

# Management of Digital Transformation: A Literature Review of Dynamic and Operational Capabilities

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## Abstract

*Within the last years, many digital-born companies entered and outperformed their market. In literature, this phenomenon is often discussed under the term of digital transformation and digitalization. Researchers agree that capabilities play a decisive role in this context. Nevertheless, most literature focus on a specific field of corporate capabilities. Our literature review aims to systematize the current state of knowledge and identify fruitful avenues for future research on dynamic and operational capabilities for successful digital transformation in an enterprise environment. As a result, a model of their interplay is presented, discussing the most relevant capabilities and illustrating them with examples from the literature.*

**Keywords:** Digital Transformation, Capabilities, IS Value, Literature Review

## 1. Introduction

Digital technologies have transformed entire industry sectors and put several traditional business models under pressure (Iansiti and Lakhani, 2014). Inspired and driven by digital-born companies, many long-established firms must find a way to leverage their strength to capitalize on new ways of doing business. Dynamic and operational capabilities play a central role in this process and among other capabilities ensure the success of traditional businesses undergoing transformation (Helfat and Raubitschek, 2018; Konopik et al., 2022; Svahn et al., 2017). The different maturity and approach can be seen, for instance, in the structure of digitization units in traditional companies, like the manufacturing industry (Hirvonen and Majuri, 2020). As of now, there is still a lot of confusion about the

range of capabilities that are important for digital transformation (Vial, 2019; Warner and Wager, 2019). Moreover, more research is needed on leveraging the benefits of information systems in the context of capability management and development (Vial, 2019). With this in mind, we aim to draw out the capabilities from the existing literature that have helped digital companies sustain their business success and apply them to the environment of established companies. In addition, we place a particular focus on digital and IT capabilities and how they drive digital transformation. Our research question (RQ) is: *What capabilities are relevant for the digital transformation in the corporate environment?* To address this RQ, we conducted a literature review, as it “facilitates theory development, closes areas where a plethora of research exists, and uncovers areas where research is needed.” (Webster and Watson, 2002). The field of capabilities is already widely discovered, starting with Teece et al. (1997) and evolving over the recent years; however, missing the perspective of digital transformation of a traditional firm and digital-born companies.

In the following, we first present the theoretical foundations. We then describe our approach to the literature review, followed by our results, before concluding our work and offering suggestions for future research.

## 2. Theoretical background and related works

### 2.1. Dynamic capabilities

Following Teece et al. (1997), dynamic capabilities focus on “exploiting existing internal and external firm-specific competences to address changing environments.” Dynamic capabilities are necessary

to implement changes from digital transformation into corporate structures (Ellstrom et al., 2021). Therefore, it is evident that developing dynamic capabilities help firms to create and capture additional value (Helfat and Raubitschek, 2018), especially when traditional firms focus on those capabilities that can be observed in digital leadership. Furthermore, it is possible to divide the dynamic capabilities into three sub-categories “to sustain the evolutionary and entrepreneurial fitness of the business enterprise” (Teece, 2007), representing dynamic capabilities as the strategic dimension of corporate capabilities (Inan and Bititci, 2015). These sub-categories are “Sensing”, “Seizing”, and “Reconfiguring”.

**Sensing.** In general, sensing can be understood as processes that provide organizations the knowledge of how to collect and analyze market information. It includes the tasks of “scanning, creation, learning and interpretive activity” (Teece, 2007). Normally an R&D-founding is inevitable to complete this task. Based on the definition of Teece (2007), Ellstrom et al. (2021) extend the capability to include the aspect of research outside one’s own company and even the market: For effective transformation processes in the company, sensing must be applied “outside the [own] service system” (Ellstrom et al., 2021).

**Seizing.** The capability of “seizing”, which was also introduced by Teece (2007), describes the realization of the results from sensing in new products, services, or processes. At this step, an investment in development and commercialization is required in nearly all cases to enable the first realization. Therefore, an investment decision has to be made and a suitable business model has to be established for the market launch of the product/service (Teece, 2007).

**Reconfiguring.** If a company can apply the capabilities of sensing and seizing, it should be able to achieve sustainable and profitable growth at the enterprise level. To do this, a company must apply the reconfiguration capabilities and recombine the company’s assets (Teece, 2007). In this way, the company is able to maintain an “evolutionary fitness” (Teece, 2007). It is also possible to reconfigure its assets in case an unfavorable situation occurs and a re-orientation is needed. According to Teece (2007), reconfiguration capabilities are needed as success creates routines in the workflow. However, routines only ensure efficiency during stable times. In times of change, a reconfiguration is needed to stay competitive.

