. It was simply too difficult for the involved managers to find gaps in the environment in which they could provide unique digital solutions out of data gathered from their products. The manager reasoned that there was "a lack of knowledge" in terms of understanding the role of data and how to convert it into actual value for the innovation process.

An interesting and surprising finding was made from a few companies that explicated that by embracing change on a continuous basis, they were able to overcome the narrow search horizon, as explained by a manager from (SME S9): *"We are constantly spinning 360 degrees around ourselves, while scanning the environment as we move forward."*

There were also cases in which data could actually be used in order to gain the necessary insights to make the decision for change, as pointed out by a manager from (SME S10):

"I am not in any way an authoritarian type and I believe this is one of the reasons that we have such success. This is because we are listening to not only our own employees, but especially our partners (agents, suppliers, and customers). If someone tells us that this isn't possible, then we change it, but the argumentation needs to come from the data."

The examples above represent two opposite approaches to scanning the business environment: 1) Some companies that seek business insights do not have data to guide them and encounter narrow search

horizons, and 2) other companies are able to effectually create actionable intelligence through the use of established data-driven platforms. This is very much in line with findings from the study by Li (2018), who found that SMEs with few capabilities and resources are more dependent on third-party digital platforms to successfully engage with the digital transformation.

Our study show that most of the companies have difficulty in the early stages of the digital transformation in terms of scanning the business environment to identify actual values from data and to build a new business model from the achieved business insights. When comparing to the 4-I framework's initiation phase, we do not recognize data as a valuable assest for the ability to create new BMs or the activities of extracting value from data in mapping the business potentials. We do, however, recognize the same traditional external factors when expanding the business horizon, such as network partners, customers, and other stakeholders.

BMI activity 1: Scanning the business environment

The managerial decision-making level		
Issue	**Mindset (Thoughts)**	**Specific solution (Actions)**
• The digital development requires the organization to change, also in terms of the employees handling the challenges they are facing. **Quote: "You are operating in the dark. The only thing you can do is to act and observe."**	• Not knowing what this leads to. • The organization is quite flexible in regards that we still learn. • The company is constantly adapting products and technologies to fit the market. • It is a transformation, it is relatively new, and there is now a new agenda.	• Divide innovation between jumps and incremental steps. • Try out different things. • Create a workspace that allows the company to change the terrain. • Driven by an idea, set out goals and get employees working on those. **Quote: "We are constantly assessing new markets and assessing these markets against each other, so that we can continuously make the changes in our product portfolio."**

	• Predictability is a major factor here.	

The value-creation level		
Value create	**Value deliver**	**Value capture**
Examples: • Making space for employees to innovate on new ideas and prototypes. • Network-based innovation with stakeholders and customers.	Examples: • Real-time data allows for continuous update of data. • The online model supports the delivery of tools and analysis into a web-based browser platform. "**I would say that we are 100 percent flexible in terms of our turnover and we can therefore change our production and marketing in a weekly basis**."	Examples: • The customers pay a yearly subscription fee. • The online model is a great statistical back-in showing how much a feature is being used and who in the organization uses it. Useful for support but also in sales.
Output: • A web-based platform in which all analysis is created and uploaded so that customers can access it after interest • Creating the necessary tools to quickly analyze the data • Closing the gap between reality and the digital version of reality		

4.2 Drivers for conveying a sense of urgency

Informants emphasized the importance of conveying a sense of urgency between recognizing the speed of change and need of change—in what was described as an increasing complex and uncertain environment, which is impacted by digitalization.

The speed of change is defined as the time span for incorporating digitalization into the business is becoming much shorter than what is previously experienced (see BMI activity 2: conveying a sense of urgency). A manager from (SME S10) clarified: *"We live in a completely political agenda–driven reality, and ultimately, when new regulatory requirements come it literally has to work tomorrow."*

The need for change is recognized by the informants and for several reasons, e.g., a survival mechanism, increased demands for digital solutions by customers, or a new digital-driven political agenda. Some companies experienced that digitalization created the urgency to change and forced the requirement to change at a much higher pace than before. As explained by managers (SME M1, M2, M7, S9, S12):

"I believe that it isn't within three years, but two years that everything we do as a business will be digital."

"Citizens, customers, and users see technology differently today than they did 10 years ago, and that initiates a new political agenda."

The increased sense of urgency is in line with current literature on digital transformation (Franklin et al., 2013; Vagnoni et al., 2016; Nambisan et al., 2017) as reviewed in this paper all emphasize that companies are now operating in increasingly turbulent business environment, in which digitalization has an impact on the ability to keep pace with changes occurring in the environment. However, our findings indicate that the clockspeed of innovation in terms of the ability to be proactive has changed for companies undergoing a digital transformation, which is much faster than traditional innovation processes. In comparison with (Frankenberger et al., 2013), the ability to convey a sense of urgency is an activity that can be associated with change drivers in the initiation phase, in which managers need to act upon changes to the BM. This also fits with our findings on the impact of digitalization that managers create the ability to convey urgency for change into managerial actions.

BMI activity 2: Conveying a sense of urgency

The managerial decision-making level		
Issue	**Mindset (Thoughts)**	**Specific solution (Actions)**
• Creating urgency because the development in the industry was too slow. • Afraid of outside competition from other industries or large corporations. • The industry is way behind in terms of data usage.	• Moving away from only focusing on developing what the industry tells you • The customers do not know what they want or need in two years. • The company has to be ahead of the industry. **"It was really important that we were fast to execute and first to market."**	• The protocol is to get the mandate in the organization and get help to support each new opportunity. • Initiated data-driven production-setup. • ERP suppliers structured and challenged to provide the capability to work with data, allowing measurement of the effect of different processes.

