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ENABLING DIGITAL TRANSFORMATION

- A DYNAMIC CAPABILITIES APPROACH

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Preface

This master thesis was written by two Master of Science students in Industrial engineering and management, Emma Berg and Cecilia Josefsson. The master thesis was written within the master profile Strategy and Management Control at Linköping university in collaboration with the consulting company Propia during spring 2019.

The first time we met Propia was during our fourth year of studies at the TEAM-fair 2017 held at Linköping university campus and we immediately got a good feeling about the company. When it was time for us to start looking for an interesting subject for our master thesis, we found Propia's theme for the master thesis 2019, "Digital capability", to be a good fit for us. We had already decided that we wanted to write about digitalization and/or digital transformation on a strategic development level, as we believe that many companies face challenges regarding their digital development. During the time spent on writing this master thesis, we have been warmly welcomed by everyone working at Propia and it has been a pleasure take part in the company's activities.

The case company of this study was Tekniska verken. They constituted an interesting organization and point of view as they are at the time of the study facing and going through practical challenges related to the fields of this study. Everyone we met at Tekniska verken has been very helpful and accommodating. We are especially grateful to everyone taking their time to take part in our interviews.

We would like to express special thanks to Thomas Claudelin who has been our supervisor at Propia and to Daniel Ellström who has been our supervisor at Linköping University. You have both been very supportive and provided valuable inputs as we juggled ideas and tested our hypothesis with you. We would also like to thank our opponents Jonathan Axelsson and Daniel Gunnarsson for appreciated discussions and feedback during the course of this study.

Thank you!

Sammanfattning

Denna rapport bygger på en teoretisk litteraturstudiestudie inom områdena digital transformation och dynamiska förmågor. En empirisk studie har gjorts hos uppdragsgivaren Propia samt en fallstudie av företaget Tekniska verken, för att verifiera de teoretiska fynden och resultaten. Studien har utförts av två mastersstudenter från civilingenjörslinjen Industriell ekonomi vid Linköpings universitet under perioden januari till maj 2019. Studien har genomförts inom ramen för examensarbete inom masterinriktningen Strategi och Styrning, och syftar till att undersöka hur ett företag kan utveckla en dynamisk digital förmåga vilket ses som nyckeln till att hantera digital transformation på ett framgångsrikt sätt.

Studien har utförts iterativt, genom att först studera området digital transformation, vilket definierats som *transformationen av verksamheter och strategi genom digital teknik och organisatoriska förändringar*. Tre områden där organisatoriska förändringar är nödvändiga identifierades, nämligen områdena *Ledarskap & Vision*, *Kultur & Människor* samt *Företagets Processer & Strukturer*. Vidare identifierades tre faktorer inom varje område som kritiska för att lyckas hantera digital transformation på ett framgångsrikt sätt. Dessa nio faktorer utgör grunden för den andra delen av studien, där området dynamiska förmågor studerats och applicerats på fynden kring hur man hanterar digital transformation på ett framgångsrikt sätt. Dynamiska förmågor kan kortfattat beskrivas som *rutiner för förändring* och kan vidare brytas ned i tre delförmågor: *Sense* – förmågan att känna av vilka möjligheter som finns i omgivningen som passar till de interna förutsättningarna; *Seize* – förmågan att fånga rätt möjligheter och integrera dem framgångsrikt i organisationen; *Reconfigure* – förmågan att, vid behov, göra förändringar av struktur och resursfördelning. Inom dessa tre kategorier har byggstenar identifierats för hur de tidigare nämnda nio kritiska faktorerna kan byggas upp på ett dynamiskt sätt.

Studien har resulterat i ett generaliserbart ramverk, uppbyggt av dessa nio kritiska faktorer samt 31 byggstenar för hur faktorerna utvecklas på ett dynamiskt sätt. Genom att utveckla de dynamiska byggstenarna och därmed kontinuerligt arbeta med samtliga faktorer underlättas utvecklandet av en dynamisk digital förmåga i verksamheten. Ramverket kan således användas som en typ av checklista för vad som redan finns på plats i organisationen, och vad som saknas och därmed bör anskaffas. Värt att notera är att såväl faktorer och byggstenar som dynamisk digital förmåga i sin helhet är en färskvara, och att checka av en faktor eller byggsten en gång innebär därmed inte att man har den, utan det handlar om att kontinuerligt arbeta med och vidareutveckla samtliga delar av ramverket.

Inbördes beroenden och relationer mellan faktorerna har identifierats, och så även påverkan från andra faktorer så som organisationens storlek, industritillhörighet eller hur långt verksamheten kommit i sin digitala transformation. Dessa beroenden diskuteras i rapporten, men ingen relativ viktighet eller inbördes ordning för hur faktorerna och byggstenarna bör anskaffas eller utvecklas har tagits fram. Detta på grund av den avsedda generaliserbarheten av ramverket.

Abstract

This report is built on a theoretical literature study within the areas of digital transformation and dynamic capabilities. An empirical study has been made on the provider of the mission of this study, Propia, and a case study has been made on the case company Tekniska verken, in order to verify the theoretical findings and results. The study was performed by two master students of Industrial Engineering and Management at Linköping university during the period from January to May 2019. The study was performed as a master thesis within the master's orientation Strategy and Management Control, and aims to explore how organizations can develop a dynamic digital capability, which is seen as the key to success when it comes to managing digital transformation in a successful way.

The study was performed iteratively, by first examining the area of digital transformation, defined as *the transformation of business and strategy through digital technology and organizational changes*. Three areas where organizational changes are needed were identified, namely the areas of *Leadership & Vision*, *Culture & People* and *Corporate Processes & Structures.* Further, three factors within each area were defined as critical in order to succeed with digital transformation. These nine critical factors laid the foundation for the second part of the study, where the area of dynamic capabilities was studied and applied onto the findings on how to manage dynamic transformation in a successful way. Dynamic capabilities can shortly be described as *routines for change* and can be further disaggregated into three capacities: *Sense* – the ability to know what opportunities exist and can be matched with the internal prerequisites; *Seize* – the ability to capture the right opportunities and successfully integrate them into the business; *Reconfigure* – the ability to, when needed, perform changes of structures and resources. Within these three capacities, microfoundations to build the previously mentioned critical factors in a dynamic way were identified.

The result of the study was a generalizable framework, consisting of these nine critical factors and 31 microfoundations required to build the factors in a dynamic way. By developing the dynamic capability microfoundations and, thereby, continuously work with all factors, the development of a dynamic digital capability in the organization will be facilitated. The framework can thereby be used as a checklist of what is already in place in the organization, and what is lacking and must thereby be obtained. Worth noticing is that factors and microfoundations as well as dynamic digital capability in itself is perishable, hence “checking the box” of a factor or microfoundation once does not mean it is obtained forever, but it requires continuous work and development of all parts of the framework.

Dependencies and interrelationships between the factors have been identified, as well as the effect of other organizational aspects such as size, industry and how far the organization has proceeded in their digital transformation journey. These dependencies are discussed in the report, but no relative importance or order of how and when the factors and microfoundations should be obtained and developed has been further explored or confirmed. This is due to the desired generalizability of the framework.

Table of Contents

List of Figures

List of Tables

1 Introduction

The introduction chapter of this report is intended to give a background to why this research is relevant followed by a problem description explaining why digital transformation efforts often fail and how dynamic capabilities can be used to tackle these issues. After this, the purpose of the study as well as the research questions that are intended to answer will be presented.

1.1 Societal impacts from the digital development

Technological innovations keep changing the way humans live, and in a research report by Svenskt Näringsliv (2016) it is stated that over the past century, a number of major changes have occurred that have been revolutionary to our society. They started with the discovery of the steam engine and the development of infrastructure and railroads. Further, the report state that the second industrial revolution came along with the spreading use of electricity and the incubation of the combustion engine. The development of electronics during the 20th century meant the third industrial revolution (Digitaliseringskommissionen, 2016) and we are now facing a new era once again, with digitalization and computerization affecting both individuals, businesses and economics (Frey & Osborne, 2017; Kääriäinen, Parviainen, Teppola & Tihinen, 2017; Svenskt Näringsliv, 2016). This is often referred to as industry 4.0 and is viewed as a transition to a new type of society – the digital society (Digitaliseringskommissionen, 2016). The transition from an industrial to a digital society creates opportunities to do entirely new things, but also the possibilities to do the things we are already doing in entirely new ways (Energiforsk, 2018; Digitaliseringskommissionen, 2016).

As digitalization spreads throughout industries and societies, it affects everything from how people interact with each other to how we do business (Digitaliseringskommissionen, 2016). Digital technology advances at an ever-increasing pace and will continue to do so (McLaughlin, 2017). Today the business environment is changing, and no matter if you are a producing, manufacturing or service-based business, all industries are facing digital change (Collins, 2017). This put demands on organizations' ability to adapt and be flexible (Digitaliseringskommissionen, 2016), hence the reason for organizations to become more digital should not focus on the technology itself but on the intent in terms of what is required to improve organizational responsiveness and performance (McLaughlin, 2017). In a report by Digitaliseringskommissionen (2016) it is stated that markets are not only affected by fast technical innovation, but also the fact that a certain geographical position no longer certifies a competitive advantage. Further, the report shows that this puts new demands on transforming their current business for established companies, to be able to keep up with the competition. Even though this means new threats, it also comes with new opportunities as companies can reach new markets and target new customer segments. Digitaliseringskommissionen (2016) further state that, to adapt and manage these changes, organizations will face new demands and requirements on what prerequisites must be "in order" within the corporation. For example, digitalization will place higher demands on the companies' abilities regarding continuous development and knowledge spreading, as these capabilities will become increasingly important for sustainable competitive advantage (Svenskt Näringsliv, 2016).

With all these new terms and conditions on businesses and their ecosystems, Kääriäinen *et al.* (2017) claim that it is crucial to adapt, embrace and integrate digitalization to be able to keep up and comply with the changing competition and business climate. Further, they state that, in this digital era, there are almost endless of digital solutions, tools, technologies and trends and many companies experience trouble receiving the desired effect from digital ventures. Investing in these digital ventures and creating a more digital business requires changes in the business itself as well as the strategy, according to Kääriäinen *et al*. (2017). It may also change the role individual companies take, from traditional supply chains to more complex networks (Svenskt Näringsliv, 2016). In a report by the Swedish Royal

Academy of Science, IVA (2017) it is stated that, even though companies still need both suppliers and customers, these actors are more involved and can thereby have higher demands, but they can also be used as a partner of innovation. The report further state that, not only does new and more targeted businesses occur, offering a share of the traditional value chain, but the need to cooperate with your competition to develop the most favorable good or service for your customer is becoming more central. Many companies realize that they can use each other and be stronger together, not saying they merge, but they learn to see what use they can have of each other to make the best offer for their individual purposes, according to IVA (2017). To handle these changes, require both digital technologies backed up by organizational changes (Jacobi & Brenner, 2017). This type of complete transformation to a digital corporation is called a digital transformation (Schwertner, 2017; Bloomberg, 2018; Kääriäinen *et al.,* 2017). This study is based on the assumption that, carrying out major changes like this and obtain maximum effect of the digital venture and simultaneously retain the core business, will be facilitated by obtaining digital capability. In this report, digital capability refers to the ability to manage digital work and digital technology to support and develop the performance of the overall business objectives. If the organization is unable to manage the digital technologies and direct the digital work to support and develop existing strategy, processes, workforces, communications and so on, the efforts to digitally transform the business will be random, and the success will be uncertain. This is in alignment with findings by McLaughlin (2017) who claims that due to the importance of retaining the original value, business leaders must keep in mind that the digitalization itself has no value but is a mean to accomplish and support something else. Hence, it must align with the overall company strategy.

The challenge to align and adapt the organization due to strategic change related to digitalization efforts is a current issue that many companies are facing today. How to manage this in a long-term sustainable manner will be further investigated in this report.

1.2 New demands and requirements on organizations due to digitalization

Today, the opportunities for digital transformation – the transformation of business and strategy through digital technology and organizational changes (Bloomberg, 2018; Schwertner, 2017; Kääriäinen *et al*., 2017) – are greater than ever and there are more different digital solutions on the market than ever before (Kääriäinen *et al.*, 2017; McLaughlin, 2017). However, many companies fail to see the potential of digital transformation, and many of those who do see the potential still struggle to make enough organizational changes in habits and ways of working to be able to capture the maximum benefits of the digital efforts (Kääriäinen *et al.,* 2017). A common reason for digital transformation efforts to fail is that the leaders do not create the right sense of urgency for managers to direct their focus and letting them know how to act (Fitzgerald, Kruschwitz, Bonnet & Welch, 2013). Another common reason for organizations to experience difficulties in their digital transformation is the workforce themselves (Jacobi & Brenner, 2017). According to Schwertner (2017), the main obstacles in regards of digital transformation are human factors, such as inertia and resistance to change, lack of knowledge and good practices, and a lack of motivation and risk-taking. Besides, according to findings by Schwertner (2017), there are risks regarding the wider adoption of digital technologies such as data security issues, lack of interoperability with existing systems and lack of control. The risk of IT security is often perceived to be the main obstacle and insecurity when it comes to developing and integrating digital technology and digitally transform companies and societies (Energiforsk, 2019; Digitaliseringskommissionen, 2016). If these risks are avoided and digital technology is implemented in a way that supports the overall strategic and operational objectives of the firm, then it can have a significant and positive impact on organizational performance (McLaughlin, 2017). This need for organizations to better align digital technology to their overall performance is demanding firms to re-think how they view and implement technology in a way that builds a capability for the organization on a holistic level (Kääriäinen *et al.*,

2017; McLaughlin, 2017). Having the latest technology is no longer a key to success on its own, it is how the technology is used to support the overall business that will determine the success achieved (McLaughlin, 2017).

To manage these challenges, it is of high importance to understand what options and opportunities are out there, and at the same time be fully aware of the internal capabilities and prerequisites (Teece, 2007). Factors like strategy, company goals, customers, financial capacity and internal processes are all important aspects of digital transformation (Kääriäinen *et al.*, 2017; Jacobi and Brenner, 2017, Teece, Pisano & Shuen, 1997) and will all affect what possibilities on the market can be turned into opportunities for the specific organization. When those conditions are matched with the right digital solution, a strategic fit is found (Teece, 2007) and the chance of successful digital ventures increase. Finding the opportunity, or collecting a lot of information, data and ideas, is of no use or value if it is not incorporated in the business and aligned with the company strategy (McLaughlin, 2017). Organizations must have routines to easily implement new ideas and innovation in the organization yet remain flexible and open to continuous change (Jacobi & Brenner, 2017). In today's dynamic and fast-moving world, technologies evolve fast (Digitaliseringskommissionen, 2016). Sometimes new changes and requirements cannot be applied directly into the original methods of the corporation. To manage the question of when to integrate parts of new ideas and technologies, and when to develop completely new structures and routines to retain and develop new value is therefore crucial (Teece, 2007). To manage these issues, and thereby develop organizational prerequisites that facilitate managing a digital transformation, this study is based on the assumption that organizations should develop a so called dynamic digital capability. The concept of dynamic digital capability is defined by the authors of this report as *"the ability to manage digital work and digital technology when developing a business and its strategy"*. Hence, developing dynamic digital capable means having the ability to manage digital transformation successfully.

One possible approach to examining how an organization can to do all this is through the theory of dynamic capabilities. The phenomenon of dynamic capabilities was first expressed by Teece, Pisano and Shuen (1997), aiming to explain how firms achieve and sustain competitive advantage. The dynamic capabilities framework focuses on the actions taken by organizations to change their resources to continuously adapt to, and build competitive advantage in, a changing environment (Teece, Pisano & Shuen, 1997). According to Teece (2007), the performance of an organization is to some extent determined by the external aspects regarding the market's reaction towards their business propositions, but the development and usage of internal dynamic capabilities is the main reason behind an organization's success or failure. Further, he claims the dynamic capabilities do not only allow the company's internal resources to adapt to changing demands, but they also seek to shape the firm's surrounding environment through innovation. Therefore, this study is based on the assumption that companies that are able to create and retain dynamic capabilities are more prepared and better suited to manage a changing environment and adapt to new technologies. Not only is it a way to navigate in today's fast-paced digitalization of businesses, but it also facilitates adapting to new changes that may occur in the future. However, the second part of the description of dynamic capabilities regarding shaping the surrounding environment has been left outside the scope of this study due to its inter-organizational aspect.

Many studies have been performed regarding which dynamic capabilities are required generally, and others, such as Fisher, Gebauer, Gregory, Ren and Fleish (2010), Kindström, Kowalkowski and Sandberg (2013) and Den Hertog, van der Aa and de Jong (2010), has explored how they differ for service businesses. However, there have only been a few studies performed regarding the dynamic capabilities required to manage digital transformation specifically. Further, previous studies, for

example by Yeow, Soh and Hansen (2018) and Karimi and Walter (2015), are still at an abstract level and therefore it is hard for business leaders to know what must be in place in the organization in order to "start digitalizing". Schwertner (2017) state that actions and prerequisites required to perform a digital transformation are similar for all industries. What differs, he claims, is the flow of activities and how fast the companies are transforming. This will also depend on the company's digital maturity (Jacobi & Brenner, 2017; Schwertner, 2017). Digital maturity can be used for companies to evaluate how far the company has gone in their development of digital capability (Deloitte, 2018). According to Hägg and Sandhu (2017), digital maturity may differ not only between companies and industries, but also between different departments as well as processes within a company. However, in this report, when sometimes lifting the question of digital maturity affecting the findings, it is referred to a digital maturity on a company-wide level. Further, although discussed, to investigate exactly in what order actions should be undertaken depending on the digital maturity level is left to future studies as it is outside of the scope of this report.

In this report, specific activities, routines and other distinctive components of dynamic capabilities – from now on referred to as microfoundations, in accordance to Teece (2007) – that facilitate for companies to develop dynamic digital capability will be investigated, within the context of companies facing digital transformation. By doing so, it aims to fill the gap in literature regarding dynamic capabilities for successful digital transformation. In addition, this study aims to provide valuable insights and contribute to previous theoretical studies, by adapting and concluding previous research within the fields of digital transformation and dynamic capabilities to provide an overview of what organizations should focus on when it comes to managing digital transformation. Further, digital transformation is not a one-time change and cannot be viewed as an exception, but instead change shall be considered the corporate norm (Jacobi & Brenner, 2017). To develop a dynamic digital capability is therefore considered a prerequisite to manage digital transformation. Further, digital transformation is not a one-time change and cannot be viewed as an exception, but instead change shall be considered the corporate norm (Jacobi & Brenner, 2017). To develop a dynamic digital capability is therefore considered a prerequisite to manage digital transformation.

1.3 Purpose and research questions

The aim of this study is to develop a generalizable framework enabling companies to build and embed dynamic digital capability into the organization. In order to develop dynamic digital capability, the first step would be to define what being digitally capable really means. Therefore, the digital capability will in this report be disaggregated into a set of critical factors needed to achieve successful digital transformation. By identifying factors that are critical, assessing what factors a company has and what factors they lack and should thereby focus on obtaining, will be facilitated. This will be investigated in within the frame for research question one:

> **RQ1: What critical factors of digital capability enables successful digital transformation?**

By applying the concept of dynamic capabilities to these critical factors, a set of specific microfoundations will be investigated within each factor. These microfoundations enable the development of the critical factors that the organization lack, by together building the critical factors in a dynamic way. If organizations implement these microfoundations in their organization, it will facilitate developing and embedding dynamic digital capability over time which is important in order to continuously manage changes regarding the digital transformation in a successful way. Hence, the second research question is formulated as:

RQ2: What dynamic capability microfoundations facilitates building dynamic digital capability?

1.4 Model of analysis

To be able to fill the gap in literature regarding specific dynamic capabilities for digital transformation, this study has been based on the model of analysis presented in Figure 1. The idea is to investigate how the concept of dynamic capabilities can be used to build dynamic digital capability and thereby achieve successful digital transformation.

In order to get an understanding of how dynamic capabilities microfoundations can be used to achieve digital transformation, a thorough scientific understanding of the two theoretical areas of dynamic capabilities and digital transformation is required in order to know what enables the transformation, that is the dynamic digital capability, and how it is built.

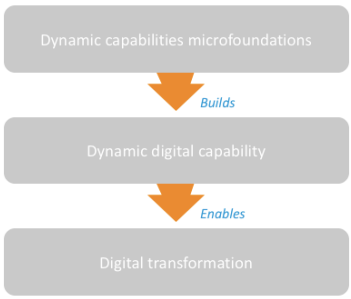

Figure 1. Model of analysis.

1.5 Disposition of report

The disposition of this report will be based on the research questions and is presented in Figure 2. Therefore, the report starts off with an approach and methodology chapter. This is followed by a frame of reference that lay the foundation for a verifying empirical chapter, and after this an analysis within the area of digitalization is performed to answer the first research question. The result from the first analysis lay the groundwork for the frame of reference as well as the empirical chapter within the area of dynamic capabilities, and a final analysis of both theoretical and empirical findings from this area follows. Lastly, the results and conclusions of the report will be presented.

Figure 2. Logic and disposition of the report.

2 Approach and methodology

The aim of the methodology chapter is structured according to guidelines by Chalmers University (2010), arguing that an ideally described method should enable anyone with basic knowledge within the given research area to redo the entire study and achieve the same results. The ambition when writing this report was to make it clear and easy to follow for the reader. To illustrate the findings and the evolvement of the study, summarizing figures and tables have been used frequently, in accordance with recommendations by Eisenhardt and Graebner (2007).

2.1 Research design

The research design for the study is visually presented in Figure 3.

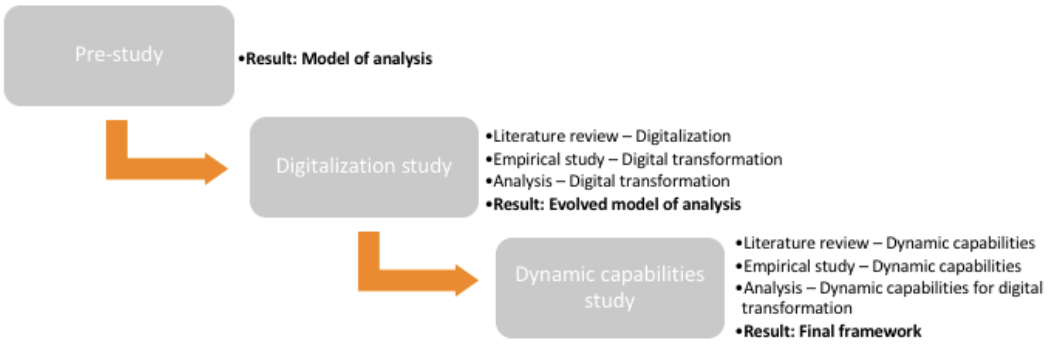

Figure 3. Research design.

The design of the model of analysis led to the decision to divide the study into two parts and to perform the analysis and fulfill the purpose of the study iteratively. It was also decided that a case study would be performed to verify the theoretical findings in order to answer the purpose and research questions. The first part of the study started off with a literature review, where the area of digital transformation was investigated. Based on this, critical areas for digital transformation, as well as factors within these areas, were identified. The identified factors were the focus of the empirical study regarding digital transformation. The findings from this empirical study were then analyzed in relation to the theoretical findings. This analysis resulted in an evolved model of analysis that lay the foundation for the second part of the study. A literature review of dynamic capabilities was the starting point for the second part of the study where microfoundations of the critical factors were theoretically identified. In the next step, a second empirical study, this time regarding dynamic capabilities, gave further input to microfoundations of the critical factors. A final analysis of the findings from this empirical study compared to the secondary literature review was conducted. The result of this analysis made up the final framework of microfoundations needed to obtain dynamic digital capability. Each area will be motivated and further described within the separate sections below.

2.2 Pre-study

A pre-study was performed to collect information and get an understanding of the two main theoretical areas for this study, digitalization and dynamic capabilities, and the connection that could be made between them. The academic aim of this report was to identify and fill the gap between the theoretical topics of digitalization and dynamic capabilities. The information in the pre-study was primarily collected from theoretical literature studies at the Linköping university online library page as well as Google Scholar, but also from research reports and newspaper articles found online. As all sources of information were not scientifically reviewed, the scientific depth in the pre-study might be arguable. To

cope with this risk, research reports and online newspapers were chosen carefully, by comparing information from different sources and evaluating the author, authority and publisher of the information in accordance with recommendations of Alexandersson (2016) regarding online sources. In addition, a semi-structured interview – meaning the questions were formulated in advance but follow up questions were allowed (Denscombe, 2010) – with a digitalization and innovations expert at Ericsson was held in order to get a wider understanding of the area and confirm the researchers' perception of the problem background of the study. The interview was held via Skype and lasted for about one hour. It should be noticed that there is always a risk with interviews regarding that respondents might misunderstand the questions and thereby give irrelevant answers. By using semi-structured interviews where questions were carefully prepared in advance, this risk was reduced (Sjöström, 2018). However, according to Sjöström (2018), follow-up questions are allowed to be spontaneous in semi-structured interviews, whereas the risk of misunderstandings partly remains. The alternative would have been to use structured or unstructured interviews. Structured interviews refer to having tight control over the format of the questions and the answers (Denscombe, 2010). In a str§1uctured interview, the researchers decide in advance what specific questions to ask and in what order (Sjöström, 2018). This structured approach is more often used in quantitative studies like surveys handed out to a larger number of respondents (Denscombe, 2010). Unstructured interviews, on the other hand, refers to interviews where the interviewer is supposed to be as un-intrusive as possible, giving emphasis to the interviewee's thoughts (Denscombe, 2010). Denscombe (2010) claims however, that semi-structured interviews are best fit as a method when they are applied to the exploration of more complex phenomena where the researcher need to gain insight into things like people's opinions, feelings and experiences, which was the case in this study. To avoid misunderstandings, the interview questions were sent ahead of the interview to make sure the respondent understood the purpose of the interview and was offered the possibility to reflect over the interview areas in advance. This approach was chosen in order to gain as much information as possible from the pre-study interviewee. The information collected, together with the prerequisite guidelines given by Propia, resulted in the purpose of this study, the research questions and an initial model of analysis. According to Eisenhardt and Grabner (2007), the method of how to conduct the study shall be depending on what question is supposed to be answered. Inductive qualitative research is suitable to answer research questions in terms of "how", not "how many" (Eisehardt & Graebner, 2007). Inductive studies are a commonly used strategy in studies aiming to build theory (Thomas, 2006), and was therefore considered a good approach for this study. Although Thomas (2006) mean the inductive approach is not as strong as some other qualitative analysis approaches as it limits the findings to the most important results, it does provide a simple and straight-forward approach deriving trustworthy results. In addition, it is suitable when researchers lack an in-depth understanding of the subject and can thereby not take a specialist approach (Thomas, 2006), which was also the case in this study. As the research questions for this study was formulated in terms of "what [...] are important" but did not intend to describe their relative importance, the inductive qualitative research method was considered appropriate for this study. In order to answer the research questions formulated, and thereby fulfill the purpose of this report, a model of analysis was created.

2.3 Literature review

Literature review regarding the area of digitalization

The literary sources in the literature review were primarily collected from the Linköping university online library. The terms used as main keywords when searching for relevant articles and books were all connected to the topic of digitalization. The keywords used are listed below:

- Digitalization
- Digital transformation
- Digital development
- Digital revolution
- Digital disruption
- Digital capability

17 scientific articles and 12 research reports from sources considered trustworthy were used within the topic of digitalization. The information collected from these sources was used to formulate a theoretical foundation for the first part of the study. The process of selecting which articles to include in the study started with first reading the abstract of each article in order to determine whether the article seemed relevant with regard to the main topics of this study. If the abstract of the article did not cover the relevant requirements, the article was rejected. There is always the risk of missing out on relevant information and theories when using this approach, as there might be information that would have been useful for this study that was not mentioned in the abstract. In some cases, the articles that first seemed relevant by their abstract was rejected later in the screening process when the researchers had started reading the article but then realized that they were not applicable to the main topics of this study. Furthermore, the articles within the subject of digital transformation mainly focused on identifying difficulties and success factors regarding digitalization or digital transformation in organizations. When more than one source claimed the same thing, that information was considered more trustworthy and certain, a strategy in agreement with recommendations by Alexandersson (2016). Further, as the topic of digitalization is a relatively new topic that develops quickly in terms of theoretical research, the time of publication of the articles or reports were kept in mind when comparing different sources of information to each other. However, the chosen articles were all relatively new, and the findings from different authors was compared in order to confirm their relevance. This literature review facilitated structuring the different terms and concepts within the topic and identifying relevant definitions for this study. By identifying the different definitions, the researchers could delimit the study regarding digitalization to only looking at digital transformation, meaning that the study only focused on the transformation of business and strategy through digital technology and organizational changes.

After gathering articles on digitalization and delimiting the study to regard digital transformation, three main areas for digital transformation, *Leadership & Vision*, *Culture & People* and *Corporate Structure & Processes*, were chosen based on the article How Large Corporations Survive Digitalization by Jacobi, R. and Brenner, E. (2017). To confirm the theoretical relevance of these areas, all articles within the topic of digital transformation were run through once more. This was done to verify the areas and further to identify critical factors within them. This time, searches were conducted on the keywords for each of the three main areas:

- Leadership
- Vision
- Culture
- People
- Structure
- Process

The information stated on each term in all articles regarding digital transformation was collected and clustered to find the key notes on what factors were considered critical to achieve digital transformation and how they should be formulated. This approach was chosen to verify that the areas were of importance, which they were considered to be if the same terms reoccurred in most articles. It was not

taken into consideration how many times the terms reoccurred within the different articles, only the fact that the same denominators were used independent of the specific focus area of the articles was considered relevant.

