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Changing Patterns in the Process of Digital Transformation Initiative in Established Firms: The Case of an Energy Sector Company

Completed Research Paper

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Abstract

Rapid digitalization and technological change are disrupting traditionally successful business models. This motivates firms to adopt new strategies based on digital technologies; such new strategies are often referred to as digital transformation strategies (DTSs). Unlike with firms that were founded with a basis in digital, the implementation of a DTS at a traditional company can lead to entire changes in organizational structure, culture, and processes; how such changes happen remains an open question. As a result, this study examines how such changes were made during the process of implementing a DTS at a global Finland-based energy company. An interpretive case study employing different data sources is used. We contribute to the research by identifying changing patterns and key features in three phases of the process of implementing a DTS. In particular, the general pattern of this process is continuous incremental change; however, each phase of the process has different features, models and directions.

Keywords: interpretive case study, digital strategy, digital transformation, organizational change, digital transformation strategy

Introduction

Rapid digitalization and technological change have been disrupting traditionally successful business models in recent years (Nanterme 2016; Vayghan 2018; Vial 2019). This motivates firms to adopt and implement new strategies based on digital technologies. By doing so, firms can transform their business model, including services, operations, and products (Berente and Yoo 2012; Bharadwaj et al. 2013; Chanas et al. 2018; Ross et al. 2016). Such new strategies are often referred to as digital transformation strategies (DTSs); digital technologies refer to technologies related to cloud computing (Du et al. 2016), mobile devices (Pousttchi et al. 2015), social media (Oestreicher-Singer and Zalmanson 2013), analytics (Günther et al. 2017), the Internet (Ross et al. 2016), the Internet of things (IoT) (Petrikina et al. 2017), platforms (Tan et al. 2015), software (Setia et al. 2013) and blockchain (Glaser 2017). However, it is argued that established companies (e.g., Volvo, ABB and Phillips) may require different DTSs compared with companies rooted in digital technology (e.g., Google, Facebook and

Instagram) (Bharadwaj et al. 2013; Ross et al. 2017). This is because established companies often face difficult challenges when they transform from their existing state to their target state of business models, processes, and structures (Bharadwaj et al. 2013; Nambisan et al. 2017; Sebastian et al. 2018; Singh and Hess 2017).

Recent research has studied changes to firms when they implement a DTS, such as organizational structure (Selander and Jarvenpaa 2016), culture (Karimi and Walter 2015) and processes (Carlo et al. 2012). Despite these studies, there is a lack of a comprehensive understanding of changing patterns when a firm implements a DTS and how the change(s) unfolds over the years. In particular, little research has examined the situation of established firms at which digital transformation is a holistic form of business transformation, including economic to technological changes at multiple levels (Besson and Rowe 2012; Chantias et al. 2018; Crowston and Myers 2004). As a result, there is a need for a study of this issue (Vial 2019), especially one that focuses on the “process” of implementing a DTS (Chantias et al. 2018). Thus, the purpose of this paper is to identify patterns of changes and their features when a company develops a DTS. The research question of this study is: What are the patterns of changes and their features during the process of developing DTSs in established firms?

To answer this research question, we adopted an interpretive case study approach (Myers and Klein 2011; Walsham 2006) for examining a large energy company, EneCo (a pseudonym for an actual company). The time frame of this study is from when EneCo was beginning to establish their DTS, enabling us to identify phenomena and patterns that emerged during the company’s implementation of their DTS. We examined the phenomena by iterating between organizational change literature and empirical data. We found that the three phases of digital transformation (e.g., bootstrapping, acceleration, and sustain phases) have different features and characteristics, but that the general pattern of the process is continuous incremental change. We believe that our findings may be valuable for established firms that are considering adopting a DTS for their organizations.

The paper is organized as follows. We describe its background and theoretical foundation in Section 2, while research methods and findings are presented in Sections 3 and 4, respectively. Section 5 contains a discussion of the findings, and our conclusions are presented in Section 6.