## 2.2. Operational capabilities

Next, operational capabilities are defined as “a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization’s management a set of decision options for producing significant outputs of a particular type” (Helfat and Peteraf, 2003). This also includes digital and IT capabilities which we particularly focus on in our literature review as they have a strong influence on key aspects of digital transformation and the corresponding strategy development for firms becoming digital (Kane et al., 2015). Also practices, like “continues improvement (CI), Just-In-Time (JIT),[...], customer relationships management (CRM)” (Inan and Bititci, 2015) are considered as operational capabilities. To name some operational capabilities in the field of digital transformation, we follow Konopik et al. (2022), who defined “innovation thinking”, and “digital transformation leadership” as operational capabilities. These examples also illustrate the close link between operational and digital & IT capabilities.

**Digital capabilities.** Following Annarelli et al. (2021), we understand digital capabilities as “formalized routines that utilize digital resources effectively to ensure a competitive advantage”. Digital capabilities include, for example, the implementation of IT and specific technologies such as media or mobile devices (Westerman et al., 2012) with the ability to effectively deliver information to customers (Kohli and Grover, 2008). In our research, we distinguish digital capabilities as IT-related capabilities facing the customer. It may include topics like service innovation, co-value creation, digital, and richer user experience (Annarelli et al., 2021). In addition to digital capabilities, we distinguish between IT capabilities which, in contrast, have a clear internal focus.

**IT capabilities.** IT capabilities are defined as the “ability to mobilize and deploy information technology (IT) based resources in combination or copresent with other resources and capabilities” (Bharadwaj, 2000). Thereby it is possible to increase the company’s internal efficiency and effectiveness as well as to enhance the flexibility to react to business needs (Tan et al., 2015) as a beneficial output. Since IT is an enabler and supporter for transformation in companies IT capabilities play a significant role in becoming digital (Hess et al., 2016).

## 2.3. The interplay of dynamic and operational capabilities

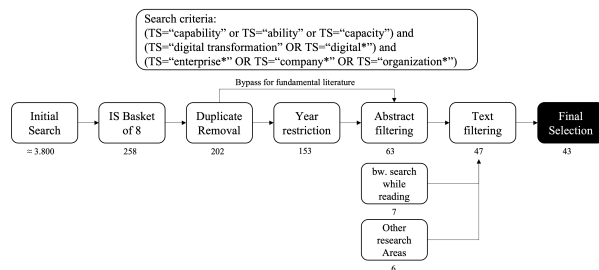
Operational capabilities are located on the operative level of corporate capabilities, which are needed to master the digital transformation. Hence, Konopik

et al. (2022) define them as the operational base for dynamic capabilities. Moreover, according to Konopik et al. (2022), several researchers agree that dynamic capabilities cannot develop solely through following a learning process. Rather, dynamic capabilities need operational capabilities as a base to influence a company's performance. At the same time, however, it is obvious that the former influence the latter: As defined above, dynamic capabilities describe the ability to reconfigure a company to evolve and adapt; thus, operational capabilities must also adapt as dynamic capabilities impact an entire organization. This implies that dynamic capabilities are used to enhance or change a company's operational capabilities to ensure sustainable growth. Consequently, both are groups of capabilities that influence each other (Inan and Bititci, 2015).

### 3. Methodology

#### 3.1. Search strategy and sample choice

In order to identify the contributing literature in the field of capabilities supporting the digital transformation in the organization, we conducted a literature research following the approach of Montenegro et al. (2019), shown in Figure 1.



