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# Sowing the Right Seeds & Harvesting Digital Transformation

## A case study of drivers and barriers to digital transformation in the forestry industry

Amanda Kristofersson, Malaika Torto

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# Abstract

*Digital transformation (DT) continuously reshapes and disrupts industries organizations operate in. Although the rising phenomenon is increasingly being investigated by academia, the factors influencing the adoption of DT in pre-digital and traditional industries are sufficiently unexplored. This study investigates managers' perspectives on the drivers and barriers surrounding DT in traditional industries. To do this, we conducted an industry-level qualitative case study of the five biggest firms in the Swedish forestry industry. Through analysis using a DT framework, our results indicate that changing customers' expectations and improving firm performance, to name a few, were the main drivers for DT in the forestry industry. However, our findings revealed that the main barriers to DT were related to the cultural and organizational identities of employees in the forestry industry. This study contributes to existing literature and provides suggestions for practitioners in traditional industries to address the challenges that may arise during the digital transformation process.*



**Keywords:** Digital transformation, digitalization, traditional industries, forestry industry, barriers, drivers.

# 1. Introduction

With the potential to immensely generate value from leveraging digital technologies, it is no surprise that the phenomenon of digital transformation (DT) has overtaken many firms worldwide. Consequently, the concept of DT has in the past couple of years gained traction in the research field of information systems (IS) and continues to be a prevalent theme in discussions in both academia (Vial, 2019; Hanelt, Bohnsack, Marz & Antunes, 2020) and industry (Forth, Reichert, de Laubier & Chakraborty, 2020; Wäger & Wager, 2019; Wessel, Baiyere, Ologeanu-Taddei, Cha & Jensen, 2020; Sebastian, Moloney, Ross, Fonstad, Beath & Mocker, 2017). Despite this, there are many differences within the definitions of the phenomena (Wessel et al., 2020, Chen, Mhlungu & Alkema, 2019), hence DT bears the risk of remaining a buzzword (Baiyere, Gupta, Grover, Woerner & Lyytinen, 2017) among many related concepts such as digital innovation (Vial, 2019) or information technology (IT) enabled organizational transformation (Wessel et al., 2020).

In a broad sense, DT can be described as a holistic approach of transforming the whole organization afforded by leveraging emergent digital technologies to reshape organizational operations and activities to enhance the outcomes of its business (Loonam, Eaves, Kumar & Parry, 2018; Westerman, Bonnet & McAfee, 2014; Haffke, Kalgovas & Benlian, 2016). These emergent digital technologies - information and connectivity technologies associated with cloud computing, analytical systems, social and mobile - have given rise to initiatives and disruptions in the way firms not only digitize old ways of working, but also develop business models, create new value, and provide new service-oriented offerings for consumers (Vial, 2019; Bharadwaj, El Sawy, Pavlou & Venkatraman, 2013; Singh & Hess, 2017; Kane, Philips, Copulsky & Andrus, 2019; Morakanyane, Grace & O'Reilly, 2017; Haffke et al., 2016).

Advancements in digital technologies have significantly contributed to the ever-changing expectations and behaviors of consumers in many industries (Verhoef, Broekhuizen, Bart, Bhattacharya, Qi Dong, Fabian & Haenlein, 2021). Consequently, organizations can not shelter themselves from the increased digital demand by consumers and the competitive disruption that follows the adoption of new digital technologies and business models (Fitzgerald, Kruschwitz, Bonnet & Welch, 2013). Moreover, DT has resulted in many organizations finding difficulties in managing the digital technologies and their corresponding DT initiatives (Loonam et al., 2018; Kane et al., 2019). The changes brought by DT have necessitated the creation of new skills and roles primarily focused on DT, usually referred to as Chief Digital Officer (CDO), in many industries, especially traditional ones (Tumbas, Berente & Brocke, 2018; Horlacher & Hess, 2016). To successfully adapt and get valuable outcomes of DT, scholars have argued for the importance of creating and communicating a strategy for DT, with clear pathways that address the disruptive nature of

the growing phenomenon (Matt, Hess & Benlian, 2015; Hanelt et al., 2020). Moreover, research has shown that working in agile cross-functional teams is an important element of DT (Hanelt et al., 2020; Vial, 2019).

While DT has been led by digital natives, such as Amazon and Facebook, pre-digital established firms have lagged in the development of DT due to their established value propositions and business processes (Warner & Wäger, 2019), however, they are now trying to understand how to successfully adapt to the changes brought by DT (Sebastian et al., 2017). The support from top management (TM) is further shown to be a key factor and driver in creating a culture allowing for DT (Westerman et al., 2014; Kane et al., 2019; Vial, 2019; Hanelt et al., 2020). Furthermore, it is argued by research that the structure of traditional firms, being typically rigid and top-down managed, can be a barrier for innovation and DT (Nylén & Holmström, 2015). Most traditional industries are at an early stage of DT and the vast majority of their revenues still come from traditional products and services (Sebastian et al., 2017).

Research on DT in traditional industries has mainly focused on technology-driven DT, referred to as Industry 4.0 (Gaspar & Juliao, 2020), and less on how organizations should be managed to digitally transform (Warner & Wäger, 2019). Due to the existing lack of empirical research done within the context of a traditional industry we deemed it important to investigate how top management within a traditional industry perceive and describe their DT. The need for a management perspective is important as research has long argued that top management support is critical to the success of using new digital technologies (Lee, Elbashir & Sutton, 2014) and recent research has pointed at the need for managers to cultivate a culture of exploring and trying new ways of working (Vial, 2019; Kane et al., 2019). Additionally, although previous literature have individually focused on the barriers (Vogelsang, Liere-Netheler, Packmohr & Hoppe, 2019) and drivers (Osmundsen, Iden & Bygstad, 2018) to DT, we aim to provide a holistic view on the phenomenon and thus seek to uncover the factors that are both expediting and impeding the DT process. In particular we aim to identify the major drivers and barriers to DT in traditional industries. With this, our intent is to address the following research question:

RQ: *What are the drivers and barriers of digital transformation in traditional industries from a management perspective?*

While prior research has investigated digital transformation in traditional industries such as manufacturing and automotive (Piccinini, Hanelt, Gregory & Kolbe, 2015; Liere-Netheler, Packmohr & Vogelsang, 2018), there seems to be very limited empirical research on the forestry industry. Furthermore, as research has focused on the adoption of digital technologies as well as the impact of the phenomenon on various industries, the forestry industry serves as a prime example of a traditional industry whose characteristics vary greatly from those that have been the subject of most research of DT thus far (Piccinini et al., 2015). Our accessibility to the forestry industry afforded us the opportunity to base our research

study on the industry. Against this backdrop, we conducted nine qualitative and semi-structured interviews with top-level managers from the five largest forestry firms in Sweden. Therefore, by developing a deeper understanding of the factors that influence DT, as this study aims to do, managers in traditional industries can ultimately develop a clearer understanding of their DT process. Additionally, this study intends to add to the growing literature on DT in traditional industries.

The remainder of the paper is organized as follows. First, we present a review of the literature describing digital transformation (DT) in traditional industries and the role of top management in shaping DT. Subsequently, we discuss our theoretical frameworks and methodological approach with a comprehensive explanation of sampling, data collection, and analysis. In the findings section, we present the main drivers and barriers to DT deduced from the qualitative data collected. Following this, we articulate and discuss our findings under the context of existing literature and draw out the academic and practical implications of this study. Finally, we briefly note the study limitations and present our conclusions and suggestions for potential future research that could contribute to the extant knowledge within the field of IS research.

# 2. Theoretical foundations

This section will provide an overview of the research that has been made in the area of DT. First, we will start with an introduction to how DT is defined by research. Following this, we present research focused on how DT is managed within organizations. Third, we provide related research on DT within traditional industries, and finally, we present the theoretical framework, *The Multi-dimensional framework of digital transformation by Hanelt et al. (2020)*, its concepts, and how it was applied to this study.

## 2.1 Related research

### 2.1.1 Defining DT

Despite the growing research on DT, information systems scholars and practitioners struggle to find a common understanding of what it encompasses and what it really means to organizations (Hausberg, Liere- Netheler, Packmohr, Pakura & Vogelsang, 2019; Hanelt et al, 2020; Morakanyane et al, 2017; Wessel et al., 2020). The ambiguity shrouding DT has seen researchers using the terms *digital transformation* and *digitalization* interchangeably. To distinguish DT from digitalization, Legner, Eymann, Hess, Matt, Böhmann, Drews, Mädche, Urbach and Ahlemann (2017) defined digitalization as "*the manifold sociotechnical phenomena and processes of adopting and using digital technologies in broader individual, organizational, and societal contexts.*" When it comes to *defining* DT, many authors

describe DT as a process of changes happening in an organization resulting from the widespread diffusion of digital technologies with financial and business improvements as expected outcomes (Hanelt et al., 2020; Kane et al., 2019, Matt et al., 2015). This way of defining DT is broad and includes more than the adaptation of new technology, but also the process of changing business models, organizational structures, and management concepts (Matt et al., 2015). In contrast, Vial (2019) describes DT more from a technical perspective and as a process with the aim to improve an organization by changes to it through combinations of information, computing, communication, and connectivity technologies. Additionally, Wessel et al. (2020) argue for the need of differentiating DT from other well-established concepts of information technology (IT). The authors sought to investigate the difference between IT-enabled organizational transformation (ITOT) and DT and found that the former relates more to using "*digital technology to support value propositions"* whilst the latter relates more to using "*digital technology to redefine value propositions*" (Wessel et al., 2020, p.41).