The value-creation level		
Value create	**Value deliver**	**Value capture**
Examples: • Cooperating with an external company that created the concept pitch • Getting something up and running, code it and adapt it. • Creating and showcasing something new and differentiating in a targeted	Examples: • The business department crafts a requirement sheet for the IT-department, which then delivers an estimation and then execute on it. • The business department works with what to prioritize and what benefits each project has. **"We want to provide value through digitalization by digitalizing our**	Examples: • Received great feedback from pilot studies (network partner) that resulted into the mobile application for business. • The value is the data that can be monitored through customers' interaction. • Collecting negative and/or positive data from agents.

market in terms of competition.	**marketing."**

Output:

- Creating the concept in 6 months, then implementing and launching the pilot.
- Placed screens at the customers' stores. Using iPads instead of catalogues for customers to see the depth of products and place them in different digital environments to see how they match with customers' preferences.
- Cooperation in the industry on fast payment options.

4.3 Experimenting with digital innovation

Informants recognized that certain conditions are required for the digital transformation process to "work." That is, to improve their approach to experimenting with digital innovation. The managers emphasized the importance of accepting risks, to accept failure as a value-adding experience and to follow their intuition in times where there are no clear answers to find outside of the organization (see BMI activity 3: experimenting with digital innovation). Some believe that aiming for flexibility will lead to a successful experimentation process, as explained by a manager from (SME S9):

"Opposite we properly haven't dared to do it radically. It should be that 8 out of 10 moonshots succeed and those you get great amount of learning from. It is evident that you have a struggle with which moonshot to prioritize first. The moonshot as a project is a form of fast-tracker innovation… It should be as such, that we suddenly take a 90-degree turn, because it was a possibility."

Another important success factor in the experimentation process was to communicate the potential rewards of developing digital solutions, while also providing top-management support that in itself provided mid-level managers and employees with the necessary mandate to pursue ideas, prototypes, or external cooperation in digital-themed network projects, as explained by a manager from (SME S10):

"We have created many prototypes for different purposes. Firstly, it is another way of creating breakthrough effects. We can sit here and talk about an idea, but you have your perspective and I have mine, and because of that we see the idea and scope differently, however when we can see the same thing

and how it works it provides a common understanding. This was absolutely necessary for our executive board to greenlight our project and as we were moving forward, we could pull on more resources. We started small and moved forward because the project was highly prioritized by our executives, which made it possible to pull on whatever resources we actually needed."

This is also similar to the ideation phase of the 4-I framework by (Frankenberger et al., 2013), in which there are no best practices for creating ideas to transform new business models. Our findings indicate that companies are pursuing the flexibility and freedom of development, which is heavily relying on the support and motivation from top management. According to Svejenova et al. (2010), the triggers and mechanisms of business model transformation is found to be based on the motivations and interest of individuals, the quest for creative freedom, which also includes the quest for authenticity, the quest for recognition, and the quest for influence.

BMI activity 3: Experimenting with digital innovation

The managerial decision-making level		
Issue	**Mindset (Thoughts)**	**Specific solution (Actions)**
• Citizens, customers, and users see technology differently today than they did 10 years ago and that initiates a new political agenda. **"A thought was born from the executive board that we needed to do things radically different from normal practices in terms of the innovation processes."**	• Take a product and rotate it and then use it for another purpose. • Agility as a holistic organization. • Fail fast. • Be ready to test something, and try it. **"There is a high level of 'let's just do it' instead of speculating too much on budget, funding and time scheduling etc."**	• Creating ideas/concepts with high risk and shooting for the moon. • Research in collaboration with universities. • Hiring a new CEO that is focused on the company becoming data—driven to create data-driven business policies. • Creating many prototypes.

The value-creation level

Value create	Value deliver	Value capture
Examples: • If the idea isn't good, then play with it and develop it one more times in a duration of three weeks. Eight weeks later, there is another version. **"We make agile IT, framework contracts, agility, and we say what is practiced."**	Examples: • Continuous testing—taking the BM from the laboratory, test it at the customers site to be sure that the early deceases are identified and eliminated before implementation • Creating a data lab **"We are failing the most when we are imagining something that we can't build, rather than we fail in terms of something we can build but doesn't have a value for the business."**	Examples: • In a position where the digitalization has made us able to identify all the errors, but we can't do anything about these. • The goal is not to limit the amount of errors. • The goal is to have more transparency. **"We are failing half of the time. We don't fail nearly enough."**

Output:

- The moonshot as a project is a form of fast-tracker innovation. It is the executives that evaluate and decide what they see as potential to greenlight.
- Creating a new machine learning platform that is recognized as service, independent if it's used in different business departments or customer segments.

4.4 Shifting decision-making from intuition to data

Although the SME approach to digital transformation implies that some companies are following their intuition, especially in terms of gaining insights in the business environment and through experimenting with digital innovation, it is recognized that key decision-makers aim to rely much more on data for successful development of digital-driven BMs for the future, as explained by managers from (SME M2, M5 and S9): *"We are currently changing our technological foundation. Next year we should have a big data lake with advanced analytics on top of that and really dig down within that area. We want to use this to get*

insights on existing solutions and future optimizations, or completely new areas, where we can provide better service for our customers."

In fact, studied companies are already embedding their resources into establishing data platforms and systems with the purpose to create automatic decision-making processes that highlight key strategic initiatives for the company to follow (see BMI activity 4: shifting decision-making from intuition to data).

The empirical observations highlight that SMEs are changing their mindsets in terms of wanting to become more agile to respond to uncertain and complex environments, which, compared to the 4-I framework (Frankenberger et al., 2013), is about securing fit with the internal and external environment. For our studied companies it is a "crossroad" decision in terms of balancing between when to follow intuition and when to follow data. Not to forget, there are companies that explicitly want to escape the "gut-feeling" approach to innovation and to increase efficiency by heavily investing resources into incorporating data platforms and business intelligence systems. This is an interesting finding in terms of SMEs balancing between managerial issues and technology aspects to overcome their narrowed search horizons during their digital transformation. This is similar to the statement from Li (2018) that digital transformation is more about finding a balance between managerial decisions and the usage of technology. This is something that we find crucial to the development of new BMs that are heavily reliant on data, which is not apparent in the 4-I framework (Frankenberger et al., 2013).