**Figure 1. Literature research Process; following Montenegro et al. (2019)**

As a first step, we limited our search databases to the search engines "Web of Science", "EBSCO" and "Science Direct". Using these three search engines we first performed an explorative keyword research for terms assigned to the area of "capabilities", as recommended by Levy and Ellis (2006). As there is no widely accepted definition for capabilities which support companies becoming digital, we needed this step to approach our subject from a holistic

perspective. Next, we broadened our scope to include dynamic capabilities (e.g., Yeow et al., 2018), operational capabilities (e.g Inan and Bititci, 2015), and organizational capabilities (e.g., Konopik et al., 2022). After a first screening of the available literature, we also included slight variations of the term "capability" as expressions like "ability" or "capacity" are often used as synonyms. Afterwards, we added the terms of "digital transformation" OR "digital\*" in combination with "enterprise\*" OR "company\*" OR "organization\*" in the search string for "Topic". Hereby we were able to focus the results on capabilities relating to the digital transformation in the organizational context. Database searches were conducted in December 2021, applying the above search criteria to the title, keywords, and abstract. In a second step, we established three criteria to narrow down the results as relevant and appropriate for our literature review: First, we chose the Senior Scholars' Basket of eight journals as a filter because it has been regularly accepted to provide high quality peer-reviewed publications in the past (e.g., Prat et al., 2015). Performing a backward search in one of the next steps it might occur that also non-"AIS-basket of eight" literature is included in our sample. In these cases, we narrowed down the literature to results awarded with a rating of at least 'C' of the VHB-JOURQUAL3 (JQ3) ranking of the German Association of Business Administration Professors. This list is also used in other studies to screen high-quality literature (e.g., Schmidt et al., n.d.) and to balance the literature review's comprehensiveness and quality. One such example from our search is Hansen et al. (2011), published in MIS Quarterly Executive, which is rated "B". Second, we selected the timeframe from 2010 until 2022 for our research. Starting in 2010, the topic of digital transformation began to heat up. This timeframe provides a large foundation of scientific publications and real-world examples for a literature review. Similar, other publications, e.g., Konopik et al. (2022), use this timeframe as it marks the "emergence of digital technology". Third, we excluded conference papers, books, and book reviews.

Continuing with our next step we focused on abstract filtering to identify relevant literature. To ensure an objective view of the available literature, we decided to have at least two researchers independently search the summaries of the available literature. Based on the following abstract screening criteria, the results were included in our reduced literature list: For one, we included publications that make a clear reference to dynamic and operational capabilities in their abstract while also addressing the topic of digital transformation in organizations. For another, we excluded publications

with an exclusive technology focus, as the idea of our study is to focus on capabilities rather than technological implementation. In addition, we excluded publications with a strong sociological background, as they primarily study the impact of digital and operational capabilities on individuals or groups of individuals.

After applying our abstract-filtering criteria we reached an interim result of 63 potentially relevant papers for our research focus (see Figure 2). To further discuss the papers content, we started the full-text-filtering where we also performed a backward search while reviewing the papers on their relevance to our subject. In this step seven additional papers were identified, which provide additional information for our research. For example, the paper of Helfat and Peteraf (2003) was identified while scanning the paper of Daniel et al. (2014). By using the backward-search many important information, like the clear structuring of dynamic capabilities into “Sensing”, “Seizing”, “Reconfiguring” (Teece, 2007) were implemented. When appropriate, relevant studies from other areas were included at this step as well, e.g., published in MIT Sloan Management Review Kane et al. (2015) provided insights into companies dealing with their ongoing digital transformation. Following this example other papers from the disciplines of management (e.g., Lansiti and Lakhani, 2014), marketing (e.g., Wielgos et al., 2021), or production (e.g., Hirvonen and Majuri, 2020) were included. In the end, the total number of publications relevant to this literature review was 43.

### 3.2. Literature clustering

Next, we followed Webster and Watson (2002)’s guideline for a literature review for concept-centric approaches. To do so the first step is to codify the available literature. Based on 43 scientific articles we began to extract the most relevant capabilities. Using the generated code, the concept matrix in accordance with Webster and Watson (2002) reveals the main capabilities (in sum 58) which we could elaborate in the review-process of the available literature. Aggregating similar capabilities to one group helped to identify a total of 37 (sub-) capabilities as relevant. Isolating the relevant concepts helps to create a more precise view on them and reveals the critical knowledge gaps. When analyzing the results, it becomes clear which capabilities are relevant for companies in digital transformation, in line with the literature research conducted.