### 2.1.2 Managing Digital transformation

A large number of researchers have devoted their attention to exploring the process of DT within organizations. Rueckel, Mühlburger and Koch (2020) found that the underlying drivers to DT are to have an innovative organizational culture with institutionalized innovation processes and allowing for individual creativity, being internal and external collaborative, and adapting a digital leadership. Vial (2019) furthermore identified four clusters of relevance to where the change brought by DT is most affecting an organization: Organizational structure, Organizational culture, Leadership, and Employee roles and skills. Similarly, Kane et al. (2019) argue that a big part of the digital disruption facing organizations is peoples' different responses to using new digital tools, thus emphasizing the importance of new ways of working.

The changes brought by DT to organizations have raised the question of leadership styles and skills for driving DT (Matt et al., 2020; Vial., 2019; Lee et al., 2014; Kane et al., 2019). The notion of the importance and influence of management on DT is well agreed upon within research (Yokoi, Shan, Wade & Macaulay, 2019; Kane et al., 2019; Vial, 2019). However, leaders often fail to focus on the importance of organizational change management in the implementation of new digital technologies; thus, they fail to properly provide adequate support and motivation for employees (Kane et al., 2019). The support from top management (TM) is further shown to be a key factor and driver in creating a culture allowing for DT (Westerman et al., 2014; Kane et al., 2019; Vial, 2019; Hanelt et al., 2020). Prior research has also argued for the importance of TM support as fundamental to the success of innovation implementation and the ability to try new things (Lee et al., 2014; Hanelt et al; 2020; Vial, 2019). The importance of supporting a culture of learning is also argued to be important in transformation processes and innovational ability (Schuchmann & Seufert, 2015). The

authors further describe that DT requires managers to nourish and enable individuality to grow and that managers need to be facilitators for learning instead of having a "leader knows it all" attitude (Schuchmann & Seufert, 2015). However, other research points at approaches to DT often lack the coherence of managers' mission and vision and how this is affecting the strategic management of change (Porfirio, Carrilho, Felício & Jardim, 2021). Yokoi et al. (2019) also bring up the importance of firms having a clear digital strategy to help guide leaders' efforts in enabling new value propositions by combining technologies with the right competencies within the firm. Organizations often seem to hold on to the traditional strategy building stemming from IT departments, thus confusing IT strategy for being a DT strategy (Matt et al., 2015). IT strategies usually focus on the management of the technical aspects of the IT strategy, whereas the focus on DT strategies lies on what drives innovations and to create new business values outside existing processes (Wessel et al., 2020; Matt et al., 2015). Hence, research suggests that organizations should move away from the IT-focused strategy and instead include the aspects of the transformation of processes as well as the changes in organizational structure and operations that occur as a result of the implementation of new IT structure (Bharadwaj et al., 2013; Matt et al., 2015). Research has also addressed technological-focused management by drawing attention to the importance of aligning technology and processes with people using the technology; it is more about the employees who work and operate the technology than the technology itself (Westerman et al., 2014; Kane et al., 2019). In contrast, Hanelt et al. (2020) argue that the management style is changing towards technology-focused and supported-oriented management, where there is a use of big data to make smart business decisions and enable data-driven operations. However, Hanelt et al. (2020) note that the role of TM is vital to capture and nourish the expected outcomes of DT, thus communicating expected outcomes is crucial to retain talents to the firm by connecting and engaging with employees. Managers should also be able to adapt and react to the fast-paced change of DT and continuously evaluate in terms of the direction and the underlying assumptions that drive the transformation (Matt et al., 2015; Kane et al., 2019). DT also requires the TM to increasingly involve the entire network of stakeholders and potential stakeholders affected by the transformation, as well as working to enable collaboration in complex environments due to new digital technology enabling new business models and increasing level of communication (Matt et al., 2015; Cortellazzo, Bruni & Zampieri, 2019). Hence, DT requires managers that are both change management-oriented but also knowledgeable within the digital field. Consequently, many firms, even in the more traditional industries, have adapted to the required changes in roles and employed managers to take charge of DT, usually as the role of a Chief Digital Officer (Horlacher & Hess, 2016; Vial, 2019). The role of the CDO is complex and multidimensional and thus requires the ability to navigate tensions and guide the organization through DT, while keeping an eye on the overall strategy and business value creation (Tumbas et al., 2018). Furthermore, research shows that the CDO often encounters several obstacles when implementing a digital strategy,

such as lacking central oversight; a traditional culture that resists change; a gap in the talent required; and legacy systems and structures that threaten to derail their ambitions (Péladeau, Herzog & Acker, 2017).

### 2.1.3 DT in Traditional Industries

DT has been widely adopted by firms in different industries, with the digital-born pioneers (Amazon & Google) in the forefront, while companies with value propositions that have long dominated their industries are lagging (Sebastian et al., 2017). Furthermore, a study conducted among executives in established firms showed that among firms with high revenues only 24 percent had digitally savvy boards, and moreover those firms significantly outperformed others on key metrics such as revenue growth (Weill, Apel, Woerner & Banner, 2019). In research within traditional industries and DT authors have devoted their research primarily to the more technical aspects of DT within traditional industries, which has led to the last decade of traditional industries working towards technology-driven DT, usually referred to as Industry 4.0 (Gaspar & Juliao, 2020). While leaders in these traditional organizations believe their companies can retain leading positions by taking advantage of their legacy combined with the capabilities offered by digital technologies (Sebastian et al, 2017), there is a void in existing research when it comes to developing managerial tools that would take in account the characteristics of the DT and its various factors that influence and enable it to occur within traditional firms (Morakanyane et al., 2017). Warner and Wäger (2019) highlight the absence of a shared understanding of DT within traditional industries; what it means, how it is perceived, and how it can be managed.

Loonam et al. (2017) identified the lack of empirical research on DT in traditional industries and therefore sought to study the factors behind the successful implementation of DT. Loonam et al. (2017) argue that for traditional organizations to be successful in their implementation of DT, they will have to learn from organizations that are digital natives. Similarly, Sebastian et al. (2017) in their study to investigate how traditional companies can navigate DT, identified that most of these companies were still in the early stages of DT and found their value propositions under the threat of digital pioneers. They also identified that research on DT has mainly focused on how to apply digital technologies and use data to improve customer relationships and was lacking focus on how traditional companies can holistically employ digital initiatives to succeed (Sebastian et al., 2017). Lucas and Goh (2009) argue that managers need to convince others of the need to change in a certain direction while altering the views before communicating the impending change. The authors further stress the importance of cultural aspects of DT to address the challenges disruptive technologies pose to firms with historical business models and explain that the beliefs of employees, the way firms organize themselves, and the nature of the interactions among employees are all aspects of culture.

Chesbrough (2010) identified that managers in traditional organizations tend to favor established business models that are already proven, with a safe gross margin, to protect the status quo, thus being resistant to experiments that might threaten the profitability of existing ones. A key factor in DT is argued among scholars to be the *disruptiveness* brought by new digital technology and how it generates innovation for businesses (Lucas & Goh, 2009; Vial, 2019). One of the most prominent theories about disruptiveness is Christensen's (1997) study, where the author argues that investing in disruptive technologies is not a rational financial decision for senior managers to make due to the notion that disruptive technologies are initially of interest to the least profitable customers in a market. Hence, traditional industries might reject disruptive technologies and when customers begin to request disruptive products it might be too late to compete in the new market (Christensen, 1997). In a similar vein, Weill and Woerner (2015) further argued that traditional firms are less likely to adopt digital business models than younger enterprises; this they argue is due to old legacy systems, complex supply chains, working in silos, and established organizational politics.

While previous research has focused on how digital technologies can be used as a catalyst for improving efficiency in value creation in the forestry industry and thus stimulating DT (Scholz, De Meyer, Marques, Pinho, Boaventura-Cunha, Van Orshoven, Rosset, Künzi, Kaarle & Nummila, 2018; Nylén & Holmström, 2011), few studies have investigated factors driving and inhibiting the DT process from top managers perspective on an industry level within the forestry industry. Holmström (2020) investigated the process of digitalizing the forestry value chain and addressed the challenges of DT in forestry with the main findings showing that while there exists a big interest in DT, the problem lies in strategic actions and knowing where to start. Thus, the firms should create strategies to develop digital maturity and enhance internal digital competency, to move from traditional supply chains to operate in ecosystems with a higher level of collaboration between firms (Holmström, 2020).

## 2.2 Theoretical frameworks

In this section, we will present different frameworks on DT as well as the framework that has been applied for this study, which helps in understanding the underlying processes of DT in an organizational context, while still allowing for exploration in the empirical data.