Background and Theoretical Foundation

Digital Strategy in General and in Established Companies

There are several concepts of digital strategy (Dang and Vartiainen 2019; Vial 2019). In this study, we view digital strategy as “concerned with the changes digital technologies can bring about in a company’s business model, which result in changed products or organizational structures or in the automation of processes. These changes can be observed in the rising demand for Internet-based media, which has led to changes of entire business models” (Hess et al. 2016, p.124). The terms digital transformation strategy, digital strategy and digital business strategy are often used interchangeably in the literature (Bharadwaj et al. 2013; Chantias et al. 2018; Hess et al. 2016; Ross et al. 2016). There is no clear distinction between business strategy and information systems (IS) strategy because a DTS covers a “fusion” view of both the IS and the business strategy in an organization (Bharadwaj et al. 2013; Chantias et al. 2018).

A DTS for established companies may differ from those of companies founded upon digital technology. This is because established companies, having different value propositions in comparison to strictly digital firms, will often change entirely in organizational structure, culture, and processes when they implement digital technologies (Bharadwaj et al. 2013; Chantias et al. 2018; Ross et al. 2016; Sebastian et al. 2018). However, the majority of studies on DTS focus on strictly digital companies. For example,

several studies have been conducted on IT platforms (Markus and Loebbecke 2013; Schreieck et al. 2017), the social network (Bogusz and Morisse 2018; Du et al. 2018; Whelan et al. 2013) and relevant issues (e.g., business models, value capture and value creation) (Baird and Raghu 2015; Briel et al. 2018; Iivari et al. 2018).

Few studies focus on established companies in different industrial sectors, such as the mining, automobile and energy sectors (Jonsson et al. 2018; Svahn et al. 2017). Firms in such industrial sectors have certain similar characteristics. For example, they create, operate and maintain extremely expensive machines or systems. Furthermore, machines in those industries require the involvement of several stakeholders, such as managers and technicians. For mining, machinery can be distributed underground, making accessibility time consuming (Jonsson et al. 2018). As a result, if something unplanned happens, the consequences can be unpredictable and costly. This leads to firms investing in technologies to monitor their machines.

Even though digital technologies have been used in those industries for decades (Tsang 2002; Yam et al. 2001), studies on how implementing a DTS can lead to changes in organizations or how firms take advantage of their existing strengths as well as digital technologies' capabilities are lacking (c.f., Chantias et al. 2018; Vial 2019). As a result, there have been calls for more in-depth understanding of how such change unfolds over the years at multiple levels of organizations (Besson and Rowe 2012; Chantias et al. 2018; Jonsson et al. 2018; Svahn et al. 2017; Vial 2019). This study thus responds to this call.

Organizational Change

We use organizational change as the theoretical foundation of this study. Change is a varying concept (Besson and Rowe 2012; Higgs and Rowland 2005; Ven and Poole 1995). Two main paradigms are employed for conceptualizing change in the IS literature, namely continuous incremental change and revolutionary episodic punctuations (Gersick 1991; Tushman and Romanelli 1985). Punctuated equilibrium emphasizes changes with episodic upheaval (Besson and Rowe 2012; Lyytinen and Newman 2008). Evolutionism rejects this and views change as gradual, without interruptions (Besson and Rowe 2012; Ciborra 1996). In addition, Besson and Rowe (2012) add a third paradigm, institutionalism, which often views change as a process (Besson and Rowe 2012) and organizational transformation as "imported from the outside" (p.104). These outside factors can influence the change adoption intention in organizations (Chatterjee et al. 2002; Dang and Pekkola 2017, 2019).

There are several factors to be considered when examining change (Forman et al. 2014; Orlikowski and Yates 2006; Volkoff et al. 2007). For example, Kuipers et al. (2014) identified the factors of change, including the process, content, leadership, context and outcomes of change. The process of change indicates the interventions and processes that are involved in the change implementation. The content refers to what the change is about, such as the organization's strategies, structures and systems, while the leadership of change explains the leaders' influence on the change. The change context and outcomes describe the settings and results of change. These factors are used in our analysis in relation to different levels of change.