## 4. Findings

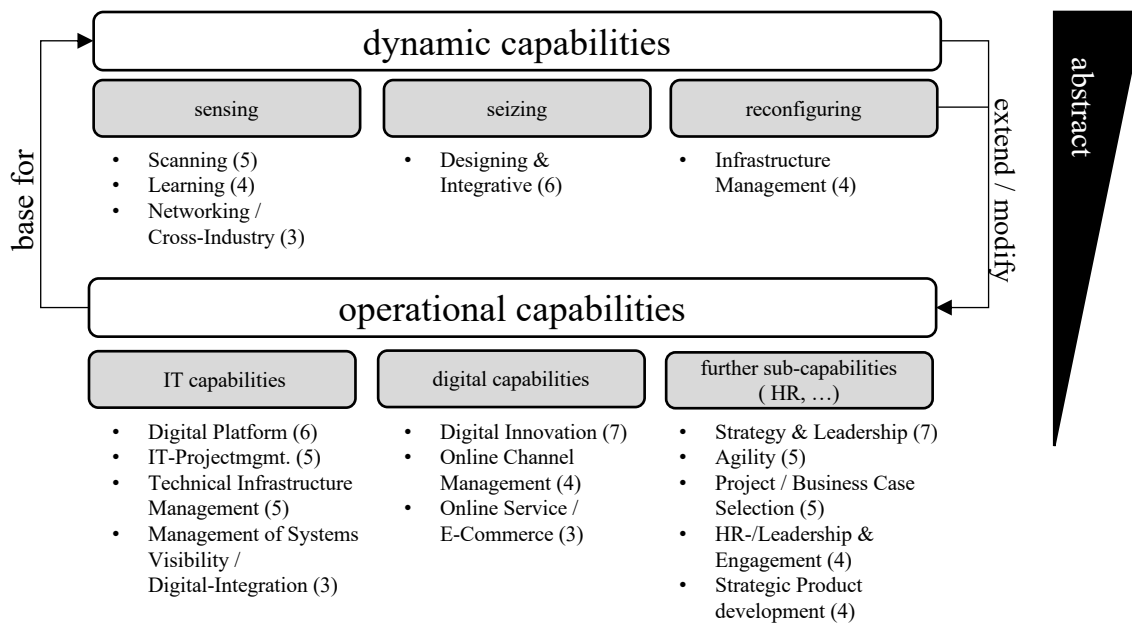
In general, we can state that the theoretical foundations of dynamic capabilities are widely

discussed, as a variety of sub-capabilities are mentioned in our sample. This may be due to the fact that dynamic capabilities as defined by Teece et al. (1997) are considered the basis for research on business capabilities, which has been continued by several scholars (e.g., Konopik et al., 2022, Ellstrom et al., 2021, or Teece, 2007). In the area of operational capabilities, we can observe a clearer focus on management and strategy capabilities.

Building on our theoretical background and understanding of operational or dynamic capabilities, our model of capabilities and sub-capabilities now follows, where we discuss the key findings and illustrate them with examples from the literature. The resulting model in Figure 2 lists 17 sub-capabilities with their number of references in our literature review (shown in parentheses) of at least 3 (the remaining 20 sub-capabilities were only referred to in less than 3 papers in our sample).

### 4.1. Dynamic capabilities

Starting with the category of dynamic capabilities, Ellstrom et al. (2021) identify several important capabilities for the digital transformation. Capabilities in the category “sensing” are *cross-industrial digital sensing* and *inside-out digital infrastructure sensing*. *Cross-industrial sensing* means the implementation of routines that help the firm to identify new digital opportunities from other industries digital leader (Annarelli et al., 2021; El Sawy et al., 2016; Ellstrom et al., 2021). Sensing the inside-out digital infrastructure the firm involves improving the way internal digital infrastructure is used and ensuring that its technology adds value. Next, in the category “seizing” capabilities are the *development of a digital strategy* and the *determination of enterprise boundaries*. Here the firm must face outsourcing decision (Ellstrom et al., 2021). The capabilities in the category “reconfiguring” are the *decomposition of the digital transformation* into specified projects and the *creation of a unified digital infrastructure* (Ellstrom et al., 2021; Helfat and Raubitschek, 2018; Yeow et al., 2018). Warner and Wager (2019) find that the capabilities of digital “sensing” are *digital scouting*, *digital scenario planning* and *digital mindset crafting*. These dynamic capabilities can be achieved by implementing big data analytics or artificial intelligence (Konopik et al., 2022; Warner and Wager, 2019). This example also shows the evidence of the connection between dynamic and operational capabilities presented in Figure 2. As applications in *big data analytics* and *artificial intelligence* (Warner and Wager, 2019) are examples for IT-Capabilities



**Figure 2. Overview of dynamic and operational capabilities relevant to digital transformation, including sub-capabilities (with a count > 2 from the literature review).**

which enable dynamic capabilities. The capabilities of “seizing” are *strategic agility, rapid manufacture of prototypes* and *balancing digital portfolios* (Warner and Wager, 2019).