### 2.2.1 Digital Transformation Frameworks

The process of DT is underscored by Vial (2019) whose inductive framework of DT stemmed from an amalgamation of current literature on the phenomenon. This framework sees the use of digital technologies as being central to driving DT in organizations. It additionally provides a holistic view of how DT evolves throughout the organization because of disruptions on a

macro-level (external). Vial (2019) also uses this comprehensive framework to build on several building blocks which outline the positive impacts as well as the negative outcomes DT may have on organizations. Although Vial's (2019) framework addresses many talking points, it fails to address how micro-level (internal) factors trigger the onset of DT. Moreover, Wessel et al. (2020) argue that Vial's (2019) framework builds its argumentation from research on IT-enabled organizational transformation (ITOT) and ultimately blurs the lines between the definitions of DT and ITOT; as a result, this begs the question of why the IS research should explore DT (Wessel et al.,2020).

To highlight the conceptualization and differences between DT and ITOT, Wessel et al. (2020) synthesize their findings into a process model. While Vial's (2019) framework only tackles the external aspects influencing DT, Wessel et al. (2020) highlight that both the organizational and environmental factors trigger DT. The process model offers insight into the differences in outcomes of DT and ITOT and places importance on the role digital technologies play in executing value propositions. In the DT process, there is an emergence of a new organizational identity because of the creation of new value propositions. However, in the ITOT process, its outcome was a reinforced organizational identity due to the use of digital technology to support existing value propositions. Although Wessel et al. (2020) unpack the differences between DT and ITOT, it leaves the question for further research on whether differentiating between these two terms is relevant for the practice, as there is a lack of empirical research on DT within traditional industries.

Due to the shortcomings of both frameworks by Vial (2019) and Wessel et al. (2020), we found it fitting to employ Hanelt et al's (2020) multidimensional framework on DT to address the aim of our study. This multidimensional framework synthesizes and builds on current and comprehensive literature on DT while also reducing the complexity surrounding the phenomenon (Hanelt et al., 2020). Additionally, the framework helps to provide an in-depth understanding of the underlying process of DT in an organizational context as well as give the study a certain focus on a complex phenomenon, while still allowing for exploration in the empirical data.

### 2.2.2 The Multi-dimensional framework of DT

The multi-dimensional framework by Hanelt et al. (2020) provides a practical tool for scholars and practitioners to analyze DT. The matrices comprise three categories – contextual conditions, mechanisms, and outcomes (see Figure 1).

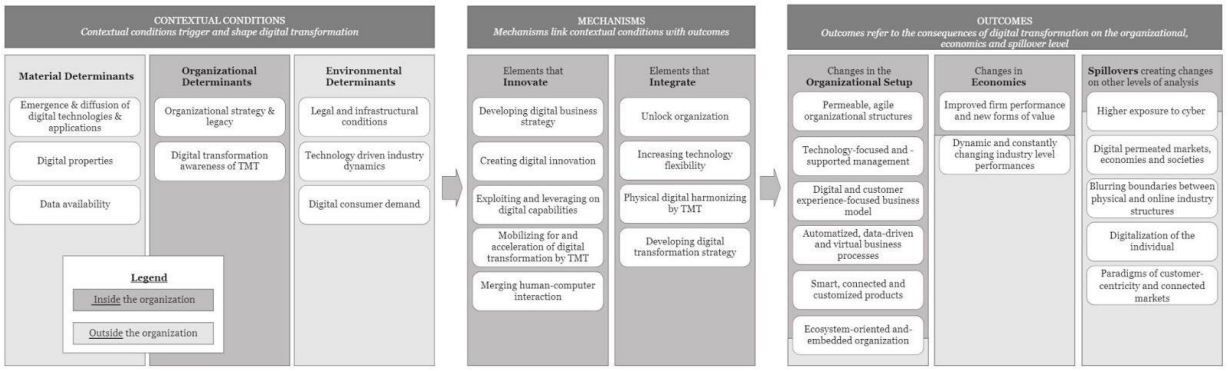


*Figure 1: The Multi-dimensional Framework by Hanelt et al. (2020).*

**The contextual conditions** can be described as the conditions in the different contexts of where DT takes place in an organization. Hanelt et al's (2020) review of literature and research on DT in the IS field revealed how both organizational and environmental aspects trigger and shape DT. The contextual block is further divided into three main parts; Material determinants; Organizational determinants; Environmental determinants. Material determinants are the technological conditions for DT, where Hanelt et al. (2020) define new digital technology as "SMACIT-technology" (social, mobile, analytics, cloud, and Internet of Things). Here, digital technology is described as consisting of a modular layered architecture of four layers: devices, networks, services, and contents (Yoo, Henfridsson & Lyytinen, 2010). When these digital technologies enter organizations, they are naturally interacting with organizational patterns called organizational determinants. Hanelt et al. (2020) here refers to Dewan, Jing and Seidmann's (2003) description of how managerial and organizational characteristics consist of the organizational strategy, IT legacy systems as well as resources, processes, values, and organizational culture. Hanelt et al., (2020) further describe the awareness by TM to initiate DT as an organizational determinant. This can be expressed in TM having positive attitudes towards change and technology. Furthermore, these managerial and organizational aspects are influenced by environmental determinants such as industry characteristics and customer characteristics (Hanelt et al., 2020). The framework points out that DT enables and demands organizational structures to develop towards a flexible and more agile design, one that is integrated with its external environment and driven by digital business ecosystems. Lastly, consumer characteristics are considered to be important when it comes to digital behavior and demand and how this shapes DT as consumers become increasingly relying on digital technologies in their everyday lives (Brynjolfsson, Hu & Rahman., 2013).

**The mechanisms** of DT, which are the processes and activities that trigger DT, are divided into two sections; *Innovate* and *Integrate*. The Innovation mechanisms largely involve the exploration and use of distributed, layered, and combinatorial technologies (Yoo et al., 2010) to create opportunities for organizations. This includes the creation of a digital

business strategy, described by Hansen, Kraemmergaard and Mathiassen (2011) as having its origins rooted in data insights, ensuring, and establishing managerial capabilities to effectively steer the process of DT. Moreover, the acceleration of DT from these managerial capabilities will appeal to and attract a new generation of workers (Hanelt et al., 2020). Integration mechanisms are the processes of alignment of existing elements with newly developed ones in an organization. Hanelt et al. (2020) highlight the need for having not only a digital business strategy but also a DT strategy that describes the different pathways and factors to be considered to coordinate and implement transformation strategies. For there to be integration, the organization must further become ambidextrous and agile while still developing its learning abilities and increasing its technological flexibility (Hanelt et al., 2020). Cross-functional collaboration and ensuring that digital technologies are used in combination with managerial resources and working practices is another main factor of the integration mechanism (Hanelt et al., 2020).

The outcomes include the effect DT has on the organization, its external environment as well as the economic effects incurred and are categorized into sections of organizational setups, economics, and spillovers (Hanelt et al., 2020). DT presents many overlapping and interrelated initiatives to be considered and for organizations to smoothly integrate new ways of working with old ones, to be ambidextrous, the organizational structure must be looked at. Thus, Hanelt et al. (2020) argue that the organization's setup changes to more agile structures to support cross-functional partnerships. Additionally, this shift also includes a change of management to a more technology-focused style and more importance is placed on the creation of business models to focus on customers' experiences. Economic outcomes from DT lead to the increased performance in organizations as well as a higher competitive advantage and new pathways for value creation and higher customer satisfaction (Hanelt et al., 2020). Spillovers stemming from DT include a greater focus on open innovation - collaboration across industries, and the need for connected markets (Weichert, 2017). Moreover, the spillovers from DT lead to the digitalization of individuals, meaning that customers' digital demand is increasing (Hanelt et al., 2020). Customers are increasingly changing their preferences and are lured away in droves by the disruption that stems from DT (Downes & Nunes, 2013). Finally, from a security standpoint, DT however creates a higher exposure to cyber threats and data security vulnerability (Hanelt et al., 2020).

# 3. Methodology

## 3.1 Research context - The Swedish Forestry industry

To understand a context (DT), the best way is to talk to people (Myers, 2020). For this study, we have conducted interviews with top-level managers within the Swedish forestry industry. With a long history rooted in the development of Sweden's economy, the forestry industry is

viewed as one of the country's most important business sectors standing for 9-12 percent of Sweden's GDP (Skogsindustrierna, 2019) and is also an important actor in preserving the biodiversity of the environment (UN 2030 Goals). The industry's digital developments in precision forestry using drones and light detection and ranging (lidar), or in-forest scanning with smartphones is proven to decrease environmental impact in comparison to non-digital, traditional, work processes (McKinsey & Company, 2018; Open Access Government, 2020).