BMI activity 4: Shifting decision-making from intuition to data

The managerial decision-making level		
Issue	**Mindset (Thoughts)**	**Specific solution (Actions)**
• Scalability is a hurdle for every organization • Big hurdle to establish the platform	• Going from feelings to data • Belief is that the technology will eventually exist, but how does the business model look like? **"When we turn around**	• Acting fast on window competitors arrived with a similar solution • Data scientist creating the platform to produce business insights out of the data we have • Securing that that the data platform is working and that our servers are running

- Hiring the right competences and to get them to provide their best suggestions

" There is no need to have a platform with a lot of data if you don't have any idea of how to use it."

ourselves we know what is going on."

- More data engineers

The value-creation level

Value create	Value deliver	Value capture
Examples: • Setting up product teams • Vertical integrated teams • Creating an organization that is highly efficient at executing ideas into business models • Securing a good and efficient alignment between the vertical integrated teams **"It is about making decisions based on data, this is really important, but don't think you should forget or underestimate being close to the customers and to have a gut feeling."**	Examples: • A data foundation is required, because it can provide you with the necessary insights • The data should be pulled out each month so that you can adjust accordingly • AB testing • Creating control groups to see which ones succeed	Examples: • Changing technological foundation • Big data lake with advanced analytics • Getting insights on existing solutions and future optimizations, or completely new areas to provide better services for customers **"We have grow to become agile, then corporate again."**

Output:

- Creating data-driven platforms to support decision-making and providing new business insights.
- New mindset of the importance of using data as a resource for innovation.

- Transforming the business to adopt new technologies that can sustain big data analytics.

4.5 Business model innovation activities: a process framework

Figure 6 reveals the BMI activities framework of the digital transformation that has been analytically generalized from the cases, and which captures both the activity level and its contextual factors. The framework represents the four main BMI activities: (1) scanning the business environment, (2) conveying a sense of urgency, (3) experimenting with digital innovation, and (4) shifting from decision based on intuition to data, which may promote change to the development of BMs through the course of digital transformation. Each BMI activity is connected to contextual factors through managerial interactions within the process, which we have divided into two levels: (1) the managerial decision-making level, which is encaptured by the issues, mindsets and decisions, and specific solutions, and (2) the value-creation level, which is captured by the value creation, delivery, and capture.

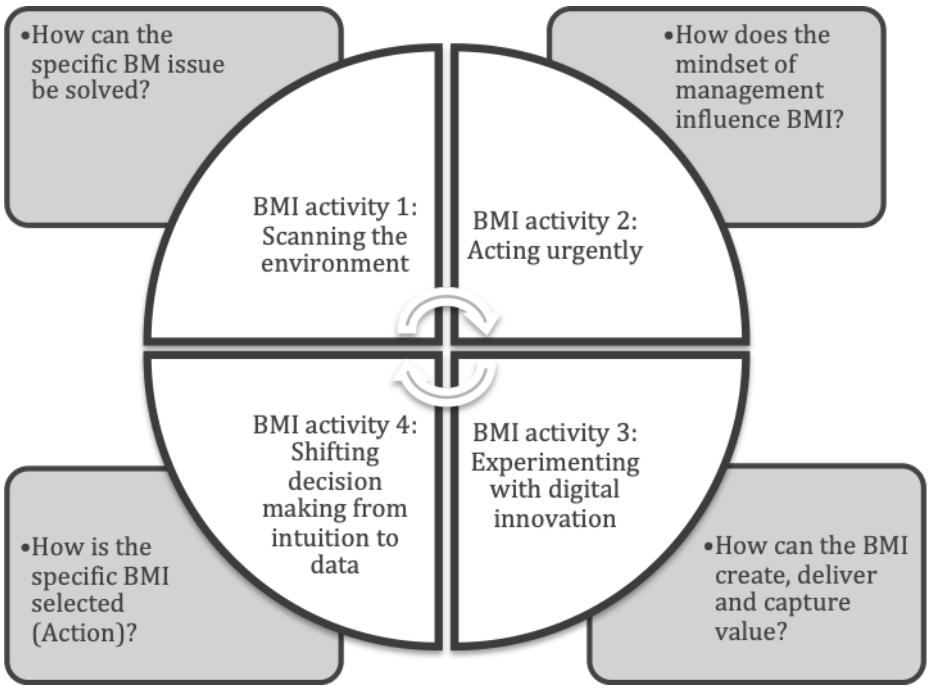


Figure 6 - Business model innovation activities

5. Concluding discussion

Business model innovation (BMI) and BMI processes have been explored by a number of authors over the last decades. In understanding the BMI process, Frankenberger et al. (2013) identify four phases: initiation, ideation, integration, and implementation. In comparing this model to the results from our study, it is apparent that the 4-I framework operates on a meso level, whereas the four BMI activities in our BMI process model are identified on the micro/company level. Furthermore, the 4-I framework emphasizes all BMI processes and not specifically BMI processes conducted in a digital context or in the context of SMEs, which do not have access to the same resources as the larger companies. However, the 4-I framework may be applied in understanding the similiarities and differences in conducting BMI in a non-digital and in digital context, and in exploring BMI processes from an organizational level compared to a company and activity level. Therefore, the 4-I framework and our model can be seen as extensions of each other, as the 4-I framework presents the generic phases and our BMI process model and findings reveal specific BMI activities carried out by management during BMI processes in a digital context. In using the 4-I framework in understanding the findings of our study, it appears that the digital context does have an impact on the BMI process and activities. Thus, *initation* is our digital study context identified to be carried out through *scanning the environment* activities. *Ideation* is captured by the *conveying a sense of urgency* activities, which go beyong listening to customers or the industry, as they may not have the answer to BMI in a digital context. *Integration* is represented in our study by the actual value creation, value delivered, and value captured through the specific (digital) BMI solution selected by management, and *implementation* is in our study identified by activities changing the managerial mindset and decision-making from intuition to data-driven mindsets and decisions.