Yeow et al. (2018) investigate the dynamic capabilities that the firm Hummel, a clothing manufacturer, implemented to successfully complete their digital transformation. The dynamic capabilities in the category “sensing” are *scanning, learning, and calibrating* (Kane et al., 2015; Yeow et al., 2018). Implementing the capability *scanning* the CEO reviewed the B2C e-commerce environment and mentioned their digital transformation plan at the Board meetings (El Sawy et al., 2016; Hess et al., 2016; Yeow et al., 2018). Hummel executed the capability *learning* by having many conversations between CEO, Head of Digital and various departments to understand Hummel’s IT system (Hess et al., 2016; Kane et al., 2015; Yeow et al., 2018). The capability *calibrating* was formulating the digital strategy (Yeow et al., 2018). *Designing, committing, and selecting* are the dynamic capabilities in the category “seizing”. Within the *designing* capability, Hummel identified for the digital transformation usable internal processes and specified the requirements for the development of the in-house platform (Yeow et al., 2018). *Committing* consisted of the development of a product information management system. Developing the dynamic capability *selecting*, Hummel had to make outsourcing decisions (Yeow

et al., 2018). The dynamic capabilities in the category “reconfiguring” are *creating, leveraging, and accessing*. To develop the first two capabilities, Hummel created the new position of the “Head of Digital”, employed skilled persons and leveraged their existing product data with the processes of the logistics, finance, and marketing departments (Yeow et al., 2018). Finally, the integration of the developed product management system with e-commerce and ERP is the *assessing capability* (Yeow et al., 2018).

In summary, Hummel’s example shows how a traditional company can use dynamic capabilities to succeed in digital transformation. This example also mentioned some operational capabilities, which will be presented in more detail in the next section.

#### 4.2. Operational capabilities

The implementation of capabilities is essential for digital transformation, in which operational capabilities also play an important role (Annarelli et al., 2021; Helfat and Raubitschek, 2018; Inan and Bititci, 2015; Kane et al., 2015; Konopik et al., 2022). The most cited operational capabilities are *Digital Leadership* and *Digital strategy*. Conducting a survey Westerman et al. (2012) find that 77 per cent of respondents fail at digital transformation because they experience skill gaps. Fitzgerald et al. (2014) explain why many firms fail in transforming into a digital firm. Many managers

do not see the urgency of changing the business into a digital one and are not fast enough in order to keep up with the rapidly changing environment (Annarelli et al., 2021; El Sawy et al., 2016; Fitzgerald et al., 2014). In order to cope with the force of new managerial thinking, the role of the Chief Digital Officer (CDO) has been implemented. The CDO is responsible for fostering collaboration, to formulate and execute the digital transformation strategy and to initiate and lead the interaction with customers (Horlacher and Hess, 2016). To successfully execute their position the CDOs “do need some IT knowhow, but mainly strong skills in strategy development, change management and communication” (Annarelli et al., 2021; Horlacher and Hess, 2016). Singh and Hess (2017) also investigate the role of the CDO by presenting six case studies: “The CDO role can be centralized of the group level or decentralized at the subsidiary level”. Firms should employ a CDO at the latest at the beginning of their digitization process in order to make the digital transformation a priority in their strategy (Singh and Hess, 2017; Svahn et al., 2017). Organizations should share a digital mindset in order to respond to the disruptions associated with the digital transformation (Hansen et al., 2011). The building blocks necessary for the implementation of *digital leadership* are “*business strategy, business models, enterprise platforms, people mindset and skill set, the corporate IT function and humanized workplace*” (El Sawy et al., 2016). To cope with the fast pace of digital transformation, a faster business strategy must be implemented at the managerial level (Daniel and Wilson, 2003; Daniel et al., 2014; Kane et al., 2015). A *digital strategy* helps the organization successfully navigating the transformation and takes advantage of the opportunities and risks evolving from using new digital technologies (Kane et al., 2015; Konopik et al., 2022; Singh and Hess, 2017). For the digital transformation the formulation of a *digital strategy* “that serves as a central concept to integrate the entire coordination, prioritization, and implementation of digital transformation within a firm” (Matt et al., 2015) is necessary. The *digital strategy* should be closely related to the IT strategy but must be separated from it. Firms should allocate clear responsibilities to the person executing the *digital strategy* (Annarelli et al., 2021; Matt et al., 2015). In order to keep up with the rapidly changing environment, firms need to constantly evaluate their *digital strategies* (Matt et al., 2015). The key decision a firm must make for the formulation of a *digital strategy* is the strategic role of IT and the company’s technological ambition (Hess et al., 2016). El Sawy et al. (2016) show the characteristics of the *digital strategy* implemented by