The Swedish forestry industry is often regarded as conservative and laggard particularly in issues related to DT. Although the forest industry may not be at the forefront of DT, the industry has in recent times drastically increased its efforts in the use of digital technologies to improve its core business (Holmström, 2020). The authors further addressed in his study that the forestry firms' digital value chain is fragmented, that the industry lacks external collaborations of sharing data. It was further shown that the level of digital maturity varied highly, that the level of digital competence in-house was relatively low, and lastly that the level of innovation regarding digital services was low (Holmström, 2020). Furthermore, a survey including 54 firms showed that more than half of Swedish forestry firms lack a concrete strategy for digitization but are at the same time positive about digital business opportunities and see great potential in the use of real-time data, development of the user experience, and business renewal (Tieto, 2018). Recent research has also shown that traditional firms, where the forestry industry is explicitly mentioned in the study, had the fewest digitally savvy managers with results showing that only one percent of executives have digital expertise (Forbes, 2021).

## 3.2 Research design

With regards to the phenomenon investigated, being DT and its blurred boundaries between organizational lines and external environment, it is a highly complex arena to study and thus making it suitable for a case study. A case study can be described as an empirical inquiry where the researcher investigates a phenomenon within a real-life context, and often that phenomenon is contemporary, and its boundaries are not necessarily very clear (Yin, 2014). Regarding the philosophical aim, we applied an interpretivist philosophical view. The interpretivist perspective helped us to identify and gain a deeper understanding of the key drivers and barriers that affect the DT process within the Swedish forestry industry. Interpretative research is often used to describe a situation, problem, phenomenon, or provide information about or discuss attitudes towards the issue under investigation (Myers, 2020).

Using the interpretivist view recognizes the importance of context, which in this case is suitable due to this study's context of a traditional industry (Myers, 2020). In interpretive studies, researchers assume that access to reality is only through social constructions such as language, consciousness, shared meanings, and instruments, and the qualitative interpretivist research methods urge researchers to engage with people in real organizations

(Myers, 2020). Hence, we have conducted a qualitative case study, which has enabled us as researchers to gather data not only about things that *are* happening, but also about things that *have* happened, such as peoples' past experiences, behaviors, or emotions, as well as peoples' thoughts and how they talk about a topic (Corbin & Strauss, 2015). In case studies, the researcher's focus should lie in asking "how" and "why" something is the way it is (Myers, 2020) and thus the focus lies in letting the respondent talk about related things around the open questions. In this study, we search for the answers to "why and how" by trying to understand DT within a traditional industry. In a case study, the researcher does not try to intervene in the study context or with the study object, as is the case for action research, but instead the researcher seeks to describe it, hence adopting a rather passive, but exploring and observing role (Myers, 2020).

## 3.3 Data collection

In total, nine semi-structured interviews were conducted with top-level managers within the Swedish forestry industry (see Table 1). The interviews took place online using video calls from March to April 2021 and were recorded through the software Microsoft Teams. Respondents were sampled by the criteria of having a top-level management position at the biggest forestry firms in Sweden.

| TABLE OF RESPONDENTS | | |
|---|---|---|
| Prefix Firm- Respondent | Gender | Interview Duration |
| A-1 | Female | 45 min |
| A-2 | Female | 42 min |
| B-1 | Male | 52 min |
| C-1 | Male | 39 min |
| C-2 | Male | 41 min |
| D1 + D2 | Males | 49 min |
| E-1 | Male | 55 min |
| E-2 | Male | 43 min |

*Table 1: Table of Respondents*

In the selection process, participants were approached through email with a research plan that consisted of a confidentiality clause, describing the research question and the aim of the study research, and included an invitation to participate in the interview.

The semi-structured interviews were broadly informed by related research, yet it left room for a discussion on the respondents' understanding of DT from their perspective as

managers. Furthermore, the respondents were encouraged to use concrete examples in their answers and to think of specific people and situations to illustrate what they meant and to concretize sometimes abstract situations such as feelings or experiences.

## 3.4 Ethical Considerations

When approaching the respondents by email, we attached a project description of the study explaining the method, aim, and expected results. We also stated clearly that this was an explorative interpretivist study and thus highlighted that their openness was a key factor in the data collection. Additionally, the respondents were informed that the final report would be published online. We followed the research ethical guidelines of the Swedish Research Council which consists of four main areas; Reliability regarding ensuring high quality in research design; Honesty when conducting the data and presenting it; Respect for research participants and their environment; Responsibility for research from the idea to publication and for its further consequences (Vetenskapsrådet, 2017).

Myers (2020) suggests that the researcher should consider three main ethical issues when conducting a research project. First, maintaining privacy (Myers, 2020), which we addressed by ensuring confidentiality and keeping the respondents names and firms anonymous, to encourage truthfulness and openness during the interviews. Second, is to represent the data with honesty and transparency (Myers, 2020), which we provide with the table of respondents (see Table 1) and in the findings by showing examples of quotes from the transcripts of interviews. Third, taking responsibility for your findings and standing behind it even though the findings might be unfavorable (Myers, 2020). We ensured we remained objective in our analysis and therefore stand by the findings that emerged from the data collected. We hope it will be useful for practitioners, as well as contribute to the research on DT in traditional industries.

## 3.5 Data Analysis

After the data collection, we transcribed the recordings manually into text documents, which we then uploaded as nine datasets in the qualitative data analysis software program Dedoose - which allowed us to work online simultaneously in the datasets.

When we had familiarized ourselves with the data, we critically discussed which methodology would be best suited for the study's aim. This study takes on inductive reasoning, meaning that we started 'bottom-up' and began by collecting data about the topic. Myers (2020) explains that inductive reasoning, compared to deductive reasoning, is more open-ended and exploring in nature. The main purpose of qualitative inductive research is to build theory from the analysis of collected data, which is done without a pre-made hypothesis about the results. However, after gaining more theoretical knowledge about the process of DT we identified that inductive reasoning was too narrow, but on the other hand, found that a

completely deductive approach also constrained us. Walsham (2006) touches upon this issue and argues that it can be problematic with deductive coding if it leads the researcher into a situation where one only sees what the theory proposes and thus leads to a loss in discoveries in the data, thus hindering us as researchers being explorative. By problematizing the use of either inductive or inductive, it led us to the decision on using the Hybrid Approach for our data analysis (Boyatzis, 1998).

The combination of approaches that the Hybrid Approach stands for allows researchers to use both data-driven coding and theory-driven coding *(*Boyatzis, 1998). Data-driven codes are codes that *emerge from the collected data (inductive)*, whereas theory-driven codes are developed *a priori from existing theory (deductive).*

The positive aspect of the Hybrid Approach is its flexibility. At the same time, it allows for exploring potential information outside the previous theory, it also enables a certain focus and delimitation of what to look for in the data sets (Boyatzis, 1998). This has been critical for us when exploring the datasets concerning theory since the IS-field on DT is broad and complex relating to definitions and perspectives of it. However, all together, the theory-driven coding part of the process has helped us to search for relevance in the data but also allowed us to be explorative with the data-driven codes.

In the coding process, our first round of coding focused on finding codes that emerged from the data and related to what drives and what hinders DT. In round two of coding, we did theory-driven coding. First, we created codes based on the applied theoretical framework, *The Multi-dimensional framework for Digital Transformation* by Hanelt et al. (2020), then we searched for information in the datasets that related to the theory-driven codes without searching for drivers and barriers, leaving that to the clustering of themes in the following steps.

Following the coding process, we then clustered them according to the empirical clustering method described by Boyatzis (1998) as a part of the hybrid approach of coding. Empirically created themes are codes clustered into broader categories that covered aspects of DT that were frequently talked about and related to barriers and drivers, or things that stood out from the rest of the data or the framework. The final themes were clustered by following Boyatzis' (1998) approach from what emerged in the empirical data and then categorized into the three main blocks of The Multi-dimensional framework by Hanelt et al. (2020). For the empirically constructed themes, we clustered the most occurring codes to themes and then we categorized them as either barrier or driver, then we further categorized them into sections of the selected framework, being: Contextual Conditions, Mechanisms, and Outcomes.

For the sake of clarity, we deemed it important to define what a barrier is and what a driver is.

**A barrier -** *Something that prevents something else from happening or makes it more difficult* (Cambridge Dictionary, 2021). Hence, a barrier, in this case, is something (item, material, cultural, action, happening, et cetera) that prevents an organization's DT journey.