In answering the research question—*how do small and medium-sized enterprises pursue business model innovation in the digital transformation?*—we sought to contribute to the BM theory by investigating the BM activities and BMI process that goes into creating and capturing value in new ways through digital transformation. So far, we presented what constitutes BMs and BMI processes and have identified four key BMI activities during digital transformation. Overall, our findings and their interpretation provide new knowledge of the nature of 1) the issues SMEs face during digital transformations, 2) the mindsets and the decisions involved, 3) the specific actions and solutions that are sought by SMEs in their pursuit of BMI during digital transformations, and 4) the ways managers create, deliver, and capture value in new ways through the BMI process during digital transformation.

5.1 Theoretical contributions

This paper makes contributions to the research on BMs and BMI, especially in the context of digitalization.

First, we complement the literature on showcasing business models for SMEs. We investigated how 12 SMEs have adapted their BMs to facilitate digital transformation. We also look into the nature of BMs as of strategic importance for SMEs (Quinton et al., 2018). We view the BM concept as a unit of innovation (Saebi et al., 2017) and show this as an ability for transformation in the digital context.

Second, we follow the argumentation by Bucherer et al. (2012) that the concept of BMI needs clarification. This study investigated the BMI process and identifies four key BMI activities taking place in the different phases of the process in the form of 1) scanning the business environment, (2) conveying a sense of urgency, (3) experimenting with digital innovation, and (4) shifting decision-making from intuition to data.

Based on the above findings and discussion, we propose a model for building BMs in a digital context that recognizes each BMI activity as managed simultaneously with the specifics of BMI actions and value creation, delivery, and capture mechanisms. It further illustrates BMI elements such as issues, mindsets, decisions, and outputs that are of managerial implication to the success of engaging with a BMI process (see Figure 6). In addition to generalizing our empirical findings into a BMI activity framework, we compared this with the 4-I framework presented in the paper by (Frankenberger et al., 2013). We found similarities between the two frameworks in terms of different unit of analysis and discussed these as extension of each other. The differentiation stems from digitalization, which we argue impacts the BMI process on the activity level, which is supported by the findings from Yoo et al. (2012), Holmström and Partanen (2014), and Li (2018). We found that the individual managers are using digital platforms and data analysis to overcome their narrowed search horizons to support the development of new BMs.

5.2 Managerial implications

The literature on BM, BMI, and BMI processes has long emphasized large, incumbent companies. However, BMI is equally (if not more) important for SMEs that want to survive and develop their businesses for the future. This study contributes empirically by exploring BMI processes in the context of SMEs. Furthermore, this paper explores the highly relevant and timely BMI challenges of SMEs of today, who are

forced/motivated to a digital transformation—using digital technologies as part of their BMIs and BMI processes (e.g., data-driven decision-making) in building sustainable, competitive advantages.

The findings from this study present implications for SME managers who are performing BMI in a digital context. The findings reveal that four BMI activities stand out as central to the BMI outputs when working in digitalization: 1) scanning the business environment, 2) conveying a sense of urgency, 3) experimentation with digital innovation, and 4) shifting decision-making from intuition to data-driven. Figure 6 presents an overview of the overall BMI process, where managers first identify BMI issues, make decisions, create solutions, and then use the four BMI activities to set up specific BMI actions to create, deliver, and capture value in developing new BMIs. The findings reveal that in this process the managers' mindsets and decisions influence the choice of specific BMI actions and how they choose to create, deliver, and capture value through the four BMI activities resulting in a successful BMI output. Thus, for managers to make "new" decisions and solutions, a new mindset may have to be installed or "invited" in through new managerial competences to avoid managerial inertia in times of digitally transforming businesses and business models.

We further identify several managerial dilemmas that managers encounter while engaging in BMI activities during digital transformation. These managerial dilemmas constitute:
1) dealing with radical changes in short periods of time by either creating prognosis or scenarios, while also dealing with search myopia and the "flashlight approach" of operating in the dark, 2) radical shift from traditional experimentation with solutions toward experimenting for needs that are based on data, 3) timing and sustainability versus being first to market, and 4) using gut feeling to steer in the dark toward being able to make data-driven decision-making a possibility. These dilemmas challenge the existing ways of managing through turbulent times. However, the vast opportunities in data-driven decision-making provide new ways of conducting BMI processes and also add new BMI activities requiring new mindsets and decision-making skills that managers need to adapt to in a digitally transformed business context.

5.3 Limitations and directions for future research

The limitations of the study also provide venues for further research. For one, this is an explorative and qualitative study identifying BMI processes and activities among SMEs undergoing digital transformation. Our study was confined to one nationality, namely, Denmark, which does present its limitations in relation

to more general recommendation across companies of different nationalities. Whether nationality of the company has an impact on the how managers build business models during digital transformation is therefore, unexplored and leaves opportunities for further research through a cross-national case study. With only one or two informants interviewed for each case company, we would of cause invite research with multiple interviews from each case company that maybe elaborates more on the decision process and potentially reveal how different management profiles impact the execution of BMI processes. Further research could therefore constitute a larger case study of more informants across the internal and external organization to explore the specificity of the intra- and inter-organizational settings and BMI processes of SMEs. Also, a quantitative study could examine the generalizability of the findings across industrial and regional contexts and investigate whether some BMI activities are more important for successful BMI output than others and depending on BMI issue, industrial context, and managerial mindsets and decisions. Finally, a longitudinal study could shed light on how the BMI process and activities impact the success and digital outcome, output, and impact over time.