LEGO. One characteristic is that the *digital strategy* is a combined business strategy that is carried out digitally and the management should be deeply committed to this strategy (El Sawy et al., 2016; Yeow et al., 2018). Besides that, it is important that the digitalization is integrated into the strategy rather than just coupling it. Also the strategy should be based on leveraging the ecosystem of partners and collaborating with them (El Sawy et al., 2016).

### 4.3. Digital capabilities

For the successful digital transformation, organizations must develop new capabilities that differ from dynamic capabilities, e.g., digital capabilities (Annarelli et al., 2021; Henfridsson et al., 2014; Karimi and Walter, 2015; Kohli and Grover, 2008). The most cited digital capabilities are *Digital Innovation* and *Online Channel Management*.

**Digital innovation.** The deep integration of digital technologies into products and services has forced companies to adjust their innovation process and to leverage new ideas (Henfridsson et al., 2014; Svahn et al., 2017; Vial, 2019). Yoo et al. (2010) highlight the importance of rethinking architectures and mention the ebook as an example for the need to *digital innovate* due to the establishment of new digital technologies. With this in mind, digital innovation has a strong intersection with the dynamic reconfiguration capabilities.

Focusing on *digital innovation* was a key aspect of Volvo Car’s Corporation (Volvo) digital transformation (Svahn et al., 2017). For this shift of innovation focus, Volvo needed to build new capabilities. The first step was the establishment of the Connectivity Hub where employees from different departments critically reflected and discussed existing practices (Li et al., 2018; Svahn et al., 2017; Wielgos et al., 2021). To solve the problem of not knowing how to balance existing capabilities with implementing new ones, internal stakeholders were engaged by setting up scenario-planning workshops (Svahn et al., 2017; Warner and Wager, 2019). Another important step was the development of its own infotainment platform. Additionally, the implementation of the Volvo Cloud allowed Volvo to shortcut existing approaches and routines (Svahn et al., 2017). A common concern in the automotive industry is the danger that the company disconnects from traditional automotive cycle plans by focusing too much on cloud-based innovation. Therefore, Volvo reassigned the product responsibility by establishing a new unit within the IT Department (El Sawy et al., 2016; Svahn et al., 2017; Yeow et al., 2018). The last important aspect was the introduction of

a Partnership Model that introduced a template contract that facilitated collaborating with external stakeholders (Svahn et al., 2017). These different approaches helped Volvo to break away from its established practices and thus to reinforce *digital innovation* and digital transformation of their products and of their company as a whole.

**Online channel management.** In order to stay competitive in the new digital landscape firms need to catch up with new customer demands (Annarelli et al., 2021; Beck and Rygl, 2015). Using new technologies shifted customers' demand and therefore, the company is forced to "possess new forms of knowledge and processes that allow them to create deeper engagements with their customers" (Straker and Wrigley, 2016). One common trend that has evolved from digital transformation is the omnichannel approach that "is defined as linking all retail channels to provide a superior customer experience along the customer journey" (Heuchert et al., n.d.). Sebastian et al. (2017) find that *online channel management* in form of a customer engagement strategy is essential for a successful digital transformation. The customer engagement strategy creates an omnichannel experience for the customer "that makes it easy for customers to order, inquire, pay and receive support in a consistent way from any channel at any time" Annarelli et al., 2021; Sebastian et al., 2017; Tan et al., 2015. For the omnichannel approach, analytics based on customer data must be implemented in order to better understand and to anticipate changing customer demands (Daniel et al., 2014; Sebastian et al., 2017). The procedure of the adoption of the omnichannel approach depends on the characteristics of the firm and the industry (Daniel and Wilson, 2003). "(P)rice-based offers have a higher requirement on process integration whereas differentiation-based offers have a higher premium on integration across channels in the customer experience" (Daniel and Wilson, 2003). Oh et al. (2012) study the effect of IT integration on multiple channels offers. The retail industry implements IT as an enabler to "automate and integrate business processes across their traditional and online channels" (Oh et al., 2012). The omnichannel approach increased digital engagement with customers and measuring the customer experience with a Net Promoter Score helped the LEGO Group (LEGO) for the digital transformation. This strategy made microdata marketing more efficient (El Sawy et al., 2016). Globalizing increased its digital assets, enabled to take advantage of economies of scale and scope. E.g., online games developed by LEGO were introduced in multiple markets worldwide with multiple languages (El Sawy et al., 2016). Here, the example