Literature review regarding the area of dynamic capabilities

Just like the first literature review, sources were collected mainly from the Linköping university online library. The literature review focused on the topic of dynamic capabilities. The terms used as the researchers' main keywords when searching for relevant articles and books were all connected to this topic. The keywords used are listed below.

- Dynamic capabilities
- Capabilities for change
- Strategic change

16 articles within the topic of dynamic capabilities were studied. The process of selecting which articles to include was based on the same strategy that was used for the articles within the topic of digitalization. The information collected from these sources was used to formulate a theoretical foundation for the continued study and to connect the topic of dynamic capabilities to that of digital transformation. The articles within the topic of dynamic capabilities mainly focused on identifying aspects needed to cope with continuous change development in organizations, as well as maintaining flexibility and adaptiveness. However, few articles were found that directly connected the two main topics to each other which supported the fact that there is a gap in literature and proved the relevance of this study in its aim to fill this gap. Therefore, when reading articles on dynamic capabilities, the perspective of digital transformation was constantly kept in mind to identify potential intersections and overlaps. The articles that focused on dynamic capabilities in regard to digital disruption or digitalization, Karimi and Walter (2015) and McLaughlin (2017), were used as inspiration for this study. It is important to note that the aim of this study, opposed to the previously mentioned studies, was to develop a generalizable framework that is applicable for organizations that are to go through a digital transformation. A search for the keywords within the three areas found in digital transformation literature was conducted to make sure that the areas were referred to in the dynamic capabilities' articles, see the keywords below:

- Leadership
- Vision
- Culture
- People
- Structure
- Process

The theory of the dynamic capabilities' framework was also applied to the findings of the key areas of digital transformation, to examine how the dynamic nature of the findings could be secured.

In dynamic capability literature, the concept of microfoundations is well-known. Microfoundations refers to activities, routines and other distinctive components that together build the dynamic capabilities in the organization. A common disaggregation of microfoundations, that was also applied in this study, are the three capacities *sense*, *seize* and *reconfigure* as originally defined by Teece (2007). Therefore, the next step was to find microfoundations in dynamic capability literature that, if implemented, were assumed to enable companies to build the critical factors for digital transformation. By obtaining the critical factors consisting of dynamic capability microfoundations, companies will according to the combination of these theories obtain dynamic capabilities that enables successful digital transformation – hence achieving a dynamic digital capability.

In order to find the microfoundations for each factor, the dynamic capabilities literature articles were run through once again. This time, searches were made on keywords such as:

- Microfoundations
- Sensing
- Seizing
- Reconfiguring

This approach aimed to identify the articles in which specific microfoundations were proposed. This occurred in eight of the articles. The microfoundations found in these articles were then collected, listed and then clustered based on their similarity to the critical factors. For the theoretical findings within each factor, the microfoundations were categorized within the terms of sense, seize and reconfigure. These were considered microfoundations that could build up the critical factors in a dynamic manner.

2.4 Empirical study

Since the aim of this study was to develop a new context connecting two different theoretical topics to each other, case studies were performed. This was due to case studies being an acknowledged method for building theory, according to Eisenhardt and Graebner (2007). They claim that a case study is a research strategy where one or more case companies are used to illustrate a theory or proposition with empirical verifications.

The empirical study, following the logic of the rest of the study, consisted of two parts. This report was based on qualitative methods. This was due to the fact that the purpose was to collect information to create a new context, hence the method of collecting information needed to be flexible. The reason for not using quantitative methods in this study was because of the limited number of cases and respondents and because of the complexity of the empirical collection. The methods used were interviews, website studies and document studies, which are all qualitative according to Denscombe (2010). He further suggests that these are all tools to help the researcher get a clearer picture of things, an accurate measurement of facts and evidence about the subject in matter. The empirical study was thereby based on primary data, which refers to first-hand information collected by the researchers themselves (Sjöström, 2018). In addition, some secondary data in terms of existing documents from the case companies were used to collect information.

Selection of source for the digitalization study

To verify the three main areas as well as the critical factors of digital transformation found in literature, a workshop was held at Propia. The selection of Propia as a case company for this part of the empirical study was due to the reason that a consultancy firm seemed ideal as they have plenty of experience, related to digitalization, from different types of projects and organizations within a variety of industries. This was desired in order to develop a generalizable framework, suitable for most companies independent of for example size, industry and digital maturity level.

Approach of the digitalization study

The workshop approach goes in line with what Denscombe (2010) call focus groups. This approach puts emphasis on the interaction within the group, as a mean of eliciting information, rather than the researcher leading the discussion which is usually the case during traditional interviews. This approach was chosen due to the wanted focus on the consultants lifting examples of experiences related to the critical factors. Seven consultants attended the workshop, see Table 1, which was an ideal number according to Denscombe (2010) because this is assumed to be a large enough number to allow a range of views and opinions to be present among the group but not too large as to be unmanageable in terms of the discussion.

Table 1. Participants of the workshop regarding digitalization.

	CEO	Head of Consultants	Management consultants
Number of participants	1	1	5

It is good to bear in mind that a risk with the interview- or workshop approach is that the interviewees might leave some aspects of information out from their answer, especially as the questions regarded examples from the past and the respondents might not remember the exact event (Yin, 2009). Further, the given response might favor the person interviewed or that person's business. These aspects might to some extent have affected the quality of the empirical study. The workshop was divided into two parts and lasted for about one hour. The first part was a brainstorming session, where the consultants were asked to write down anything that they considered important prerequisites in order to digitally transform the organization on post-it notes. The aim of that first part was to verify the three areas found important for digital transformation in the model of analysis. The second part was more of a discussion seminar, where the consultants were first divided into three discussion groups, one group for each area. The groups were then asked to write down experiences related to the factors within their given area. The groups were not given background or detailed information about the factors which might have led to misunderstandings of what the theoretical factor concerned. However, this approach was chosen to encourage open discussion so that the respondents could give as objective answers and examples as possible. This approach was considered favorable as the study of this report is of exploratory nature. When writing down their examples, the consultants were to write a 1 on the note if the example originated from an experience regarding digital transformation or digitalization projects, a 2 if the example originated from an experience regarding general organizational change projects and a 3 if they did not have a specific example but believed and could argue that the factor discussed would be important for digital transformation. The group discussions were followed by a joint discussion around the factors for each area where the consultants had the opportunity to present their findings and give input to factors within the other groups' areas. This final discussion was also recorded for the researchers to be able to control and verify what was said if needed later.

Selection of source for the dynamic capability study

Helfat, Finkelstein, Mitchell, Peteraf, Singh and Teece (2007) claim that empirical studies are required in order to truly understand dynamic capabilities and to be able to develop a model that captures the specific market dynamics. This was considered to further add to the importance of this study being performed, by aiming at and looking specifically into companies that are going through a digital transformation. The second empirical study was performed at the case company Tekniska verken.

To verify if the, in the literature of dynamic capabilities, identified microfoundations were important to build the critical factors for digital transformation, interviews were held at Tekniska verken. The selection of Tekniska verken as a case company for this empirical study was mainly because the energy industry is facing the challenge of digital disruption (Energiforsk, 2019; Energifork, 2018; Roland Berger, 2015) and Tekniska verken, as an important local actor in the energy industry, would therefore be interesting to study in regard to investigating organizational prerequisites for digital transformation. According to Eisenhardt and Graebner (2007) and Yin (2009), when performing a single-case study in order to build theory, the case company must offer opportunities for unusual research access or in some way be extreme, which Tekniska verken was considered to be both due to their industry and their current facing of digital transformation. A single-case study was chosen as approach because of the ambition to collect a lot of information in order to get a holistic view of the routines and activities in the organization, which was preferred over getting a brief insight in several different companies. The

holistic view was required as the identified factors and three main areas of digital transformation regard the entire organization and its management as well as its design and structure. In order to get a more generalizable view it would be preferred to get a holistic view on more than one company which would require a multiple case study, but this would have been too time consuming and did not fit within the extent of this study but will be left to future studies. In addition to this, Tekniska verken are an important customer for the employer of the mission of this report, Propia, and the availability of information was therefore secured. However, considering that the aim of the study is to develop a generalizable framework for developing dynamic digital capability independent of organizational specific factors such as size, industry affiliation and digital maturity, the choice of the case company for this part of the empirical study was quite flexible.

Approach of the dynamic capability study

The empirical study at Tekniska verken was exploratory, as it revolved around exploring which microfoundations were currently in place, and which were considered important to have in place, at the case company. Therefore, the questions in the interview template mainly focused on how and why the critical factors were considered important for digital transformation and how they were accomplished in the given context. Further, the interview template involved background questions regarding how long the interviewee had been working at the case company as well as their specific tasks. The information collected from these background questions were then considered when interpreting the interview answers, in accordance to Bryman and Bell (2013). The interview template can be found in Appendix 1. Since the fundamental focus was exploratory, interviews were the main method used and semi-structured interviews were held in accordance to theory by Denscombe (2010). Nine interviews were held at Tekniska verken. The interviewees were from corporate management level, business unit management level and department management level and the respondents also had different extent of insight in the digital transformation work within the organization, see Table 2, and the interviews lasted for approximately 60 minutes. The interviewees were chosen based on recommendations from Propia consultants that had previously been, or are currently, working on projects at Tekniska verken, to get different perspectives and provide an as wide and overarching view as possible. Hence, the respondents were representing different hierarchical levels, business units and so on. This is recommended by Eisenhardt and Graebner (2007) to make sure that the study does not provide a biased perspective.

Table 2. Respondents participating in interviews regarding dynamic capabilities.

	Top management level	**Manager**	**Department level**
Involved in the work with digital transformation on a corporate-wide level	1	1	1
Not involved with the work with digital transformation on a corporate-wide level	--	4	2

The interview questions were not sent to the interviewees in advanced which might have increased the risk of misunderstandings of the questions asked or the risk of information being left out from the answers. However, this approach allowed the interviewees to speak freely and it increased the likability that the answers were top of mind, according to Bryman and Bell (2013). In addition, the iterative process of this study, where the critical factors were already established when performing the interviews on Tekniska verken, ensured the right questions were asked. Both researchers attended all interviews, where one of the researchers mainly asked the questions while the other mainly focused on taking notes. The interviews were held in Swedish and the noted answers were later translated by the authors of this report, hence there is a risk that some of the given information might have been lost in translation. The

aim of the interviews was to collect empirical information about which microfoundations could be identified to build the critical factors.

2.5 Analysis of findings

Analysis of the digitalization study

The results from the primary empirical study were analyzed together with the theoretical findings on digital transformation to be able to answer the research question ***RQ1: What critical factors of digital capability enables successful digital transformation?***

The findings from the brainstorming part of the Propia workshop was analyzed by nesting the notes and categorizing them within the three areas. The aim was to decide whether the three areas could be empirically verified, modified or disconfirmed as important for digital transformation. All notes that could be categorized within the three areas, were considered to verify the importance of the areas and therefore were found to support the model. All notes that could not be directly referred to one of the areas were analyzed separately to see if they had some similarities. A common ground for these notes was found, and therefore, an analysis was conducted to decide whether they should be added as a fourth important area, or in other ways integrated in the original areas, and thereby modify the original model, or if these notes would imply a disconfirmation of the original model.

The findings from the discussion part of the Propia workshop were compiled and analyzed depending on their grade of relevance. Examples that were graded with the number 1, stating when and how a certain factor had been important for a digital transformation or digitalization project, were considered to empirically verify the factor. For examples that were graded with the number 2, stating when and how a certain factor had been important for another type of organizational change, their relevance to digital transformation was taken into consideration before they were considered to empirically verify the factor. Examples that were graded with the number 3 were not considered to verify a factor. However, if they were in line with what was stated in theory, they were not considered to provide any reason for disconfirming or modifying the factor. If an example of any grade had an interesting new point of view and brought a new dimension to the theoretical factor, it was analyzed whether the factor should be somehow modified. If no example were found for a certain factor, it was considered to imply that the factor should be modified or disconfirmed as critical for digital transformation. However, the theoretical findings were considered to outweigh the empirical findings, due to the higher credibility because of their profound evaluation in order to be published in a scientific article. Therefore, the researchers were careful to modify factors on empirical grounds without making sure that the empirical findings were supported by theory.

The results from the primary analysis were a number of critical factors for digital transformation that together answer the first research question. These critical factors were collected in and build up the evolved model of analysis that guide the second part of the study.

Analysis of the dynamic capability study

The results from the secondary empirical study at Tekniska verken were analyzed together with the theoretical findings on dynamic capabilities microfoundations to be able to answer the research question ***RQ2: What dynamic capability microfoundations facilitates building dynamic digital capability?*** The theoretical findings were assumed to outweigh the empirical findings, due to the higher credibility because of their profound evaluation in order to be published in a scientific article. However, since this study concerns the specific context of companies facing digital transformation, the importance of the empirical findings should not be undermined since they are investigated within that given context, as opposed to the theoretical findings.

An important aspect of the secondary analysis was to interpret the answers given by the interviewees and decide whether they were really considered to be microfoundations. The interviewees were asked open-ended questions were the specific terms used in the theoretical microfoundations were not mentioned. Therefore, interpretations of the interviewees' answers in terms of the connection to the microfoundations were made. This might be a source of error thus it could have resulted in biased interpretations by the authors of this report.

The empirical findings were analyzed related to the theoretical findings. If the aspects discussed in theory were also found empirically, the microfoundation was considered empirically verified. If aspects found in theory was not found in the empirical study, it was analyzed whether the microfoundation would be beneficial to obtain and if so, it was considered important. When many respondents experienced a problem within the organization, it was taken into consideration whether this could be related to the lack of one or more microfoundations identified in the theoretical study. If the interviewees described specific routines, roles and activities and why they were experienced as important for their digital transformation and enabled the critical factor discussed at the time, that example was given more weight in regard to verifying the microfoundation's importance rather than if the interviewee could only imagine specific routines or activities that the respondent believed would be important for building that factor. When performing the analysis, all the respondents' answers were analyzed together and when different respondents were of different opinions the idea closest to the one in theory were given more substance.

The results from the secondary analysis were a number of dynamic capabilities microfoundations in terms of sensing, seizing and reconfiguring that build up the critical factors for digital transformation. Together they answer the second research question. These microfoundations were collected in and built up the final framework that is the result of this study.

2.6 Research Validity, Reliability and Objectivity

Validity, reliability and objectivity are three aspects regarding the quality and trustfulness of research studies (Sjöström, 2018). Sjöström (2018) states that validity and reliability are related to each other, validity assumes reliability. That means that the study must be reliable in order to be valid. Further he argues, the right conclusions, in line with the purpose and research question, can only be drawn if a study has validity and reliability. The following section explains what actions were taken to ensure the quality of this research.

Validity can be described as the extent to which the authors measure what they intend to measure (Sjöström, 2018). To achieve validity, an extensive pre-study of digitalization and dynamic capabilities was conducted to get as much knowledge on the subject as possible. Furthermore, when collecting empirical data in the second empirical study of the case company, several people in different positions in the company were interviewed in order to create a holistic image of the company's way of business. By performing several deep and thorough interviews with people with different perspectives from the organization, their answers could be compared, and the holistic view and the validity of the study was ensured.

The aspect of reliability refers to the trustworthiness of the measurement instrument, to what extent the result becomes the same when the study is repeated (Sjöström, 2018). The reliability and generalizability of this study could be affected by the fact that only one case company was used during the completion of the study, hence, the context of this study might have had an impact of the theory built. However, the measurement instrument was mostly based on a thorough literature review regarding digital transformation, which is considered to increase the reliability due to the scientific anchoring of those sources. Further, by describing explicitly how the case studies were conducted in

the method chapter, similar to what Gibbert, Ruigrok and Wicki (2008) refers to as a case study protocol, replicability is enabled. Another reliability issue of this report regards the fact that the provider of the mission to perform this study are consultants hired by the case company, hence the case company is a customer of Propia, which may have affected the respondents' answers during the interviews. This is something that was taken into consideration when performing the analysis, but the risk that the respondents were giving biased answers because of this issue is good for readers of this report to keep in mind.

Objectivity refers to the extent to which the author's values affects the results of the study (Sjöström, 2018). The objectivity of this study was enabled by comparing many different theoretical data sources when developing the critical factors, as well as microfoundations. These theoretical sources are all motivated in the *2.3 Literature review* section of the methodology chapter, which according to Björklund and Paulsson (2012) increases the objectivity by clarifying the choices made by the researchers. Further, the authors of this report were careful not to express any personal opinions when collecting empirical data. Additionally, all data sources have been candidly referred to and stated as given.

2.7 Ethics

In research, it is not only important to give an honest and candid view of the study and results, but there are also demands regarding the integrity of the respondents (Sjöström, 2018). According to the Swedish Research Council (2017), the researchers must stay objective and obtain a proper ethical approach during the study.

In all interviews, the respondent was informed of the purpose of the interview, the aim of the study and how their replies were to be used, according to ESOMARS rules (Sjöström, 2018). The interviews were voluntary, and respondents could terminate the interview at any time. No misguidance, such as financial compensation did occur before, during or after the interviews. If respondents wanted any type of compensation, they were informed when and where the results would be presented and that they were invited to listen and take part of them. In the final report, no respondents are named, and their specific position of the company were not mentioned in order to make them unidentifiable by third-party readers. The researchers took necessary measures to make sure no respondents were negatively affected by their participation in and contribution to this study. At the start of both the interviews and the workshop, all respondents were informed about the researchers and their objectives. The results were intended to objectively and detachedly investigate what facilitates building a dynamic digital capability. The result was not to be reflected in an advantage of any participating respondents, and nor was it to be used in any commercial purposes by the researchers.

3 Frame of reference regarding Digitalization

Digitalization is a widely discussed area. To get an overview, authors have tried to structure the field from different angles, resulting in a wide range of definitions. In this chapter, the definition and delimitations of this report will be explained. Thereafter, the area of digital transformation will be further examined.

3.1 Digitization, digitalization and digital transformation

One common way of distinguishing and structuring the digital world is by the intention of digital efforts. With this perspective, the focus lies on the concepts of *digitization*, *digitalization* and *digital transformation*. This area is debated in literature, and a final definition has not yet been widely accepted.

Most authors agree that there is a difference between digitization and digitalization (Kääriäinen *et al.*, 2017; Brennen & Kreiss 2014) and further, most agree with the definition of digitization by Gassman, Frankenberger and Csik (2014), claiming that digitization refers to the act of transforming analogue data to digital form. Only information can be digitized, not processes (Bloomberg, 2018). More twisted is the difference between the two terms digitalization and digital transformation, if there is one at all. Stolterman and Fors (2004) define digital transformation as the change digital technology cause in all aspects of human life. This is however what others (Kääriäinen *et al.*, 2017; Henriette, Feki & Boughzala, 2015) refers to as digitalization.

Zoulian and Bouza (2018) separate the three terms, arguing that digitization is transforming from analogue to digital, digitalization is digital changes to save money, such as improving efficiency, and digital transformation is digital changes to earn money, such as implementing new business models or reaching a new customer segment. Bloomberg (2018) also separates the terms, claiming digitalization is the transformation of business processes, and thereby business operations, using digital technology. Digital transformation, on the other hand, he argues, cannot be implemented through projects alone, but are customer-driven strategic business transformation and requires both organizational change and implementation of digital technology. To make a clear distinction he claims that: "*we digitize information, we digitalize processes and roles that make up the operations of a business, and we digitally transform the business and its strategy"* (Bloomberg, 2018). This goes in line with the definition by Kääriäinen *et al.* (2017), stating digital transformation to include changes in ways of working, roles and business offerings, that can be obtained through the adoption of digital technologies, either in the organization itself or in its business environment.

Jacobi and Brenner (2017) argue that digital transformation does not only require strong leadership and a clear strategy, it is also necessary to combine these with an experimenting and flexible culture and new organizational structures and processes. This is similar to the definition by Schwertner (2017) claiming that digital transformation means using digital technology to build new business models, processes, software and systems that in turn will generate more profits, greater competitive advantage and more efficient business. This, he claims, will be achieved by empowering the workforce and create new business models, but also to be more customer-driven and personalize the customer experience.

Based on the different definitions above, the three terms will be separated and defined in this paper accordingly:

- *digitization*: the transformation of information from analogue to digital
- *digitalization:* the transformation of business processes with digital technology
- *digital transformation:* the transformation of business and strategy through digital technology and organizational changes.

The research in this study will focus on digital transformation, as the aim of the study is to develop a framework for building digital capability for companies that will be effective over time and therefore be independent of specific digital technologies. Hence, a more complete transformation of strategy and business must be investigated.

3.2 Important areas for digital transformation

To be successful in a digital world, Jacobi and Brenner (2017) argue that companies must constantly develop their internal structures and build a strong culture around beliefs focusing on innovation, speed and agility. Change shall not be viewed as an exception but as the corporate norm (Jacobi & Brenner, 2017). They further claim that there is a difference between traditional change and a complete transformation including strategies and culture. This view is shared by Schwertner (2017) who claims that to perform a digital transformation the corporation needs a clear digital strategy and leaders who foster an innovative and risk-taking culture. Furthermore, Kane, Palmer, Ngyen Phillips, Kiron & Buckley (2015) argue that to be able to carry out a digital strategy, it is crucial to have the right culture, driven by the right leadership. To achieve a successful digital transformation, Jacobi and Brenner (2017) developed a framework consisting of three main areas which they claim are critical when it comes to succeeding with digital transformation: *Leadership & Vision, Culture & People* and *Corporate Processes & Structures*.

Leadership & Vision

This is what make up the foundations that must drive digital transformation (Jacobi & Brenner, 2017). The leaders must have knowledge about digital transformation, have the courage to change the organization and fight inertia. Beside this, Jacobi and Brenner (2017) claim that the leaders must have an organizational commitment. To achieve this, they mean, leaders must promote digital initiatives. Further, to know what initiatives to sponsor, they must create a digital vision, that in turn must be integrated into a digital strategy. The digital strategy shall focus on integrating the entire coordination, prioritization and implementation of digital activities into the firm (Matt, Hess & Benlian, 2015). Schwertner (2017) emphasizes the importance of the digital strategy to be clear, and Matt, Hess and Benlian (2015) point out that it must be aligned with and supportive of the overall company strategy. The digital strategy shall focus not only on actions like investments but on the entire core value chain including support processes. According to Fitzgerald *et al*. (2013), one of the main reasons for digital transformation efforts to fail is the lack of sense of urgency for managers to achieve digital transformation, as their leaders do not provide a vision and a road map for digital transformation. Beside this, according to Jacobi and Brenner (2017) is for the executives to communicate the vision to all employees, and anchoring it in the organization, starting at board level. To have a CEO advocating digital transformation will not receive much effect on an operational level unless the second and third level managers share this vision (Jacobi & Brenner, 2017; Matt, Hess & Benlian, 2015; Fitzgerald *et al*., 2013).

Culture & People

One of the main issues related to any organizational change, including digital transformation, is regarding human factors such as minimizing employee resistance (Schwertner, 2017). Jacobi and Brenner (2017) have identified that to be able to steer a company through a digital transformation, the company culture must encourage its people to take chances, be creative, respond to new ideas and be willing to take risks. They claim that to be able to keep up with fast-changing demands, even large companies must foster creativity and innovation, creating an entrepreneurial environment. The importance of leaders fostering a new culture is well supported in literature (Schwertner, 2017; Kane *et al.*, 2015). One challenge when it comes to digital transformation is the workforce themselves,

according to Jacobi & Brenner (2017). Further, they claim that, in most enterprises, there is a mixture of young newcomers and elder and more experienced employees. These two groups, and all in between, must be combined and challenged towards the same goal. Going through a digital transformation does not mean changing the entire workforce of old employees to new IT-interested ones. Jacobi and Brenner (2017) suggest there must be individual digital goals, investments in education and digital knowledge development for all employees. For this to be successful, they claim, leaders must set the right incentives. They must also be able to attract those young people with the right competencies. With all industries and businesses going through the digital transformation at the same time, the talent is highly coveted, and it is the employees' market. Further, employees across all age groups want to work at companies that are committed to digital progress and therefore employers must be able to live up to new demands and expectations regarding their job offerings which is important for leaders to bear in mind (Kane *et al.,* 2015). Hence, it might be crucial to attract and retain the best new talent which in the long run is critical to maintaining a competitive advantage. In order to attract talent, companies must, therefore, prioritize digital transformation as a mean to stay relevant (Kane et al, 2015).

Corporate Processes & Structure

Having strong leadership and an innovative culture with risk-taking employees is the drivers and implementers of the changes, but to be able to carry out those changes there must be a system where they can be implemented (Jacobi & Brenner, 2017). This is supported by Kääriäinen *et al.* (2017), arguing that digital transformation involves implementing digital capabilities and will impact both operational processes, resources and users. Schwertner (2017) claims that to obtain successful digital transformation it requires reengineering and optimization of business processes, that goes in line with the strategy. According to Jacobi and Brenner (2017), knowing when to pursue what changes and how to manage the changes and convincing all stakeholders it is the way to go, is what makes the digital transformation occur. But implementation of the digital strategy requires reforming the corporate processes and structures. To steer a more digital company and be able to use digital technology to create new forms of value, structural changes are often required (Matt, Hess & Benlian, 2015). This includes both how and where digital activities will take place and managing the effect it will have on existing products, processes and skills. Digital transformation requires the structures to change so that employees naturally think and act across functions. Digital technology can help elaborate integrated knowledge tools, information streams and communication processes throughout the organization, which in turn will make it faster, more adaptable and flexible to new demands (Jacobi & Brenner, 2017). Hence, working in agile teams are becoming increasingly common. Likewise, structuring the organization to be able to integrate new value from digital activities is important, according to Matt, Hess and Benlian (2015).

Based on the discussion above, the three areas developed by Jacobi and Brenner (2017) are proved to be supported also in other literature of digital transformation. Hence, the framework presented in Figure 4 has been used to build the evolved model of analysis.

Figure 4. Main areas for digital transformation according to Jacobi and Brenner (2017).

3.2.1 Theoretical discussion of factors within the three areas

Below follows a theoretical discussion within each of the three areas, leading up to new, modified success factors.

Leadership & Vision

Jacobi and Brenner (2017) define three factors within the area of *Leadership & Vision*:

- Create a digital vision and mission
- Anchor digital transformation at board level
- Install credible digital leadership within the organization

To achieve a successful digital transformation of an organization, it has to be clear to all employees what the goal with the digital transformation is (Schwertner, 2017; Kane *et al.*, 2015). According to Jacobi and Brenner (2017), the leadership must set up clear and measurable goals with the digital strategy and communicate these with a unified voice, both internally and externally. Fitzgerald *et al.* (2013) discuss the importance of having clear KPI's and do follow-up on the goals regarding digital transformation. Further, Kääriäinen *et al.* (2017) claim that a lack of an overall digital strategy is one of the most typical obstacles for digitalization. McLaughlin (2017) claim that without a clear digital strategy, there will be disagreements within the organization regarding what capabilities need to be developed in order to support aligned digital enablement. Kane *et al.* (2015) and Matt, Hess and Benlian (2015) also discuss the importance of a clear digital strategy. Another important aspect of digital transformation is to have a leadership that is driving the transformation (Kääriäinen *et al.*, 2017; Kane *et al.*, 2015). Karimi and Walter (2015) point out the importance of what they call Senior Management Support for innovation and digital transformation, an idea that is also supported by Fitzgerald *et al.* (2013) and Matt, Hess and Benlian (2015). Matt, Hess and Benlian (2015) claim that top management support is essential through the whole transformation process, since digital transformation strategies affect the entire company, and there may be resistance in different areas of the company. Jacobi and Brenner (2017) argue that to reduce resistance it is of high importance that the leadership is not only engaged in the digital transformation but also manages to install a credible digital leadership. In order to do this, it may be necessary to take advantage of the competence from the IT department, which goes in line with the statement of McLaughlin (2017) who talks about the importance of no longer seeing IT as only a separate business support function but as a mean of driving competitive performance across the organization as a whole. Matt, Hess and Benlian (2015) advocate the implementation of a CDO, Chief Digital Officer, to have the overall responsibility for the digital transformation. They claim that today there is no clear answer on which senior management should be in charge of digital transformation which can be problematic given that if a digital transformation strategy is approached half-heartedly, the organization risks to lose their scope with the digital transformation and may encounter operational difficulties. Jacobi and Brenner (2017) also propose the implementation of a CDO, or someone else explicitly responsible for the digital transformation, and they talk about the benefits of this person being part of the top management.

This discussion has resulted in the following identified critical factors to achieve successful digital transformation within the area of *Leadership & Vision*, as presented in Figure 5:

Figure 5. Critical factors to achieve digital transformation within the area of Leadership & Vision.