**A driver -** *a factor which causes a particular phenomenon to happen or develop*. (Oxford Dictionary, 2021). For example, '*the hope of achieving such monopolies becomes the main driver of investment.'*

In summary, the analysis can be described as grounded in empirical data and informed by theory. Furthermore, there is a reciprocal relationship between the applied theory and the empirical data. Data-driven coding was done first and then the theory-informed codes were used when coding the empirical data in round two. The following presented coding scheme (See Table 2) will provide clarity in the analysis process, as well as increase transparency of the research process and the discussion of findings.

| EXAMPLE FROM DATA & THEORY-DRIVEN CODING | | | |
|---|---|---|---|
| **Excerpts from data →** | **Codes →** | **Theme →** | **Description of Theme** |
| *"The industry is pretty conservative. Comparing the forestry industry to other industries, the forestry industry is about 5-10 years behind in digitalization. This is noticeable everywhere."* | Theory-driven:<br>*Contextual condition<br>*Environmental determinants<br><br>Data-driven:<br>*Industry culture<br>*Conservative industry<br>*Digitally lagging behind | Conservative Industry culture | The conservative and slow-paced nature of the forestry industry was highlighted by some respondents as an inhibitor of digital transformation. One respondent said that the traditional culture is noticeable everywhere, in how they do their marketing, which systems they work in and how processes are carried out. |
| *"I think the pandemic has sped up the transformation of the forest owners' needs of digital tools. We tend to hide behind the notion that the forest owners do not like digital transformation and they like the old ways of operating."* | Theory-driven:<br>*Outcomes<br>*Digital consumer demand<br><br>Data-driven:<br>*Customers digital demand<br>*Pandemic triggered DT | Customers' digital demand | It could be inferred from the data and the opinions of the respondents that the change in interests and expectations of customers related to the availability of digital products and services was one of the driving forces of digital transformation. |

*Table 2: Examples from the data, and theory-driven coding process (Boyatzis, 1998).*

# 4. Findings

This section presents the findings from the analysis of the data. After creating the themes, we further categorized them into each main block of the Multi-dimensional framework for DT by Hanelt et al. (2020). The following subsections are accordingly divided into contextual conditions, mechanisms, and outcomes. Lastly, as a summary, we present (see Table 3) the identified barriers and drivers under each part of the framework.

## 4.1 Contextual conditions

> *The forest industry as a whole is slightly behind other companies when it comes to the use of digital solutions - C-1*

Starting with the **internal aspects** of the contextual conditions, regarding culture-related topics, the forestry firms showed a variety of cultural beliefs and habits. On an industry level, there was a clear consensus concerning its traditional values and habits. The conservative and slow-paced nature of the forestry industry was highlighted by the majority of respondents as an inhibitor of DT. One respondent said that the traditional culture is noticeable almost everywhere; from how they do their marketing, which systems they work in, to how processes are carried out. However, at an organizational level, all of the firms expressed a willingness to develop their DT process. Although showing a positive attitude towards DT, finding the right path with the right technology, and leading the transformation appears to be a struggle. Some respondents described that their firms were ready for the transformation, but they did not know where to start and felt overwhelmed by the complexity of DT. While some firms were standing on the edge of it, wanting to jump but did not know how to, other firms had come further on their journey and were past the material determinants of DT (elaborating on which new digital technology to use).

> *I feel that we are ready for this transformation, but we don't really know where to start. - A-2*

From the responses of the respondents, it was clear that the phenomenon of DT was described as a complex one, not being a separate project, but an ongoing process. Firm D even talked about the process starting so early as in the '80s when the forestry industry started to collect data.

When talking about their IT and information systems, almost all respondents expressed frustration towards their old legacy systems. E-1 described their system as being a barrier to new development since the old structure and components do not allow for add-ons. Hence, making changes to the system is followed by huge change management initiatives for it to be successful. The presence of legacy IT systems was further described by multiple firms as time-consuming.

*When it comes to maturity in systems integration, we may be behind other industries that don't have this legacy to care for. - E-1*

Unlike the forestry firms, D-1 highlighted that modern firms have no legacy systems and thus do not have to be concerned about them. This showed that the legacy IT systems were considered a strength despite them not being conducive for rapid change and adaptation.

Stressing on the importance of organizational identity, C-2 described a willingness to be perceived as a digitally competent company, demonstrating a shift from the traditional values existing in the forestry industry. C-2 also described using data to enhance the business decisions not as a question but as a must.

At an organizational level, respondents spoke about some employees feeling threatened when talking about automation of tasks and new roles emerging as a result of DT. As a result, there were some negative connotations associated with the term DT. There was also the notion of fear coupled with wanting to feel safe. Some respondents described cultures where employees take pride in trying to solve problems individually rather than asking for help as well as being knowledgeable and good at their specific roles. This may subsequently prevent them from collaborating amongst themselves.

*If we start to develop drone technology, people will wonder if their jobs would disappear and if we start to transform in a digital way how would it affect me (employees) and how would it affect the forest owners. Are they ready for this? We are a little bit afraid and feel quite safe in the forestry industry. It is a traditional industry. - A-2*

*Personally, I am a little bit careful in using these terms because I've learned that if you use the word digital transformation, it comes with a lot of fear. - A-2.*

Additionally, hesitation toward DT and how it should be applied within the context of the forestry industry was expressed.

*So now it's new tools and new ways of opportunities and you need to find out what is the right way for us, I mean there are a lot of companies that are knocking on the door and saying "hey we can help us with your digitalization" but we need to find out what's in it for us. There are a lot of buzz words out there. - D-2*

The culture of some employees as described by respondents were shaped by the industry in which they operated. Organizational identity appears to be important for the forestry firms, and multiple firms talked about the way of doing things in forestry is by following the shoveled pathway.

*We have a tradition of having a life vest before we can jump off the boat. We want to feel safe, and we want to do it the right way. - A-2*

When it came to where the firms found inspiration, it was underscored by some firms that they are not looking for inspiration from other forestry firms, due to the industry lagging in

DT. Instead, they tend to look for inspiration in other industries. On the other hand, one respondent expressed that forestry firms tend to follow other forestry firms very closely, so if one firm does something then other firms also want to try it out.

When asking the respondents about their external collaborations, only one respondent, C-1, highlighted an external network consisting of firms from different industries that has been beneficial for their DT.

> *So, we joined this network, which is very good for us because here we can talk to counterparts or other people in other industries without being afraid that it will leak out to someone else. It's a collaboration network where we share knowledge. - C-1*

Other managers were however mentioning their collaboration with research institutes as a way to allow for innovation.

When looking at the Contextual Conditions within the **external environment** the findings showed diverse responses when they talked about their customers' digital demands and expectations and how they affected their DT. Some firms described (E and B) their customers' digital demand as relatively low and not a driving force for transformation. Arguing for the firms being "further ahead" than their customers, and that their small contractors (customers) are still working in traditional non-digital ways. The need for customers to change their user habits was seen as a necessity for DT to occur.

> *If I could do a digital transformation that doesn't involve a change of habit of the end-user, I will take it any day of the week. […]one of the barriers is how mature the users are and how used they are to using digital tools. - B-1*

Conversely, some managers talked about the increased importance of value creation stemming from digitalization (see more under Outcomes). Customers have become accustomed to services where they get information and can communicate digitally, so the forestry firms feel the need to meet those demands as well. Some managers talked about trying to meet the customers' demand by adapting a more service-minded way of meeting them digitally and creating additional value with digital communication and information.

> *For our purchases from private forest owners we have made a lot of changes in how we communicate with them, today we do digital contracts and signoffs. That was not possible, let's say five years ago. - D-2.*

C-1 also described the way they used data as enhancing business differs because of changes in customers' expectations within the last five years. One respondent (C-1) expressed that forest customers expect an app developed by a forestry firm to be equally good as Netflix or Spotify. A couple of years ago they might have accepted an app with worse quality, but that is no longer acceptable. This has led to the forest firm's increased customer research activities, such as conducting in-depth interviews for user experience improvements.

*A lot of supplier-customer interfaces for small customers still work in a traditional way, but I think it's going to change fast in the coming years, And I would say that we're a little bit behind - E-1*

Notably, respondent A-2 mentioned that their organization tended to hide behind the notion that forest owners like the old ways of operating, and this was affecting the firm's sense of urgency to digitalize their services.

## 4.2 Mechanisms

The existence of an articulated and well-communicated strategy was present in some of the firms that had been interviewed and several respondents described the unfolding process of their firm's strategy and underscored the efforts being made to use data and digital technologies to drive new initiatives.

*It has been documented. It was communicated a lot before I joined the company in different kinds of meetings and on the intranet - A-2*

*Yes, we have a document describing the strategies. Since there are new technologies and so on, we are working with different initiatives to get proofs of concepts for different applications - D-1*

Some also envisaged an overall strategy that would incorporate their digital strategy into the different aspects of their organization's vision.

*We want one company strategy where digital is part of everything. A very similar type of strategy is sustainability. You know, taking care of their environment. And until now we've had a very good sustainability strategy, but we realized that this document becomes a very isolated document. Instead, we want sustainability to be in the overall strategy of the company everywhere, digital to us is the same. It should be everywhere. - C-1*

However, an antithesis to these findings was that some respondents in other firms stated that they did not have a digital strategy. Moreover, a recurring trope in their responses was the lack of communication in instances where there was a strategy. The knowledge and details of an existing strategy were concentrated to a select few and not the entire organization.

*Maybe we have but to be honest I don't know if we have a strategy for that. That's the honest answer. I think there is the management team in the company, and the digital responsible person in the company, but I can't say that I know what the strategy is. [...] The plan for the digitalization has not been communicated. - E-2*

*I know there have been people that have been appointed to work with the digital transformation strategy and I have been interviewed and so on, but I haven't*

*taken part in the result. So, the short answer, we don't have any digital strategy. - B-1*

In terms of clarity and a vision of where the DT journey is headed, some respondents explained that it is still in the process of being defined. The lack of communication and a clear strategy has also left employees in some of the organizations to define it based on their own understanding, leading to variations in how DT is understood and addressed.