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PART 5

5. CONCLUSION

In this chapter, I discuss the key contributions of the dissertation. The chapter is divided into four sections. First, I present the key findings from the study. In doing so, I followed the research objective, which is to investigate strategic agility and business model innovation during digital transformation. Specifically focus lies on results related to two broad themes: 1) to identify the core elements underpinning strategic agility and business model innovation practices during digital transformation and 2) to define types of strategic agility and business model innovation practices. The second section explores the theoretical contributions to the literature. The third section describes the contributions to practice. Specifically, the focus rests on three broad themes: 1) to identify drivers and inhibitors within the elements of practicing strategic agility and business model innovation during digital transformation, 2) to define a continuum model to guide managers in terms of practicing strategic agility during digital transformation, and 3) to identify types of business model innovation activities that are essential in the initiation phase of digital transformation. Finally, in noting some of the limitations, I present some key directions for further inquiry and conclude the dissertation.

5.1 Summary of results:

The research objective of this study is to seek answers to the research objective: *investigate the role of strategic agility and business model innovation during digital transformation*. In doing so, I divided the objective into three questions in advancing current research on strategic agility and business model innovation. These questions were explored and answered through three research papers providing contribution to the theory and practice of strategic agility and business model innovation. Each paper was guided by the overall research gaps identified and with the purpose to fulfill those gaps in the literature.

The specific questions addressed by each appended paper are:

- **Research paper 1: Exploring the role of strategic agility in business model innovation during digital transformation**

  RQ1*: "What drives and inhibits the process of business model innovation in cultivating agility during digital transformation?"*

- **Research paper 2: Investigating the managerial implications of leveraging strategic agility: strategic tensions, actions and capabilities.**

  RQ2: How do companies leverage strategic agility and what are the managerial implications, strategic tensions, actions and necessary capabilities during digital transformation?

- **Research paper 3: Building business models in SMEs in a digital context: Organizing search behaviors, experimentation and decision-making.**

  RQ3: How do Small and medium-sized enterprises perform business model innovation and manage business model innovation activities during digital transformation?

The first paper tapped into the question of what drives and inhibits the process of business model innovation in cultivating agility during digital transformation, for example, drivers showed the increased awareness and visibility of identifying new opportunities and revenue streams by sensing the environment for technological trends and customer preferences. Whereas, for inhibitors, results indicated managerial bias between exploring and exploiting new business models and misguided priorities of resources in terms of lack of clarity in governance between control versus flexibility, which warrants further studies. Based on the insights from the singly-case study company, the paper proposes four strategic agility dimensions: the need for increased agility through digital transformation, embedding service-driven capabilities into the organization, change in business model logic, and customer co-creation and co-development. The paper further identified strategic agility dimensions that demonstrated how dynamic capabilities were managed and supported the process of business model innovation. Finally, the paper identified strategic agility actions as progressing the case company through the digital transformation process.

The second paper investigates how companies across different industries leverage strategic agility through managerial implications of tradeoffs and compromises, actions and capabilities. In particular, it starts where the first paper ended on further investigating the inhibitors there exists when practicing strategic agility. The paper proposes a model for recognizing the strategic agility conundrum during digital transformation and subsequently how companies practice and balance between strategic commitments and organizational renewal, while pursuing agility through strategic flexibility to conduct quick responses in high-turbulence environments. This paper testifies to what constitutes the strategic agility conundrum in the balance between two contrasting positions (the rigidly of planning through structure versus flexibility through no structure), and what the managerial implications are hereof in relation to strategic tensions, actions and capabilities, pursuing the identified three strategic agility practices (no planning, planning for near future and planning for future).

The third paper investigates the business model innovation processes that companies undertake to achieve digitalization and competitive advantage. Specifically, the paper identifies four critical business model innovation activities that companies undertake in terms of: 1) scanning the business environment, 2) conveying a sense of urgency, 3) experimenting with digital innovation and 4) shifting decision-making from

intuition to data. Subsequently, findings reveal the mindsets, actions and value processes of business model innovation during the companies' digital development. However, there are several managerial dilemmas between: a) prognosis and scenario-driven search myopia, b) timing and sustainability, c) radical shift in experimentation methods and d) using intuition versus data-driven decision-making.

5.2 Theoretical contribution

The findings of this dissertation make several contributions with both theoretical and practical implications, especially around the central theme, being the research objective to investigate strategic agility and business model innovation during digital transformation.

5.2.1 Strategic agility and business model innovation practices during digital transformation

The papers included in this dissertation can be instrumental in the search of answers to some fundamental questions and statements from above, on the role of strategic agility and business model innovation during digital transformation. The insights offered by the dissertation directly link into the digital transformation activities that companies might go through, i.e. 1) initiating the digital transformation (Basole, 2016, Hess et al., 2016), 2) managing strategic change (Vagnoni et al., 2016) and 3) the business model innovation process (Achtenhagen et al., 2013, Li, 2018). In Figure 7, I present the overall relation between the three appended papers as each contributes to different activity steps of the digital transformation, which is illustrated in Figure 7. Within each step, I discuss the findings from appended papers with the literature review of this dissertation with the purpose of clarifying how the dissertation as a whole contributes to different research streams of strategic agility, business model innovation and digital transformation. Furthermore, I clarify the contributions to organizational change and dynamic capabilities in terms of companies balance between stability and flexibility, and exploration and exploitation.