Culture & People

Jacobi and Brenner (2017) define four different success factors within the area of *Culture & People*:

- Establish a culture of open-mindedness and risk-taking
- Challenge and support existing workforce
- Reward risk-taking
- Become attractive to new talent

Many authors support the importance of creating a feeling of being a team, where it is okay to think out loud, and where both success and failure is shared within the team. A collaborative culture where employees trust each other and work toward common goals is considered critical (Kääriäinen *et al.*, 2017; Jacobi & Brenner, 2017; Matt, Hess and Benlian, 2015). Lyytinen, Rose and Yoo (2010) point out the significance of creating internal networks to help employees connect and share ideas and knowledge. Further, they argue that mentorships between employees on different levels are a way to increase learning and sharing of knowledge within the organization. This idea is shared by Jacobi and Brenner (2017) offering the idea of reversed mentorship, where younger and more digitally skilled employees teach elder colleagues. This emphasizes the feeling that everyone is important, and that everyone is one team. To create natural environments and opportunities for employees to meet and talk to enhance integration is both important for, and supported by, the use of digital technology and crucial in order to achieve successful digital transformation (Schwertner, 2017; Kane *et al.*, 2015). Beside this, a type of culture that encourages employees to think outside the box, be innovative and come up with their own ideas is stated to be important (Jacobi & Brenner, 2017; Karimi & Walter, 2015; Kane *et al.*, 2015). This requires a culture that allows risk-taking, both by encouraging employees to take risks and try new ideas and by leaders being accepting that some of these ideas may not be successful (Kääriäinen *et al.*, 2017; Kane *et al.*, 2015).

To become a digital corporation, digital skills for employees must be encouraged. Karimi and Walter (2015) advocate the creation of a digital mindset for all employees. This refers to the idea of "making digital strategy everyone's job", where everyone must understand how their everyday job relates to the digital strategy, but also embrace digital innovations and build the right skills. To encourage this, there should be separate goals and metrics connected to digital development for all employees (Jacobi & Brenner, 2017; Schwertner, 2017). Regarding the development of digital skills, Kane *et al.* (2015) emphasizes the importance of this development supporting and aligning with the digital strategy. This development shall be addressed both by using external expertise and allowing internal practicing (Jacobi & Brenner, 2017), and there shall be expertise and responsibility for digital development (Jacobi

& Brenner, 2017; Lyytinen, Rose & Yoo, 2010). Apart from the development of the existing workforce, recruiting new digital expertise must also align with the digital strategy to build the right knowledge-base for the future, according to Hoberg, Krcmar, Oswald and Welz (2015). They claim that more companies should have their HR departments developing specific recruitment routines. This put demands on the company to appeal to the right digital talent, enabling desired recruiting (Jacobi & Brenner, 2017).

This discussion has resulted in the following identified critical factors to achieve successful digital transformation within the area of *Culture & People*, presented in Figure 6:

Figure 6. Critical factors to achieve digital transformation within the area of Culture & People.

Corporate Processes & Structures

Jacobi and Brenner (2017) define three factors within the area of *Corporate Processes & Structures:*

- Build a digital-savvy management layer
- Make cross-functional teams the norm
- Build strong partnerships with outsiders

Jacobi and Brenner (2017) talk about making cross-functional teams the norm as a key success factor for digital transformation. Similarly, Karimi and Walter (2015) claim that it is important to create new processes and ways of working together over individual functions. This goes in line with what McLaughlin (2017) discuss regarding the importance for IT to be involved in driving competitive performance across the organization, rather than being a separate functional unit, when going through a digital transformation. Karimi and Walter (2015) further talk about the importance of integrating into more complex value networks in order to handle the digital disruption of society, and Bharadwaj, El Sawy, Pavlou and Venkatraman (2013) discuss the impact that digital transformation has on value chain networks and business ecosystems. Although this is an important aspect that companies that are facing a digital transformation should manage, the external aspect of networks is left out of the scope of this study. The ability to manage the changes in network constellations will however place some new demands on the internal organization as well, mainly on the IT infrastructure and processes in order to be flexible for new digital solutions (Bharadwaj *et al.*, 2013). Bharadwaj *et al.* (2013) further suggest that one of the key requirements for digital business strategy for organizations is the ability to structure, manage and design integrating networks that provide complementary capabilities to those of the firm itself. Ciasullo, Fenza, Loia, Orciuoli, Troisi and Herrera-Viedma (2017) also discuss the importance of integrating in complex value nets in order to have a flexibility emphasizing strategy. This is however an aspect that is considered to be closely related to the formulation of the digital strategy. Further, Bharadwaj *et al.* (2013) claim that for the organization to fully capture the digital opportunities, there needs to be a restructuring of the business. This means that, in order to achieve the digital strategy, companies must develop their organizational capabilities so that there is an increase of interconnection

of things, people and data in the organization. Schwertner (2017) discusses the need for a digital business platform that is outcome driven and enabled by technology. He claims that one single digital platform is needed to connect all business units and thereby empower workforce efficiency and innovation, personalize the customer experience and transform processes and business models. Lastly, Karimi and Walter (2015) talk about their findings regarding how companies that made above average progress on responding to disruptive innovations had allocated more of their resources towards processes for prioritizing investment decisions of digital transformation efforts than those below average. McLaughlin (2017) further discuss the importance of portfolio management to collect and compare digital initiatives. Ciasullo *et al.* (2017) also discuss the importance of decision-makers to consider the alignment between organizational priorities and business processes to enhance performance. They claim that the business processes should be designed and evaluated considering the digital strategic priorities. This goes for digital initiatives and projects as well.

Based on the discussion above, the following critical factors have been identified to achieve successful digital transformation within the area of *Corporate Processes & Structures,* presented in Figure 7:

Figure 7. Critical factors to achieve digital transformation within the area of Corporate processes & Structures.

3.3 Summary of the theoretical findings on digitalization

The area of digitalization will in this report be delimited to regard digital transformation, defined as the transformation of business and strategy with digital technology and organizational changes based on a discussion on definitions by Zoulian and Bouza (2018), Bloomberg (2018), Kääriäinen *et al.* (2017), Jacobi and Brenner (2017) and Schwertner (2017).

Three main areas of digital transformation are identified by Jacobi and Brenner (2017) and confirmed in a literature review. The three main areas are *Leadership & Vision, Culture & People* and *Corporate Processes & Structures* (Jacobi & Brenner, 2017).

Within each area, a number of critical factors have been identified in the literature study. These factors are the foundation of the continuous study and will make up the workshop material for the first part of the empirical study. The three main areas with their respective factors are presented in Figure 8.

Figure 8. The three main areas and their respective critical factors needed to perform sucessful digital transformation.

4 Empirical validation of areas and factors for digital transformation

The aim of this empirical study was two-fold. The first part was supposed to verify the three main areas of digital transformation. The aim of the second part was to verify and give input to the theoretically identified critical factors for digital transformation.

4.1 Case company Propia

The empirical validation of the identified critical factors for digital transformation was performed on Propia, who is also the provider of the mission for this study. Propia is a consultancy firm located in Norrköping, Stockholm and Karlstad. Propia consists of 17 consultants (Propia, 2019a), and they specialize in process management, change management and business development (Propia, 2019b).

4.2 Empirical findings on Propia

The first part of the workshop was related to verifying the three main areas of digital transformation. The findings of this part of the workshop are presented in Appendix 1.

The idea of the second part of the workshop was to find examples of when and how the critical factors identified in digital transformation literature have proven to be important based on the consultants' previous experiences. The results will hereby be presented per factor discussed.

Formulate clear digital strategy with clear goals

The main discussion topic regarding having a clear digital strategy and goals was how "clear" or specific the goals or the strategy should be in order to stay flexible for changes in the dynamic environment. The importance of guiding and providing a direction was discussed while having formulated the exact way to reach the goal was considered "too specific" and affecting the flexibility negatively. Further, the consultants agreed that the digitalization or digital efforts of companies are means to reach the overall corporate goals, hence there should not be any formulated goals related to digital transformation per se.

An example that was brought up during the discussion was one consultant's experience from a global industrial company, where they controlled the digitalization efforts by budget. The person responsible for digitalization projects within the organization, and the budget for these, appeared to panic because of the lack of a clear outspoken digital strategy, yet the person was still expected to invest a great monetary value in digitalization projects. The outcome of this was that the person responsible started to look for efforts or projects within the organization that could be interpreted as regarding digitalization just to "fill the budget" which meant that the digitalization efforts lacked a common focus.

Support and involvement from the top management

A distinct example was discussed regarding this factor that many of the consultants could relate to. The company discussed were a municipal energy corporate group, which is also the case company of this study, where employees felt committed to the idea of digitalization and more specifically requested RPA (Robotic Automation Process). These ideas were then put on hold by lower management levels, as they were unaware of the management's prioritization of these types of projects. This indicated to the consultant's that, due to the lack of support and involvement from the top management stating the importance and prioritization of these projects to lower management levels, the initiatives were not taken further. Hence, the factor *Support and involvement from the top management* were perceived to be important by the Propia consultants.

Have someone explicitly responsible for digital transformation at board level, alternatively a CDO

The main discussion regarding this factor was whether the responsible person really needed to be seated at board level. The Propia consultants all agreed that a person should be made responsible at management level, but they could not see the need for it at board level. They also discussed the fact that there are trends regarding what roles are required to be part of the management, and right now a CDO may be trending but might not be necessary over time. Hence, they agreed that the responsibility is important to clarify and distribute to an explicitly accountable person at management level, but this person might as well be the CFO or the COO, or someone else already part of the management team.

An example from a Swedish public real estate company was discussed, where the top management team were very eager to digitalize and discussed a lot of ideas and projects but did not include the IT department in the discussions. By not involving people with IT competencies within the top management team, digitalization efforts did not give the desired results, and the consultant with this experience pointed out the importance of involving all concerned parties. The responsible someone is not only responsible for driving the initiatives, but also install credible digital leadership and ensure feasibility in the efforts. To succeed with digital transformation, the consultants argued, companies should get all business areas united and engaged, understand what skills and competencies are required, and the IT department should work together with the rest of the company.

Collaborative culture with a lot of internal integration between employees at all corporate levels

The discussion focused on the collaborative relationship between managers and employees and the importance for managers to involve employees at the operational level, that work with the problems at hand, while still recognizing the managers' role as an initiator and driver of change.

An example that was brought up was regarding the business unit of fuel-based energy at the municipal energy corporate group. Here, the change development was connected to the process development model which meant that the business unit manager discussed the developments needed with operational employees, who actually work with the problems at hand. Thereby, the business development involved the people directly affected who had operational knowledge of that part of the process which leads to more effective process development. The example regarding the business unit of fuel-based energy at the company did not refer to change regarding digitalization or digital transformation, however, the consultants at Propia agreed that the same principles should apply.

Innovative, open and risk-taking culture

The discussion revolved around the importance of having an open culture and not a punishment culture. One employee should be able to come up with ten bad ideas in order to come up with one good one, and they cannot be punished for the bad ones if the culture is supposed to encourage innovation. Instead, the culture should enable innovation by praising innovation initiatives, even if they prove to be unsuccessful. Further, it was discussed whether innovation within an organization should be completely free or if it should be free within certain limits. An argument was that technology should be seized when it is somewhat developed to avoid risk-taking with completely new technologies.

An example from a Nordic communication and logistics company around the new millennium was discussed. Around this time, a lot of new digitalization efforts for e-commerce development where initiated at the company discussed. The CEO was clearly committed and invested a great amount of money in digitalization efforts. Employees from all operational levels in the organization were involved and allowed to come up with new ideas that were taken seriously, and the CEO was not afraid to invest in the ideas. The innovative, open and risk-taking culture was at hand. However, in the case of the Nordic communication and logistics company, the problem was external as the market was not mature

enough at the time and therefore the digitalization efforts did not get the effect that the company had hoped for. The consultants therefore raised the importance of monitoring the surrounding business climate and keeping up to date on new technologies as well as customer receptivity.

Metrics to evaluate digital efforts for all employees

The discussion focused on the distinction between evaluating/measuring and monitoring/supervising. The consultants agreed that it was of great importance that the employees should not feel supervised or monitored and therefore, the concept of metrics should be used carefully. However, they agreed that there are benefits from measuring the commitment to digital transformation in the organization. Further, the consultants discussed different ways that a company could evaluate metrics regarding commitment or efforts for digital transformation without supervising the employees. One example that was discussed originated from experiences of process development at an engineering company in the construction sector. At the company, they evaluated how many people were using processes by examining the number of improvement proposals. If no improvement proposals were brought up, people were not assumed to use the process at hand. Another way of evaluating commitment and efforts for digital transformation without employees feeling that they are monitored could, according to the consultants, be by adding questions regarding digital transformation in employee surveys. This way, the managers get an overview of the digital efforts made in the organization and at the same time, the importance of digital transformation is emphasized as it is something that is included in the employee surveys.

Development and maintenance of digital knowledge to fulfill the digital strategy

The consultants claimed that developing and maintaining digital knowledge to fulfill the digital strategy is important in order to have the ability to seize new digital technology. The discussion focused on experimenting as a source of skills and competence development. By allowing employees to experiment and test different ideas, companies build systems for continuous competence development. Which of these experiments that will proceed, however, depend on the digital strategy. This way competence will be developed, but it cannot be guaranteed that all competencies developed through experimenting will be of use to fulfill the digital strategy. Further, in order to maintain competence, the consultants agreed that documented and established processes were important. If the processes, and the competencies connected to the processes, are documented, it will remain even if employees with the relevant knowledge were to be replaced.

Work in cross-functional teams

All consultants agreed that this factor was important and that it relates to what they do and encourage in their everyday work through their process development models, where it is important to use knowledge from all functions involved to create the right process. When developing a process, inputs are needed both from the ones who have the request and the need for the process, who knows the systems, who enable the work, who obtain the benefits, and so on. The consultants had many experiences of this related to digital transformation, gained from projects on a network operator company, a multinational industrial company and a technical consulting company to name a few. Challenges that were discussed were in regards of how to know when to include knowledge-carriers that are not viewed as natural partners, such as User Experience-specialists, Social scientists etc. to gain all competence needed for digital transformation. Not interlocking the project members too firmly were discussed as a way of handling this issue. The core members may be the same but allowing integration with different areas of expertise when needed is increasingly important. This is usually harder to accomplish in bigger corporations where time reports to different accounts make flexible integration more difficult. The consultants agreed that it is good to have a structure for the corporate processes, but in order to develop them, it is important that this structure is not too rigid.

Corporate digital infrastructure

The discussion on this factor regarded where to draw the line for the common digital infrastructure. Is it enough to have a corporate digital infrastructure? What is the domain? How do we keep it flexible when our integration in external networks increases? Years ago, companies had no common digital infrastructure what so ever, later everyone tried to develop big "super-systems" that included everything. Today the common infrastructure is on a more abstract level, with common information models to enable communication between the different systems. The consultants did not come up with a specific example, but what was agreed upon was the fact that on a corporate level, a common digital infrastructure refers more to controlling how to integrate new systems and services and knowing what composition of different systems represent the corporate digital infrastructure. The consultants agreed that the most important aspect of having a corporate digital infrastructure should be the communication ability between the systems and having an overview of all implemented systems. One department shall not buy a separate system for something that another department already solves with an existing system.

Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy

All consultants agreed that this is important, and an example from a consultant's experience at a network operator company, was discussed where directed portfolio management, to accelerate and prioritize initiatives that had the greatest desired effect, had been implemented. To prioritize projects was coherently agreed to always be important, but the importance of evaluation, according to the Propia consultants, depends on what stage the project or activity is in. This mainly refers to work with innovation. Even though it is important to know what is going on within the organization, the need to evaluate these activities is not necessary in the same way that other types of projects are evaluated and followed up. At the network operator company, by knowing what initiatives were running within the portfolio and knowing the goal and ambition, it helped to choose the right projects to carry out. This increased the feeling of overall organizational confidence in executed projects and the feeling among project members that they were doing something that would succeed. This, in turn, created commitment among employees and made it possible to point out success stories that had contributed to the digital strategy and goals.

5 Analysis of main areas and critical factors for digital transformation

In this chapter, the theoretical findings will be compared to and analyzed with the empirical findings, in order to verify or modify the findings. The results of this chapter aim to answer the first research question. It will also lead to an evolved model of analysis used for the second part of the study.

5.1 Verification of the three main areas for digital transformation

Based on the results from the consultants brainstorming important aspects for digital transformation, a discussion regarding the main areas that need to be in focus hereby follows.

Notes of aspects naming the importance of a vision, strategy or common goals, as well as involvement from the management are considered to support the area of *Leadership & Vision* as one of the main areas for digital transformation, in accordance to theory by Jacobi and Brenner (2017), Kääriäinen *et al.* (2017), McLaughlin (2017), Schwertner (2017), Kane *et al.* (2015), Matt, Hess and Benlian (2015) and Fitzgerald *et al.* (2013). Notes on the importance of communication with employees – regarding explaining, clarifying and describing – are also considered to support the importance of the area *Leadership & Vision*. This is because communication with the employees is assumed to be originating from a management level to clarify and anchor common goals related to digital transformation. The note stating "*Cooperation between IT and other business areas (e.g. IT management must be involved in the management team)*" is also considered to belong to this area, as it regards the importance of making IT skills part of the top management level, which is in alignment with findings by McLaughlin (2017).

Notes indicating the importance of change management, change willingness, competence and culture are considered to directly support the area of *Culture & People*. Notes regarding innovation, by encouraging new ideas, experimenting and other R&D work, are also considered to support this area due to the connection to the development of an innovative culture. The note saying *"Lay the rails as we go"* is interpreted as pointing out the importance of a flexible and experimenting culture, hence it is also considered to support this area. The importance of developing the right type of culture goes in line with findings by Jacobi and Brenner (2017), Kääriäinen *et al.* (2017), Karimi and Walter (2015), Kane *et al.* (2015) and Matt, Hess and Benlian (2015).

Notes naming the word process, as well as notes regarding the technical platform and IT structure, are categorized to support the importance of the area Corporate Structure & Processes, in accordance to findings by Schwertner (2017), Karimi and Walter (2015) and Bharadwaj *et al.* (2013). The same goes for notes naming the importance of having a portfolio to structure projects, which includes digitalization projects, in accordance to theory by McLaughlin (2017). Further notes regarding external stakeholders were clustered to this area as they are assumed to affect the organizational structure and processes based on findings by Ciasullo *et al.* (2017), Karimi and Walter (2015) and Bharadwaj *et al.* (2013), even though the aspect of external stakeholders is outside of the scope of this study.

Five of the notes are not perceived as directly related to any of the three main areas, namely:

- *Monitoring the outside world. What is going on? What is the new? New demands, regulations etc.?*
- *Front edge monitoring*
- *Seize the digital technology development*
- *Access to digital technology that fits into the business*

All these notes are interpreted to relate to the ability to know what is going on, and what is right for the specific company. Since all these notes can be clustered to the same area, one might argue that a fourth

main area should be added to the other three as a key success area for digital transformation. However, the ability to not only know what opportunities and threats are out there, but also detect how opportunities can be captured, and how threats can be avoided cannot be accomplished without involving all three original areas. Therefore, a fourth area regarding monitoring and evaluating opportunities shall not be added as a separate area, but instead, be included in all original areas. By examining how the areas and critical factors can be built up using dynamic capability microfoundations, which will be further investigated in the next part of this study, this integration will be managed and included in the final framework.

Based on this discussion, the main areas to look further into, where changes should be made to facilitate successful digital transformation, are confirmed to be *Leadership & Vision, Culture & People* and *Corporate Processes & Structures*. Further, findings both from the literature review (Jacobi & Brenner, 2017; Schwertner, 2017) and the empirical study shows that the three areas are all affecting each other. For example, having an organizational structure where working in cross-functional teams is the norm will facilitate developing a collaborative and innovative culture. At the same time, this type of innovative culture places demands on the leadership regarding a clear formulated direction so that the innovation will be aligned with the overall digital strategy. Arrows have been added between the three areas to visualize this interrelationship, as presented in Figure 9.

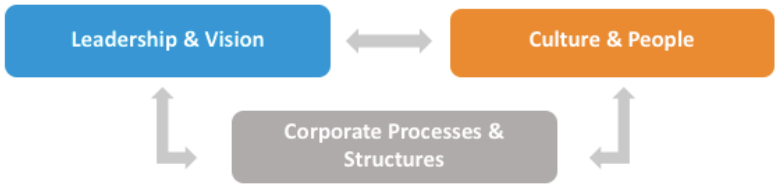

Figure 9. Illustration of the three main areas for digital transformation and their interrelation to each other.

5.2 Verification and modification of critical factors for digital transformation

The following analysis is based on the results from the workshop with Propia consultants regarding the theoretically based critical factors for digital transformation.

Formulate clear digital strategy with clear goals

It was clear that the consultants agreed that this factor was important. However, the discussion above clarified that even though the strategy and goals should be clear, they still need to be flexible. By allowing the digital strategy and goals to be clear yet flexible, the organization remains adaptable for new opportunities. The consultants also argued that digital transformation is merely a way to achieve the overarching goals of the company and there should therefore not be any goals specifically regarding the digital transformation. This notion is supported in theoretical findings, for example by McLaughlin (2017) who claims that digitalization has no value in itself but is a way to accomplish and support something else. These inputs regarding this critical factor are considered important and the original critical factor will be modified and will in the future report be: *Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives.*

Support and involvement from the top management

The critical factor that regards having *Support and involvement from top management* for digital transformation, found in theory by Jacobi and Brenner (2017), Kääriäinen *et al.* (2017), Kane *et al.* (2015), Karimi and Walter (2015), Matt, Hess and Benlian (2015) and Fitzgerald *et al.* (2013) was found to be supported by the consultants at Propia. They had clear examples of when this factor had

been proved to be important for digital transformation or digitalization projects. The discussion, therefore, emphasized the importance of this factor and nothing was added that would suggest that the critical factor should be modified. The critical factor is thereby considered to be empirically verified.

Have someone explicitly responsible for digital transformation at board level, alternatively a CDO

This critical factor was discussed with some skepticism. The consultants argued that having someone explicitly responsible for digital transformation is important at management level. However, they did not have any experiences that implied that it would be important to have someone responsible for digital transformation at board level. Matt, Hess and Benlian (2015), Karimi and Walter (2015) and Fitzgerald *et al.* (2013) all agree that a digital responsibility is important to have at management level. Jacobi and Brenner (2017) argue that it is still important to anchor the digital transformation at board level. However, this is assumed to be possible without having someone explicitly responsible at that certain level. Further, at management level the Propia consultants argued that there should not necessarily be a specifically appointed Chief Digital Officer (CDO), the responsibility could be handled by another role as long as the responsibility was clearly delegated. The example from the Swedish public real estate company that came up confirmed the view of McLaughlin (2017) and Jacobi and Brenner (2017) that it is not sufficient to have a management team that is committed to digital transformation, as stated in the factor *upport and involvement from the top management*, it is also necessary to include the IT department and IT skills in order to install credible leadership and be able to develop realistic initiatives. This is assumed to be certainly important when the appointed person responsible to drive the initiatives lack the relevant IT skills. The discussion resulted in a modification of the theoretically developed critical factor. Based on the empirical experiences from Propia consultants the explicit responsibility for digital transformation is assumed to be important to have at management level, not at board level. Having someone explicitly responsible does not necessarily imply that someone has digital transformation as their only responsibility and therefore, including the role of a CDO in the formulated critical factor might be misleading. These inputs regarding this critical factor are considered important and the original critical factor will be modified to be: *Have someone explicitly responsible for digital transformation at top management level.*

Collaborative culture with a lot of internal integration between employees at all corporate levels

This critical factor was agreed to be important by the consultants. The consultants talked about the importance for managers to collaborate with operational personnel when working with business development. Although, it is important to notice that the discussion revolved only around the collaboration between the management level and operational levels, not collaboration generally as a cultural aspect. Managers being involved and engaged in projects could be considered a way to achieve the critical factor of Support and involvement by top management, hence this part of the factors are somewhat intertwined. In the theoretical findings, the importance of internal networks and mentorships was brought up as drivers for a collaborative culture and making people feel like part of a team (Jacobi & Brenner, 2017; Lyytinen, Rose & Yoo, 2010). This subject was not discussed by the consultants. However, a collaborative culture is assumed to depend a lot on the collaboration between different organizational levels. The aspect of having a collaborative culture and a lot of internal integration is considered very similar and inseparable from the factors regarding having an innovative, open and risk-taking culture as well as the factor regarding cross-functional teams. In addition, mentorship programs and internal networks is a mean to achieve the factor *Development and maintenance of digital knowledge to fulfill the digital strategy.* Many aspects of a collaborative culture could be assumed to build other factors, such as the two mentioned above. For example, by having a *Corporate digital infrastructure* as well as working in cross-functional teams, the communication between different organizational units and levels will be enabled and thereby the internal integration will be increased.

Further, collaboration between different functions is assumed to be an important aspect for knowledge sharing and knowledge transferring. Based on this discussion, the critical factor *Collaborative culture with a lot of internal integration between employees at all corporate levels* is assumed to be a mean to achieve other factors and it will thereby be removed as a critical factor itself.

Innovative, open and risk-taking culture

The critical factor that regards having an *Innovative, open and risk-taking culture*, found in theory by Jacobi and Brenner (2017), Kääriäinen *et al.* (2017), Karimi and Walter (2015) and Kane *et al.* (2015) was found to be supported by the consultants at Propia. However, from the example regarding the Nordic communication and logistics company, the importance of having the ability to time innovations with the external market window to get the most out of the digitalization efforts was proved to be an important aspect. Therefore, when having an innovative, open and risk-taking culture, it is important to have the ability to prioritize which ideas to proceed with and to base this priority on how well the idea at hand is believed to be received on the market. This discussion does not undermine the impact of the critical factor, hence, this critical factor is assumed to be empirically verified. Further, the aspect of timing can partly be tackled by having an organizational structure that facilitates the ability to prioritize initiatives and proceeding with "the right ones", which is the focus of the critical factor *Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy*. This is an example of how different critical factors influence each other and are all important in order to succeed with digital transformation.

Metrics to evaluate digital efforts for all employees

This critical factor resulted in an intense discussion amongst the consultants. The issue of making employees feel monitored and supervised may be contradictory to trying to create an innovative and open culture, hence the problems discussed by the consultants are taken into consideration. In literature, Karimi and Walter (2015) discuss the need to make every employee understand how their everyday job relates to the digital strategy. Further literature findings state that one way to do so is by developing separate goals and metrics connected to digital development for all employees (Jacobi & Brenner, 2017; Schwertner, 2017). The Propia consultants' suggestion referring to use employee surveys offer the opportunity to not only emphasize the engagement from the management into digital transformation making this a focus area, but also provides the opportunity to measure whether the employees feel committed without making them feel monitored. Further, in order to avoid the risk of employees feeling supervised, the focus of this critical factor will in the future be decomposing the digital strategy to clarify how and encourage when an individual digital contribution is made. The critical factor will thereby be modified and will in the future report be: *Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution.*

Development and maintenance of digital knowledge to fulfill the digital strategy

This critical factor was found to be supported by the consultants at Propia as it was assumed to develop the ability to seize new digital technology. During the discussion, they focused on the impact that experimenting has on developing new competencies and skills, meaning that experimenting was of great importance for this intent. This goes in line with what was found in theory, as Jacobi and Brenner (2017) lifted the importance of allowing internal practicing for digital knowledge development. The Propia consultants also pointed out, however, that it cannot be guaranteed that all competencies developed through experimenting will be of use to fulfill the digital strategy. Even though that is assumed to be correct, it is not considered to undermine the importance of developing digital knowledge and skills that goes in line with the digital strategy. The fact that all developed competencies may not be directly useful to fulfill the digital strategy is considered somewhat inevitable in an experimenting

culture. As discussed in the factor *Innovative, collaborative and risk-taking culture*, one way of coping with this issue is by to some extension "steer" the direction of the experiments in order to develop desired digital knowledge. Further, the consultants agreed that documented and established processes were an important mean for maintaining digital knowledge. This discussion is a complement to that in the literature that focused on the importance of recruiting new digital expertise to build the right knowledge-base for the future (Hoberg *et al.,* 2015). Still, the discussion and the examples highlight the fact that developing and maintaining the right digital knowledge in order to be able to fulfill the digital strategy is important, and the critical factor is thereby considered to be empirically verified.

Work in cross-functional teams

This critical factor was coherently agreed upon during the workshop. All consultants had experience from different projects and cases where this had been found critical in order to develop processes, and they could also name several projects related to digital transformation where it had been found important. The consultants shared the view of Jacobi and Brenner (2017) on making cross-functional teams the corporate norm to gain all relevant knowledge needed on all projects, also supported by Karimi and Walter (2015). The challenge that was brought up by Propia consultants, was regarding how to add additional temporary competencies apart from the cross-functional team itself. This is an issue that should be managed in order to perform a successful digital transformation, as all competencies and knowledge within the firm should ideally be maximally exploited. By obtaining a collaborative culture discussed in a previous factor, and by having a *Corporate digital infrastructure* that facilitates communication throughout the organization, gathering competencies and integrating temporary competence and consulting within the firm will be facilitated. This is assumed to be one intersection between the different factors, and a situation where different factors affect and facilitate each other. The new perspective presented is important to consider when developing a structure where cross-functional teams are the norm, however, the discussion does not imply that the factor itself should be modified and its importance for digital transformation is thereby considered empirically verified.

Corporate digital infrastructure

The discussion offered an interesting new point of view on what is needed regarding a corporate digital infrastructure. The discussion regarding a common ground or idea of what systems are included and build up the organizations infrastructure is in line with what is argued for in literature (Schwertner, 2017; McLaughlin, 2017; Bharadwaj *et al.*, 2013). The new aspect regarded lifting the concept to a more abstract level, that would allow different systems within the company but still enable communication and transferring data from one system to another. As all consultants agreed with the idea that a corporate digital infrastructure is necessary, the factor will remain and is considered empirically verified. However, the meaning and content of the factor are somewhat modified, now referring to a common information system to facilitate collaboration and communication between digital systems as well as business units, and less focus is on the need of developing a corporate digital business platform. However, the aspect lifted in theory by Bharadwaj *et al.* (2013) regarding interconnection of people, apart from data and things, is also considered an important aspect of this factor.

Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy

This critical factor was coherently agreed upon. The example from the network operator company, shared during the workshop emphasized the importance of this factor. Upon the reasons named in theory regarding the decision-making process, according to findings by Karimi and Walter (2015) and Ciasullo *et al.* (2017), attention was also drawn to the fact that prioritizing and evaluating digital activities in alignment with the digital strategy can create additional commitment among employees involved in the

project. This provides yet another argument for this factor to be critical, hence it will not be modified but instead considered empirically verified. To take the analysis further, the discussion on this factor also raised the idea that to be able to foster an innovative culture, the rest of the organization also need confidence in the innovation projects. By knowing the goals and prioritizing according to the digital strategy, it will facilitate evaluation and enable visualization of how each project contributed to the digital strategy. This will reduce resistance from those who believe innovation investments should perhaps be invested elsewhere. Besides, the notion discussed that there should not be as much evaluation of innovation projects goes in line with the discussion on the critical factor *Development and maintenance of digital knowledge to fulfill the digital strategy*, regarding that experimenting and innovation cannot be guaranteed to fulfill or be aligned with the digital strategy. Having systems for prioritizing initiatives and projects based on how well the idea at hand is believed to be accepted on the market is important to increase the probability of projects fulfilling the digital strategy. However, by not fully evaluating all initiatives but only those that are turned into actual projects, the organization foster an innovative, collaborative and risk-taking culture where initiatives are encouraged without judgment.

5.3 Evolved model of analysis

The analysis of the empirical findings at the workshop with Propia consultants together with the theoretical findings in digital transformation literature have resulted in some modification of the critical factors found in the literature.

The findings from the study so far have led to an evolvement of the original model of analysis. The changes needed for digital transformation efforts is now illustrated as three main areas that affect each other. The three areas have been expanded, now including the modified critical factors for each area. This evolved model of analysis is presented in Figure 10. Further, the three areas are all affecting each other, the arrows visualize the interrelationship between these three areas. To build the critical factors in a dynamic way, in order to develop dynamic digital capability, the area of dynamic capabilities will be applied onto the factors in the second part of the study.

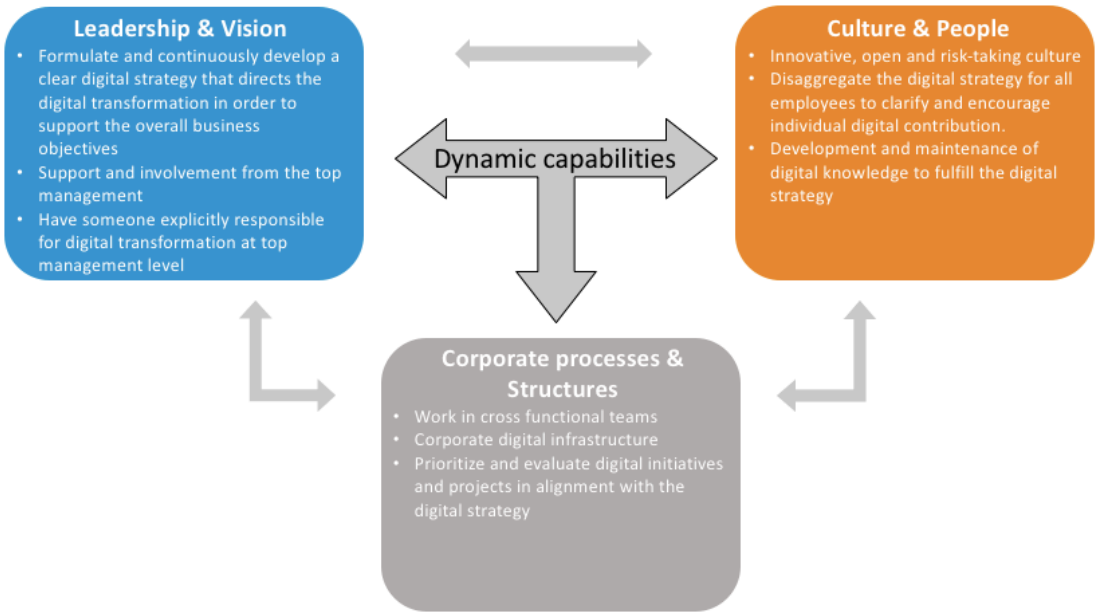

Figure 10. Evolved model of analysis with modified critical factors.

6 Frame of reference regarding Dynamic capabilities

Jacobi and Brenner (2017) argue that, for the digital transformation to create sustainable value and competitive advantage for companies in a digital world, the internal conditions of the organization need to continuously evolve and adapt to market changes. Hence, the identified critical factors for digital transformation should be dynamic in their nature in order to allow the company's internal resources to adapt to changing demands. Therefore, applying the theory of dynamic capabilities to the critical factors for digital transformation is found to be relevant. In this chapter, the intersection between dynamic capabilities and digital transformation will be evaluated. After this, the theory of dynamic capabilities will be applied to the critical factors of digital transformation.

6.1 Dynamic capabilities and digital transformation

The increasing pace of digital technology development affects and bring major changes to all industries (Schwertner, 2017). Since having and developing a suitable strategy matters most during times of change (Helfat *et al.*, 2007), the changes linked to the digitalization of our society places entirely new demands on companies regarding their digital strategy as well as the overall business strategy. Jacobi and Brenner (2017) distinguish traditional change from complete digital transformation because of the latter also including changes to strategies and culture. Therefore, they argue, we cannot study digital transformation by looking only at the literature on organizational change. They continue by claiming that change shall not be viewed as an exception but as the corporate norm. The theory of dynamic capabilities, defined as *"The firm's ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments"* (Teece, Pisano & Shuen, 1997, p. 516) is therefore relevant to examine when studying digital transformation. The theory of dynamic capabilities emerged from the resource-based view in strategy literature which emphasizes firm-specific capabilities and assets for explaining how competitive advantage is achieved and obtained over time (Teece, Pisano & Shuen, 1997; Yeow, Soh & Hansen, 2018; Kindström, Kowalkowski & Sandberg, 2013; Helfat *et al.*, 2007; Eisenhardt & Martin, 2000). The dynamic capabilities' framework seeks to identify the firm-specific capabilities that can be sources of competitive advantage and to define how combinations of resources and competencies can be developed, deployed and protected over time when responding to changes in the business environment (Teece, Pisano & Shuen, 1997). Matt, Hess and Benlian (2015) argue that companies often wait for incentives to perform a digital transformation, and the risk is that if they wait too long, they may not be able to perform the changes needed. Therefore, they claim, companies ought to continuously evaluate their options and needs for digital transformation, which is in accordance with the dynamic capability framework. This can be achieved by having routines for evaluating opportunities and identifying possible actions. Likewise, Eisenhardt and Martin (2000) use the term routines when discussing dynamic capabilities. They claim that the dynamic capabilities by themselves are identifiable and specific routines and that some of these routines aim to attain and release the organizational resources, others integrate these resources while still others focus on the reconfiguration of these resources.

In a dynamic marketplace, resource advantages might become disadvantages when the environment and the market conditions change (Ambrosini, Bowman & Colliers, 2009). This means that companies ought to continuously develop their resources and their businesses and not expect one good investment or idea will be enough to achieve a long-term competitive advantage. To remain sustainably competitive in a dynamic market environment, where digitalization creates a high-velocity aspect even to traditionally more stable markets, the ability to adapt and be flexible to new opportunities is crucial (Schwerter, 2017). This is yet another reason for why applying the concept of dynamic capabilities onto digital transformation is highly relevant, as all industries regardless of their market pace, are facing

changes due to the new digital era. The traditional view of dynamic capabilities framework as especially important in strategy development for organizations that are part of a dynamic market (Teece, Pisano & Shuen, 1997; Ambrosini, Bowman & Colliers, 2009; Helfat *et al.*, 2007) is challenged by Eisenhardt and Martin (2000) who argues that even when competing in relatively stable markets, the need to gain, release, integrate and reconfigure resources in response to changes in the marketplace indicates the need for dynamic capabilities. In addition, Bharadwaj *et al.* (2013) suggest that the two concepts of dynamic capabilities and digital transformation go hand in hand, as digital technologies enable the development of dynamic capabilities by fundamentally reshaping traditional business.

For analytical purposes, dynamic capabilities can be disaggregated into three different capacities: the capacity to *Sense* and shape opportunities and threats, the capacity to *Seize* these opportunities and the capacity to maintain competitiveness by *Reconfiguring* the organization's tangible and intangible assets (Teece, 2007). Yeow, Soh and Hansen (2015), Kindström, Kowalkowski and Sandberg (2013) and Fisher *et al.* (2010) all based their studies off this disaggregation by Teece (2007), which is also the definition that this study will be structured by.

Sensing

The sensing (and shaping) new opportunities is very much a scanning, creating, learning and interpreting activity (Teece, 2007) which involves "*identification, development, co-development and assessment of technological opportunities in relationship to customer needs*" (Teece, 2014, p. 332). To be able to do this, Teece (2007) claims that organizations must have routines for activities related to scanning, interpreting and creating. Further he states that it is crucial that these activities are embedded in the organization, not relying on certain individuals, to make them long-lasting. Furthermore, he argues that companies must be aware of their entire ecosystem, not just their immediate surrounding and direct competitors. This refers to both local and global customers, suppliers and complementors. Apart from sensing opportunities, it is also crucial for companies to be able to sense threats, such as new competitors or new activities on the market, to tackle these events (Teece, 2007).

According to Jacobi and Brenner (2017), knowing when to pursue what changes and how to manage the changes is fundamental for digital transformation. To have this knowledge and the ability to make those tough decisions, the company need dynamic capabilities to sense new opportunities.

Seizing

When the new business opportunities or needs are sensed, they must be addressed through new products, processes or services (Teece, 2007). The seizing capacity allows organizations to capture the value of new business opportunities, not only understanding them, by deciding what specific changes to make across the different components of the organization to seize this value (Yeow, Soh & Hansen, 2015). Teece (2007) points out that it is not unusual for companies to sense an opportunity but then fail to capture it because of a lack of commitment, budgeting or risk aversion. He continues by stating that, to overcome these biases, companies must improve routines, decision rules, strategies and leadership in order to evaluate and capture opportunities.

Karimi and Walter (2015) acknowledge the capability gap that occurs when new technology is introduced to incumbent organizations. They claim that dynamic capabilities related to changing, extending or adapting an organization's resources, processes and values are important to capture value from the new opportunities.

Reconfiguring

Reconfiguring refers to continuous renewal and transformation of the organizational routines (Yeow, Soh & Hansen, 2018). The ability to recombine and to transform organizational structures and assets as

the company grows and as the environment changes are keys to maintain sustained profitable growth (Teece, 2007). According to Yeow, Soh and Hansen (2018) the dynamic capability of transforming plays an important role when it comes to reconfiguring existing resources to align with new strategies, as well as building new resources to supplement current gaps in the resource base of the organization. Eisenhardt and Martin (2000) describes dynamic capabilities as the activities of leveraging, creating, accessing and releasing. The leveraging activity regards putting existing resources to new uses, creating in this case refers to the creation of new resources, accessing involves the use of external resources for example from vendors or partners, and finally releasing refers to the activity of letting go of existing resources that are no longer optimal for the new strategy. These activities are very similar to Teece's (2007) description of the activities involved in the reconfiguring capability.

Yeow, Soh and Hansen (2018) also point out the previously mentioned capability gap by claiming that because of the relative novelty of digitalization, many companies might not have the essential internal resources, like digital expertise, needed to succeed with the digital transformation. Therefore, having the ability to access and build new resources, through the reconfiguring dynamic capabilities, would be significant for these companies.

6.1.1 Applying theory of the dynamic capability framework to the main areas for digital transformation

The first area identified by Jacobi and Brenner (2017), *Leadership & Vision,* refers to the need for strong digital leadership and a clear digital vision integrated into a digital strategy. In dynamic capability literature, Teece, Pierce and Boerner (2002) notes the importance of managerial capacity to sense opportunities which agrees with the notion by Jacobi and Brenner (2017) that the leadership aspect is important to consider in regard to developing a dynamic organization. For an organization to be flexible and adaptable to a dynamic marketplace – which all marketplaces are considered to be when it comes to digitalization – Eisenhardt and Sull (2001) argue that organizations must have a simple strategy. They argue that the organization should have a number of simple rules that all employees should be aware of. These rules are to be followed as commandments but within these, the employees are free to act according to their own ideas. This also affects the second identified area by Jacobi and Brenner (2017), *Culture & People,* that refers to the importance of fostering creativity and creating an entrepreneurial environment in order to keep up with fast-changing customer needs. By applying this idea by Eisenhardt and Sull (2001) on the critical success factors for digital transformation, the organization can create a business environment where innovation and experimenting are encouraged while still having a clear digital strategy and common goals. Eisenhardt and Sull (2001) further claim that these commandments help creating a sense of stability in the organization by remaining the same in the long-term while the organization goes through extensive changes. As a common problem with regard to extensive organizational development is that the employees are reluctant to change, creating a sense of stability is a very important aspect in minimizing the resistance to digital transformation. Further, Helfat *et al.* (2007) claim that in order to fully understand, identify and respond to the need for change through dynamic capabilities, firms must examine the underlying organizational and managerial processes. Hence the area of *Corporate Processes & Structures* as a key success factor for digital transformation (Jacobi & Brenner, 2017) seems relevant to study also from a dynamic capability perspective of change.

6.2 Dynamic capability microfoundations building up the critical factors for digital transformation

As dynamic capability microfoundations for digital transformation is a relatively unexplored area within literature, the findings in this section come from articles discussing dynamic capability microfoundations from other areas. Kindström, Kowalkowski and Sandberg (2013) and Fisher *et al.*

(2010) both regard microfoundations for service organizations. Mousavi, Bossink and van Vliet (2018) contribute to the area of microfoundations for sustainability innovation, while Alford and Duan (2016) investigate the area of collaborative innovation. Karimi and Walter (2015) observe digital disruption within the newspaper industry, and McLaughlin (2017) look at microfoundations to handle the emergence of new technology. Teece's (2007) article is of a more theoretical nature covering microfoundations of dynamic capabilities on a general level, while Yeow, Soh and Hansen (2018) are closer related to the area of this study, examining microfoundations for aligning with a new digital strategy.

In the section below, the microfoundations from literature sources above, are discussed in order to achieve the identified critical factors for digital transformation.

Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives

In order to achieve a digital strategy that supports the overall business objectives, the ones responsible for formulating the digital strategy must have an understanding of how digital technology can be integrated into the business in a way that supports the overall objectives, similarly to the findings by Fisher *et al.* (2010) who claims that, for service companies, an important microfoundation is the ability to identify service opportunities that will change the overall offer. Further, Teece (2007) emphasizes the importance of co-specialization, meaning to handle the strategic fit so that assets are combined in a way that adds value. McLaughlin (2017) also points out the importance of finding the strategic fit as an important aspect regarding Strategic planning. Yeow, Soh and Hansen (2018) discuss that the formulation of the digital strategy should be conducted in a way so that it does not risk cannibalizing on the core business, a statement that also implies the importance of finding the strategic fit. Mousavi, Bossink and van Vliet (2018) discuss a similar subject when writing about the importance of integrating market expectations, meaning to re-examine the latest technology in regard to options, possibilities and information, continuously. This indicates that finding the right digital options for the specific organization at hand, by continuously re-examining which options have a strategic fit to the overall objectives of the organization, is an important aspect of formulating and developing the digital strategy. The ones formulating the digital strategy therefore, in order to find the value-adding alternatives, need to understand the surrounding business environment. Mousavi, Bossink and van Vliet (2018) discuss the importance of having routines to anticipate market trends and scan information and developments outside, as well as inside, the company to make informed decisions about the recognized digital opportunities. Not only should they have routines to understand what is going on by processing information in a fast and reliable way, but also, according to Fisher *et al.* (2010), have the capacity to quickly prepare a strategic response to competitors' activities as well as customers changing demands. One way discussed in the literature in order to be flexible to changing conditions is scenario planning, which means formulating several alternative strategies, and which will be implemented depends on what occurs in the surrounding business climate (Fisher *et al.*, 2010). By doing so, the management is aware of different threats and scenarios and are prepared and know what actions to take. Further, evaluation is an important aspect according to McLaughlin (2017) in order to understand how well the digital strategy is working, and what changes must be made. Further, he claims, evaluation is also important to understand how well the digital strategy is accepted, understood and anchored in the business and among all employees.

In order to seize opportunities and manage threats, the ones formulating the digital strategy should be responsive to when and understand how to update the strategy. This must be managed both quickly and at the right time, according to Fisher *et al.* (2010). However, by continuously evaluating both the digital strategy as well as the strategic fit, it is considered a natural effect to update the strategy timely and is

therefore not a microfoundation in itself. In order for the digital strategy to be flexible, it should be formulated as umbrella strategies rather than one exact strategy, according to Fisher *et al.* (2010). The umbrella strategies should provide clear behavioral guidelines as boundaries and let strategy emerge within these boundaries, allowing various scenarios to emerge within the formulated "umbrella" to deal with uncertainty. This creates a high degree of managerial flexibility and open-mindedness within the strategy formulation. It is also, according to McLaughlin (2017), of great importance that the strategy is formulated and communicated in a clear way that is aligned with the overall business and, of course, that the transition really is implemented timely.

No theoretical findings that imply a need for reconfiguring microfoundations were found for this critical factor.

The microfoundations needed to *Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives* are based on the discussion above, and will be presented in Table 3.

Table 3. Microfoundations of the factor Formulate and continuously develop a clear digital strategy that direct the digital transformation in order to support the overall business objectives identified in theory.

	Sense	Seize	Reconfigure
Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives	Develop routines to find the strategic fit between business objectives and surrounding business environment Continuously evaluate the digital strategy to be flexible and adapt to changes	Formulate umbrella strategies Formulate and communicate the direction and boundaries of the digital strategy in a clear way	N/A

Support and involvement from the top management

In order for the top management to be supporting and involved in the digital transformation, they should be perceptive of what is going on in the organization. Therefore, it is important to have effective communication (Teece, 2007), meaning that the communication goes in both directions – from the management to the organization and from the organization to the management.

For the leaders to be perceived as supporting and involved, they have to, according to Teece (2007) demonstrate that they are committed, in this case, to the digital transformations. This includes recognizing non-financial aspects of digital efforts and advocating values and the innovative culture needed for digital transformation. Clearly demonstrating the support from management and anchoring of the digital transformation signals the importance of innovation to the organization (Yeow, Soh & Hansen, 2018). Further, in order for top management to be supportive and involved in the digital transformation, they have to acquire knowledge regarding digitalization to increase their digital credibility (Teece, 2007).

To show the top management's support, they must allocate resources and time to convey their message and encourage the employees (Yeow, Soh & Hansen, 2018) in their digital transformation. One way of achieving this may be for the top management themselves to engage in different projects (Karimi & Walter, 2015). According to Karimi and Walter (2015), this does not only demonstrate the importance of digital transformation projects but help reduce obstacles by taking advantage of the senior management's experience.

The microfoundations needed to achieve *Support and involvement from the top management* are based on the discussion above, and will be presented in Table 4.

Table 4. Microfoundations of the factor Support and involvement from the top management identified in theory.

	Sense	Seize	Reconfigure
Support and involvement from the top management	Develop routines for top management perceptiveness of the organization	Inform about the value of, and advocate, digital transformation Develop routines to acquire digital knowledge in top management	Allocate resources to digital transformation projects Top management engagement in digital transformation projects

Have someone explicitly responsible for digital transformation at top management level

The first step of having a role with explicit responsibility for digital transformation is to examine the success criteria for the role and investigate the resource usage regarding if this new digital responsibility will be possible to appoint within their current workforce, which is in accordance to what Teece (2007) refers to as Business planning. Further, to define the role objectives, they should scan what knowledges they already have internally in the organization and investigate what demands are required for the role by communicating with different organizational departments (Yeow, Soh & Hansen, 2018).

For the responsibility to be explicit, there should be an actual articulation of the role and someone needs to be appointed. The role should contain a formulated responsibility to integrate and leverage data and digitalization knowledge between organizational departments and levels, similar to findings by Yeow, Soh and Hansen (2018). Further, the role should include the task to distribute digital transformation responsibility out were needed in the organization (Kindström, Kowalkowski & Sandberg, 2013). In order to do this, structures and authorities ought to be managed and altered so that the person appointed with the new responsibility can meet the demands of the role.

Kindström, Kowalkowski and Sandberg (2013) discusses the need of having service roles on all levels of the organization when it comes to servitization of product organizations. This idea can be implemented here as well as managers closer to the operational level have an understanding for the digitalization possibilities regarding their everyday work that the top management might not have. Therefore, it is important to allow the explicitly responsible person to allocate resources when needed in order to delegate responsibilities for digital transformation on all organizational levels. Part of the responsibility for this role should include creating organizational readiness for the digital strategy, which according to McLaughlin (2017) is done by distributing assets where needed for communicating and explaining the digital transformation and strategy. This is yet another benefit of delegating the digital responsibility within the organization.

The microfoundations needed to *Have someone explicitly responsible for digital transformation at top management level* are based on the discussion above, and will be presented in Table 5.

Table 5. Microfoundations of the factor Have someone explicitly responsible for digital transformation at top management level identified in theory.

	Sense	Seize	Reconfigure
Have someone explicitly responsible for digital transformation at top management level	Continuously examine role requirement	Give the appointed person the authority required to meet the demands of the role	Allow resource allocation and delegation of digital transformation responsibilities on all organizational levels

Innovative, open and risk-taking culture

In order to achieve an innovative, open and risk-taking culture, it is important to have internal sensing of digital opportunities and detection of decentralized initiatives for digitalization, in accordance to findings by Kindström, Kowalkowski and Sandberg (2013), for example in this case by having a structured innovation process. This goes in line with findings by McLaughlin (2017) regarding monitoring and communicating within the organization to identify innovation initiatives. Kindström, Kowalkowski and Sandberg (2013) also claim that in order to have service innovation, it is important to scan and explore sources outside the service system, that is not only investigating what services others are offering but instead look at all offerings, to identify new opportunities. Similarly, it can be assumed to be important for innovation related to digital transformation to seek new opportunities and solutions outside the expected frames for digital transformation. This idea is supported by findings by Mousavi, Bossink and van Vliet (2018) claiming that it is important to have entrepreneurial resources within the company which enable the company to behave creatively, act with foresight, use intuition, and be alert to new opportunities for digital transformation. Further, it is important to have the ability to recognize what might be barriers for innovation within the organization and how to overcome these, similar to findings by Karimi and Walter (2015). However, that aspect will be automatically achieved if the other microfoundations building up this factor are fulfilled, such as having routines to seek and discover new opportunities, top management signaling the importance of innovation, having ways to structure and steer the innovation for example through an innovation process (Kindström, Kowalkowski & Sandberg, 2013) or by dedicating resources to innovation in addition to hiring innovative, open and driven people (Mousavi, Bossink & van Vliet, 2018). Based on these assumptions, the aspect of recognizing barriers for digital transformation will be removed as a microfoundation in itself.

To foster an innovative, open and risk-taking culture is very much related to the factor *Support and involvement from the top management*, which was discussed in a previous factor. According to Karimi and Walter (2015) senior management support is necessary to signal the importance of innovation, which is a first step in order to encourage this type of behavior and culture among employees. Similarly, Fisher *et al.* (2010) and McLaughlin (2017) means that the management must communicate the importance of innovation to create and obtain value from new opportunities. One way of doing this can, according to McLaughlin (2017), be through rewards and recognition. Further, Karimi and Walter (2015) claim that having an innovative culture means defining boundaries of what the organization and the people within it may or may not do and thereby reduce the risk of innovation and encourage smart experimenting. This is in line with what was argued for under the factor regarding formulating the digital strategy. By not giving direct guidelines but boundaries to stay within, employees are free to experiment within these boundaries, and allowed to be innovative and creative. This is similar to what Teece (2007) refers to as creating a state of decentralization and near decomposability, with loosely coupled structures and embracing innovation. An important aspect in order to support innovation and open-mindedness is creating a risk-taking culture where ideas are embraced and mistakes are allowed (McLaughlin, 2017; Fisher *et al.*, 2010). Fisher *et al.* (2010) further discusses the importance of managers having an entrepreneurial mindset, and routines for exploration ideas such as visioning and risk-assessing. By steering the innovation and determining "what risks to take" and what ideas to proceed with, it will facilitate and enhance the value creation from the new ideas and innovation.

To foster an innovative, open and risk-taking culture, all employees should be allowed to contribute to the innovation and encouraged to come up with ideas. According to Karimi and Walter (2015), relying only on human resources dedicated to the related area, in this case for example only employees of the IT department, will limit the innovativeness and the organizations ability to come up with and capture new ideas. Instead reconfigurations shall be made in order to give all personnel the time and opportunity

to share their ideas. Further, Karimi and Walter (2015) argues that, by dedicating financial resources for responding to digital disruption, an organization can facilitate new growth, increase the potential for new ideas to succeed and avoid traps associated with directly allocating slack resources to the core business. This goes in line with findings by McLaughlin (2017) who claims that funding and resource allocation is an important aspect of innovation management. Mousavi, Bossink and van Vliet (2018) also discuss the importance of resource deployment and investment in R&D and market research in order to achieve an innovative culture. The ability to implement innovation projects is, according to findings by Alford and Duan (2016), based on having organizational agility. Further they claim organizational agility refers to the ability to make decisions more quickly by, for example, less local authority control and it enables the ability to effectively utilize and transform internal and external assets for digital transformation. Therefore, organizational agility will in this report include all of the above-mentioned aspects to implementing innovation projects, such as creating opportunities for all employees to be innovative and dedicating financial funding to digital innovation initiatives.

The microfoundations needed to create an *Innovative, open and risk-taking culture* are based on the discussion above, and will be presented in Table 6.

Table 6. Microfoundations of the factor Innovative, open and risk-taking culture identified in theory.

	Sense	Seize	Reconfigure
Innovative, open and risk-taking culture	Develop routines to detect internal innovation initiatives Seek new opportunities and solutions outside of the expected frames for digital transformation	Continuously communicate the value of innovation Define boundaries, steer the innovation and allow risk-taking	Create organizational agility

Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution

To enable a disaggregation of the digital strategy for all employees, it is important to understand if employees on all organizational levels have a common ground regarding knowledge of what digital transformation, and the digital strategy, really means. One way of making sure that everyone understands what is said is by using a common language, according to Karimi and Walter (2015). They claim that a common language can create a shared perspective and help to hardwire new concepts in the organization by repeated use of certain terms. This common language can therefore facilitate a common understanding for digital transformation in the organization. Further, it can create a digital-oriented mental model, similar to findings by Kindström, Kowalkowski and Sandberg (2013), which refers to making sure everyone understands how their everyday job relates to the digital strategy, hence clarifying for the employees what is expected of them.

An important aspect of this factor is to reduce and overcome internal resistance and opposition to the digital transformation. This is something Fisher *et al.* (2010) highlights as an important microfoundation. By disaggregating the digital strategy and clarifying for all employees how they contribute and how their job is important for the common organizational goals the digital strategy will be anchored throughout the organization. In order to do this, control and governance must be prioritized, according to Teece (2007). He means that an organizational aim shall be to achieve incentives alignment, in order to get all employees to work toward the same goal, without having to monitor and steer them too much. Further, according to Fisher *et al.* (2010) important microfoundations for developing service organizations are performance measurement systems and establishing routines to

stabilize the new value constellation. In regard to digital transformation, these microfoundations can be interpreted as important means to measure and follow-up the performance of the digital strategy and the digital efforts within the organization and how well individual employees understand their part of the digital transformation.

No theoretical findings that imply a need for reconfiguring microfoundations were found for this critical factor.

The microfoundations needed to *Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution* are based on the discussion above and are presented in Table 7.

Table 7. Microfoundations of the factor Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution identified in theory.

	Sense	Seize	Reconfigure
Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution	Create a common language regarding digital transformation	Anchor the digital strategy throughout the organization Align individual incentives to the digital strategy Install follow-up systems for individual employees on their digital contribution	N/A

Development and maintenance of digital knowledge to fulfill the digital strategy

In order to develop and maintain the digital knowledge required to fulfill the digital strategy, it is necessary to understand what type of knowledge should be developed and where in the organization it is needed, hence, the requirements of people's competences must be defined (McLaughlin, 2017). Yeow, Soh and Hansen (2018) discusses the importance of knowing what knowledge is already existing within the organization throughout all departments and functions. They claim that the responsibility for collecting this knowledge should be incorporated in the role of the explicitly responsible person for digital transformation discussed above. The ability to understand what knowledge should be developed, obtained and maintained is also discussed by Fisher *et al.* (2010) who emphasizes the importance of having information-gathering and information processing routines in order to continuously generate this type of knowledge.