*But I would say the overall digital strategy is not very clear because we have, like I said, these different business segments, and all of them have their own strategy right now- C-1*

*I don't think that it has been articulated. And that's a problem because then a lot of people could make up their own minds about what that means to them. - C- 2*

The necessity for agility and enhanced collaboration was not lost on the respondents when asked their opinions on how organizational structure impacted DT. Most respondents mentioned that they were already working in cross-functional teams which consisted of people from different business areas in the organization.

*We try to work a lot cross-functionally both locally and on top level. If you look at development, we have meetings from all functions to see what different developments are going on, and often these developing projects include several units and functions. When we start the project, it often touches more than one function, so we have to work together- E-2*

These teams were usually dispersed throughout the country and communicated in agile ways through digital meetings. This way of working was seen as essential to improve outputs and strengths related to DT. Some of the organizations are trying to foster the climate for a more connected organization by having meetings with departments from different parts of the organization to be abreast with the ongoing projects and digital developments.

*...we had a couple of people that were working with digitalization in different parts of the organization, but we saw that you get a better impact instead of having three persons working in separate areas we saw it could be a possibility to bring them together so that we can get a higher output from our efforts in improving our strengths in digitalization. - D-1*

While some firms interviewed are actively working in a collaborative environment, others referenced a lack of this. Due to this, people willing to work with others were often met with some resistance albeit being encouraged. The current organizational structures in some of these firms were described as rigid and pipeline-oriented by respondents and were thus not conducive for cross-collaborative work.

*From the leading[sic] board of directors, they try to encourage cross-functional teams but when you try to do it you meet these walls and people are reluctant to collaborate and work with others. - A-2*

*We don't cross these different business processes very often to learn from each other and develop some things together. […]No, and that is one of the biggest problems we have seen, during this year. It's like we work in different silos and also develop the business in these silos. - A-1*

However, though the reality of the organizational structures was rigid, employees at times tried to work as though they were operating in a flat organization to streamline processes better.

*We want to have a flat organization where we can work together in cross-functional ways. But in reality, we are a pipeline organization - A-2*

The quote above shows a desire by employees in firm A to work more in an agile and collaborative environment but are stifled by the linear structure of their organization. They described the ideal way of working as cross-functional and allowing for agile teamwork, which was something that they did despite the organizational structure not explicitly allowing for it. However, one manager, B-1, expressed that it was hard to network between the many widespread regions that the firm was located in unless you already had established contacts.

To realize the sought-after outcomes of DT, it is common for organizations to explore innovative initiatives. Respondents highlighted the impact that innovation played on their DT journey and the need for them to approach more innovative ventures.

*I think we are on a journey where innovation is driven by the understanding of our market and what problems to solve on that market and we're on a journey to understand that and have that as the driver for our innovation. - E-1*

With experimentation and innovation, respondents from several firms spoke about the current steps being taken in their organizations to further investigate how digital technologies can be used to improve their business areas. From the creation of innovation hubs and departments and researching the advantages of A.I. to collaboration with research institutes and external partners, some respondents showcased their firm's keen interest in innovation. They also stated their openness to try new ideas as well as exploring new ways of thinking.

*We have an innovation group, and their main focus is to take innovation ideas and make them happen. We have started to try new ways of working and have started using the design thinking process to see if we can make things happen faster and make things based on the needs - A-2*

The ability to promote an innovative climate stemmed from the support employees in the various organizations received from top management, as many respondents pointed out.

*I will say that the interest of the transformation is huge from the top management. It's not random that they appointed a CDO. They wanted to focus on digital transformation, digital innovation, and digital things. - B-1*

Although innovation was spoken of in high regard by some respondents, the time taken to implement proposed innovative projects was slow. Respondents highlighted low flexibility and inconspicuous red tape as factors that contributed to the slow innovation processes in their organizations.

*I introduced a tool for mobiles like six years ago. And now, they call it managed five years later and that's maybe not the best way to do it. Maybe we should just say, okay, let's wait for the management to be ready. - B-1*

Additionally, the members who sat on some management boards were not digital natives and were thus mainly interested in implementing projects that were only set to increase their profits. One of the managers stated that if the board were Silicon Valley entrepreneurs, then it would look different, but rather than trying new ways of working, they implement things that are already proven profitable.

*So you could say that maybe with a different leadership, we would have implemented and reorganized for deep learning in our sales organization and a lot of projects that might've taken us longer on the A.I frontier but rather the management wanted us to explore and then look for what was profitable and go for profitable applications.[...]But I think that it's reasonable for a company like ours to carefully tend to our efficiency and profitability and that drives us to be not in the forefront of trying new ways to work but rather to implement things that are proven profitable- E-1*

The juxtaposition of these two themes shows that regardless of the factors that may be obstructing some of the forestry firms in trying new ways of working and exploring unconventional innovative avenues, the desire to be innovative is widespread.

## 4.3 Outcomes

From our findings, the managers interviewed described their firms as being competitive. The data also revealed that DT is one major factor when it comes to affecting the firm's ability to compete. Considering the customer's effect on the forestry business processes, another firm argued for customers being the driver for the firm's urge to compete on the market.

*Yes, definitely we are competitive because our customers, the forest owners, are comparing us with other companies and we need to compete with them. - C-1*

*To be the best company in the forestry industry. - A-2*

DT was described by one manager as contributing to competitive advantage and becoming a valuable player on the market, since the customers, as described in external contextual

conditions, are demanding, and picking forest firms that offer digital services that offer additional values for them as forest owners. For example, this extra value offered can be that the customer can get notifications and updates about their forest's current condition without having to go out in the forest themselves. Apart from staying ahead by offering the best physical forest management services, the managers highlighted the importance that developing digitally has by boosting their business and giving them "a competitive edge". A respondent even described competitiveness when it comes to DT-related activities and projects as a *"hygiene factor."*

Moreover, the effects of DT in other industries as well as the digitalization of our society can lead to changes in roles and required working skills. Although the forestry industry has long had in-house IT departments, the digital transformed landscape in which they operate demands for new roles to emerge, the CDO being one of them. Manager C-R1 mentioned that regardless of where you looked at the company level, be it the guy on the floor or at the finance office, they all need a stronger technical skillset now than they needed 10 years ago. This manager further discussed the changes of roles and how this increases the need for understanding between the roles and thus blurring the lines between IT and other departments.

> *I think this is where the large change comes. It's where the business actually hires technology-skilled people, which, and their first job is not to work with technology. This is when things are starting to really, really develop because now the IT department has a very good counterparty in the business, and they understand each other. If you go back 10 years ago and you had someone from finance and someone from IT and they spoke, they didn't understand each other. Now for every day, this understanding gets stronger, stronger, because finance is an innovation. Everyone understands technology. This is where I think the large change will come from. - C-2.*

The spillovers are pushing the firms to employ workers with competencies that are both tech-savvy and business-focused. There was concern about how they should find the right competence, and how to attract the best talents to the forestry firms, where the securing of the firm's future was stressed. Although there was a lot of pride expressed concerning forestry being an old industry (as seen in the Contextual Conditions), there were also some concerns when it came to image and attracting new talents.

> *I mean, who wants to work at an old company. So that's one reason why we are going on a digital transformation, we want to employ the best and try to get them to our company. - B-1*

DT was also something that a respondent looked upon as a way to secure employee satisfaction. By supporting their employees and enabling them a better work experience by increasing their productivity with the help of digital technology, and in that way release time from repetitive tasks towards focusing on *business development*.

*So those individuals can do something else that could actually develop the business. - C-2.*

Although DT was seen as a way to attract new talent and help employees further develop their knowledge and expertise, respondents revealed that employees in some firms felt the opposite way. Based on the response of a manager from one firm, DT is viewed as a threat by employees. The sense of insecurity that employees feel when it comes to how their jobs and roles would be affected as a result of DT was said to impede the progression of the transformation journey in some firms.

*Most people are afraid of the term digital transformation because they think that it will just erase their jobs. Especially in the forestry industry people are afraid of this digitalization. […] The main barrier is the fear of what will happen with roles - A-2*

The ability to be profitable and improve their firms' overall performance was a recurring theme amongst respondents on why their organizations set out on this DT journey. To create new business models that will help identify new sources of value creation, be based on producing digital solutions, and make better decisions based on data and get the most out of business. Many respondents also highlighted that with DT, they will be able to improve the quality of their operations as well as be more efficient. DT is also seen as an opportunity by many firms to reduce their costs and gain a higher income and become more profitable.

*The second one is that we want to, how would I put it, transfer certain workloads, which we feel are. Very repetitive and quite easy to be frank in nature using automatic processes. So those individuals can do something else that could actually develop the business. […] creating new business models based on digital solutions- C-1*

*I think the biggest part is to lower costs, do things more effectively with fewer employees, every employee can do more, we are also better[sic] to get higher income by following up quality in the work we are doing in a better and faster way by using digital tools. I think from the start that was the biggest part to see how we can reduce the cost by being more effective with digitalization. - E-2*

With the possibility of reaping the benefits associated with DT, many of the forestry firms are striving to put their best foot forward. This shows their determination to utilize digital technologies in the best way possible to improve their performance and organizational setup.