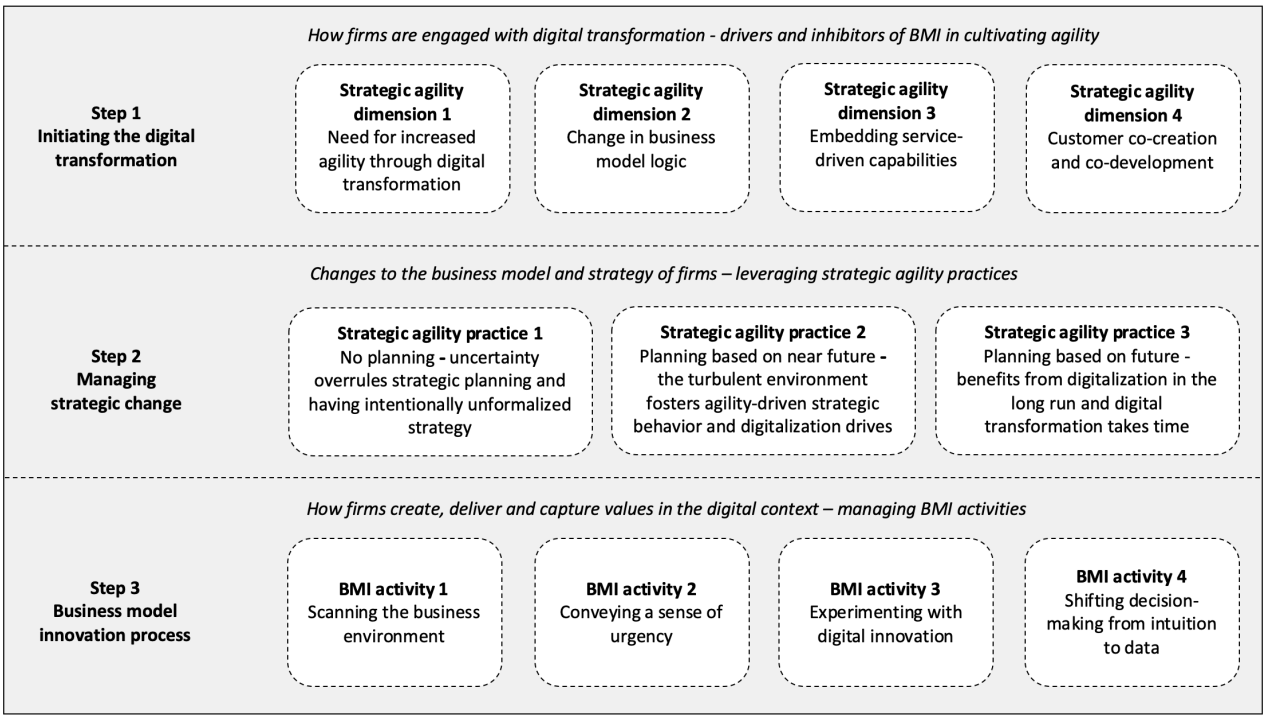

Figure 7 - The strategic agility and business model innovation framework

Digital transformation activity step 1 - Initiating digital transformation to cultivate agility

In this dissertation, I argue that strategic agility is crucial for companies to reform their current business models or to create new opportunities during turbulent circumstances. Consistent with the literature (Hess et al., 2016, Nambisan et al., 2017), I found that initiation of digital transformation leads to significant changes to the current business model, which indicates a shift in business model logic. Also, it was evident that the company initiated their digital transformation by recognizing the need to adapt to changes in the environment. However, there are significant impacts from the pursuit of initiating digital transformation on current literature streams of strategic agility, dynamic capability and organizational change literature, in the following ways:

- **Contributions to strategic agility and dynamic capability research:** I extend the current literature on strategic agility as a process (Doz and Kosonen, 2008), in which the findings revealed a set of strategic agility actions "on top of dynamic capabilities" that managers utilized as a guidance to progress through the initiation of the companies' digital transformation. Meanwhile, the strategic agility actions showcased how managers dealt with drivers and inhibitors in the BMI process, for

example, using technologies to embed new service-driven capabilities into the organization. These approaches were accumulated into the strategic agility dimensions that explains the relation between strategic agility and business model innovation in achieving digital transformation. I found strategic agility as a process extending dynamic capabilities into concrete strategic agility actions, I call this combination strategic agility dimensions, which is a contribution to extant literature as this explains their relation at a higher level than previous literature (Doz and Kosonen, 2008, Fourné et al., 2014 Lewis et al. 2014).

- **Contributions to digital transformation and organizational change research:** I looked into how specific digital technologies advanced the organizational change towards achieving agility within the initial phase of digital transformation, for example, customers role as co-developers of the remote-monitoring system and interactions with a self-driven service platform accelerated the initial phases of digital transformation by sharing knowledge and learning between customers and managers. Hence, I provided answers to the research call by (Hess et al., 2016) on managers guidance in the initial phase of digital transformation. Furthermore, I saw indications of strategic tensions between the exploration and exploitation of business model in relation to pursuing digital transformation. Specifically, I noted that cultural barriers occur when seeking new opportunities, while reluctant of the fallouts from pursuing these digital opportunities.

Digital transformation activity step 2 – Leveraging strategic agility

The second step of the digital transformation activity involves managing strategic change, in which I follow the argument from (Hemmati et al., 2016) that the concept of strategic agility needs more empirical studies on the specific actions that companies undertake to create the strategically agile company. In particular, I complemented existing literature on how companies leverage strategic agility (Lewis et al., 2014, Weber and Tarba, 2014) and provide empirical evidence on the specific mechanisms and processes during strategic change, in the following ways:

- **Contributions to strategic agility and dynamic capability research:** I extend current literature on strategic agility by defining strategic agility practices as how companies during digital transformation manages strategic change. In doing so, I found specific types of strategic practices and extended the concept of strategic agility conundrum by (Doz and Kosonen, 2008) as findings revealed two other types of strategic agility practices. I found companies that fostered agility through strategic change in different ways. For some, having no planning in terms of how

uncertainty overruled strategic planning and unformalized strategy as a specific choice to foster agility and maximize its high rents through digital transformation. Opposite, I found companies managing strategic change by foster planning and maximize its high rents, in which managers acknowledged the long-term investments of digital transformation. In contrary to literature, the findings also showed that some managers tend to thrive in high-turbulent environments by intentionally making strategic choices to operate near anarchy with no structure or procedures for their innovation and decision making. Contradictory, for these managers it was not a choice of striking a tactful balance to achieve strategic agility, but leadership choice.