Fisher *et al.* (2010) further emphasizes the importance of continuous adaption of the operational capabilities to the new value constellation, or in the case of this study, adaption to the digital strategy. An important way to develop and maintain digital knowledge within the organization is, according to Fisher *et al.* (2010) and Teece (2007), by knowledge management and knowledge sharing. This goes in line with the findings by McLaughlin (2017) that point out the importance of post-project and inter-project learning. Different means to develop and maintain digital knowledge and make sure that it is aligned with the digital strategy is further discussed by McLaughlin (2017) where he mentions tools such as standards, methods and standardized and defined processes.

Sometimes the required knowledge may not be existing within the firm. This may require sending employees to external courses and education, or, according to Yeow, Soh and Hansen (2018), accessing the required knowledge through recruiting people with the right knowledge. Developing this knowledge, either by recruiting or sending employees to courses will require resources. By doing so,

they claim, the organization make sure to access the necessary requirements both technically and competence-wise.

The microfoundations regarding *Development and maintenance of digital knowledge to fulfill the digital strategy* are based on the discussion and are presented in Table 8.

Table 8. Microfoundations of the factor Development and maintenance of digital knowledge to fulfill the digital strategy identified in theory.

	Sense	Seize	Reconfigure
Development and maintenance of digital knowledge to fulfill the digital strategy	Develop routines to monitor what knowledge exists in the organization, and what should be obtained	Install knowledge sharing routines	Allow resource allocation to knowledge development

Work in cross-functional teams

Working in cross-functional teams intends to create a flexible organization and new ways of working together over individual functions (Karimi & Walter, 2015) and to take better advantage of different competencies within the organization (McLaughlin, 2017). McLaughlin (2017) discuss that one important microfoundation for building digital organizations regards managing organization structure and skills management. Knowing how to structure the organization and how to manage different skills and competences, he claims, are valuable knowledge in order to design effective cross-functional teams that provide value both in the current and future projects. By planning the projects within the organization, the skill management needed over time can be understood.

For the organization to start working in cross-functional teams, there should be routines to enable this type of collaborative work by providing enough resources and flexible time frames to the teams, according to findings by Fisher *et al.* (2010). This also goes in line with the idea by Fisher *et al.* (2010) that the capacity to re-design processes and structures are important in order to achieve cross-functional teams. To implement new digital ventures in an organization's processes will likely change the communication and interrelationships needed between different functions involved in the process, which will require developing new organizational routines and processes in order to achieve the maximum value of the digital venture (Fisher *et al.,* 2010).

Working in new projects will require having the ability to be flexible as to which competences are involved in the team as the projects develops, according to findings by Kindström, Kowalkowski and Sandberg (2013), hence managing work in cross-functional teams put new demands on reconfiguring assets and structuring the organization. Teece (2007) discusses the value of co-specialization, regarding managing strategic fit in order to combine assets to increase value. This view can in this case be applied on cross-functional teams as well, where managers should keep in mind that who works on which project will affect the outcome of the project, as well as the shared knowledge of the team members. To enable resource allocation to cross-functional teams it may be required to reconfigure the internal organizational design (Fisher *et al.*, 2010). This may mean some employees will need to transfer, either physically to join a new project or respond more to their project manager than their line manager, in order to achieve maximum affect from the digital transformation (Yeow, Soh & Hansen, 2018).

The microfoundations regarding *Work in cross-functional teams* are based on the discussion above and are presented in Table 9.

Table 9. Microfoundations of the factor Work in cross-functional teams identified in theory.

	Sense	Seize	Reconfigure
Work in cross-functional teams	Develop routines for project planning with focus on skills management	Develop organizational routines for cross-functional work	Enable resource allocation of team members between projects to be flexible

Corporate digital infrastructure

McLaughlin (2017) identifies the need for technical infrastructure management. Part of this includes knowing what systems exist in the organization today, understanding how they can be used in an optimal way, seeing future demands and functions needed, and understanding how the corporate digital infrastructure would be managed ideally. Yeow, Soh and Hansen (2018) discuss the need for designing, which includes specifying demands and stating what systems we have and what demands are met today by these systems, as well as defining what demands are not met by today's systems and thereby should be developed or integrated. McLaughlin (2017) also discuss the need to understand when systems are outdated or misunderstood, and when development and improvement is needed. He states the need for user experience and allowing feedback in order to detect improvement possibilities.

McLaughlin (2017) further discuss typical tasks for technical infrastructure management which involves the process of managing, monitoring and optimizing technical systems, for example computer systems, for performance, availability, security and operational requirements. Hence, the organization should be able to handle when the digital technology does not fulfill the requirements. Further, the organization should also secure the availability and performance of the digital technology by communicating and anchoring the technology to the business, similar to findings by McLaughlin (2017). An important aspect to achieve a corporate digital infrastructure is asset management (McLaughlin, 2017) by when needed integrate new systems and digital technologies, and when needed use existing solutions in new ways. Further, when systems exist on separate departments or in separate parts of the organization, value can be captured by reusing the same systems on other departments (Fisher *et al.*, 2010). This is referred to as leveraging (Yeow, Soh & Hansen, 2018), which may include using the same system in a new part of the organization or using an existing system in a new way, which should also a part of the method for

Fisher *et al*. (2010) discusses the need to sometimes reconfigure internal organizational design factors. In the case of digital transformation, the use of a corporate digital infrastructure may be a way to reconfigure the organizational design digitally without physically moving people, by allowing and facilitating more communication, collaboration and innovation between departments and organizational levels.

The microfoundations needed to achieve a *Corporate digital infrastructure* are based on the discussion above and are presented in Table 10.

Table 10. Microfoundations of the factor Corporate digital infrastructure identified in theory.

	Sense	Seize	Reconfigure
Corporate digital infrastructure	Develop routines to evaluate the demands for the digital infrastructure and detect needs for improvement Know what the corporate digital infrastructure consists of today	Secure availability and performance of the digital techniques Develop methods to integrate digital technologies	Allow digital reconfiguration of the organizational design

Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy

McLaughlin (2017) discusses the importance of portfolio management for projects and different initiatives. By introducing a portfolio for both initiatives and projects, current and closed, an overview is achieved, that lets decision makers know what they are deciding among.

Further, according to findings by McLaughlin (2017), important aspects of business process management is planning, strategy and defining scope of implementation. These aspects are considered important when prioritizing which digital initiatives to turn into projects, meaning to have routines to examine how the different initiatives could be aligned with the digital strategy and to plan how this alignment could be achieved. Further, it is important to define the requirements for different projects regarding alignment with the digital strategy, similar to findings by McLaughlin (2017). This also goes in line with findings by Fisher *et al.* (2010) regarding the importance of having quality control routines and performance measurement systems for projects and initiatives.

Prioritizing and evaluating is important in order to allocate resources. Karimi and Walter (2015) suggests the implementation of staged allocation of resources to manage resource allocation based on continuous evaluation of projects. This is assumed to lead to more flexibility to changing demands and adaptiveness to findings from projects as they evolve. Beside this, it is important to have routines for evaluating projects, in order to be able to redefine the projects as they go if they do not meet demands (Fisher *et al.*, 2010). McLaughlin (2017) also lift the importance of post-project evaluation to see if the requirements were met but also if the requirements set really led to an alignment with the strategy as planned.

The microfoundations regarding to *Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy* are based on the discussion above and are presented in Table 11.

Table 11. Microfoundations of the factor Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy identified in theory.

	Sense	Seize	Reconfigure
Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy	Collect digital initiatives and projects in a portfolio	Define requirements for project alignment to digital strategy	Continuously evaluate whether projects meet demands and base resource allocation on this

6.3 Summary of the theoretical findings on dynamic capabilities

Dynamic capabilities can be disaggregated into three different capacities: the capacity to *Sense* and shape opportunities and threats, the capacity to *Seize* these opportunities and the capacity to maintain competitiveness by *Reconfiguring* the organization's tangible and intangible assets (Teece, 2007; Yeow, Soh & Hansen, 2015; Kindström, Kowalkowski & Sandberg, 2013; Fisher *et al.,* 2010).

Building the critical factors to be dynamic in their nature has been found important in order to allow the company's internal resources to adapt to changing demands based on the discussion in *6.1 Dynamic capabilities and digital transformation.* Each critical factor consists of a set of dynamic capability microfoundations within the three capacities of *sensing*, *seizing* and *reconfiguring*, which have been identified and confirmed through a literature review. All theoretically found microfoundations, and critical factors they build up, are presented in the framework in Table 12.

Table 12. Dynamic capability microfoundations of the critical factors identified in theory.

		Sense	Seize	Reconfigure
Leadership & Vision	**Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives**	Develop routines to find the strategic fit between business objectives and the surrounding business environment Continuously evaluate the digital strategy to be flexible and adapt to changes	Formulate umbrella strategies Formulate and communicate the direction and boundaries of the digital strategy in a clear way	N/A
	Support and involvement from the top management	Develop routines for top management to be perceptive of the organization	Inform about the value of, and advocate, digital transformation Develop routines to acquire digital knowledge in the top management	Allocate resources to digital transformation projects Top management engagement in digital transformation projects
	Have someone explicitly responsible for digital transformation at top management level	Continuously examine role requirement	Give the appointed person the authority required to meet the demands of the role	Allow resource allocation and delegation of digital transformation responsibilities on all organizational levels
Culture & People	**Innovative, open and risk-taking culture**	Develop routines to detect internal innovation initiatives Seek new opportunities and solutions outside of the expected frames for digital transformation	Continuously communicate the value of innovation Define boundaries, steer the innovation and allow risk-taking	Create organizational agility
	Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution	Create a common language regarding digital transformation	Anchor the digital strategy throughout the organization Align individual incentives to the digital strategy Implement follow-up systems for individual employees on their digital contribution	N/A
	Development and maintenance of digital knowledge to fulfill the digital strategy	Develop routines to monitor what knowledge exists in the organization, and what should be obtained	Install knowledge sharing routines	Allow resource allocation to knowledge development
Corporate Processes & Structures	**Work in cross-functional teams**	Develop routines for project planning with focus on skills management	Develop organizational routines for cross-functional work	Enable resource allocation of team members between projects to be flexible
	Corporate digital infrastructure	Develop routines to evaluate the demands for the digital infrastructure and detect needs for improvement Know what the corporate digital infrastructure consists of today	Secure availability and performance of the digital techniques Develop methods to integrate digital technologies	Allow digital reconfiguration of the organizational design
	Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy	Collect digital initiatives and projects in a portfolio	Define requirements for project alignment to digital strategy	Continuously evaluate whether projects meet demands and base resource allocation on this

7 Empirical exploration of dynamic capability microfoundations for digital transformation

The aim of the empirical study at Tekniska verken was to identify routines, roles and activities that could be considered dynamic capability microfoundations needed to build the previously identified critical factors of digital transformation.

7.1 Case Company Tekniska verken

The empirical findings of this study were collected as a case study of the digital development work at Tekniska verken. Tekniska verken is a company primarily involved in the energy and utility sector and they offer their customers services in electricity distribution, district heating, district cooling, waste management, biogas, broadband, effective energy solutions and electricity trade. They have both private and commercial customers, roughly around 240 000 in total (Tekniska verken, 2019a). The company is owned by Linköping municipality and has about 885 employees (Tekniska verken, 2019b). Tekniska verken is divided into nine business units, that are in turn divided into departments. In addition, there are eight support units and fifteen subsidiaries which of most are represented in the corporate management. In the presentation of the empirical data, the reader should therefore keep in mind the difference of corporate-wide level, business unit level and department level.

The strategic goal with the digital transformation journey at Tekniska verken is to *"utilize the full potential of digitalization"*. The work with this digital transformation project at Tekniska verken officially started back in 2012 when the top management started to realize the importance. In 2014 a person was appointed the responsibility for the digital transformation, and the same person possess the role today. According to a definition of digital transformation by Tekniska verken themselves, led by the previously mentioned person, the digital transformation occurs in four different stages – *Initiation*, *Focusing*, *Integrating* and *Normalizing*. The Initiation stage is recognized by having unclear digital goals, a leadership that is not involved in the digital work and digitalization is viewed as a question for the IT department. At the Focusing stage, the leadership is interested in digital development but has no knowledge regarding how to accomplish it. At this stage, digital transformation is viewed as a too important question to place only at the IT department but the notion of what needs to be done differs between different parts of the organization. Tekniska verken entered this Focusing stage in 2016, and, according to Tekniska verken themselves, moved on to the third and current stage, the Integrating stage, in 2019. To complete this stage, digital transformation has to be a part of the overall operations and there has to be a clear digital ownership in each of the business units. Further, there is also horizontal control with the responsibility to control and steer five different horizontal focus areas across the organization within the frame of digital transformation, these are described further in the paragraph regarding the digital portfolio below. The fourth and final stage in the digital transformation journey is the Normalizing stage. This stage is recognized by having a digital approach through all business development and that the different business units do not depend on the IT department for most digital activities.

At Tekniska verken, the person responsible for digital transformation has developed a digital portfolio that attempts to collect all digitalization projects that provide corporate-wide value, projects that are considered too complex for a separate business unit or stab to handle on their own. The portfolio is divided into five focus areas: Digital customer experience, Digital business development, Digital productivity, Digital leadership/employees and Digital platform. There is no official prioritization of these different focus areas, nor the projects within them.

7.2 Empirical findings on Tekniska verken

The results from the empirical study at Tekniska verken will hereby be presented per factor discussed.

Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives

All respondents were aware of the digital transformation efforts and the fact that there is some kind of digital strategy within the organization. However, only one respondent, apart from those working with the digital transformation on a corporate-wide level explicitly mentioned the vision *"utilize the full potential of digitalization"*. The respondents involved in the digital transformation work also mentioned the fact that the strategy is somewhat outdated and is mostly used indirectly by being applied to the business, rather than explicitly talked about as the strategy. One respondent stated that there is a strategy document but updating this is not of high priority as there are no requirements from the CEO to do so. Instead, focus lies on getting the organization ready and getting people on board. All respondents did, however, mention the digital portfolio and/or the digital focus areas when asked about the digital strategy, and they agreed that digitalization is supposed to permeate all these focus areas. When asked about how the digital focus areas had been chosen, it was stated that the person responsible for the digital transformation had made some research and googled the subject and simply adjusted the findings to the corporation.

It appeared that three of the respondents experience a lack of clear focus and articulated goals regarding the digital transformation, which contributes to certain incoherency when it comes to digital projects and efforts. For example, one respondent stated that top management clearly communicates the ongoing initiatives within digital transformation, but the respondent experienced some difficulty when it comes to understanding the overall vision and the common denominator for these initiatives. A person from the top management stated however that the strategy is supposed to provide more of a direction than being too precise. It ought to be clear why something shall be done, but not how. Another respondent, who is involved in the work with the digital transformation on a corporate-wide level, points out that the most important thing is that digitalization shall be viewed as a tool to develop the corporation.

Support and involvement from the top management

All respondents coherently agreed upon the fact that the top management is engaged in digitalization questions, that it is a widely discussed topic throughout the organization and that ambitions are high when it comes to digital transformation. Even though the top management does not directly engage in specific digitalization projects, their commitment is shown by, among other things, concrete efforts and resource allocation to digitalization projects, and assigning a sponsor to each digital initiative. Support and involvement for digital transformation is also displayed by actively using and informing on the common intranet and the internal digital communication platform Workplace, which is referred to as a Facebook for workplaces.

From a management perspective, there is a concern about developing too concrete directives and roadmaps on a central level, as it is such a big organization with several focal points. Instead, the ambition is to clarify a common target but let the different business units get there in their own ways, as they all have different digital maturity. The idea is to create a certain freedom and encourage initiatives from the business to drive their own part of the digital transformation. From the business, however, a higher degree of clarity is called for, as well as coordination on a higher level. This in order to avoid sub-optimization and provide a clearer direction. One respondent experience that the credibility of the management's digital ventures is somewhat decreased when there is no sync or clear prioritization between different initiatives, as well as no clear roadmap on how to get to the goal. Another respondent pointed out that the new situation the organization is facing, with high demands on the organization

being agile and organized, places higher demands on a more active leadership. The respondent stated that the management ought to make managers on lower levels responsible for not following common practice and working procedures. By building more structures for how things shall be managed in the organization, and thereby develop more common working methods, resources could be used better as double work could in some cases be avoided, according to the respondent.

Have someone explicitly responsible for digital transformation at top management level

At Tekniska verken there is a person explicitly responsible for the organization's digital transformation. The responsibility of this role includes developing the digital strategy, engaging the corporate management and anchoring the digital transformation journey among them, as well as spreading information, driving the change and ensuring the digital initiatives are executed and delegate responsibilities throughout the business. Further, the person in the position of this role at Tekniska verken claim that an important aspect of the role is conveying clearness and create insight into why the transformation is needed and incorporate a sense of security among the employees in a time of change. This partly means informing people about the time aspect of this type of change and thereby securing that they feel comfortable being in the middle of a process of change during a longer period. A majority of the respondents pointed out the importance of informing and educating employers in the organization in order to reduce resistance to digitalization ventures and changes connected to these.

All the respondents believe that engagement and focus on digitalization should come from a management level, and that decisions should be taken from the top, in order to create clarity and a unified organization. Three of the respondents argue that the explicit role of driving the digital transformation is more important at the beginning and the early phases, as someone ought to really have the time, patience and commitment to get people along. One of them further describes that as the organization develops further in their digital transformation, the importance of spreading the responsibility further down increases, for example to business unit managers, in order to reach all parts of the business.

Innovative, open and risk-taking culture

Several respondents mention concrete examples of how Tekniska verken engage in activities to facilitate innovation. Half of the respondents mention the yearly contest Innoverket, where employers get to compete with their ideas, and the contest ends with the finalists presenting their ideas to the rest of the organization. This effort is one way of drawing attention to improvement suggestions and lifting ideas from the business on the agenda. Another example of how an innovative and open culture is created, mentioned by two of the respondents, is by assigning so-called innovation-coaches. These coaches are responsible for sensing and catching ideas from the business and taking them forward. Half of the respondents claim, when asked how they are encouraged to be innovative, that it is something expected by them according to their role requirements. Three of the respondents argue that the organization's ability to be creative and have a lot of innovation basically depends on individual people's drive and commitment to develop, come up with ideas and improve. This means, according to two of the respondents, that it also becomes a matter of hiring the right type of people to be able to achieve a certain type of culture.

How to encourage an innovative and risk-taking culture seem to vary between departments. One respondent described the strive after an entrepreneurial environment where employees are given relatively free rein without direct top governance. *"I often prefer when my employees excuse themselves in retrospect rather than asking permission"*, the respondent states. A majority of the respondents do not experience a lack of ideas and improvement suggestions within the organization today. One respondent even described the situation as a "*creative chaos*". Yet another respondent seemed to share

this view, talking about the importance of developing a structured process for innovation as this would mean that more would happen, according to the respondent, even though the innovation might not be as high-flying. The respondent further argues that today ideas tend to die quickly as it eventually turns out that they were not anchored enough in the organization to be carried through, a problem that the respondent believed can be reduced by having structures and methods in place before starting the project. Further, half of the respondents claim that a more defined direction and clarity is required from the management regarding what innovations and ideas should be prioritized. Two respondents claim that it is a matter of allocating resources. One of the respondents, for example, describes the situation, saying "*We must always compare work with benefit and pick the low hanging fruits*".

Two respondents name the importance of using coherent terms when creating a certain culture. One respondent takes the word innovation as an example, asking "*What is innovation, really?*". It does not always have to be revolutionizing but can be copying something that has been done elsewhere or applying something old in a new way, as long as it creates value.

Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution

Three of the respondents said that it is the business units' separate business plans alternatively the remit of the different support functions that clarifies what is to be done in line with the overall business goals and strategy within each department, including digitalization efforts. Two of the respondents thought that there were clear links between the overall business strategy for the organization and specific individual goals and development plans, whilst three of the respondents rather thought that business units and staffs had to make more or less unclear interpretations of how the overall business plan and strategies could be applied to each and every department. One respondent argued that, for the department where the respondent works, there are no clear goals that correlate with the overall goals of the organization. From the top management level, it was made clear that they have not made any direct efforts in telling different department or business units what they are to do or what is expected from them when it comes to digital contribution beyond communicating the digital focus areas of the organization. The focus areas are good, but they place demands on well-functioning interaction, one respondent concluded.

From the interviews, it became clear that the routines for follow-up and giving feedback for individual and group contribution varied across different departments. At department level, there seemed to be clear routines regarding giving feedback. Examples that were discussed were weekly department meetings, mentioned by two respondents, and individual performance appraisals, mentioned by two respondents, on which goal achievement is discussed. Two respondents also mentioned that for work in projects there are more formal feedback routines controlled by the project sponsor and that follow-ups are requested by the board within each focus area.

Development and maintenance of digital knowledge to fulfill the digital strategy

When asked about how Tekniska verken develop and maintain relevant digital knowledge and competence needed to perform a digital transformation, two respondents talked about a natural shift of the workforce and claimed that the competence regarding digital solutions are gradually increased as the workforce become younger. This is due to young people of today have grown up in a more digital world than previous generations. The respondents at hand continued by stating that some people that have been with the company for a long time are willing and able to keep up with the digital development, while others are not, and these people need to be removed. The respondent stated that it is a though readjustment, but it would not work otherwise. There is a need for new competence, culture, and ways of working in order to manage the changes needed to adapt to the changing surroundings. The two

respondents that talked about a shift of workforce also pointed out that an increased focus on digitalization within the organization creates a need for new internal competencies. It also means having people with abilities that are not directly knowledge-based, but rather the ability to live in a mobile environment and to lead others, after which the respondents reasoned that the employee can learn the technical competencies later.

How to keep track of what competencies exist internally and what needs to be updated or further developed seems to differ by department, however, one respondent from top management said there are no skill- or competence plans for what competencies or skills will be needed in the future for the organization as a whole. At the department level, one respondent showed that they document routines and instructions, which includes using film format on YouTube, in order to preserve and disseminate knowledge and thereby reduce person-dependent knowledge and skills. The fact that new employees can go parallel with more experienced colleagues is another example that is used at certain departments in the organization to achieve this. However, two respondents argued that the challenge is to preserve more person-specific aspects, such as personal networks and drive, rather than direct competencies and skills. Building personal networks within the company seem to be encouraged, as two respondents said that transferring to different departments within the corporation is often encouraged, which naturally creates personal networks and important connections between business units and departments.

Being able to attract the right internal competences places new demands on the organization's recruitment. One respondent said that this is a challenge for the HR department, since they have no prior experience from hiring these new roles and competencies. One challenge highlighted by one of the respondents is the shift of attitude that comes with the new generation of the workforce. They work at a company for a few years and then change employer, unlike previous generations where most people stayed with the same employer until they retired. The fact that the competencies that are needed continuously change means that you cannot always hire the skills, but instead it places higher demands on collaborations and having strategic staffing planning where you build and invest in internal competencies.

Work in cross-functional teams

The overall picture from the interviews was that the cross-functional work in the company mainly takes place in different types of projects and that historically there has not been very much cross-functional work at all. Four of the respondents said, however, that the organization has started to work according to processes that stretch across all the different business units, whereupon it becomes more natural that different competencies work together. Three of the respondents argued that the previous lack of cross-functional work depends on historically built structures and cultures within the company that today result in slowness, but they further believe that there has been a great development in this area in recent years. However, there is yet some work to be done in this area, for example, one respondent mentioned that there is no organization-wide project methodology, today both “the project manual” and the project methodology XLPM are used. Working in cross-functional teams is an area where challenges occur linked to the staffing of projects due to a lack of resources. One respondent pointed out that the digital portfolio needs to be wider and include for example HR-projects. Today, it is always the same people involved in several projects and they become overburdened. Another respondent explained that bottlenecks often arise around key competencies since they are simply too few within the company. One respondent thought that the resource allocation problems would become easier as an increased understanding of the entire process chain spread across the organization, which will be an effect of engaging more in cross-functional work. The respondent further believed that there is no direct coordination and prioritization between contemporary projects, which is why there are collisions of individual resources, and continued by saying that a better overview from the top management would

probably reduce these problems. At the same time, half of the respondents emphasized that they see the potential for learning from the different competencies that exist within the organization. Two respondents argued that further cross-functional work and learning from each other is a necessity for the future as it could mean that the organization could develop a completely different offer to the customer.

Corporate digital infrastructure

A clear majority of the respondents claimed that there are many different IT-systems within the company and that it differs to a large extent between departments which systems are used. Two of the respondents said that when it comes to finding information about systems within the organization, it requires knowing where to look for that information, which is not always the easiest. One respondent explained that, when there is a need to implement a new system at a department level, the difficulty of knowing which systems are already in place at different places in the organization is a complicating aspect. The respondent continued by saying that, historically, you could get this information by asking the IT department, but they no longer have the resources to prioritize that type of tasks leaving the information unattainable. Further, one respondent mentioned that an important aspect of making systems and technologies available is to consider all requirements, for example being aware that there has to be alternatives to access systems, maps and instructions on employees mobile devices for when they are working out in the field, but also that there must be backup offline alternatives for when the employees are without internet access. The respondent also discussed the need for raising the general digital competence level within the company so that employees could make better use of different digital tools. A majority of the respondents claimed that the most important aspects of this matter are that the organization manage to gather information and data in a coordinated manner. Today, there are a lot of data in various parts of the organization, but the data is not commonly collected anywhere. However, one respondent mentioned an ongoing effort on system integration within the company. Utilizing all data that exists in the organization is something that is highlighted by four of the respondents as the greatest potential benefit of digitalization as it enables creating new well-supported products and services.

At Tekniska verken the internal digital communication channels are mainly an intranet, that is relatively new, and the platform Workplace. All of the respondents explained that they mostly use the intranet to find static information via different shortcuts and two respondents also mentioned using the intranet for time booking. Workplace is used by all the respondents primarily to get information about news and of some also to send out information themselves. Two respondents emphasized that they see development potential for these internal digital platforms. They requested having only one platform that allows more functions. Some examples that these respondents said they would appreciate were to be able to book meetings, have contact with external parties and be able to send internal messages on Messenger-like services rather than having to use e-mail. The respondents in question argued that using one and the same platform probably would result in more efficient communication and information gathering, for example regarding digital communication between members of project teams.

Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy

When asking about the prioritization of digital initiatives during the empirical study at Tekniska verken, a majority of the respondents mentioned the digital portfolio as a well-known concept, although only a few people know how the work around it is structured. One of the respondents involved in the work with the digital portfolio explains that it is aiming to collect all digitalization projects, however, based on the empirical study, there does not seem to be any structured prioritization between projects within the portfolio. The respondents involved in the portfolio work have not yet experienced the lack of official prioritization between the focus areas in the portfolio as an issue, even though it is expected to

arise as the portfolio expands and grow bigger as it will be increasingly difficult to get an overarching view of all projects. The respondents who are not involved in this work, however, perceive the digital efforts today as somewhat sprawling and with a lack of focus. One respondent points out that the digital portfolio is a good initiative and a way to develop systematic corporate working methods, but that it is too narrow, only covering a small spectrum of what Tekniska verken do. Another respondent agreed, claiming that a wider portfolio would enable prioritizing projects in a different manner, as they would not be competing of the same resources. One respondent point out that the benefits could be optimized on a corporate-wide level, by coordinating the projects better also between different departments and business areas. This opinion reoccurs among yet another couple of respondents, stating that prioritization between different projects should be able to be more effective by obtaining a more centralized overview of different projects.

A majority of the respondents described different ways to prioritize at department levels, but what the prioritization is based on seems to differ. Having many various ways of prioritizing at department level without routines for coordination of these projects results in a lack of focus according to a majority of the respondents. Based on the empirical study, it appears to be a common view at Tekniska verken that they lack a general method for prioritization of initiatives and that this is an area that needs to be improved. One respondent believed that many projects are allowed to start on poor ground conditions, but the respondent also stated that the main problem is rather that projects rarely are shut down once started although in many cases, there is no argument for keeping them running. The respondent believe this may be due to the fact that shutting down projects that have already been invested both time and money in may feel uncomfortable, however, the respondent points out, it should be kept in mind that keeping projects that do not meet requirements will only keep resources from being allocated where they make more use. Another respondent believed that the challenge is primarily to determine which projects or initiatives should be prioritized when there are many stakeholders or business areas concerned and no one really has the required helicopter perspective.

8 Analysis of dynamic capability microfoundations to build dynamic digital capability

In this chapter, the theoretical findings will be compared to and analyzed with the empirical findings from Tekniska verken, in order to verify or modify the findings from the theoretical study. The results of this chapter aim to answer the second research question. It will also lead to the final framework and thereby, the result of this study.

8.1 Verification and modification of dynamic capability microfoundations to build dynamic digital capability

The following analysis is based on the empirical findings from the study at Tekniska verken regarding the theoretical based dynamic capabilities microfoundations. In this chapter, the empirical and theoretical findings are analyzed per factor.

Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives

Sense

The findings by McLaughlin (2017) and Fisher *et al.* (2010) highlighted the importance of finding the strategic fit between business objectives and the surrounding business environment. This indicates that finding the right digital options for the specific organization at hand, by continuously re-examining which options have a strategic fit to the overall objectives of the organization, is an important aspect of formulating and developing the digital strategy. When examining the empirical findings at Tekniska verken, it was clear that the company had the digital vision "*utilize the full potential of digitalization*" but was not working according to a clearly communicated digital strategy regarding how to reach this vision. The empirical findings show that there seem to be a general knowledge within the organization of the digital portfolio and/or the digital focus areas which indicates that there is some sort of formulated organizational digital direction, although many respondents said to be discontent with the digital direction as they experience a lack of focus from the top management. These experiences signal the need for better evaluation of the digital direction and thus, the strategic fit. Evaluation is, according to findings by McLaughlin (2017), important in order to understand how well the digital strategy is accepted, understood and anchored in the business and among all employees. Respondents involved with the work with the digital strategy talked about the fact that the digital strategy probably needed updating, but it will most likely not be prioritized this year. This shows that the organization does not work with evaluating and developing the digital strategy continuously today. The lack of evaluation of the strategy's acceptance in the organization as well as updating the digital strategy can, according to this analysis, be an underlying aspect resulting in a perceived unclear digital direction amongst the employees, hence the empirical findings verify the importance of the theoretically found microfoundations.