of LEGO shows how a company responds to an ever-changing environment (Teece et al., 1997) and produces a significant (new) output (Helfat and Peteraf, 2003) by shifting its business model to a digital one.

#### 4.4. IT capabilities

Traditionally, the role of IT was to undertake IT-specific activities supporting a companies regular business (Sambamurthy and Zmud, 2000). Nowadays, IT also plays an important role identifying innovative and novel technologies and solutions (Wiesbock et al., 2020) supporting the digital transformation in companies. Most cited IT capabilities are *Digital Integration, Technical Infrastructure Management* and *Digital Platform*.

**Digital integration.** Chen et al. (2012) provide an insight into the tools available for integrating processes and data. These include business intelligence, business analytics and Big Data analytics. Activities and technologies supporting these tools are data management, reporting tools, database query, business performance management, statistical analysis and data mining techniques (Chen et al., 2012). Most of these analytical and data processing technologies have been incorporated by large IT firms like Microsoft, Oracle or IBM (Sallam et al., 2011). However, firms in the process of digital transformation find the implementation of data driven analytics challenging. To enable analytics adoption, traditional organizations need to improve their data science knowledge and skills, be open to change, and integrate data management (Gust et al., 2017). It is also important that firms fully exploit Big Data and integrate it in their already existing decision-making process (Blackburn et al., 2017). Saggi and Jain (2018) present an analysis on how to deploy and identify Big Data analytics. Data generation, data acquisition, data storage, advanced data analysis, data visualization and decision-making for value creation were identified as the core components of the Big Data analytics architecture (Saggi and Jain, 2018). Dremel et al. (2017) examine how AUDI AG (AUDI), an automotive manufacturer, implemented Big Data analytics in its digital transformation journey. In the first step the required competencies and skills necessary in the field of data analytics were developed and identified. Then the IT departments provided technological support and knowledge and enabled the implementation of data analytics. In the last step the IT department offered solutions which were leveraged and discussed by the sales and marketing department and the Innovation Hub (Dremel et al., 2017).

**Technical infrastructure management.** Levallet

and Chan (2018) identify a well-developed information management (IM) as an important driver for the digital transformation of a firm. With a flexible IT-infrastructure including software, hardware and network the IM can be facilitated (Levallet and Chan, 2018; Sebastian et al., 2017). Having a well-developed IM, the organization can leverage its IT and manage the information lifecycle (Levallet and Chan, 2018). For the implementation of an effective IM the firm needs to develop a data platform, being able to derive insights from data and to make decisions based on the information of data (El Sawy et al., 2016; Levallet and Chan, 2018). The firm needs to ensure a well-functioning digital infrastructure in order to avoid costs caused by an outdated IT-infrastructure. For the transformation, it is important to automatically support decisions based on consequently updated and relevant data which can be achieved by a well-developed infrastructure (Ellstrom et al., 2021; Sebastian et al., 2017). Additionally, with a well-established and developed *technical infrastructure management*, the firms can execute efficient, scalable and predictable core operations. E.g., LEGO struggled with cost inefficient deliveries and processes. To solve these problems, LEGO leveraged an under-used ERP system and implemented programs that standardized processes related to manufacturing, HR and product lifecycle management (Sebastian et al., 2017). Hirvonen and Majuri (2020) find that building an *efficient IT-infrastructure* is one important capability for the digital transformation of manufacturing SMEs. Having a well-developed IT-infrastructure helps the organizations in creating added-value and being more efficient (Hirvonen and Majuri, 2020; Levallet and Chan, 2018). Kim et al. (2011) find that IT personnel expertise, IT management and the IT infrastructure flexibility are all connected with each other and are foundations for a successful digital transformation.