- **Contribution to organizational change and strategic tensions research:** Through the studies I found specific strategic tensions in the form of unique compromises for each type of strategic agility practice of companies managing strategic change because of digital transformation. Companies that followed no planning made compromises to maximize agility (strategy inhibits their innovative capabilities, but at the cost of innovating blindfolded). Companies that follow planning for the near future made compromises (using data to drive decision-making to avoid being bogged down with internal politics) and planning for future (striving for digital transformation to enable future avenues of growth take a toll on the organization in terms of high resource costs and a long-time horizon).

Digital transformation activity step 3 – Business model innovation

The third step of digital transformation activity involved the business model innovation process of how companies create, deliver and capture values in the digital transformation process. I extended the literature on business mode innovation during digital transformation in the following ways:

- **Contribution to business model innovation and dynamic capability research:** First, when acquired, internalized and mastered, the competence to renew one's business model becomes a rather specific example of a dynamic capability (Teece et al., 1997) that allow a company to achieve and maintain fit with the changing business environment. Second, the view on business model innovation developed in this dissertation is on specific innovation activities, which stems from the digital transformation process distinctive from previous proposed somewhat more detailed stage-gate and/or evolutionary life cycle models (Bucherer et al., 2012, Morris et al., 2005, Zott and Amitt, 2015, Frankenberger, 2015).

- **Contribution to organizational change and strategic tensions research:** I found a rather surprising managerial dilemma that managers encountered while engaging in BMI activities during digital transformation, which was identified as: using gut feeling versus data-driven decision-making.

5.3 Practical contributions

In this section, the managerial implications are outlined for each appended paper of this dissertation.

Research paper 1: Exploring the role of strategic agility in business model innovation during digital transformation

RQ1*: "What drives and inhibits the process of business model innovation in cultivating agility during digital transformation?"*

Contribution 1. *Strategic agility as an effective mindset for mediating strategic decision-making processes in the digital transformation.*

I contributed to managerial practices by proposing strategic agility as a mindset for managers to mediate strategic decision-making processes in the digital transformation. In fact, I showed that by applying strategic agility in business model innovation managers could create a successful initiation, implementation and execution of a digital transformation. I found that managers need to *1) establish visibility and awareness to foster commitment and understanding on the necessity of change in the organization, 2) prioritize the balance of resource management to ensure progress and change in business model innovation, and 3) make use of strategic communication to enact managerial actions necessary to create new digital business models as a result of the business model innovation.* Consequently, I showed that strategists had limited experience dealing with both simultaneous concepts of strategic agility and business model innovation, their value impact, and its familiarization to recognize its benefits. However, I did find that managers showed legitimacy with business models and by adding strategy to its development process. In addition, the results showed a progression from managers using strategic agility and business model innovation as mindset towards using tools for digital business model development.

Research paper 2: Investigating the managerial implications of leveraging strategic agility: strategic tensions, actions and capabilities.

RQ2: *How do companies leverage strategic agility and what are the managerial implications, strategic tensions, actions and necessary capabilities during digital transformation?*

Contribution 2. Providing a continuum model for recognizing strategic agility practices as guidance for managers to leverage their company's strategic agility *by understanding the implications of strategic tensions, actions and capabilities necessary to gain high rents of agility.*

In most cases the strategic agility practices in this study embodies essential elements of the characteristics and activities of a strategically agile company. The continuum model was developed in the hopes to guide managers by providing a tool to diagnose and plan different ways of practicing agility for existing companies, including its alternative ways of innovating during a digital transformation process. I find that managers make certain strategic choices that are in line with the theory about creating a tactful balance towards maximizing agility. However, I also see some managers that intentionally choose to be at the outer edges of the two extremes of strategic practices, hence beyond the edge of chaos, and close to anarchy. These managers thrive in high-turbulent environments with no form of structure or procedures to innovate or take decisions during the digital transformation of their companies. An interesting observation, is that the degree of strategic planning has nothing to do with the digital maturity of companies. I see a mixture of companies with similar planning approaches but at different stages of digital maturity. Companies at the early stages of digital maturity might be a mixture of different strategic believes, some will be committed to a strategy plan, while others have none.

There are several implications to consider:

- First, in most cases leadership pushes the innovation process through the organization by following intuition-based logic in reaction to emerging changes from the environment.
- Second, the digital transformation requires new types of competences, which currently doesn't exist within the organization.
- Third, companies rely on the external environment in terms of gaining competences and resources to support the transformation process.
- Fourth, the digitalization leads to new opportunities for optimizing products and services through the use of data analysis.

Research paper 3: Building business models in SMEs in a digital context: Organizing search behaviors, experimentation and decision-making.

RQ3: *How do Small and medium-sized enterprises perform business model innovation and manage business model innovation activities during digital transformation?*

Contribution 3. Providing managers with a business model innovation process model *by how managers identify business model innovation issues, create business model innovation actions, and develop new business model innovations.*

Contribution 4. Showing business model innovation as a highly relevant approach for companies that are forced/motivated to a digital transformation *by using technologies as part of their business model innovation and processes in building sustainable and competitive advantages.*

This paper contributed to managerial practices by presenting implications for SME managers who performs business model innovation activities in a digital context. In particular, I found four business model innovation activities that are central to the success of business model innovation outputs when working in digitalization. I contributed with the business model innovation model for managers to identify business model innovation issues and then use the four activities to set up specific actions to explore and develop new business models. I also found that it is in the process that managers mindsets and decisions influence the choice of specific actions and how they choose to create, deliver and capture values through the four business model innovation activities, resulting in a successful business model innovation output.