Three levels or "orders" of change have been identified. These are subsystem, organization and sector change (Bartunek and Moch 1987; Lyytinen and Newman 2008). Subsystem change (first-order change) occurs in a part of an organization (Carnall 2007; Kuipers et al. 2014); organization change (second-order change) is an organization-wide change (Fox-Wolfgramm et al. 1998; Lyytinen and Newman 2008); and sector change (third-order change) indicates that the change spans beyond organizational boundaries and affects other organizations (Gratton 2005; Kuipers et al. 2014).

When a firm implements a DTS, changes happen. They include, for example, organizational structure (Selander and Jarvenpaa 2016), culture (Karimi and Walter 2015), and processes (Carlo et al. 2012). However, the literature has overlooked seeking an understanding of change patterns when a firm implements a DTS over several or many years. Hence, this study examines this issue.

Research Methods

This study uses an interpretive approach (Walsham 2006). We chose to conduct a case study on an energy company which has implemented a DTS. A case study was chosen because it is considered an appropriate approach for studying a complex phenomenon, one embedded in context settings that are difficult to study outside the context's environment. Moreover, this approach is chosen because it helps in understanding the phenomenon from multiple data sources and over a long period of time (Myers and Klein 2011; Walsham 2006).

Case and its Context

EneCo is a global Finland-based energy company founded in the 1800s. In 2019, EneCo's net sales totaled more than EUR 5.3 billion, and the company employed approximately 19,000 employees. The company has operations in more than 80 countries in over 200 locations around the world.

Since its inception, EneCo has been constantly seeking new directions for its business in response to changing circumstances. EneCo originated as an operator of sawmills and ironworks; by the mid-20th century it had switched to making diesel engine and shipyard before it extended its reach into the marine and energy sectors in the 1990s.

In 2016, EneCo sensed that its business needed to transform from being an engine maker to becoming a smart technology company in the marine and energy industries and launched EneCo's Smart Marine and Smart Energy visions. In particular, its marine business mission was to create an intelligent shipping ecosystem, while its energy business is leading the way towards a future with 100% renewable electricity. To achieve its visions, the company started adopting and implementing a DTS.

Data Collection and Data Analysis

We used secondary data, including interviews, press releases, official discussions and events from EneCo and its partners during the process of implementing their digital DTS. Interviewees included the president and CEO, managing director, CIO, R&D director, testing and validation director, delivery center director, technology and product management director, project management director, director general at the Ministry of Economic Affairs and Employment, the mayor of the city the company is based in and the company's partners. The authors' institution was selected as one of the company's partners in implementing its DTS, and the first author has participated in several events that discussed issues related to the transformation strategy and its process. Those issues were, for example, developing ideas and establishing strategies, business models, and co-creation and cooperation models. In addition to that, we collected hundreds of thousands of documents from the company's official social media (e.g., YouTube and Facebook) and their websites, as well as presentations by the company's key personnel at official events, forums and conferences.

Data analysis was begun by coding the data using open coding technique. The findings were then discussed among the authors to uncover insights and evolve interpretations. The coding activities were refined when we decided to focus on the change through implementation digital strategy. We followed

the interpretive research approach (Walsham 2006), guided by the seven principles for interpretive field research (Myers and Klein 2011).

Findings

In this section, we present the three phases of the company's process of implementing a DTS.

Bootstrapping Phase (2016-November 2017)

The first phase of reinvention is bootstrapping. EneCo borrowed the bootstrapping term from the start-up world, where it is defined as setting up the business conditions for change and demonstrating why transformation is essential.

The bootstrapping was begun in 2016. Activities in this phase included setting up business conditions, testing ideas, making a few mistakes, refining ideas, putting together the right teams, and processing and planning the DTS implementation. The outcome of those activities was identifying products that would shape the companies' futures. This phase happened at the senior management level. The company identified its visions as "Smart Marine and Smart Energy." The company leaders sensed that they had to change to achieve these visions. The chief information officer (CIO) stated:

We need to be able to move the company into new areas. So a major transformation is needed.