**Digital platform.** Implementing *digital platforms* helps companies in the newspaper industry to evolve their digital transformation by developing digital products, engaging, and connecting digitally with their customers in new ways (Karimi and Walter, 2015). The risk of not building and implementing a well-defined *digital platform* is to fall behind the competitors that are able to rapidly adjust to digital opportunities. A *digital platform* should include digital components that enable different types of business and technical services like customer alerts, serve as a service where a cloud-based environment fosters and gives access to loosely connected services, provide storage for a large amount of data, transform the data into meaningful insights and connect the data with

processes (Sebastian et al., 2017). Li et al. (2018) investigate the digital transformation journey of small and medium-sized enterprises with limited resources. The *digital platform* helps the companies to better understand the generated data and therefore to get more insights into the customers' preferences. It also enables the companies to keep up with rapid changes to the services and to stay close to the customer (Li et al., 2018). LEGO rethought its platform architecture by implementing two different platforms: one for transactions and another one for customer engagement and interaction (El Sawy et al., 2016). The first step was to bolster the enterprise IT platform by launching a company-wide ERP project. The improvement of the platform fostered improvements in data sharing and transparency of operations. The engagement platform requires digital interaction, 24/7 availability and to gain user driven experiences. To fulfill these requirements the platform was built on open architecture, APIs and micro-services (El Sawy et al., 2016).

## 5. Discussion and future research

This paper set out to capture what capabilities are relevant to digital transformation in the enterprise environment. First of all, we found that it is possible to apply the current understanding of capabilities to the field of digital transformation as well. Frameworks that explain the general interplay of capabilities such as Inan and Bititci (2015) or Teece (2007) are also applicable. Second, this paper draws on real-world research, e.g., from LEGO, Volvo, and Hummel, that illustrates that capabilities drive digital transformation. In our review, we found more capabilities with an operational focus. However, this does not imply that operational capabilities are more important than dynamic ones, as dynamic capabilities are essential for implementing transformation in companies (Teece et al., 1997) and therefore play a very important role. Overall, our literature review reveals that there are few quantitative studies that address the role of capabilities in digital transformation. Most publications used qualitative approaches, employing case studies and interviews with experts undergoing digital transformation. Therefore, future research could use quantitative methods to confirm the results of the qualitative studies and support the findings with further empirical evidence. Moreover, we found only a few studies that cover several different types of capabilities. Most studies focus on specific types of capabilities, but as the results show, combining operational capabilities with digital and IT capabilities is important for successful digital transformation. Future research could



focus on analyzing the impact of combined capabilities on digital transformation. Further, we noticed that the results are very company and industry specific. It would be interesting to see if the findings from the automotive industry (e.g. Dremel et al., 2017; Svahn et al., 2017) can be applied to other industries, such as retail. Applying Webster and Watson (2002)'s concept matrix, we note that the literature for some capabilities such as digital transformation capabilities, digital supply chains, or adapting to new IT and software trends is still in the development phase. Svahn et al. (2017) show that non-transformed companies struggle to find the right balance between building new capabilities and leveraging existing capabilities needed for digital transformation. However, there is no research yet on how those companies should most efficiently balance and allocate their resources. Future research could help address this issue. After reviewing the literature on the capabilities needed for digital transformation, the role of IT, such as IT systems and applications, etc., in transforming capabilities into digital companies remains unclear. Even though we have identified IT capabilities, future research should focus on the role of IT in implementing capabilities and explore more deeply how IT enables or supports digital transformation. The focus on IT and digital technology adoption needs to be explored further.

## 6. Conclusion

In this paper, we explore which role dynamic and operational capabilities play in the digital transformation of a company. Based on the analysis of 43 articles, we provide deep insight into the different types of capabilities that enable digital transformation. We have developed a model of how dynamic, operational and digital and IT capabilities are interconnected. Looking at the dynamic capabilities, we investigated how these help the company by sensing opportunities, seizing existing capabilities and reconfiguring the company's resources to digitally transform. Our findings show that a combination of all types of capabilities is essential for digital transformation. A common mistake many companies make is that they often invest a lot of money in implementing digital technologies without considering operational capabilities. However, the key to transforming a business lies not only in implementing digital technology and IT, but also in providing the right capabilities, as many of the practical examples we have referenced show.

The main limitations of this study are related to the snapshot nature of its methodology and the limited

number of journals included. Nevertheless, this study can serve as a starting point for further studies to address the importance of corporate capabilities in managing digital transformation.

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