Contribution 5. Showing managerial dilemmas of managers engaging in BMI activities *by dealing with search myopia while operating in the dark, shift from radical experimentation towards data-driven experimentation, timing and sustainability versus first to market, and from gut-feeling to making data-driven decision a possibility*

I further identify several managerial dilemmas of managers engaging in BMI activities, in the form of: *1) dealing with radical changes in short periods of time by either creating prognosis or scenarios, while also dealing with search myopia and the "flashlight approach" of operating in the dark, 2) Radical shift from traditional experimentation with solutions towards experimenting with needs that are based on data, 3) timing and sustainability versus first to market and 4) using gut-feeling to steer in the dark towards being able to make data driven decision making a possibility.*

5.4 Research limitations and suggestions for future research

No research is ever complete, and this dissertation is no exception. Each of the included papers exposed their limitations and suggestions for further avenues of research, which are summarized in the following.

The first paper invited more research on the concept and impact of digital transformation. I argue that it would be of interest to understand how digital transformation changes over time and with the growing experience and capabilities of companies. I would therefore see the value of a longitudinal study on how strategic agility influences business model innovation and digital transformation over time.

The second paper provided the limitations of the research study and presented new avenues for future research. The study was conducted across industries and in order to draw more industry-specific results on the use and integration of strategic agility, I would like to invite more research with a larger study. The study was also confined to one nationality, namely Denmark, which does present its limitations in relation to more general recommendation across companies of different nationalities. Whether nationality of the company has an impact on the use and balance of strategic agility is therefore, unexplored and leaves opportunities for further research through a cross-national case study. With only one or two informants interviewed for each case company, I would of cause invite research with multiple interviews from each case company that maybe elaborates more on the decision process and potentially reveal how different management profiles impact the choice and balance of planning and strategic agility. Finally, the study only focused on strategic agility approach as input and not on performance as output of the selected strategic agility approach. The latter would especially require a longitude study in terms of exploring outcome and performances of companies using different strategic agility approaches.

As the pace of change and level of complexity is increasing, the need for building in agility in strategy and organizations will be growing. Thus, further research is required to fully understand and investigate the most successful strategic agility approaches for companies and managers to pursue and how to implement/facilitate/build in strategic agility in different organizations across sectors and geographies. In addition, I did not measure how strategic agility practices affects the performance of companies, which would be an interesting research avenue to pursue in the future.

The third paper described the limitations of the study which also provide venues for further research. For one, I used an explorative and qualitative study identifying BMI processes and activities among SMEs undergoing digital transformation. Further research could therefore constitute a larger case study of more informants across the internal and external organization to explore the specificity of the intra- and inter-organizational settings and BMI processes of SMEs. Also, a quantitative study could examine the

generalizability of the findings across industrial contexts and investigate whether some BMI activities are more important for successful BMI output than others and depending on BMI issue, industrial context and the managerial mindsets/decisions.

There are indeed many avenues that require further investigation in terms of advancing the research on strategic agility and business model innovation. This is especially with the hope that science can support companies in all industries to embrace the truly magnificent benefits of digital transformation to ensure a thriving and sustainable future.

6 APPENDIX

6.1 Co-author statements

AARHUS BSS SCHOOL OF BUSINESS AND SOCIAL SCIENCES
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Declaration of co-authorship*

Full name of the PhD student: Troels Christian Korsgaard Andersen

This declaration concerns the following article/manuscript:

Title:	Exploring the role of strategic agility in business model innovation during digital transformation
Authors:	**Andersen, T.,** Aagaard, A.,

The article/manuscript is: Published ☐ Accepted ☐ Submitted ☒ In preparation ☐

If published, state full reference:

If accepted or submitted, state journal: European Journal of Innovation Management

Has the article/manuscript previously been used in other PhD or doctoral dissertations?

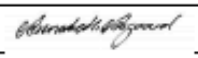
No ☒ Yes ☐ If yes, give details:

The PhD student has contributed to the elements of this article/manuscript as follows:

- **A.** Has essentially done all the work
- **B.** Major contribution
- **C.** Equal contribution
- **D.** Minor contribution
- **E.** Not relevant

Element	Extent (A-E)
1. Formulation/identification of the scientific problem	C
2. Planning of the experiments/methodology design and development	A
3. Involvement in the experimental work/clinical studies/data collection	A
4. Interpretation of the results	B
5. Writing of the first draft of the manuscript	A
6. Finalization of the manuscript and submission	C

Signatures of the co-authors

Date	Name	Signature
26.04.2019	Annabeth Aagaard	

In case of further co-authors please attach appendix

Date: 26.04.2019

Troels Christian K. Andersen

Signature of the PhD student

*As per policy the co-author statement will be published with the dissertation.

AARHUS BSS SCHOOL OF BUSINESS AND SOCIAL SCIENCES
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Declaration of co-authorship*

Full name of the PhD student: Troels Christian Korsgaard Andersen

This declaration concerns the following article/manuscript:

Title:	Investigating the managerial implications of leveraging strategic agility: tradeoffs, actions and capabilities.
Authors:	**Andersen, T.,** Aagaard, A.,

The article/manuscript is: Published ☐ **Accepted** ☐ **Submitted** ☒ **In preparation** ☐

If published, state full reference:

If accepted or submitted, state journal: Journal of World Business

Has the article/manuscript previously been used in other PhD or doctoral dissertations?

No ☒ **Yes** ☐ **If yes, give details:**

The PhD student has contributed to the elements of this article/manuscript as follows:

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AARHUS BSS SCHOOL OF BUSINESS AND SOCIAL SCIENCES
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Declaration of co-authorship*

Full name of the PhD student: Troels Christian Korsgaard Andersen

This declaration concerns the following article/manuscript:

Title:	Building business models in SMEs in a digital context: Organizing search behaviors, experimentation and decision-making.
Authors:	**Andersen, T.,** Aagaard, A.,

The article/manuscript is: Published ☐ Accepted ☐ Submitted ☒ In preparation ☐

If published, state full reference:

If accepted or submitted, state journal: Journal of Business Research

Has the article/manuscript previously been used in other PhD or doctoral dissertations?

No ☒ Yes ☐ If yes, give details:

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26.04.2019	Annabeth Aagaard	

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