Three main sources drove their changes towards these visions. First, the company faced pressures from fast-changing global markets as new competitors emerged around the world. This led to leaders feeling the need to disrupt its existing business model before it was itself disrupted. As the company's strategy stated:

The maritime industry faces the challenge of realizing decarbonization by the end of the century. In order to do so, the industry will have to collaborate to introduce new technologies, legislations, and fuels [...]. Industry players are faced with major sources of inefficiency that impose a significantly negative impact on business operations, environmental performance, and profitability [...]. Eliminating these inefficiencies forms the basis of EneCo's marine strategy towards decarbonization and ecosystem thinking.

Second, to achieve the company's visions, EneCo leaders sensed they would have to change from a traditional industrial engineering firm to a data-driven technologies company. The company thought this would help them to better manage and enhance the performance and efficiency of marine and energy hardware. In particular, the company decided to transform into a customer-centric, data-driven, collaborative and innovative company by using smart technology. The company's strategy on digital transformation and the director of Project Management of Marine Solutions stated:

EneCo is transforming into a smart technology company [...]. We are exploring new digital business models and innovations together with our partners. We develop new services, solutions and products through a digital first, insights-led mindset that is all about open innovation and ensuring that everything begins with understanding the customer needs.

Co-creation and partnership will enable us to be much faster, to be much more precise to what we develop to really meet customer needs, and also to enhance our cooperation with key suppliers.

Third, seeking sustainability was also to play a big part when the company decided to implement their DTS. EneCo aimed at efficient, profitable, and competitive operations with environmental and social responsibility.

In the bootstrapping phase, the leaders also identified key technologies, competencies and approaches for implementing DTS. In particular, the company focused on its people and creating an empowered and collaborative culture. The company identified that technologies were important, but viewed them as a means to an end, not an end in itself. EneCo's director of R&D Engineering, Marine Solutions indicated:

Digital Transformation is not about adopting technology just for its own sake - it is about driving business value to customers at pace. We have [...] focused on our people [...] we accelerate their personal transformation. It is the people that drive the change. Big data and general digitalization has absolutely a key role [...].

Acceleration Phase (November 2017- September 2019)

An acceleration phase is when a company focuses on executing its DTS. In particular, EneCo aimed at delivering tangible outcomes to enable, support and speed up its drive for change. The company executed and implemented several tools and projects to materialize its DTS.

First, they implemented an innovation platform, here called KR (a pseudocode). This platform helped the company collect ideas in a transparent and efficient way. People could vote and comment on ideas; the company expected that all employees would have the opportunity to be a part of a transparent ideation process. Moreover, the EneCo Venturing Model was launched in November 2017. This model offered the company interactions with start-ups and helped it commercialize their ideas at a rapid pace. There were five steps from idea to product: accelerator, cooperation, partnering, production and acquisition. If the company spotted startups that they thought were in line with its strategy, those startups would join one of the company's Digital Acceleration Centers around the world. For example, a project named Guti (a pseudonym) was developed with an acceleration center in October 2018. This project collaborated in the areas of intelligent vessels, connected smart port operations and cyber-physical security.

Second, EneCo established its Smart Hub in August 2018. EneCo invested EUR 83 million, and total investment in the Hub will be about EUR 200 million. At the Hub, EneCo can research, develop and produce products that meet the company's vision of smart shipping and smart energy. In addition, the company will invite other operators and researchers there to collaborate in product development. The president and CIO said:

[...] we invite partners from the industry and the academia to participate in the process of product development, research and manufacturing together with EneCo.

The Hub also provides access to customers, suppliers and start-ups for ambitious cooperation with EneCo to enhance innovation and discovery.

Sustain Phase (September 2019-)

A sustain phase is when a company realizes what its visions are and acts on those visions.