Seize

To formulate the strategy in accordance with the microfoundation Formulate umbrella strategies is according to theory desirable in order to not narrow down possibilities and to stay adaptive and flexible to changes and to create a high degree of managerial open-mindedness when formulating the strategy (Fisher *et al.,* 2010). At Tekniska verken, people throughout the organization knows that the company is facing a digital transformation. However, a concern regards the fact that the direction is too broad, and that they do everything that could be included within those broad, given boundaries of the digital vision without a clear focus or prioritization. These problems experienced at Tekniska verken supports

the importance of what McLaughlin (2017) discuss regarding Formulate and communicate the direction and boundaries of the digital strategy in a clear way. The management does not want to provide a too strict strategy in order to stay flexible, however, they need to formulate clearer guidelines and boundaries to provide a clear direction that everyone in the organization knows and understands. Hence, clear boundaries of the digital strategy make up a type of umbrella strategy and the digital direction can be flexible within those limits. Therefore, the microfoundation Formulate umbrella strategies is not considered a microfoundation in itself and it is therefore crossed out in the table below and further removed from the microfoundation list.

The revised icrofoundations of the factor *Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives* are presented in Table 13.

Table 13. Revised dynamic capability microfoundations of the factor Formulate and continuously develop a clear digital strategy that direct the digital transformation in order to support the overall business objectives.

	Sense	Seize	Reconfigure
Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives	Develop routines to find the strategic fit between business objectives and the surrounding business environment Continuously evaluate the digital strategy to be flexible and adapt to changes	~~Formulate umbrella strategies~~ Formulate and communicate the direction and boundaries of the digital strategy in a clear way	N/A

Support and involvement from the top management

Sense

The findings by Teece (2007) regarding effective communication highlight the importance that the top management being perceptive of the organization. From the empirical study, it was clear that all respondents agreed that there is a willingness from the top management regarding digitalization and digital transformation. However, the findings from the empirical study show that the top management had made an effort not to develop too concrete directives, while from an employee perspective, a clearer focus was asked for. These findings show the problems that could arise when top management lack certain perceptiveness of the organization regarding what type of support is asked for by the organization. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

Seize

Clearly demonstrating commitment and advocating values are important means for top management to be perceived as supporting and involved (Teece, 2007; Yeow, Soh & Hansen, 2018) in digital transformation. It was clear from the empirical study that respondents perceived that the top management showed support for digital transformation by, for example, spreading information regarding digital efforts and the value of them on the internal digital communication platform Workplace. By sharing the information and advocating the value on the online platform, it is made available to all employees independent of role in the company. Thereby, the empirical findings are assumed to verify the importance of the microfoundation Inform about the value of, and advocate, digital transformation as a mean to show top management support and involvement. Further, one

respondent from the empirical study mentioned that, even though the support for digitalization efforts are clear, the credibility of the top management in digital transformation questions are somewhat questionable because of the lack of clear focus for the digital transformation efforts. Educating the top management and making sure they have a common view can be considered an effort to minimize the risk of not having a clear direction, hence achieving higher credibility, in accordance to findings by Teece (2007). One respondent mentioned the need for more active leadership as the organization enters a situation that place demand on being agile and flexible, meaning that top management should be better at making managers responsible for following common practice and working procedures. This statement indicates that the problem regarding credibility at Tekniska verken could rather be related to not making sure this common direction is communicated and retained further down in the organization. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

Reconfigure

The empirical findings show that top management makes sure to allocate resources and prioritize projects and efforts regarding digital transformation, which goes in line with findings by Yeow, Soh and Hansen (2018) stating that allocating resources to encourage employees in their digital transformation is crucial in order to show support for digital transformation. According to findings by Karimi and Walter (2015), one way for the top management to show support and involvement for a certain type of projects could be for top management themselves to engage in these projects. For people in the top management to be directly involved in specific digitalization projects does not seem to be crucial according to the empirical findings at Tekniska verken, however this may be dependent on the extent and impact of the project. Hence the meaning of the "engagement" aspect of this critical factor may vary, but the important denominator is that the top management should show support for these types of questions. Together these findings indicate that the most important reconfiguring aspect of showing the top management's support and involvement for digital transformation is to encourage employees and allocate resources to digital transformation projects, making it possible for employees to lead their own digital transformation. The analysis above indicates that the microfoundation regarding Top management engagement in digital transformation projects should not be considered a microfoundation in itself for this critical factor and it is therefore crossed out in the table below and further removed from the microfoundation list.

The revised microfoundations of the factor *Support and involvement from the top management* are presented in Table 14.

Table 14. Revised dynamic capability microfoundations of the factor Support and involvement from the top management.

	Sense	Seize	Reconfigure
Support and involvement from the top management	Develop routines for top management to be perceptive of the organization	Inform about the value of, and advocate, digital transformation Develop routines to acquire digital knowledge in the top management	Allocate resources to digital transformation projects ~~Top management engagement in digital transformation projects~~

Have someone explicitly responsible for digital transformation at the top management level

Sense

To have someone who initiates and pushes the digital transformation, and enhances the importance of the change, has been found important in theory (Yeow, Soh & Hansen, 2018; McLaughlin, 2017;

Kindström, Kowalkowski & Sandberg, 2013). These theoretical findings have been verified based on the empirical findings that all of the respondents believe that engagement and focus on digitalization should come from a management level, and that decisions should be taken from the top, in order to create clarity and a unified organization. Empirical findings also indicate that the responsibilities and focus of this person vary depending on the digital maturity and the phase of the digital transformation the corporation is in. The fact that the role requirements changes implies that the role requirements should continuously be re-examined, and it is important to understand why and how the success factors for the role changes, which is in accordance with findings by Yeow, Soh and Hansen (2008). In addition, the resource usage for the role requirements need to be continuously evaluated (Yeow, Soh & Hansen, 2018; Teece, 2007). Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

Seize

In order to meet the changing demands of the role, the responsible person should be allowed to delegate and allocate responsibilities as the digital transformation become more integrated in the organization, as stated by Kindström, Kowalkowski and Sandberg (2013). This may require managing structures and authorities in the organization, to allow the responsible person to perform its duties without having to ask permission or going through other authorities, as some decisions may need to be implemented on a short basis. Managing structures includes integrating and leveraging digitalization knowledge on different departments and hierarchical levels (Yeow, Soh & Hansen, 2018). This need for managing structures and authorities is verified by the empirical findings regarding the requirements of the role involving driving the changes so that it is managed in the most effective, and least confusing for employees, way possible, ensuring digital initiatives are understood and executed. In addition, the responsibility to drive and anchor the change should eventually be delegated further down in the organization, as described by one of the respondents in the empirical study, to managers on lower hierarchical levels that ought to spread the word and explain the changes to their respective employees. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

Reconfigure

Resources should be distributed throughout the organization that enables explanation and communication of the digital transformation, as a mean to achieve what McLaughlin (2017) discuss when it comes to creating organizational readiness for the digital transformation. From the empirical findings on Tekniska verken, it appears to be increasingly important to spread both digital knowledge and responsibility further down in the organization as digital maturity increases, which also requires more resources allocated to the digital transformation. Further, as digital transformation proceeds, one single person holding the role of explicitly responsible for digital transformation can no longer manage the change on their own, but each business unit, and eventually each department, should have resources to manage their digital transformation. This goes in line with what Kindström, Kowalkowski and Sandberg (2013) discuss when it comes to delegating responsibilities on all organizational levels. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

The verified microfoundations of the factor *Have someone explicitly responsible for digital transformation at the top management level* are presented in Table 15.

Table 15. Verified dynamic capability microfoundations of the factor Have someone explicitly responsible for digital transformation at the top management level.

	Sense	Seize	Reconfigure
Have someone explicitly responsible for digital transformation at the top management level	Continuously examine role requirement	Give the appointed person the authority required to meet the demands of the role	Allow resource allocation and delegation of digital transformation responsibilities on all organizational levels

Innovative, open and risk-taking culture

Sense

Innovation and creativity in an organization comes from creating an environment where the people within the organization get new ideas, get the opportunity to meet and share these ideas and that there is a way to capture these ideas and turn them into something real, improving and value-creating (Jacobi & Brenner, 2017). When it comes to larger corporations, the top management cannot possibly know what is going on throughout the organization, so there should be routines to capture ideas throughout all organizational levels, as stated by Kindström, Kowlakowski and Sandberg (2013) and McLaughlin (2017). The empirical study at Tekniska verken show that the respondents feel encouraged to be innovative by different routines that have been developed in order to draw attention to improvement suggestions and lift ideas from the business. These empirical findings are considered to verify the theoretical findings regarding the microfoundation Develop routines to detect internal innovation initiatives. Further, two respondents from the empirical study pointed out the importance of using coherent terms when talking about innovation. Defining that innovation does not have to be revolutionizing but can just as well be copying something that has been done elsewhere or applying something old in a new way may reduce the pressure or expectations when employees are asked to be innovative, which in turn may foster creativity even more. This could be considered one way of achieving the microfoundation Seek new opportunities and solutions outside of the expected frames for digital transformation based on findings by Kindström, Kowalkowski and Sandberg (2013), as it inspires and encourages people to think and practice ideas and solutions in unproven ways. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

Seize

Findings by Karimi and Walter (2015) imply that one way of encouraging innovative behavior is by communicating its importance which is similar to findings by Fisher *et al.* (2010) and McLaughlin (2017) regarding signaling the importance of innovation. The empirical study at Tekniska verken showed that several respondents consider creativity and innovation a requirement for their role and claim this is something that is expected from them in their everyday work. Further, findings by Karimi and Walter (2015) indicate that it is important to define the boundaries of innovation, both in order to steer and direct the innovation so that the development of the organization follows the desired direction, but also so that people feel free to be creative within these boundaries and encouraged to experiment in smart ways. The respondent from the empirical study naming the development of a structured innovation process lifts an important aspect, stating that this would enable taking ideas further, although the ideas would not be as high-flying. However, the sacrifice of high-flying ideas goes in line with the idea of steering the innovation, by focusing on ideas that can really be implemented. The effort to define

boundaries seems, based on the empirical interviews, to differ between departments and business units on Tekniska verken. However, it is important that everyone knows what is expected from them and what they are allowed to do, no matter where they are in the organization (Karimi & Walter, 2015). In addition, by steering the innovation it is easier to ensure that risks taken will more likely provide the desired effect and value, hence the potential benefits are high enough that a potential failure is a risk worth taking (Fisher *et al.*, 2010). An example of this was shown in the empirical study regarding giving the employees relatively free rein to be innovative without direct top governance, since the risk of the employees failing is worth taking to create the entrepreneurial environment where successful ideas can foster. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

Reconfigure

In order to generate actual value from innovation requires organizational agility (Alford & Duan, 2016), which includes dedicating resources, both financial and human, to different initiatives and projects in order to facilitate innovation (McLaughlin, 2017; Karimi & Walter, 2015). One empirical example of this need for organizational agility is again the contest Innoverket at Tekniska verken, which demands both financial funding to carry out, while being time-consuming hence resulting in time lost from the core business and thereby the money-making activities. As Innoverket is, according to empirical findings, a mean to create the opportunity for employees to take part in developing the organization and quickly implement and try out their ideas, the importance of having the organizational agility that enables initiatives such as Innoverket is considered empirically verified. At Tekniska verken, the problem does not seem to lie in fostering an innovative culture and encouraging people to come up with and share ideas, but instead a lack of resources in order to carry out all projects. If the people responsible for allocating resources does not understand the desired focus of the innovation, due to unclear direction and clarity as the case described at Tekniska verken, the scarce resources will most likely be allocated to activities related to the core business as the direct benefits of the core business might be easier to understand. This goes in line with theory by Karimi and Walter (2015) stating that allocating enough resources and financial funding to innovation management is important in order to avoid traps associated with directly allocating slack resources to the core business. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

The verified microfoundations of the factor *Innovative, open and risk-taking culture* are presented in Table 16.

Table 16. Verified dynamic capability microfoundations of the factor Innovative, open and risk-taking culture.

	Sense	Seize	Reconfigure
Innovative, open and risk-taking culture	Develop routines to detect internal innovation initiatives Seek new opportunities and solutions outside of the expected frames for digital transformation	Continuously communicate the value of innovation Define boundaries, steer the innovation and allow risk-taking	Create organizational agility

Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution

Sense

According to theory by Kindström, Kowalkowski and Sandberg (2013), it is important to create a digital oriented mental-model amongst the employees at an organization that is to go through a digital transformation, partly because the employees should be able to really understand what is expected of them regarding digital contribution. From the empirical study, some respondents said they had a clear view of what was expected of them, regarding the organization's digital transformation efforts, while a couple of other respondents rather thought that they had to make interpretations of how to align their digital efforts to the overall business, making their efforts unclearly linked to the overall objectives. This indicates that there might be different views of what the overall business' digital goals and strategies really mean. From the top management level, it was clear from the empirical study that they had not made any direct efforts in telling different department or business units what is expected from them beyond communicating the focal areas for the digital efforts of the organization. However, just like the common goals and efforts ought to be explained and commonly agreed upon at the top management level, all employees need to be able to understand what is expected of them and what different goals really mean in their case. The findings by Karimi and Walter (2015) emphasized the importance of having a common language that can create a shared perspective and help to hardwire new concepts in the organization. They stated that this common language can facilitate a common understanding of digital transformation in the organization. By creating a common language and standardized concepts, the underlying meaning of the stated goals and strategies could be clearer, and the departmental interpretation of the overall digital objectives and strategies facilitated. Hence, not using common terms regarding digital transformation could be an underlying aspect resulting in employees feeling unsure what is expected of them in regard to contribution to the overall digital objectives of the organization, hence the empirical findings verify the importance of the theoretically found microfoundations.

Seize

According to findings by Fisher *et al.* (2010), anchoring the digital strategy throughout the organization by disaggregating the digital strategy and clarifying for all employees how they contribute and how their job is important for the common organizational goals is a way to overcome internal resistance to the digital transformation. One respondent from the empirical study mentioned the importance of communicating to all employees that they are responsible for their own digital transformation. Explaining to the employees how the department objectives are related to overall business objectives and showing employees how digital tools could facilitate their everyday work, and thereby create incentives for individual contribution to digital transformation could be a way of anchoring the digital transformation within the company. Based on the analysis above, the microfoundation of Aligning individual incentives to the digital strategy is considered to be connected to the microfoundation of Anchoring the digital strategy throughout the organization, as aligning the incentives to the digital strategy could be viewed as a mean to anchor the digital strategy. Hence, there is no need for two separate microfoundations. The microfoundation Anchoring the digital strategy throughout the organization is therefore crossed out in the table below and further removed from the microfoundation list. Further, follow-up and feedback are according to findings by Fisher *et al.* (2010), important means to measure the performance of the disaggregated digital strategies and goals as well as evaluate how well individual employees understand their part of the digital transformation. By giving feedback to employees on their contribution to their goal achievement, the employees get a wider understanding for what they should focus on in order to contribute to the fulfillment of the overall business objectives

which facilitates having a common direction where everyone works towards the same goals. It was clear from the empirical study that there were no organization-wide routines for follow-up today, but all departments have their own routines for follow-up and evaluation of goal achievement, and consider this a mean to encourage digital contribution, which verifies the importance of this microfoundation.

The revised microfoundations of the factor *Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution* are presented in Table 17.

Table 17. Revised dynamic capability microfoundations of the factor Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution.

	Sense	Seize	Reconfigure
Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution	Create a common language regarding digital transformation	~~Anchor the digital strategy throughout the organization~~ Align individual incentives to the digital strategy Install follow-up systems for individual employees on their digital contribution	N/A

Development and maintenance of digital knowledge to fulfill the digital strategy

Sense

According to the findings by Yeow, Soh and Hansen (2018) as well as findings by Fisher *et al.* (2010), it is crucial to know what competencies exist within the organization, and what competencies are needed where, in order to develop and maintain the digital knowledge required to fulfill the digital strategy. This includes keeping track of the level of digital knowledge and whether it could be taken further advantage of. The empirical findings showed that there were different routines for keeping track of existing competencies at different departments, but there were no organization-wide routines for evaluating which types of competencies exist today and which would be necessary for the near future. One respondent mentioned that there should be more consideration regarding which competencies that need to be developed or obtained in the company in the future, but today there is no structured way of doing so. From the empirical interviews, two respondents mentioned that in order to maintain and obtain relevant digital competencies for digital transformation, there is a need for a shift in the workforce. However, according to theory by Jacobi and Brenner (2017), digital transformation does not mean changing the entire workforce of old employees to new IT-interested ones, but instead finding ways to encourage and develop the digital knowledge for the existing employees. As the digital development place new demands on personal aspects, such as the ability to adapt to a fast-paced environment, rather than direct technical competencies which, according to one of the respondents, is something that can be taught once hired and therefore is contradictory to the opinion of a need for a shift in workforce. Likewise, people without certain digital knowledge may still possess other valuable skills and traits, hence the sensing microfoundation of this factor has empirically been observed to include knowing and understanding all valuable knowledge within the organization and how different aspects of knowledge and experience can be valuable in the digital transformation journey, not only specific digital knowledge.

Seize

Further, theoretical findings by Fisher *et al.* (2010) and Teece (2007) imply that it is important to have routines to maintain and develop digital knowledge within the organization. Because, for one reason or the other, eventually people do leave the company and, therefore, it is inevitably important to make sure that the knowledge remains within the organization when employees leave. This become increasingly important since the shift of attitude amongst the workforce, mentioned in the empirical study, imply that people are becoming less loyal to their employers. The findings by McLaughlin (2017), Fischer *et al.* (2010) and Teece (2007) emphasized the importance of having knowledge management and knowledge sharing routines. The issue with knowledge leaving the organization may therefore be founded in lacking routines for documenting working methods and skills, rather than people leaving. A few respondents mentioned different examples of knowledge sharing routines on the department level, however, no respondents mentioned any demands on an organizational level on these types of routines which indicates that the responsibility to make sure that the competence is person-independent lays on department managers or, in some cases, individual employees. If there are no routines for documenting instructions, skills and knowledge, new recruits will have to discover their own ways of doing their job. On the one hand, this can be a way of encouraging creativity, but on the other hand, it will likely be both ineffective and lead to an even bigger variation in ways of working within the company, as observed at Tekniska verken, which might, in turn, make future knowledge sharing activities more difficult. Another aspect of knowledge sharing was highlighted by a few respondents who believed that a challenge regarding knowledge sharing is that you cannot share aspects like personal networks, which make these types of assets or competencies very person dependent. One method of implementing knowledge sharing, while building internal networks, is through different types of mentorships. Findings by Jacobi and Brenner (2017) indicate that it can be a good idea to use reverse mentorships regarding digital knowledge development were younger colleagues help elder ones become more comfortable using digital tools. In the case of Tekniska verken, this could be a way to reduce the need for a workforce shift caused by the senior employees having a hard time keeping up with the digital transformation. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

Reconfigure

According to findings by Yeow, Soh and Hansen (2018), an important aspect in obtaining the competencies and skills needed for digital transformation is managing to recruit the right people. Since digital transformation place new demands on which personal competencies and abilities are needed, the empirical study showed that recruiting the right people for digital transformation puts new challenges on the HR department regarding recognizing which characteristics are important for that particular role. Even new recruiting for roles that have been in the company for a long time but now require other personal qualities require changing and renewing the recruitment process. It is therefore important to understand that, in order to digitally transform an organization, there is a need for other types of new knowledge, that is not only digital knowledge, to develop internally, in accordance to the empirical findings. In addition, to facilitate for new recruits as well as transferring people within the company, documentation is of high importance to enable new people to take over tasks and continue where someone else left off. However, it is not always reasonable to hire important competencies as the competencies required can be assumed to change continuously as digitalization evolves fast. Being flexible therefore means there are routines to develop or obtain the knowledge when needed, not always relying on recruitment. One way to take advantage of and develop the knowledge that already exist in the firm, is to advocate and allow employees to study and join courses in order to develop the type of

knowledge required to achieve the digital strategy. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

The verified microfoundations of the factor *Development and maintenance of digital knowledge to fulfill the digital strategy* are presented in Table 18.

Table 18. Verified dynamic capability microfoundations of the factor Development and maintenance of digital knowledge to fulfill the digital strategy.

	Sense	Seize	Reconfigure
Development and maintenance of digital knowledge to fulfill the digital strategy	Develop routines to monitor what knowledge exists in the organization, and what should be obtained	Install knowledge sharing routines	Allow resource allocation to knowledge development

Work in cross-functional teams

Sense

From the theoretical findings, it is stated that working in cross-functional teams is an effective way to take advantage of, and gain value from, different competencies and people with different backgrounds (McLaughlin, 2017; Karimi & Walter, 2015). In order to obtain this value, however, it is necessary to understand what the desired value really is (Karimi & Walter, 2015) and understand that sometimes a project that does not directly fulfill the strategy but enable performing even more successful and value-adding projects in the future because the competencies build on each other. Exploiting the knowledge within the firm while developing the competencies needed in the future, is assumed to be a great value of working in cross-functional teams and something that is requested by the respondents at Tekniska verken. This requires routines to make sure allocating people to projects is not only based on who is available when a project starts, but rather based on which competencies are most suited to obtain the value, in accordance to findings regarding skills management by McLaughlin (2017). Another important aspect of working in cross-functional teams is enhanced collaboration throughout the company (Fisher *et al.,* 2010). The respondents believed that working together will help in gaining an understanding of different parts of the organization and thereby an understanding of what value each business unit deliver to the customer. Further, two respondents stated that by expanding collaboration within the organization, the customer offer could be improved as different business units combine their competencies and put together a more unified and better offer. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

Seize

Theoretical findings by Fisher *et al.* (2010) indicate that there must be organizational routines for the cross-functional work within organizations in order to achieve the desired value. At Tekniska verken, every business unit has historically been allowed to work in its own way. When working more together cross-functionally, however, there should be more standardized routines to enable employees taking part in new types of constellations. For example, one respondent mentioned using several different project methodologies across the organization, believing the cross-functional work could be further developed by forming more coherent working methods. However, something that appears to be lacking at Tekniska verken is a clear process of choosing projects. Respondents point out that the projects ran in this type of cross-functional collaborations are often the same type of projects, with the same type of people and competencies, which leads to bottlenecks arising. When developing routines for cross-functional work, the type of projects chosen should also be something taken into consideration, which

will be further discussed under the factor *Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy.* Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

Reconfigure

From the empirical study, it was made clear that a challenge when it comes to working in cross-functional teams is the resource allocation of team members to different projects. In order to facilitate allocation of employees to different tasks without tensions arising due to conflict of interests the internal organizational design and a shift in authority may be necessary, in accordance to findings by Fisher *et al.* (2010) and Yeow, Soh and Hansen (2018). The prioritization between operational work, business unit projects and corporate-wide projects should thereby be clarified on a corporate-wide level, as requested by one of the respondents during the empirical study. In addition, once people are assigned to a certain project, there ought to still be on-going resource allocation between different projects. Different project managers need to be able to see the overall benefit of all projects and understand when a team member may be better used or more critical in another project, even though this will result in the own project being delayed or put on hold, in order to find the optimum value as stated by Teece (2007). Enabling team members to be flexible both between their line and project duties as well as between different projects is therefore an important aspect. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

The verified microfoundations of the factor *Work in cross-functional teams* are presented in Table 19.

Table 19. Verified dynamic capability microfoundations of the factor Work in cross-functional teams.

	Sense	Seize	Reconfigure
Work in cross-functional teams	Develop routines for project planning with focus on skills management	Develop organizational routines for cross-functional work	Enable resource allocation of team members between projects to be flexible

Corporate digital infrastructure

Sense

According to the findings by Yeow, Soh and Hansen (2018) and McLaughlin (2017), having a corporate digital infrastructure where there is an organization-wide knowledge of which systems that are included and an understanding of the purpose of each system are proven to be important for digital transformation. According to the empirical study, there is a lack of overview today of what systems exist within the company which according to one of the respondents makes it difficult for managers on department level when they have a need for a new system. Further, theoretical findings by McLaughlin (2017) discuss the need for employees to understand when systems are outdated or misunderstood, and when development and improvement is needed. As mentioned in several of the other critical factor discussions above, this place demands on having common ways of working. At Tekniska verken, there is an ongoing project regarding the creation of corporate-wide information storage which is indented to enable all employees to find relevant information when needed by collecting all information at the same place. Sharing information across business units will most likely facilitate mutual understanding and collaboration over business units and departments. This could, in turn, improve the service to the customers as different business units could be aware of when they have common customers which could enable coordination of customer contact.

Based on the analysis above, it is assumed that if there is no overview or understanding within the organization of what the corporate infrastructure consists of, it will be difficult to know where

improvements should be made and where they will gain maximum effect. Therefore, in order to improve the digital corporate infrastructure, the first step will be to know what it consists of today, whereupon the microfoundation Know what the digital infrastructure consists of today is considered a prerequisite for the microfoundation Develop routines to evaluate the demands for the digital infrastructure and detect needs for improvement. It is therefore not considered a microfoundation in itself and is therefore crossed out in the table below and further removed from the microfoundation list.

Seize

The findings by McLaughlin (2017) show that there must be routines for managing, monitoring and optimizing the digital techniques and IT-systems to ensure availability, security, and performance according to requirements. Respondents from the empirical study mentioned that availability is a very important aspect of the digital infrastructure, for example enabling for the field staff to access systems, maps, and instructions in their mobile devices. It is, however, important to be aware of all aspects of demands. The security aspect of mobile availability placing new demands on for example offline systems, as found in the empirical study, is yet another indication that point towards the importance of having a wider understanding of the demands and requirements of the components in the corporate digital infrastructure, in accordance to theoretical findings by McLaughlin (2017). Another aspect of availability of digital techniques regards the empirically found issue when it comes to knowing who to contact in order to leverage systems could thereby be managed by having structured methods for integrating both completely new and elsewhere existing digital technologies and systems. In addition, findings by Yeow, Soh and Hansen (2018) and Fischer *et al.* (2010), imply that leveraging and reusing existing systems in new ways or places within the organization are important aspects of creating a corporate digital infrastructure. Further, to make the process of integrating systems in a way that fulfill the demands of the digital infrastructure, there should be more demands regarding information sharing of what functions the system has in order to detect if existing systems could be leveraged or used in new ways. Today at Tekniska verken, knowing whom to contact is claimed to be tricky, which negatively impact the availability of the digital techniques within the company. This goes in line with the findings by McLaughlin (2017) regarding collecting feedback by the employees to make sure that the digital systems and techniques perform as intended. Further, as stated by one respondent at Tekniska verken, there is a need for raising the general digital knowledge amongst the employees so that they can utilize digital tools in their everyday work and thereby get the full benefits of them. The empirical findings are, based on the analysis above, considered to verify the importance of the theoretically found microfoundations.

Reconfigure

The digital development enables new ways of using digital solutions, in accordance to findings by McLaughlin (2017). At Tekniska verken, the digital communication platforms are mainly used for information sharing, both regarding news and for finding shortcuts to important static information. However, a couple of respondents talked about a wider potential for improving digital communication. For example, they believed that using e-mail as the main communication tool is somewhat outdated, that there should be more effective ways for digital group-communication in project groups and that having better opportunities for online-meetings could make meetings more efficient. According to findings by Fisher *et al.* (2010), there is sometimes a need to reconfigure internal organizational design factors to enable new ways of working together, both internally in an organization but also with external parties. Improving the digital platform usage could thereby be a way of enabling easier communication between employees and also increase the flexibility of the employees regarding distance work which could, in the long run, be something that increases the employer's attractiveness towards new potential

job seekers. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

The revised microfoundations of the factor *Corporate digital infrastructure* are presented in Table 20.

Table 20. Revised dynamic capability microfoundations of the factor Corporate digital infrastructure.