In summary, we present (see Table 3) the identified barriers and drivers under each part of The Multi-dimensional framework by Hanelt et al. (2020).

| **BARRIERS** |
|---|

| CONTEXTUAL CONDITIONS | MECHANISMS | OUTCOMES |
|---|---|---|
| Internal:<br>Organizational identity<br><br>Old legacy systems | Slow innovation process with low risk-taking<br><br>Unclear vision and strategy for DT<br><br>Rigid organizational structures | Changes in roles and required work skills |
| External:<br>Conservative industry<br><br>Customers low digital maturity | | |
| **DRIVERS** | | |
| **CONTEXTUAL CONDITIONS** | **MECHANISMS** | **OUTCOMES** |
| Internal:<br>Positive attitude toward using digital technology | Top management support of working in cross-functional teams<br><br>Increased innovative initiatives | Improved firm performance<br><br>Wanting to attract new talent<br><br>Increased competitiveness |
| External:<br>Customers' demands and expectations | | |

*Table 3: Summary of drivers and barriers to DT, based on the framework by Hanelt et al. (2020).*

# 5. Discussion

The purpose of this study was to investigate digital transformation(DT) in traditional industries. The addressed research question was: *What are the drivers and barriers to digital transformation in traditional industries from a management perspective?* This was done in the context of the Swedish forestry industry. In this section, we will discuss our results together with related research and theoretical frameworks.

## 5.1 Barriers to DT

### 5.1.1 Changes in Roles & New Ways of Working

Research has underlined how DT acts as a driving force in the change of roles and the creation of a digital workforce (Vial, 2019; Wessel et al., 2020). Although some managers expressed willingness to attract new talent, they were hesitant as employees were fearful about the effect DT would have on their roles. This can be due to the lack of a DT strategy and vision to engage employees and provide them with assurance about their roles. Compared to other industries, the forestry firms' roles have changed moderately since the last century, making it an industry with a low level of change and few experiences of radical change processes. With new competencies arising in areas where some forestry employees lack the expertise and knowledge, their fear is heightened from whether their jobs will be obsolete.

Regarding new ways of working, the managers advocated cross-functional ways of working, which correlates with Hanelt et al's. (2020) research on the need for agile and collaborative working structures. However, some described their organizations as pipelined, and according to research, working in silos can be a barrier to DT (Warner & Wäger, 2019). Related to cross-functional ways of working within organizations, Warner and Wäger (2019) stressed the importance of firms' social networks and how they should allow the workforce to participate in ideation of processes and collaborate in virtual teams across the organization. In contrast, the managers found it difficult to describe how they were facilitating a learning environment as manager, B-1 expressed difficulty in networking between regions and firms as a newcomer in the industry without any pre-established contacts.

### 5.1.2 TM Support of Innovation & Lack of DT Strategy

To be able to realize the full potential of digital technologies and place organizations at the pinnacle of their DT journeys, it is argued by research that it is important to have a clear vision for the DT (Hanelt et al., 2020; Vial,2019; Westerman et al.,2014). The vision should serve as the foundation of DT and should engage employees at different levels to make it a reality (Westerman et al., 2014). However, compared to Westerman et al's (2014) research, we identified that some forestry firms were still unclear about their visions and lacked a DT, and in instances where there was a strategy, it had either not been properly communicated to the wider organization or was communicated to a select few. Our findings are also contrary to Hanelt et al's (2020) point on the need for a DT strategy that will integrate and coordinate the implementation of DT in organizations. Furthermore, Westerman et al. (2014) stress the necessity of connecting the organization and encouraging open dialogue to allow for employees to play a role in helping realize the potential of DT. Due to lack of clarity and poor communication, employees in some forestry firms have thus begun to coin their own meanings of DT. This can be a barrier in the transformation journey as DT requires the concentrated effort of the whole organization; leaders must therefore place employees high

on their agenda and try new ways of communicating and collaborating (Westerman et al., 2014. p,132).

The findings showed that innovation cut across many aspects of our results. For some respondents, the importance of experimenting and exploring different innovative initiatives was clear. The managers expressed that innovation was however solely profitability-driven and this stifled their chances of exploring more creative avenues. This aligns with Warner and Wäger's (2019) analysis of incumbent firms which revealed that managers favored ideas with higher gross margins and resisted experiments that posed a threat to the profitability of existing business models (p.330). This tension can be a barrier to DT as innovation plays a key role in unlocking the new pathways to value creation (Vial, 2019; Hanelt et al., 2020).

Moreover, our findings showed that in some firms, innovation was not really a burgeoning concept and was approached more cautiously. This was attributed to the digital maturity of executive board members as a respondent mentioned that things would be different if they had different leadership, and this can ultimately be a barrier for DT. Our findings are substantiated by Warner and Wäger's (2019) research which highlights that senior leadership teams with little digitalization experience in incumbent firms struggle to transform organizations as they are tied to history and habits associated with the firms (El Sawy et al., 2016).

The topic of a slow innovation process was broached by a respondent who spoke about the rigidity of management in implementing some digital initiatives. This can be due to the inconspicuous red tape and rules and norms that make up the existing structure of some traditional firms (Warner & Wäger, 2019). Coupled with established organizational politics and complex legacy systems, some forestry firms are less likely than new firms to adopt new business models and innovative ideas and this can be a major barrier to DT (Weil & Woerner, 2015).

### 5.1.3 Organizational Identity

From our findings, although showing a positive attitude towards digital technology and innovation initiatives, some managers described a culture of "wanting to feel safe"; relating to what Vial (2019) describes as *inertia*, where old habits are considered to be good enough and so deeply rooted that employee become resistant to change. Moreover, the barrier is not the support from the managers in using new digital technology, but rather the organizational culture and their identity. This coincides with what Töytäri, Turunen, Klein, Eloranta, Biehl, Rajala and Hakanen (2017) describe as *institutional barriers*, where the issue lies in the structural components of the organization (both cultural and process-wise) that are so deeply rooted within everyday practices that they hinder the employees' innovative capability of exploring new digital technologies. Research within traditional industries has emphasized that it is crucial for firms to craft a digitally oriented culture and for firms to cultivate a willingness to take risks and to experiment (Fehér & Varga, 2017; Warner & Wäger, 2019). In

contrast, our study's findings showed that managers described a culture of doing things in a safe and "right way" with clear expectations and results before trying new things. Moreover, some respondents expressed a culture of silence, whereby employees find pride in solving problems individually instead of asking for help although they are willing to help if asked by colleagues. This could be a barrier to innovation and consequently affecting the DT process (Vial, 2019). Managers should therefore try to create a culture of learning and encourage employees to share their problems and help each other to nourish innovation and new ways of working (Schuchmann & Seufert, 2015; Hanelt et al., 2020). This cautious disposition and behavior among employees could be an effect of the conservative and slow-paced nature of the forestry industry. This is in line with Warner and Wäger's (2019) findings, where all executives that they interviewed agreed that DT should not replace historic values but rather enhance the roots of corporate culture - similar to the findings of our study where managers did not talk about changing cultural values and identity as a part of DT.

Although the managers expressed a clear digital demand stemming from their customers, they did not talk about how new digital technology could enable *new business value*, outside the traditional offers of a forestry firm, which is seen as one major outcome of DT (Hanelt et al, 2020). Instead, managers talked about digital tools to enhance *existing business processes*, which from the perspective of Wessel et al. (2020) can be seen as an IT-enabled organizational transformation. According to Wessel et al. (2020), DT is when digital technology is being leveraged to *redefine* organizational values and hence changing the identity of the organization at its core (Wessel et al., 2020). Based on how some managers focused on describing ways to enhance existing processes and not enabling new value, it could be a barrier to DT, relating to the notion of institutional barrier raised by Warner & Wäger (2019). One distinctive finding which was contradictory to related research about DT was that the managers did not talk about their customer data, and more so how to utilize it for business purposes by analyzing it and better meet their customers' needs (Günther et al., 2017; as cited in Vial, 2019). Research has expounded that firms' value propositions are very much related to their organization's identity (Teece, 2010; as cited in Wessel et al., 2020). This corresponds well with how the managers talked about the forestry industry and how they differentiated themselves from the digital native firms, which relates to Hanelt et al's. (2020) question about whether industrial-age incumbents become more "Silicon Valley-like" when they build upon digital technology created by tech giants. This might be why the forestry firms have been slow in creating digital services for their customers as seeing themselves as forest firms and not digital firms hinders them from accepting that changes derived from DT affect their way of working and organizational identity. Hence, the forestry firms' rigid organizational identity as traditional and steady might be a barrier to transformation. By working for a more flowing and open environment for change and new beliefs and attitudes, the forestry firms could enable the transformation to be fully embraced without seeing it as something external to their organizational identity.