In the sustain phase of transformation, EneCo moved toward realizing its vision as a smart technology company. While the first two phases aimed at changing mindsets and preparing EneCo's employees, the third phase was a full scale transformation that became the company's culture. As the CIO stated:

The mindset has changed, even four years or five years ago, I would have never imagined that these kinds of technology discussions would be happening in the traditional engine company that we used to be. Many different people from different parts of the organization are focusing on trying to use and create technological solutions.

EneCo was achieving its aims of become a cutting edge technology company whose operations were based on digitally-enabled and data-driven services. The company was building a smart technology culture that combined five main concepts: people first, customer centricity, togetherness, smart technology mindset, and open innovation. To build this culture, the company launched an internal WL (a pseudocode) transformation app, which helps employees learn and keep up-to-date with digital development. The company also identified its core competencies; cooperation, cybersecurity and people were its main assets. The managing director said:

Great ideas seldom happen in a vacuum, possibility of bringing together people from companies, universities and expertise from different [...] suppliers, we hope to create an environment which is inspiring and will bring us forward with this development.

Discussions

Changing Patterns in Digital Transformation in Established Firms

There are two kinds of change patterns when organizations implement a DTS. First, a general pattern of the process is continuous incremental change. For example, EneCo identified that it would implement its DTS by continuously changing their organization’s visions, strategies and structures. This, however, is in contrast with the punctuated equilibrium model of change (Besson and Rowe 2012; Lyytinen and Newman 2008), as the change phenomenon here was not interrupted by brief periods of discontinuous, radical change. In fact, EneCo was constantly reinventing itself. The company’s president and CEO said: “Constant renewal is in EneCo's DNA.” The literature also indicates that there are significant changes when organizations implement DTS (c.f., Vial 2019).

Table 1. Change phases and their features in DTS implementation

Phase \ Feature	Bootstrapping	Acceleration	Sustain
Definition	Setting up the business conditions for change and demonstrating why transformation is essential.	Executing a digital strategy and delivering tangible outcomes, as well as enabling and supporting the company’s business and continuing to drive value at pace.	Realizing what its visions are, and actions toward its visions.
Direction of change	Top-down	Top-down	Top-down Bottom-up
Scope of change	Organizational level	Slowly expand to the individual level	Fully cover both organizational and individual levels and becoming a culture
Examples of the case’s activities	EneCo’s visions EneCo’s business models	EneCo’s venturing model EneCo’s Digital Acceleration Centers EneCo’s Smart Hub	EneCo’s transformation app

Second, there are different change patterns in each phase. Those patterns are illustrated in Table 1. In each phase, we summarize the definition, the direction of change, the scope of change and the case’s

example of activities. In particular, during the bootstrapping phase, the company was looking for shifting market opportunities in the energy and marine sectors. As a result, the leaders sought product innovations, and the company was being changed and transformed through altering their products based on digital technologies. In that sense, the change was evolutionism, gradual, without interruptions (Besson and Rowe 2012; Ciborra 1996), the change direction was top-down and the majority of activities happened at the organizational level (Fig. 1).