	Sense	Seize	Reconfigure
Corporate digital infrastructure	Develop routines to evaluate the demands for the digital infrastructure and detect needs for improvement ~~Know what the corporate digital infrastructure consists of today~~	Secure availability and performance of the digital techniques Develop methods to integrate digital technologies	Allow digital reconfiguration of the organizational design

Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy

Sense

From the findings by McLaughlin (2017) it becomes clear that portfolio management is a useful tool that helps to get an overview of the different projects running in the organization to let decision makers know what they are deciding among. Portfolio management can thereby be used to prioritize what projects to start up, which to proceed with and which to shut down, and in addition clarify how resources should be allocated among them (McLaughlin, 2017). Further, by gathering projects, an understanding could be developed on how to expand the digital portfolio to include a wider variety of project types, as requested in the empirical findings. This, in turn, would ease prioritization and avoid bottlenecks to arise, which was discussed within the microfoundations of the factor *Work in cross-functional teams*. Having a digital portfolio is also, according to one of the respondents from the empirical study, an important mean to develop systematic corporate working methods. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

Seize

At Tekniska verken it is made clear that many respondents experience a lack of focus when it comes to the prioritization of digitalization projects. However, respondents from the empirical study requests that the corporate management clarifies what shall be in focus and what is of highest priority when it comes to digital transformation projects from a corporate-wide point of view. All digitalization projects should be means to achieve the digital strategy (McLaughlin, 2017), therefore, there should be routines to know what the digital strategy is, what the aim of the specific project is and how this alignment can be achieved (McLaughlin, 2017; Fisher *et al.,* 2010). By continuously evaluating the requirements for the digital projects' alignment to the digital strategy in order to see if the goals that were set actually led to the intended effect, and that the projects performed really do contribute to achieving the digital strategy (McLaughlin, 2017), a more accurate prioritization among projects can be achieved, and the focus will likely appear clearer throughout the corporation. By developing the portfolio, deciding on common grounds as to what projects shall be of highest priority, and including a wider range of digitalization projects, it would help to develop the type of helicopter perspective that respondents feel are lacking at Tekniska verken today. Even though one person would still not have this helicopter perspective, the common measurements would facilitate including a wider perspective when it comes to outweighing different business unit's interests against each other. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation Define requirements for project alignment to

digital strategy by highlighting the negative effects if such efforts are not incorporated in the organization.

Reconfigure

In order to allocate resources and prioritize between the different resources, there should be continuous evaluation of all projects throughout all phases (Fisher *et al.*, 2010). This is something that appears to be lacking at Tekniska verken based on the empirical findings. First, there ought to be better prioritization of what projects shall be started in the first place, to reduce the lack of focus experienced by respondents today. Second, projects that are running should be evaluated based on how well they meet demands and provide the desired benefit, and base resource allocation on this (Karimi & Walter, 2015). The empirical study shows that few projects are shut down once they have started at Tekniska verken, resulting in ineffective resource usage. Once a project has been carried through, there shall be evaluation both of the requirements on the project, as mentioned under the Seize microfoundation above, and one the evaluation of the performance of the project itself (McLaughlin, 2017). By making sure only the most value-adding projects get to continue it will ease bottlenecks and resource allocation among the different projects. Based on the analysis above, the empirical findings are considered to verify the theoretical microfoundation.

The verified microfoundations of the factor *Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy* are presented in Table 21.

Table 21. Verified dynamic capability microfoundations of the factor Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy.

	Sense	Seize	Reconfigure
Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy	Collect digital initiatives and projects in a portfolio	Define requirements for project alignment to digital strategy	Continuously evaluate whether projects meet demands and base resource allocation on this

8.2 Final framework for building dynamic digital capability to enable digital transformation

The final framework developed through this study consists of nine critical factors that enables successful digital transformation, and 31 dynamic capability microfoundations that build up these factors, see Table 22. The resulting framework of this study is not a static checklist, but all factors and microfoundations should be continuously evaluated and improved in order to be adaptive to surrounding environment changes and secure continuous performance of the internal microfoundation aspects.

Table 22. Final framework of dynamic capability microfoundations that facilitates building a dynamic digital capability.

		Sense	Seize	Reconfigure
Leadership & Vision	**Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives**	Develop routines to find the strategic fit between business objectives and the surrounding business environment Continuously evaluate the digital strategy to be flexible and adapt to changes	Formulate and communicate the direction and boundaries of the digital strategy in a clear way	N/A
	Support and involvement from the top management	Develop routines for top management to be perceptive of the organization	Inform about the value of, and advocate, digital transformation Develop routines to acquire digital knowledge in the top management	Allocate resources to digital transformation projects
	Have someone explicitly responsible for digital transformation at top management level	Continuously examine role requirement	Give the appointed person the authority required to meet the demands of the role	Allow resource allocation and delegation of digital transformation responsibilities on all organizational levels
Culture & People	**Innovative, open and risk-taking culture**	Develop routines to detect internal innovation initiatives Seek new opportunities and solutions outside of the expected frames for digital transformation	Continuously communicate the value of innovation Define boundaries, steer the innovation and allow risk-taking	Create organizational agility
	Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution	Create a common language regarding digital transformation	Align individual incentives to the digital strategy Implement follow-up systems for individual employees on their digital contribution	N/A
	Development and maintenance of digital knowledge to fulfill the digital strategy	Develop routines to monitor what knowledge exists in the organization, and what should be obtained	Install knowledge sharing routines	Allow resource allocation to knowledge development
Corporate Processes & Structures	**Work in cross-functional teams**	Develop routines for project planning with focus on skills management	Develop organizational routines for cross-functional work	Enable resource allocation of team members between projects to be flexible
	Corporate digital infrastructure	Develop routines to evaluate the demands for the digital infrastructure and detect needs for improvement	Secure availability and performance of the digital techniques Develop methods to integrate digital technologies	Allow digital reconfiguration of the organizational design
	Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy	Collect digital initiatives and projects in a portfolio	Define requirements for project alignment to digital strategy	Continuously evaluate whether projects meet demands and base resource allocation on this

9 Discussion of results

In this chapter follows a discussion of the resulting framework developed throughout this study. First, the mutual relation of the critical factors and how they affect and facilitate each other will be discussed. Then, some common issues related to digital transformation that was presented in the problem description of this report will be discussed in terms of how the framework can help organizations manage these issues.

9.1 Discussion of the relation between the critical factors

As emerged throughout this report, the aspect of being flexible and dynamic when it comes to digital transformation does not simply rely on obtaining single microfoundations but rather on obtaining microfoundations that together build dynamic digital capability. The resulting framework of this study is not a static checklist, but all factors and microfoundations should be continuously evaluated and improved in order to be adaptive to surrounding environment changes and secure continuous performance of the internal microfoundation. Digital transformation is not a one-time organizational change but requires a new mindset and creating a dynamic organizational structure and management. This implies, a digital transformation will require plenty of resources, and it may be overwhelming for managers to know where to focus their efforts and determining where to start the transformation. In addition, the factors as well as the microfoundations, and the possession of them, will affect and facilitate each other. Further, the importance of the critical factors and microfoundations, as well as how they should be achieved, will depend on the organization itself, based on aspects such as organizational size, digital maturity and/or industry (Schwertner, 2017; Jacobi & Brenner, 2017). Plenty of examples on how these dependencies can occur has been observed throughout this study, and yet other interrelations will most certainly arise when studying other organizations. In addition, as the factors affect and facilitate each other, which ones are already installed will have an impact on how easy the rest of the factors will be to obtain. The aim of this part is to highlight the interconnectedness of the factors and how they can reinforce each other. The identified dependencies have been visualized in Figure 11. By identifying how the factors affect and depend on each other on the specific organization, as well as using the final framework in Table 22 identifying which factors are already installed within the organization, the organization can get an overview of where they should focus their efforts in order to gain the most out of them. Below follows a discussion revolving around each factor and what other factors they may affect and – when relevant – how their importance varies with the digital maturity level, based on the findings on Tekniska verken.

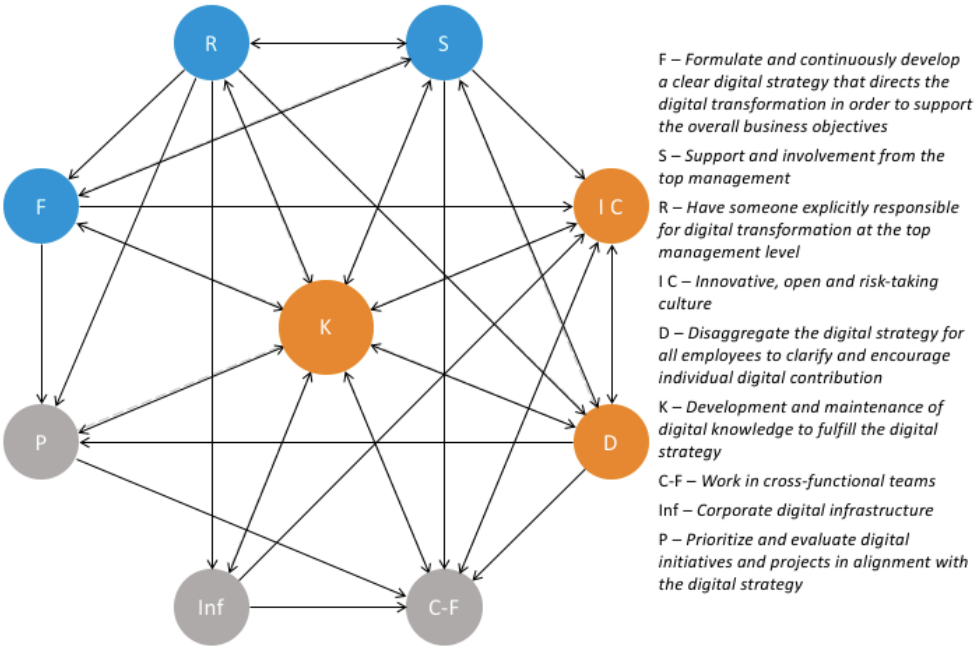

Figure 11. Visualization of the relation between the critical factors.

Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives (F)

How the digital strategy is formulated and communicated to the organization directly affects the factor *Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution (D)*, as it will affect how it can be interpreted and disaggregated to different business units and departments. If the formulated strategy is unclear or not sufficiently communicated to the organization, the different departments and business units will have to make a free interpretation of the aim of the digital strategy resulting in a lack of common digital focus. If the digital strategy is formulated and communicated in a way that creates a common digital direction, it serves as guidelines for which digital projects to prioritize, hence facilitate the factor *Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy (P)*. Thereby, it creates a direction for future competence development needs and could in turn affect the planning of which digital knowledge and competencies are needed in the organization in order to fulfill the digital strategy, thereby affecting the factor *Development and maintenance of digital knowledge to fulfill the digital strategy (K)*. Further, the credibility of the top management partly depends on the organizations' perception of the feasibility of the digital strategy and thereby the formulated digital strategy in itself might affect the factor *Support and involvement from the top management (S)*. Which critical factors this specific factor – in the figure named F – affects are visualized in Figure 12.

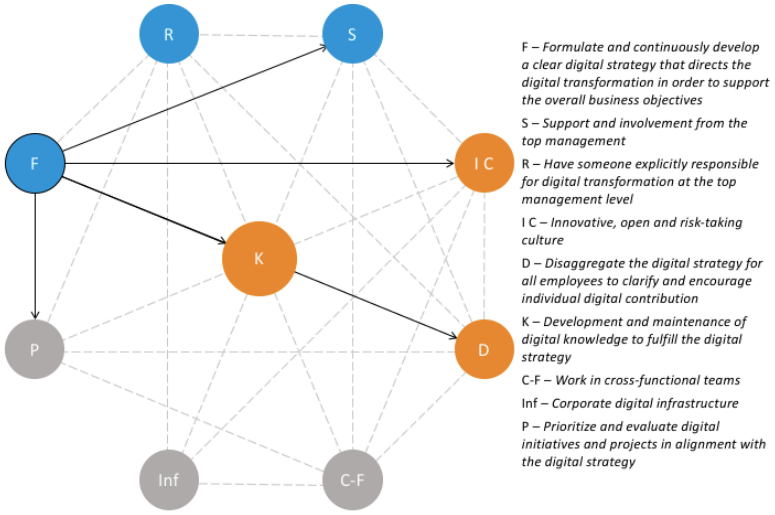

Figure 12. Visualization of factors affected by the critical factor Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives.

Support and involvement from the top management (S)

Realizing the potential of, and need for, digital transformation could in some cases come from lower organizational levels but having the top management's support is important to really steer the organization to such a change. For example, the factor *Innovative, open and risk-taking culture (I C)* relies on this, as developing a certain type of culture will be affected by how top management acts and what is requested and supported. Further, top management is responsible for creating a direction for the digital transformation by making sure the factor *Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives (F)* is achieved. For many organizations, the overall responsibility of formulating, communicating and continuously developing a digital strategy will be appointed to a specific role. The top management is responsible for appointing this role, that is, someone explicitly responsible for the digital transformation journey and to make sure that this person is given the resources and authorities needed to fulfill the role requirements, hence it will affect the factor *Have someone explicitly responsible for digital transformation at top management level (R)*. Further, top management and the role of the explicitly responsible for digital transformation need to have an understanding and a perceptiveness of the organization while formulating the digital strategy to ensure that a disaggregation of the digital strategy is possible for all business units, which means it is important in order to achieve the factor *Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution (D)*. The top management's support and involvement for digital transformation questions signal the importance of digitalization efforts and encourage employees to prioritize their individual digital knowledge development, which will facilitate the factor *Development and maintenance of digital knowledge to fulfill the digital strategy (K)*. The top management also plays an important part when it comes to enabling *Work in cross-functional teams (C-F)* by supporting and requesting more collaboration between business units while at the same time allowing a re-design of the organizational structures and authorities. The *Corporate digital infrastructure (Inf)* is also affected by the top management support as the potential of the digital infrastructure is dependent on top management's acceptance towards the digital reconfiguration of the company and allowing new ways of working by using digital tools. As the organization becomes more digitally mature, digital transformation will be a natural part of the organization's development and thereby the support from top management will not be directly focused on digital transformation efforts, since there will not be any digital transformation efforts that are not

viewed as means to achieve something else. Which critical factors this specific factor – in the figure named S – affects are visualized in Figure 13.

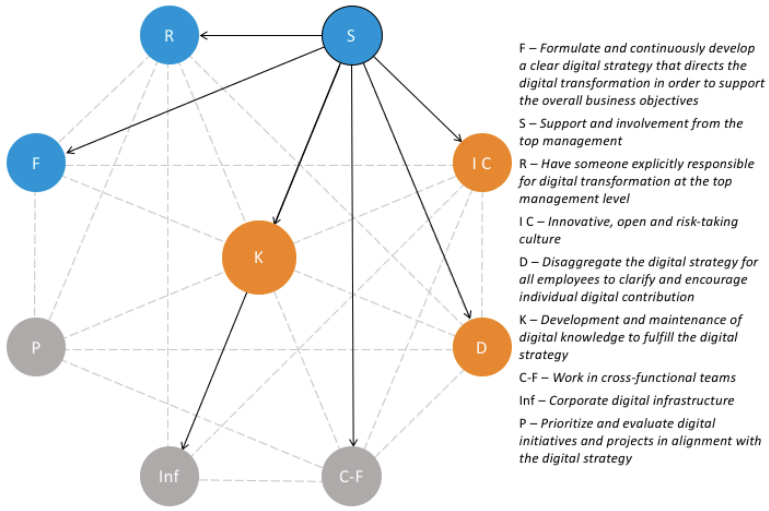

Figure 13. Visualization of factors affected by the critical factor Support and involvement from the top management.

Have someone explicitly responsible for digital transformation at top management level (R)

When the organization is at the beginning of the digital transformation journey, the purpose of this role will revolve around anchoring the digital transformation at top management level and actively push the digital transformation forward by working with the factor *Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives (F)*. Further, at the beginning of a digital transformation journey, another purpose of the role is to unify the top management and ensure that everyone in top management is on board the digital transformation journey. In order to do this and to get the top management unified in the digital direction, an important aspect is to make sure that the people in the top management have enough digital knowledge. Thereby this factor is assumed to anchor the digital transformation at top management level, hence it will very much affect the degree of *Support and involvement from the top management (S)* for digitalization questions as well as the *Development and maintenance of digital knowledge to fulfill the digital strategy (K)*. Further, the person responsible for the digital transformation at top management level should also drive the implementation of a common *Corporate digital infrastructure (Inf)* by setting the requirements for the digital infrastructure and communicate these to the organization. The role requirements of the person explicitly responsible for digital transformation will likely change as the top management become more aware of the benefits of digital transformation. As the organization moves further in their digital transformation, the purpose of the role will revolve around delegating the digital responsibility and anchor the digital transformation in the organization rather than in the top management. Further, the role includes the responsibility to ensure that projects are collected and that there is an overview of current digital projects as well as setting directives of how to prioritize different projects, thereby affecting the factor *Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy (P)*. Which critical factors this specific factor – in the figure named R – affects are visualized in Figure 14.

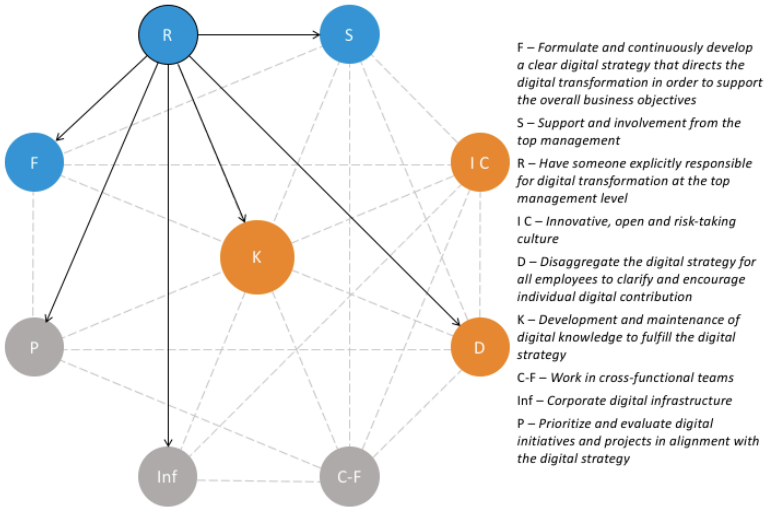

Figure 14. Visualization of factors affected by the critical factor Have someone explicitly responsible for the digital transformation at top management level.

Innovative, open and risk-taking culture (I C)

Developing an innovative, open and risk-taking culture is necessary in order to achieve a constant knowledge development. Partly by continuously developing new ways to learn by implementing methods for knowledge sharing, but also by allowing experimenting and thereby achieving new insights. This means it is a way to achieve the factor *Development and maintenance of digital knowledge to fulfill the digital strategy (K)*. Being innovative in how different solutions can be implemented in new ways is a mean to leverage value between departments and increase collaboration. An innovative and open culture will therefore facilitate *Work in cross-functional teams (C-F)*, since it will open new ways to combine different competencies and enable having a more flexible view of what a project team should be. In addition, by constantly innovating, the idea of what can be done and how the strategy can be disaggregated on a business unit and departmental level will continuously evolve, which will lead to new ways of fulfilling the digital strategy, hence affecting the factor *Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution (D)*. Which critical factors this specific factor – in the figure named I C – affects are visualized in Figure 15.

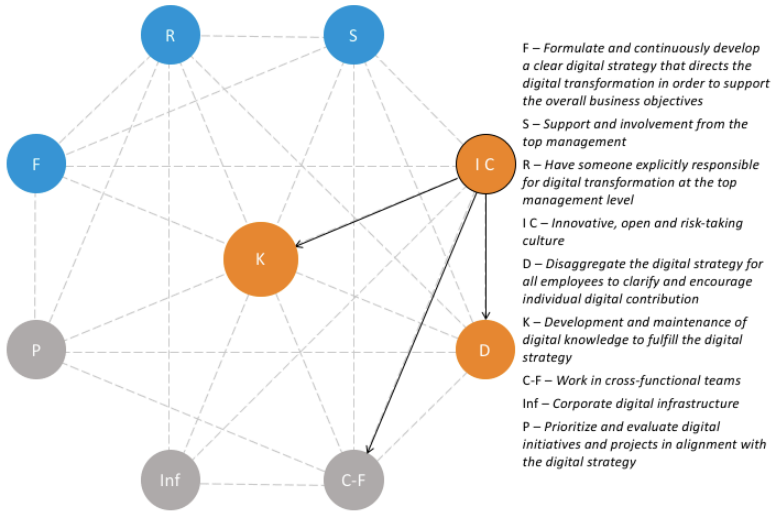

Figure 15. Visualization of factors affected by the critical factor Innovative, open and risk-taking culture.

Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution (D)

Disaggregating the digital strategy will ease and clarify how to achieve the digital strategy on all levels of the organization. In order to disaggregate it on an individual level, the strategy should first be disaggregated on a business unit level, and thereafter on department and group level. This will clarify how to *Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy (P)* and thereby provide opportunities for different departments and business units to collaborate, as common interests will be clarified, and the value of engaging in *Work in cross-functional teams (C-F)* will be made visible. Disaggregating the strategy on an individual level and implementing routines for follow-up on individual contribution will facilitate top management perceptiveness of the organization, as well as anchoring the digital strategy and gain an understanding of how well it is received by all employees, hence facilitate the factor *Support and involvement from the top management (S)*. Simultaneously, putting individual digital goals and stating how achieving these goals will contribute to the digital strategy will encourage innovation and clarify what shall be in focus as well as what are the boundaries to innovate within. When people understand their contribution and value, they will be more motivated, which helps create an *Innovative, open and risk-taking culture (I C)*. In addition, these individual digital goals will steer the knowledge development focus of the employees, hence it is a mean to certify *Development and maintenance of digital knowledge to fulfill the digital strategy (K)*. However, it is important that the disaggregation is done in such a way so that the individual goals are received well and perceived as encouraging, not monitoring or forcing. In the same way, the follow-up shall be more rewarding and encourage positive contribution rather than putting pressure on employees, creating what can be experienced as a punishment culture. Which critical factors this specific factor – in the figure named D – affects are visualized in Figure 16.

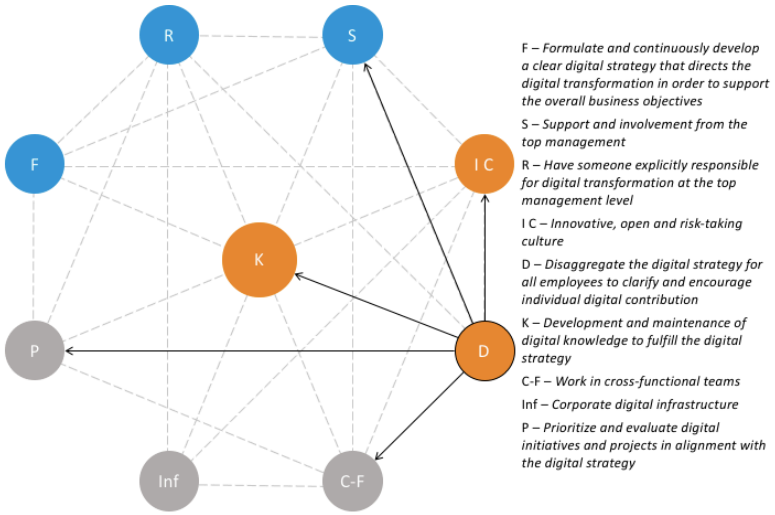

Figure 16. Visualization of factors affected by the critical factor Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution.

Development and maintenance of digital knowledge to fulfill the digital strategy (K)

Having sufficient digital knowledge and digital competence within the organization is very important to manage digital transformation as it affects all aspects of it. For example, digital knowledge amongst the top management is needed to understand the digital environment when examining the strategic fit, as part of the factor *Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives (F)*. When the digital strategy is

formulated, the understanding of digital transformation and effects of different digital efforts will affect which prioritization aspects to choose in order to *Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy (P)*. Here another important aspect where digital knowledge is important is regarding how *Work in cross-functional teams (C-F)* can be coordinated, hence which combination of different digital competencies could facilitate the fulfillment of the digital strategy. Further, the digital knowledge level amongst the employees will also determine if the digital tools reach their full potential of the *Corporate digital infrastructure (Inf)* once implemented in the organization. These examples aim to visualize how the importance of having digital knowledge in order to succeed with a digital transformation. This importance is however not limited to these examples, rather the digital knowledge – in the figure named K – affects all other identified critical factors which is visualized in Figure 17.

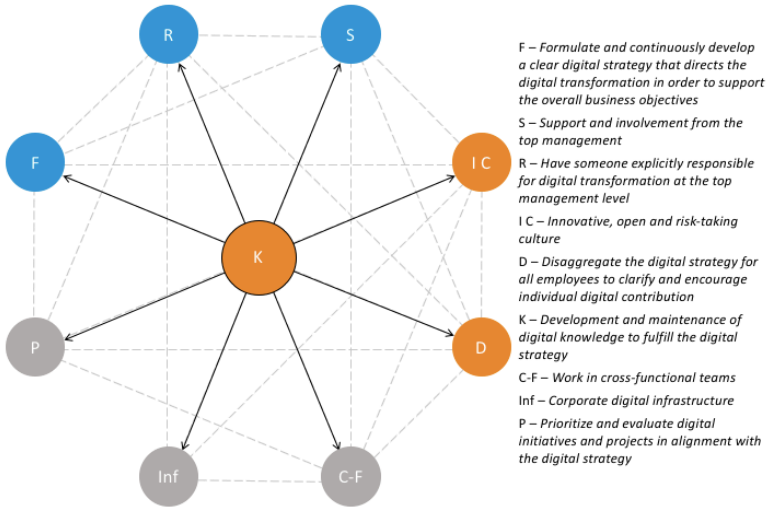

Figure 17. Visualization of factors affected by the critical factor Development and maintenance of digital knowledge to fulfill the digital strategy.

Work in cross-functional teams (C-F)

Engaging in cross-functional work will create space for different competencies to meet and be combined. This will foster new ideas and insights in how to re-use different solutions, tools and methods in new ways, and allow innovation and creativity among employees, hence facilitating an *Innovative, open and risk-taking culture (I C)*. In addition, by working in cross-functional teams and collaborating with people of different knowledge areas and expertise, the employees involved in the projects will learn from each other, get a wider understanding of the entire corporation and its value chain, and become broader in their knowledge base, thereby affecting the factor *Development and maintenance of digital knowledge to fulfill the digital strategy (K)*. Which critical factors this specific factor – in the figure named C-F – affects are visualized in Figure 18.

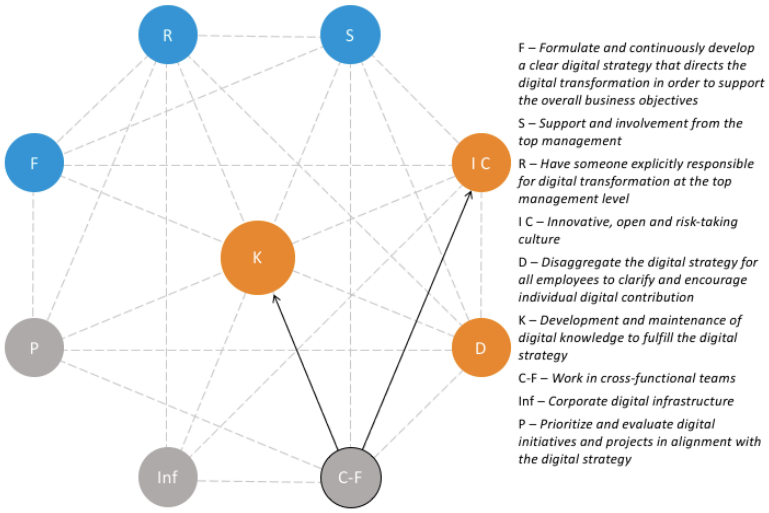

Figure 18. Visualization of factors affected by the critical factor Work in cross-functional teams.

Corporate digital infrastructure (Inf)

A corporate digital infrastructure will facilitate communication without people having to physically be at the same place, which will enable getting in contact with a line manager, project manager, project team member, department co-worker, or any other person with valuable information in a fast and easy manner. It will thereby enable *Work in cross-functional teams (C-F)* as working in different constellations and communicating efficiently within different projects requires the possibility to meet and/or communicate by simple means. Further, it enables demonstrating *Support and involvement from the top management (S)* regarding the digital transformation and reach out with information to all employees. By developing common digital tools and systems, it is easy to provide both information and knowledge to everyone within the organization, at the same time as it facilitates online learning and new methods for knowledge development and knowledge sharing thereby facilitating *Development and maintenance of digital knowledge to fulfill the digital strategy (K)*. Another impact of creating a corporate digital infrastructure is that it provides better conditions for innovation and creating an *Innovative, open and risk-taking culture (I C)*. For example, by gathering all customer data and making it accessible for everyone, chances of combining different business unit's value offering and creating new and better ways of taking advantage of all customer data will increase. Which critical factors this specific factor – in the figure named Inf – affects are visualized in Figure 19.

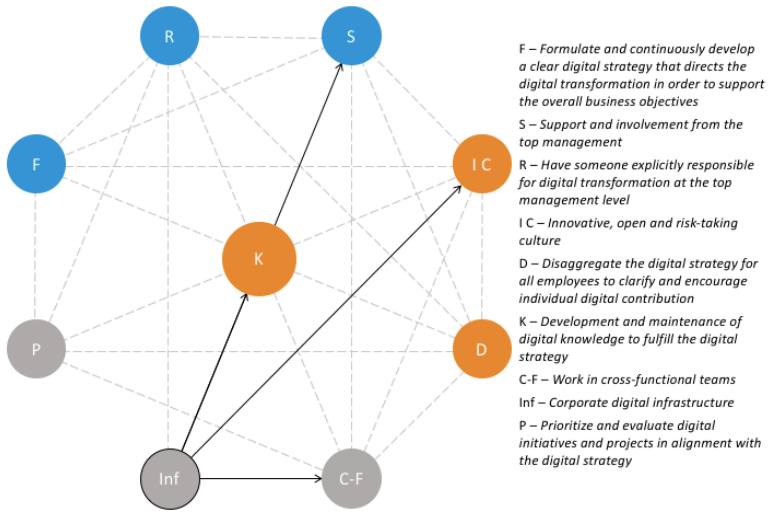

Figure 19. Visualization of factors affected by the critical factor Corporate digital infrastructure.

Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy (P)

Having the means to prioritize and evaluate digital initiatives and projects will enable choosing the right cross-functional projects to carry out, thereby affecting the factor *Work in cross-functional teams (C-F)*. What people do on an everyday basis will affect what knowledge they attain, maintain and develop, hence, prioritizing projects will steer the *Development and maintenance of digital knowledge to fulfill the digital strategy (K)*. In addition, prioritizing projects will steer the innovation and ensure that new ideas are in line with the strategy by determining the work and projects prioritized, thereby affecting the factor *Innovative, open and risk-taking culture (I C)*. Further, prioritizing in a structured manner will ensure that risk-taking when it comes to innovating will more likely involve "risks worth taking" meaning that the potential benefits of the efforts if they succeed are worth the potential negative outcome. Further, as digitalization shall only be viewed as a mean to achieve the overall business objectives (McLaughlin, 2017), keeping a separate portfolio for digitalization could be discussed as somewhat contradictory. One might argue that the digital initiatives and projects should be compared and evaluated on the same terms as other corporate-wide projects as all projects compete about the same resources. However, within the given context of going through a digital transformation, the need for a specific digital portfolio will change. At the beginning of the digital transformation journey, an extra focus should lie on digital projects in order to get them into focus, or there is a risk of them being down-prioritized compared to projects more related to the core business. As the digital transformation journey proceeds, digitalization becomes a more natural part of the business and the value of these types of projects is more accepted throughout the organization, hence, there might no longer be a need for a separate digital portfolio. Which critical factors this specific factor – in the figure named P – affects are visualized in Figure 20.

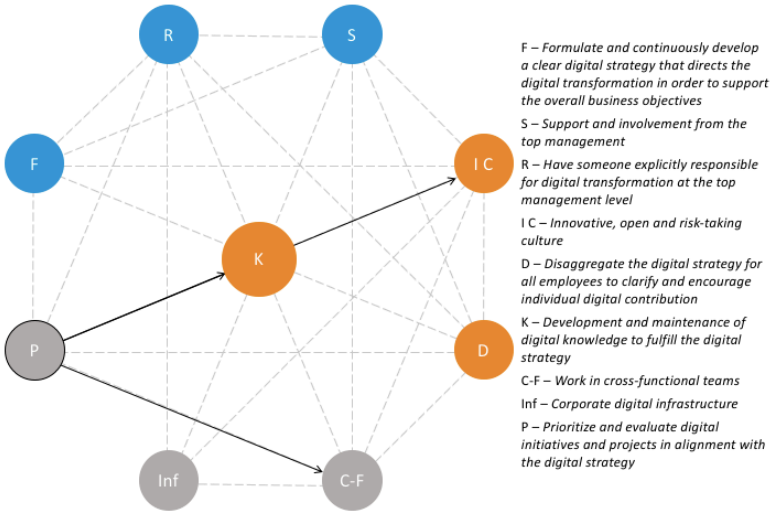

Figure 20. Visualization of factors affected by the critical factor Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy.

9.2 Common digital transformation problems managed by developing dynamic digital capability

Many organizations start to realize the potential of digital transformation, but there are many challenges to tackle in order to achieve the maximum benefits of a digital transformation of the business. What specific challenges that arise or how they take place will depend on the specific organization, whereas it is up to each organization to define how these challenges should be handled in the specific case. However, this report has examined general critical factors for digital transformation and how these

critical factors can be dynamically achieved by presenting a number of microfoundations to obtain. These results create a framework that, if used by organizations, can simplify managing the most common challenges that might arise and thereby facilitate the digital transformation. Below follows a discussion on common challenges with digital transformation and how the presented framework can be a mean to manage these challenges.

Failing to see potential with, and implement enough changes for, digital transformation

The findings by Kääriäinen *et al.* (2017) showed that many companies fail to see the potential of digital transformation and/or struggle to make enough organizational changes in habits and ways of working to be able to capture the maximum benefits of the digital efforts. By implementing the microfoundations regarding the formulation of the digital strategy, including finding the strategic fit, the potential of the digital transformation for the organization at hand will likely be maximized as business objectives are being compared and fitted to the surrounding business environment. Finding the strategic fit also imply knowing that digitalization has no value itself and finding how the digitalization efforts can retain the overall objectives and original value and thus align with the overall strategy of the company, which is important according to theory by McLaughlin (2017). Making sure the digital strategy is understandable for the organization, by using a common language, as well as possible to disaggregate, to clarify individual and/or group contribution, will create incentives for employees to make efforts to work in line with the digital strategy. By having a supportive, involved and perceptive leadership, the top management can evaluate how the digital strategy is understood and accepted amongst employees in the organization and thereby evaluate if the organization get the most out of the chosen digital strategy. Further, if the organization creates a project prioritization system so that the digital projects can be prioritized depending on how well they link to the digital strategy, they will contribute to the digital strategy in the best way possible and thereby contribute to achieving maximum benefits as well as clarifying the value of digitalization. An important part of capturing the benefits of digitalization is to really utilize the implemented digital tools, systems and other project results and make sure to take fully advantage of the potential benefits. By creating a corporate digital infrastructure and educating employees to increase the overall digital knowledge level, digital tools and systems can be better utilized resulting in a more flexible way of working with more effective communication methods.

Not creating a sense of urgency

Findings by Fitzgerald *et al.* (2013) imply that one challenge with digital transformation is for leaders to create a sense of urgency for managers to direct their focus. By implementing the microfoundations of the factor *Support and involvement from the top management*, top management can clearly demonstrate the support for and importance of digital transformation, resulting in a common sense of urgency. Further, a more active leadership can place demands on managers regarding following common practices and engaging in digitalization efforts. By appointing someone explicitly responsible for the digital transformation within the organization and allocating resources to accomplish the role requirements, authorities for digitalization can be managed on different organizational levels. When doing this, it is important to clarify the digital focus and make sure everyone delegated digital responsibility understand the digital focus and the aim of his or her responsibilities. At the same time, it is important to keep track of the digital responsibilities delegated to ensure that no important responsibilities are left out. By having clear, active leadership and someone delegating the digital responsibilities within the organization in a clear and exclusive manner, top management should be given the opportunity to create a sense of urgency for managers to act in accordance to the digital transformation efforts of the organization.

Difficulties regarding human factors

Both Jacobi and Brenner (2017) and Schwertner (2017) identifies human factors and the workforce themselves as one main difficulty when it comes to digital transformation. Like any major organizational change, there is a risk of inertia rising, and employees showing resistance for change. This is one of the reasons why disaggregating the digital strategy all the way down to an individual level is important, as it will help to anchor the digital transformation as well as getting people along, feeling important and seeing and understanding their own contribution. There is also the importance of creating a common language in order to get everyone along and allow them to see what the changes really mean in their specific case and at the specific company. In addition, by creating an innovative, open and risk-taking culture, the potential of digitalization will be visualized and employees will not only see possibilities rather than obstacles, but through creating the organizational agility discussed in this report, it will create the opportunity for employees to be innovative and think in new ways. Further, the right type of culture will reduce the lack of motivation and risk-taking. The aim shall be to create an environment where ideas are taken seriously into consideration so that employees feel important and that their ideas are being appreciated, but the environment should also foster the idea that it is okay to fail. Further, the innovative environment should steer the innovation so that employees are not only encouraged but also certified to take the right risks, and thereby dare to stay innovative and risk-taking. Another common problem that creates an obstacle when it comes to human factors is the lack of knowledge and good practices (Schwertner, 2017). In fact, in a report by Svenskt Näringsliv (2016), it is stated that digitalization will place even higher demands on continuous development and knowledge spreading in order to obtain a sustainable competitive advantage. This emphasizes the importance of developing digital knowledge within the organization, as everyone needs the right competence to make use of the digital tools implemented in the organization. By developing routines for knowledge sharing it reduces the risk of everyone developing their own working methods, and thereby aggravating future knowledge sharing. Likewise, by developing routines for cross-functional work, both for how to allocate resources, engage in and perform projects by developing a common project methodology, it will provide a common practice and reduce confusion and fragmentation. In addition, collaboration over business units and department boundaries enhances the possibility to learn from each other and get a wider understanding of the entire value chain, as well as exploiting and developing competencies. In order to achieve this and to manage the new demands of knowledge spreading, the development of a corporate digital infrastructure will facilitate communication and information spreading, as well as creating the opportunity to find and ask for help.

Risks related to IT- and data security

Risks related to IT- and data security are, according to Energiforsk (2019), Schwertner (2017) and Digitaliserinskommissionen (2016), often perceived to be the main obstacles for digital transformation. An important aspect of creating a corporate digital infrastructure is to ensure that the systems integrated into the digital infrastructure meet the requirements and demands placed upon them and these demands should include IT- and data security aspects. For example, the handling of customer data place great demands on the organization regarding securing personal information. Therefore, it is important once demands are placed on IT- and data security, that these demands are continuously developed, and that the fulfillment of these requirements is regularly evaluated. Further, Schwertner (2017) emphasized the risk regarding the wider adoption of digital technologies and the lack of interoperability with existing systems. This risk will be minimized by the microfoundations for corporate digital infrastructure as they regard developing methods to integrate new digital technologies and ensure availability and performance of the digital infrastructure.

10 Conclusion

Successfully carrying through digital transformation place demands on organizations in terms of continuous flexibility and adaptability, a challenge many organizations face today. The purpose of this study has been to investigate and concretize what it takes for organizations to successfully go through digital transformation. By answering the first research question, ***RQ1: What critical factors of digital capability enables successful digital transformation?*** nine factors were identified to be critical in order to succeed with digital transformation. Further, to facilitate building these critical factors, 31 dynamic capability microfoundations were found to be important to implement. The set of these dynamic capability microfoundations building up the critical factors is the answer to the second research question, ***RQ2: What dynamic capability microfoundations facilitates building dynamic digital capability?*** The 31 microfoundations and the resulting framework, see Table 22, creates a checklist that can be used by organizations in order to facilitate the identification of what microfoundations, and thereby critical factors for digital transformation, that are currently missing within the organization. If all 31 of the microfoundations, and thereby all nine of the critical factors, are in place, it will facilitate for the organization to develop a dynamic digital capability. This dynamic digital capability will enable for the organization to successfully manage digital transformation.

This study makes up a contribution to previous theoretical studies, by adapting and concluding previous research within the fields of digital transformation and dynamic capabilities, providing a collected and clarified overview of organizational prerequisites that should be managed in order to facilitate performing a digital transformation successfully.

10.1 Future research and limitations

As stated in the purpose of this report, the aim of this study has been to develop a generalizable framework enabling companies to build and embed dynamic digital capability into the organization. Therefore, the framework developed aims to be generalizable for all companies facing digital transformation, with disregard to their industry, size or digital maturity. Both the critical factors as well as the dynamic capability microfoundations are formulated in a way that makes them relevant for any company. The aim has been to visualize all areas that should be managed to succeed with a digital transformation and cover all aspects of how to do this in a flexible and sustainable manner. However, making the framework generalizable has affected the level of concreteness of the microfoundations, as well as the concreteness when it comes to stating what should be done in order to obtain them. Hence, the framework provides a checklist with things that will facilitate managing a digital transformation. The theoretical findings that lay the foundation of this study has been empirically verified. However, due to the limitations of time for the study, although no implications that the findings should differ between industries have been found, the final framework has not been tested on several organizations and industries with different size and digital maturity levels, hence further studies ought to be performed to verify the framework and its generalizability.

The focus of this study has been to clarify what needs to be installed within the organization when facing digital transformation. However, digital transformation affects not only single companies but the entire society. Therefore, digital transformation will not only affect the internal aspects of an organization, but also how the organization interacts with and is affected by external parties and stakeholders, as digital transformation may also change the role individual companies take, from traditional supply chains to a more complex network according to a study by Svenskt Näringsliv (2016). Even though some of the identified microfoundations regard monitoring the surrounding business environment and finding the strategic fit, the inter-organizational aspect has mostly been delimited from this study. The aspect of inter-organizational relationships and interdependencies are however an

important part of digital transformation and the impact of external networks and collaborations should, therefore, be of interest for further research.

Another important aspect that all companies ought to manage when going through digital transformation is the matter of IT- and data security. Even though the aspect of IT- and data security is briefly included in the framework presented in this report, the aspect demands a further investigation as it is one of the major risks that have been identified for companies facing and going through a digital transformation. Further examination of how the risk could be managed is thereby left for future studies.

Whether or not some of the factors or microfoundations can generally be proven to be more important than others, or if there is a certain order that some microfoundations should be tackled and installed has although been discussed in this report, not been empirically nor theoretically proven. The belief of the authors is that this may alter depending on each organization itself and its preconditions, for example its digital maturity level, as well as its already obtained microfoundations. However, if more of a “step-by-step" framework or method should be developed, this area would need to be further examined and evaluated.

References

Alexandersson, K., (2016). Källkritik på internet. 1 red. Stockholm: .SE internetguide.

Alford, P. & Duan, Y., (2016). Understanding Collaborative Innovation from a Dynamic Capability Perspective. International Journal of Contemporary Hospitality Management. 30(6), pp. 2396-2416.

Ambrosini, V., Bowman, C. & Collier, N. (2009). Dynamic Capabilities: An Exploration of How Firms Renew their Resource Base. British Journal of Management, 20(1), 9-24.

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A. & Venkatraman, N. (2013). Digital Business Strategy: Toward a next generation of insights. MIS Quarterly, 37(2), 471-482.

Björklund, M. & Paulsson, U., (2012). Seminarieboken: att skriva, presentera och opponera. 2:a red. Lund: Studentlitteratur.

Bloomberg, J. (2018). Digitization, Digitalization, and Digital Transformation: Confuse Them at Your Peril. Forbes. [Online] https://www.forbes.com/sites/jasonbloomberg/2018/04/29/digitization-digitalization-and-digital-transformation-confuse-them-at-your-peril/#1b042982f2c7 [2019-01-30]

Bossen, H. & Ingemansson, J. (2016). Digitalisering av Svensk Industri - Kartläggning av svenska styrkor och utmaningar, Stockholm: Roland Berger AB.

Brennen, S. & Kreiss, D. (2014). Digitalization and Digitization [Online] http://culturedigitally.org/2014/09/digitalization-and-digitization/ [2019-01-30]

Bryman, A. & Bell, E. (2013). Företagsekonomiska forskningsmetoder. Stockholm: Liber ekonomi.

Chalmers. (2010). Utformning av rapport/examensarbete. [Online] https://student.portal.chalmers.se/sv/chalmersstudier/programinformation/maskiningenjor/examensarbete/Sidor/Utformningavrapport.aspx [2019-03-01]

Ciasullo, M., Fenza, G., Loia, V., Orciuoli, F., Troisi, O. & Herrera-Viedma, E. (2017) Business process outsourcing enhanced by fuzzy linguistic consensus model. Applied soft computing 64(2018), pp. 436 - 444.

Collins, R. (2017). Are You Ready for the Second Wave of the Digital Revolution? Huffington post. [Online] https://www.huffingtonpost.com/great-work-cultures/are-you-ready-for-the-sec_b_10816242.html [2019-01-31]

Den Hertog, P., van der Aa, W. & de Jong, M.W. (2010). Capabilities for managing service innovation: towards a conceptual framework. Journal of Service Management, 21(4), 490-514.

Denscombe, M. (2010). The good research guide for small-scale social research projects. 4th edition red. Berkshire: Open University Press McGraw-Hill.

Deloitte. (2018). Digital Maturity Model – Achieveing digital maturity to drive growth. [Online] https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Technology-Media-Telecommunications/deloitte-digital-maturity-model.pdf [2019-03-08]

Digitaliseringskommissionen. (2016). För digitalisering I tiden. SOU 2016:89 [Online] https://www.regeringen.se/4af25c/contentassets/f7d07b214e2c459eb5757cea206e6701/sou-2016_89_webb.pdf [2019-01-31]

Eisenhardt, K. M. & Graebner, M. E. (2007). Theory building from cases: Opportunities and Challenges, Academy of Management Journal, 50(1), 25-32.

Eisenhardt, K. M. & Martin, J. (2000). Dynamic Capabilities: What Are They? Strategic Managemnet Journal, 21, 1105-1121.

Eisenhardt, K. M. & Sull, D. N. (2001). Strategy as Simple Rules. Harvard Business Review.

Energiforsk, (2018). Digital utveckling och möjligheter för energisektorn. [Online] https://energiforskmedia.blob.core.windows.net/media/24915/digital-utveckling-och-mojligheter-for-energisektorn-energiforskrapport-2018-501.pdf [2019-01-30]

Energiforsk, (2019). Digital utveckling och möjligheter för energisektorn 2. [Online] https://energiforskmedia.blob.core.windows.net/media/25652/digital-utveckling-och-mojligheter-for-energisektorn-2-energiforskrapport-2019-557.pdf [2019-02-06]

Fisher, T., Gebauer, H., Gregory, M., Ren, G. & Fleish, E. (2010). Exploitation or exploration in service business development? Insights from a dynamic capabilities perspective. Journal of Service Management, 21(5), 591-624.

Fitzgerald, M. Kruschwitz, N. Bonnet, D. & Welch, M. (2013). Embracing Digital Technology – A New Strategy Imperative. MIT Sloan Management Review Research Report 2013.

Frey, C. B., & Osborne, M. (2017). The future of employment: How susceptible are jobs to computerization?. Technological Forecasting and Social Change, 117, 254-280.

Gassman, O., Frankenberger, K. & Csik, M. (2014). The Business Model Generator. Pearson. [Online] http://doc1.bibliothek.li/acc/flmf044728.pdf [2019-01-31]

Gibbert, M., Ruigrok, W., & Wicki, B. (2008). What passes as a rigorous case study? Strategic Management Journal, 29(13), 1465-1474.

Helfat, C., Finkelstein, S., Mitchell, W., Peteraf, M.A., Singh, H. & Teece, D.T. (2007). Dynamic capabilities: Understanding strategic change in organizations. Blackwell, MA.

Henriette, E., Feki, M. & Boughzala, I. (2015). The Shape of Digital Transformation: A Systematic Literature Review. MCIS 2015 Proceedings.

Hoberg, P., Krcmar, H., Oswald, G. & Welz, B. (2015). Skills for Digital Transformation – Research Report 2015. IDT-Survey 2015. Technical University of Munich, Chair for Information Systems.

Hägg, J. & Sandhu, S. (2017). Do or Die: How large organizations can reach a higher level of digital maturity - A multiple case study. Industrial Engineering and Management. Luleå Technical University.

IVA (2017). Smart Industri. [Online] https://www.iva.se/globalassets/rapporter/smart-industri/201712-iva-smartindustri-rapport.pdf [2019-02-26]

Jacobi, R. & Brenner, E. (2017). How Large Corporations Survive Digitalization. In: Linnhoff-Popien C., Schneider R., Zaddach M. (eds) Digital Marketplaces Unleashed, 83-97. Springer, Berlin, Heidelberg.

Kane, G. C., Palmer, D., Ngyen Phillips, A., Kiron, D. & Buckley, N. (2015). Strategy, not Technology, Drives Digital Transformation. MITSloan Management Review and Deloitte University Press.

Karimi, J. & Walter, Z. (2015). The Role of Dynamic Capabilities in Responding to Digital Disruption: A Factor-based study of the Newspaper Industry. Journal of Management Informational Systems, 32(1), 39-81.

Kindström, D., Kowalkowski, C. & Sandberg, E. (2013). Enabling Service Innovation: A Dynamic Capabilities Approach. Journal of Business Research, 66(8), 1063-1073.

Kääriäinen, J., Parviainen, P., Teppola, S. & Tihinen, M. (2017). Tackling the digitalization challenge: how to benefit from digitalization in practice. International Journal of Information Systems and Project Management, 5(1), 63-77.

Lyytinen, K., Rose, G. & Yoo, Y. (2010) Learning routines and disruptive digital change. Hyper-Learning in seven software development organizations during internet adoption. Information Technology & People, Vol. 23 Issue: 2, pp.165-192.

Matt, C., Hess, T. & Benlian, A. (2015). Digital Transformation Strategies. Business and Information Systems Engineering, 57(5), 339-343.

McLaughlin, S. (2017). Dynamic capabilities: taking an emerging technology perspective. Int. J. Manufacturing Technology and Management, 31, Nos. 1/2/3.

Mousavi, S., Bossink, B. & van Vliet, M. (2018). Microfoundations of companies' dynamic capabilities for environmentally sustainable innovation: Case study insights from high-tech innovation in science-based companies. Business Strategy and the Environment, 28, 366-387.

Propia. (2019a). Medarbetare. [Online] https://www.propia.se/Vi-pa-Propia.html [2019-01-30]

Propia. (2019b). Lär känna oss. [Online] https://www.propia.se/Om-oss.html [2019-01-30]

Roland Berger, Strategy Consultants, (2015). The digital transformation of industry, u.o.: Study commissioned by the Federation of German Industries (BDI), Munich.

Schwertner, K. (2017). Digital Transformation of Business. Trakia Journal of Sciences, 15(1), 388-393.

Sjöström, R. (2018). Utredningsmetodik och Industriell Marknadsanalys. [Online] https://polopoly.liu.se/polopoly/polopoly_fs/1.739659.1521378014!/IMAbok_2018.pdf [2019-01-31]

Stolterman, E. & Fors, A. C. (2004). Information Technology and the Good Life. In: Kaplan, B., Truex, D. P., Wastell, D., Wood-Harper, A. T., & DeGross, J. I. (eds) Information Systems Research, 143, 687-692.

Svenskt Näringsliv. (2016). Företagen och digitaliseringen. [Online] https://www.svensktnaringsliv.se/migration_catalog/Rapporter_och_opinionsmaterial/Rapporter/foretagen-o-digitaliseringenpdf_648145.html/BINARY/F%C3%B6retagen%20o%20digitaliseringen.pdf [2019-01-30]

Swedish Research Council. (2017). God forskningssed, u.o.: u.n.

Teece, D. T. (2007). Explicating Dynamic Capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance. Strategic Management Journal, 28, 1319-1350.

Teece, D. T., Pierce, J. & Boerner, C. S. (2002). Dynamic capabilities, Competence and the Behavioural Theory of the Firm. Business Strategy and Enterprise Development in Competitive Environments, 2008, 53-67.

Teece D. T., Pisano, G. & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509-533.

Tekniska verken. (2019a). Om oss. [Online] https://www.tekniskaverken.se/om-oss/ [2019-01-31]

Tekniska verken. (2019b). Organisationsfakta. [Online] https://www.tekniskaverken.se/om-oss/ekonomi-och-organisation/organisationsfakta/ [2019-01-31]

Thomas, D. R. (2006). A General Inductive Approach for Analyzing Qualitative Evaluation Data. American Journal of Evaluation. Vol. 27 No. 2, June 2006, 237-246.

Yeow, A., Soh, C. & Hansen, R. (2018). Aligning with new digital strategy: A dynamic capabilities approach. The Journal of Strategic Information Systems. 27(1), 43-58.

Yin, R. K. (2009). Case studies: design and methods, 4th ed. Thousand Oaks: Sage Publications.

Zoulian, A. & Bouza, A. (2018). API Product Management. [Online] https://leanpub.com/apiproductmanagement/read_sample [2019-02-30]

Appendix 1. Interview template used at Tekniska verken.

Interview template

Our names are Emma and Cecilia, we are studying M.Sc. Industrial Engineering and Management at Linköping University, and currently writing our Master thesis at Propia. Our Master thesis aims to explore how dynamic capabilities can be used to manage digital transformation. The idea is to develop a framework where we concretise what should be in order to succeed with a digital transformation.

This interview will be part of our empirical research study at Tekniska verken. You will not be mentioned by name in the report. The result will be presented at Tekniska verken at the end of May, and you are welcome to attend the presentation.

Background questions:

- Tasks (demands/responsibilities of the role)?
- How long have you been employed at the company and in your role?

Main questions:

The interview will be divided into three areas where we have identified factors that enable digital transformation according to theory. We will cover one factor at a time and ask you some questions on how you experience that this issue is managed here at Tekniska verken. Please provide concrete examples if you have any. If this is something that you don't work with, or if you believe the issue could be managed in a more appropriate way, please share those ideas as well.

Leadership & Vision

We will start of discussing your experience of how Tekniska verken manages leadership and vision when it comes to digital initiatives, and how this affects your work.

Formulate and continuously develop a clear digital strategy that directs the digital transformation in order to support the overall business objectives.

- Are you familiar with the digital strategy of Tekniska verken?
- How does it affect your day-to-day work?
- *To strategic managers –* How is the digital strategy formulated and developed over time? (who is included?)
- *To strategic managers –* How do you know/evaluate taht the digital strategy supports the overall business strategy?

Support and involvement from the top management

- How and when do you see the management's commitment to innovation and change generally? What about digitalization ventures?
- How are values and focus areas communicated in the organization?
- How are the managements ideas anchored in the rest of the organization?
- How would you like to see that Tekniska verken worked more with this?

Have someone explicitly responsible for digital transformation at top management level

- How is the digital work anchored at management level?
- Do you think it is important to have someone responsible for driving the digital transformation?

Culture & People

We will now ask some questions regarding how you work with culture and people. When you answer the questions, please consider both how you experience the culture, and how you work with developing and encouraging a certain type of culture.

Innovative, open and risk-taking culture

- How would you say you are encouraged to be innovative, creative and come up with ideas? How do you encourage others to contribute with their ideas? (Any types of rewards? When/how/to whom?)
- *To managers –* How do you proceed with ideas that employees bring to you?
- *To managers –* How do you determine what ideas to proceed with?
- How would you describe the collaboration within the organization, both within and between departments and hierarchical levels? (concrete examples – lunch together? Natural meeting spots? Knowledge sharing without being part of the same projects?)

Disaggregate the digital strategy for all employees to clarify and encourage individual digital contribution

- *To managers –* How do you make sure your employees understand the digital goals and objectives and why they exist?
- How would you say your work is connected to the company's digital objectives? How do you know what is expected from you?
- How are you encouraged to take your own initiatives and develop your digital knowledge?
- How do you work with feedback at Tekniska verken? How does one know when they reached a certain (individual) goal?

Development and maintenance of digital knowledge to fulfill the digital strategy

- Competence is said to exist in three steps, according to the model IN-WITHIN-OUT:
    - How do you discover what knowledge is necessary and to get that knowledge in to the company?
    - How do you make sure you take advantage of and develop the knowledge that already exist in the company?
    - How do you ensure that the knowledge stays in the organization (e.g. when somebody quits their job)?
- How do you perceive your knowledge is taken advantage of and developed? What would happen if you left the company?

Structure & Processes

We will now ask some questions on the organizational structure and processes. Think of how you and your co-workers work, but also how the organization is structured as a whole.

Work in cross-functional teams

- When are you part of cross-functional teams? How is it managed practically?
- How do you work with resource allocation to different projects vs "ordinary" tasks?
- If you have been part of different projects and teams – how do you experience fractions of time between different interests? (please provide examples if available)

Corporate digital infrastructure

- How do you know what digital systems exist and what they are used for?
- How do you use your intranet today? What benefits and potential improvements do you see? (What more could the intranet be used for?)

Prioritize and evaluate digital initiatives and projects in alignment with the digital strategy

- *To managers –* How are you involved in the work with the digital portfolio? Could you tell us about how you prioritize what projects end up here and what happens after they are included in the portfolio?
- How are different IT systems chosen and evaluated? How do you think this process could be improved?

General questions:

- What opportunities do you see for Tekniska verken when it comes to digitalization?
- What new demands would this put on the organization/your department and your daily work?
- What needs to be improved/how should the development come about?

Final questions:

- Is there something more you would like to add?
- Would it be alright if we contact you again if some further questions arise?

Appendix 2. Empirical findings from brainstorming on digital transformation with Propia consultants.

Brainstorming

A goal/vision that is not fixed as it is probably changing fast
A role as ambassador and extra knowledgeable on the possibilities of digitalization i.e. technology and also within business development
Access to digital technology that fits into the business
All roles in the organization must be supplemented with what is needed in order to identify opportunities
CEO with a long-term focus
Change management
Change management
Change manager
Clear goal, "where are we going?"
Commitment and prioritization from the top management
Communication with employees: simplify and explain concepts
Competence within digitalization as well as project management and strategy development
Contact/relation with customers that can benefit from/participate in the digitalization
Continuous work with innovation and R&D
Cooperation between IT and other business areas (e.g. IT manager must be part of the management team)
Culture that encourages fast-movement on all levels
Digitalization competence: 1) technology, 2) organizational
Explicit common strategy
Fearless of the "new"
Front edge monitoring
How do we build in new ways of working to learn organizations to work "digitally"
Idea producer
Identify and establish strategic partners within new technological areas such as digital technology
Inclusion in portfolio
Initiatives driven from the organization
"Lay the rails as we go..."
Monitoring the outside world. What is going on? What is the new? New demands, regulations etc.?
Portfolio management of projects
Possibility to test ("lab") and improve (a process for this)
Seize the digital technology development
Technical competence
Technical support and platform
Try/"experiment" with new technology etc. To what extent do we convert it into our organization? "Innovation lab"
Two types of IT: 1) a fast-moving and innovative (the one that initiates change); 2) a stable (the foundation of the innovative one)
Well defined offer to customer - what values are created/do we want to deliver
Well-developed processes are a prerequisite
Willingness to change on all levels
Vision and objective, overall and per initiative
You must know the processes and all businesses as a whole before you start digitalizing
You need: 1) process awareness, and preferably 2) established processes