## 5.2 Drivers of DT

### 5.2.1 “Do or Die” - Increased Competitiveness & Customers' Demand

One manager stated that they could no longer hide behind the notion of belief that their customers did not want digital services, partly pushed by the ongoing pandemic. Overall, the findings showed that the managers had experienced a change in their customers' demand in recent times and they expressed a willingness to create new value for their customers. This relates to Hanelt et al.’s (2020) research where they argue that finding new business values for customers is a spillover outcome, stemming from the increased digital habits of customers (Wessel et al, 2020). The increased customers demand in remote digital services has led to increased competitiveness and our findings show that DT was seen as a driver for gaining the additional lead, which aligns with what Warner and Wäger (2019) highlight as disruptive competition stemming from DT. The managers expressed that they saw DT as a way to stay ahead of their competition and felt the urge to try new things. As one manager phrased DT as a question of “Do or Die”, which according to Hanelt et al. (2020) is a spillover from increased speed in the development of digital tools, meeting the demand of customers’ digital habits can be a driver to DT.

### 5.2.2 Improved Firm Performance

The potential for DT to positively impact organizations was highlighted by respondents as a key driving force (Vial, 2019; Hanelt et al., 2020). The findings revealed that DT was seen as a means to gain financially and reduce costs. This corroborates previous research which has investigated the impact DT has at an organizational level and has shown that organizations see the main benefits of DT as improving operational efficiency and organizational performance (Hanelt et al., 2020; Vial, 2019). Additionally, the forestry companies talked a lot about the importance of DT in increasing efficiency and improving their operations. According to Wessel et al. (2020), the agenda of companies to make work more efficient and effective while still reinforcing their existing value propositions is however more closely related to IT-enabled organizational transformation (ITOT). More emphasis was placed by respondents on the use of digital technologies to become more efficient or to improve existing processes rather than creating new business models and redefining value propositions. This begs the question of whether the forestry firms are undergoing DT or ITOT.

### 5.2.3 Alignment Between Roles & Attracting New Talent

The changes in new required work skills brought by DT were identified as a driver of developing understanding between roles and units. For example, some managers expressed that regardless of which level in the firm they are working at, the employees need a stronger

technical skillset now than they needed 10 years ago. This has further led to that technical required knowledge is no longer only centered around the IT department, and thus the convergence of technical skills across roles has led to increased understanding between the roles. This aligns with Vial's (2019) notion on how even the non-technical roles can drive DT forward, similar to what many managers described as happening in their firms. Furthermore, research has shown that a major effect of DT is the possibility to attract a new generation of workers and establish a digital mindset (Hanelt et al., 2020). This directly relates to the willingness expressed by managers to attract new talent for driving digital projects. This can be viewed as a factor that could drive the firm's DT.

## 5.3 Implications for Practice

This section will discuss potential implications arising from this study which may be valuable to key stakeholders in the forestry industry and other traditional industries.

Through identifying the driver and barriers, our study assists managers in anticipating what challenges may arise during their attempts to transform organizations. As managers strive to transform their organizations, whether from leveraging new digital services or meeting the changes brought by DT with the increased demand for new competencies and roles, they will likely face barriers that are firmly rooted in work practices and culture. Despite managers having positive attitudes towards DT and new digital technology, the forestry industry's traditional culture and identity are ultimately preventing them from transforming. Our findings suggest the need for managers to communicate a clearer vision and strategy for their DT, foster activities for organizational learning, and the development of competencies of the existing workforce (Vial, 2019) to allay the fears of employees. Managers could further ensure stability by encouraging knowledge sharing and cross-functional collaboration so that DT becomes a natural part of the whole organization and not only a question of higher conceptual strategy concentrated to the top management (TM) level of the firms. Our study findings also indicate that managers should critically assess what DT means to their firms, and how they could create new business models with outcomes that result beyond the increased efficiency of existing processes; they could create new value with digital services by utilizing the data from both the forest and their customers. Furthermore, we suggest that managers should put more effort into change management and transformational leadership, where change is communicated and where leaders engage employees on all levels to contribute with ideas. In relation, one of the respondents pointed to the fact that technological skills are now needed at all levels of the firm, from the employees on the floor in the mills to the board. Hence, we suggest that the forestry firms could benefit by having not only TM supporting DT or CDOs (that often is placed at the executive level) but to have middle managers at every region (preferably included in a cross-functional team together with the CDO) to implement actions and encourage transformation to occur. Consequently,

DT will merge into the everyday habits and attitudes, and beliefs about their organizational identity will give more space for transformation to occur.

## 5. 4 Theoretical contributions

This study contributes to research in digital transformation in several ways. In this thesis, we have applied Hanelt et al's (2020) Multi-dimensional Framework of digital transformation in an empirical study thus adding to the growing research on the aforementioned complex phenomenon. The framework also provided the necessary building blocks to investigate and identify insights into the drivers and barriers to DT in traditional industries; accordingly adding to the limited research done in the context of the Swedish forestry industry, specifically on an industry level.

## 5. 5 Limitations and Future Research

The study has limitations that are worth mentioning. This study was not longitudinal and data collection was not extensive due to the limited time frame, thus the study would have benefited from conducting more interviews with top managers. Additionally, with another round of interviews, we could have investigated further into the cultural aspects of DT, as our findings showed that when applied in the framework by Hanelt et al. (2020), a majority of barriers belonged to the forestry's contextual conditions, particularly culturally related. Hanelt et al's. (2020) framework was created as a result of the synthesis of secondary data and analyses and Thorne (1998) highlights the potential of researchers' biases to be influenced in either a positive or negative direction. This viewpoint is validated as the multi-dimensional framework by Hanelt et al. (2020) fails to include the organizational consequences and effects of digital technologies on structural forms (Robey, 1996), thus perpetuating an optimistic notion of the whole DT process. Hence, we propose that future scholars should devote their research to investigate how managers best cultivate an organizational culture that supports transformation and how organizational identity affects transformation efforts.

It would be further interesting to understand the process of DT to get insights through the perspective of employees from different levels at the firms, representing a broader view of DT within the firms and thus representing the industry more holistically. The generalization of these results might be questioned, however, the discussion provided similarities with previous studies within traditional industries. The similarities show measures of generalization, why these results can be of interest in the discourse of DT, especially in the context of managing DT.

Furthermore, although the managers expressed high support of new digital tools, they were mainly describing the motivators to this as increased efficiency, saving, or making more money, thus not mentioning creating new value or services. From Wessel et al's. (2020)

perspective it could be argued that many of the aspects brought up by managers in this study are related to IT rather than digital technology (defined in the related research as “SMACIT technology”). One can question if a radical change such as transforming values must be considered before going through with DT, as the perspectives of Wessel et al. (2020) suggest, especially within a traditional industry with a long history. Also, is there a need for dividing IT-enabled transformation and digital transformation? Or is IT-enabled transformation just a part of DT? If this distinction is not made by practitioners (as our findings indicate), is there a need for researchers to?

On the differences in how DT is defined by researchers and practitioners, we find it essential to conduct research and implement theories in empirical settings, so that research on DT is not isolated from practice.

# 6. Concluding remarks

This study aimed to investigate the factors responsible for driving and hindering DT within traditional industries, as that area of DT had not been extensively explored in previous research. This resulted in the formulation of the research question: What are the drivers and barriers to DT in traditional industries from a management perspective? The study was investigated from the context of the Swedish forestry industry. To address this, we conducted a qualitative case study and our data collection consisted of nine semi-structured interviews with top-level managers from five of the biggest forestry firms in Sweden. This study relied on the multi-dimensional framework on DT by Hanelt et al. (2020) to study and analyze the data collected. Our findings (see Table 3) showed that the main barriers were due to the conservative industry and perceived low digital maturity among customers. Also, owing to the unclear DT strategy and vision, and the fear of changes in roles and new required competencies the process of DT was evolving at a slow pace. We also discovered that old legacy systems and the pipelined organizational structures stifled the DT journey in forestry firms. As the forestry industry can be classified as a traditional industry, the barriers that were identified were mostly found within the context of organizational life, related to cultural and identity factors as some employees clung to their organizational identity. Furthermore, we identified that positive attitudes towards technology-enabled transformation and the increased urge of competitiveness and customers' digital demand were seen as drivers to DT. The support from TM to work in cross-functional teams and increased initiatives of external collaboration for innovation were seen as important drivers of DT. Additionally, the possibility for improved firm efficiency and financial outcomes, as well as attracting new talents with digital competencies were also seen as reasons for the forestry firms to embark on the DT journey.

Although by no means exhaustive, we believe that the findings of this study will be helpful for managers in traditional industries when leading their organizations further on the DT journey and how DT can contribute to sustainable industries in the future.

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# Appendix 1

## Student Contribution

For this thesis we have both worked collaboratively on all parts of the report. We discussed and researched our areas of interest and jointly decided on the research aim and question. For our related research section, we wrote the sections together and cross-checked the sections individually to identify errors. In our methodology section, we reached out to our respondents and conducted the interviews together in case one of us forgot to mention anything or had a follow-up question, all of which were conducted virtually. To work faster, we split up the transcription of interviews in half and then cross-checked each other's transcripts to ensure accuracy. In our data analysis, to work collaboratively and quickly we used a software called Dedoose. For our findings and discussion, we continuously discussed how to cluster and categorise our results and worked jointly to ensure we both agreed on the final outcome. Overall, this thesis was done through the joint efforts of both authors.