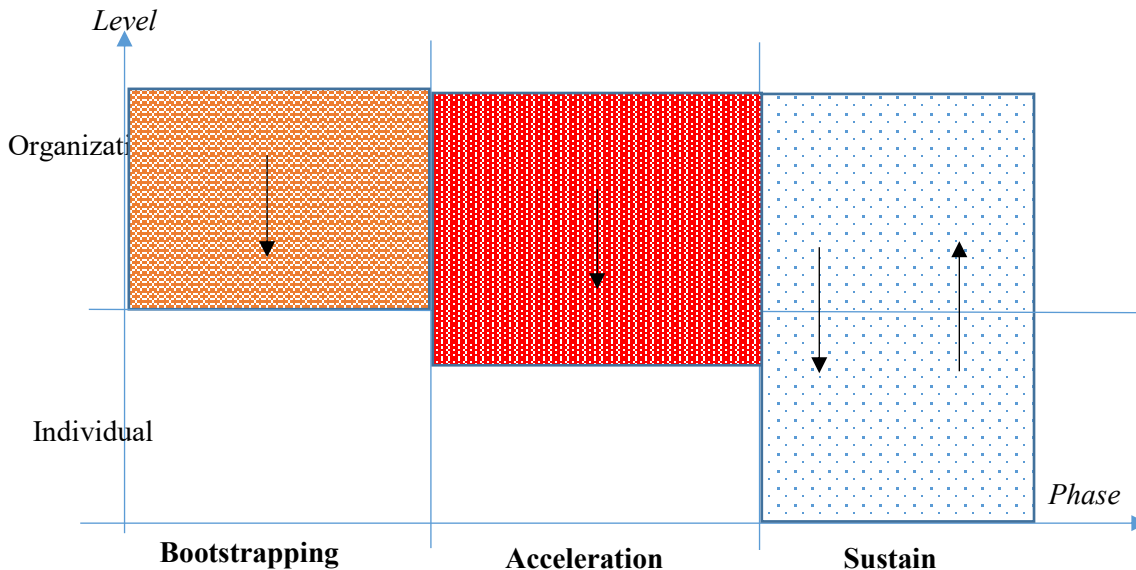


Fig. 1 Direction and level of change during the process of DTS implementation

In the acceleration phase, the company executed their digital strategy, delivering tangible outcomes. For example, the company established the Venturing Model to offer new ideas and transform those ideas into products from start-ups. They also launched Digital Acceleration Centers and the Smart Hub as frameworks for developing and co-creating products based on smart technologies. The company believed these actions would help bring it one step further toward its visions. This indicates that the change was punctuated equilibrium in some parts of the organization, but not entirely, as the change phenomenon applied to their business models was interrupted by brief periods of discontinuous, radical change (Besson and Rowe 2012; Lyytinen and Newman 2008). Moreover, the change direction was top-down and expanded from the organizational to the individual level (Fig. 1). In the sustain phase, some parts of the organization fit the punctuated equilibrium change model, but the trend was evolutionism, since the process was a gradual one without interruptions (Besson and Rowe 2012; Ciborra 1996). The change direction was both top-down and bottom-up and shaped a new culture at the company (Fig. 1).

Features in Implementing DTS

This study shows that established firms must consider several features when they implement a DTS. First, it is surprising that cybersecurity was one of the core competencies chosen when the company implemented its DTS. For example, cybersecurity appeared in all levels of the company, from its operations to its leadership's thinking to its strategy. This is because, for EneCo, DTS meant that it would integrate all company aspects into a united and streamlined process, from solutions, robotics and smart manufacturing to its supply chain. While the current literature on digital transformation acknowledges the importance of security and privacy to society, organizations and individuals (c.f.,

Newell and Marabelli 2015; Piccinini et al. 2015), it does not yet address how security and privacy are viewed as sources of positive impacts to an organization (Vial 2019). This study thus provides a view of this issue.

Second, technologies play important roles in digital transformation, especially in companies based in technologies (c.f., Hess et al. 2016; Vial 2019, Nwankpa and Roumani 2016; Singh and Hess 2017). This study indicates that while digital technologies have their roles, the heart of implementing a DTS is people, who are the engine of a company's transformation. For example, EneCo built a smart technology culture across its entire organization, and the company even launched an app so that every employee could take part in the process of innovation. As a result, they were strongly motivated to turn EneCo's visions into tangible results.

Third, seeking strategic alliances and cooperation was one of the company's major tasks during its implementation of its DTS, and these were achieved with people from companies, universities and suppliers. Furthermore, while profits are important in every company, EneCo was ready to take risks during the DTS implementation process. For example, the company made large investments in new ideas and new ways of developing their products, such as organizing challenge contests, establishing a venturing model and establishing a new technology hub. Cooperation and collaboration are also discussed in the literature concerning organizations implementing a digital strategy (Helfat and Raubitschek 2018; Li et al. 2017). However, it is not clear how different stakeholders and participants will bring benefits to customers given the nature of the complex relationships among multiple stakeholders with potentially competing interests (Tan et al. 2015). We provide some insights into this issue.

Finally, this study adds a complement to the change process in other domains. For example, in the public sector, the change process is usually done in a top-down manner, and technology is not always an important factor when organizations implement enterprise architecture (Dang et al. 2019; Dang and Pekkola 2017). This, however, is not the case in this study. Moreover, the digital transformation process in the financial sector is top-down for digitalizing existing products and services, while the trend is bottom-up for new digital products and services (Chanias et al. 2018). This study illustrates when those trends take place.

Conclusions

Unlike strictly digital companies, established companies undergoing digital transformation often entirely change their business models, processes and structures (Bharadwaj et al. 2013; Nambisan et al. 2017; Sebastian et al. 2018; Singh and Hess 2017). However, evidence of how a company changes during the process of implementing a DTS remains scarce. In this study, we provide an answer by illustrating three phases of digital transformation process and their features at a large energy firm.

First, we contribute to the literature by describing change patterns during the process of implementing a DTS (Table 1). A general pattern is continuous incremental change. The firm competes by changing continuously at a rapid pace, i.e., EneCo is constantly reinventing itself. In other words, the change phenomenon here is not interrupted by brief periods of discontinuous, radical change (Besson and Rowe 2012; Lyytinen and Newman 2008).

Second, we describe the change phases (Fig.1) in the process of implementing a DTS for established firms. Those phases are bootstrapping, acceleration and sustain. We also show features of each phase (Table 1). This extends our understanding of organizational change in the context of digital transformation, which is a significant change when organizations implement digital strategies (Vial 2019). This demonstrates that changes take place not only in society and industries through the use of

digital technologies (Agarwal et al. 2010; Majchrzak et al. 2016), but also in organizations and individuals.

Third, we also identify the core competencies of an organization during the process of DTS implementation. While technologies are foundations for digital transformation (Nwankpa and Roumani 2016; Singh and Hess 2017), the other important core competencies are cybersecurity and people, who are the engine of a company's transformation.

This study has several practical implications. First, the study shows that a DTS needs to involve all levels of an organizations and that managers need to be willing to take risks. Managers at established companies thus should take into consideration this issue when they apply a DTS. For example, EneCo used trial-and-error approaches when establishing its Venturing Model, gathering ideas from outside companies, especially from start-ups, and from contests to speed up the process of developing ideas and products. Second, the development of a DTS requires two approaches, top-down in the first two phases and both top-down and bottom-up during the third phase, when an organization's culture is transformed. Third, managers should take into consideration changing the mindsets of their staffs long before implementing their digital strategy. This will help a company better achieve its visions while getting everyone involved in the process of implementing its strategy. Finally, management teams should focus on having prepared their core competencies when implementing their strategies, such as employees, cybersecurity and culture.

Limitation and Future Research

This study has its limitations. First, the study used only one case study of an established firm. As a result, the findings of this study may not be generalizable to other firms. However, we believe that our findings might be useful for established firms that intend to implement a DTS. Second, it has been discussed in the literature that organizations need to appoint chief digital officers or similar positions to help them achieve organizational transformation (Sia et al. 2016; Weill and Woerner 2018). Those roles and their relation to other roles (e.g., CIO, CEO, and R&D) are not clear regarding decision-making during the process of implementing a DTS. Further study is thus needed. Third, future study should focus on how outside factors influence changes in organizations or in adopting a new approach or technology. This can be done by using, for example, institutional theory as a lens to study digital transformation phenomena (Dang 2019; Devereaux Jennings et al. 2003; Mignerat and Rivard 2009). Fourth, future research should also focus on problems in each phase and their impact on the process of implementing a DTS; this can make a great contribution to the management of digital strategy transformation. Finally, we acknowledge that this is only the first phase of our ongoing research and that the details and interviews regarding each phase and its features have not been presented in the study.

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