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Wagner Lopes da Silva

THE DIGITAL TRANSFORMATION JOURNEY OF INCUMBENT COMPANIES

Porto Alegre - RS

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Master Thesis submitted to the Graduate Program in Business Administration of the Federal University of Rio Grande do Sul as a requirement for receiving the degree of Master of Science in Business Administration.

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ABSTRACT

Digital transformation has become a strategic topic on the agenda of CEOs of large companies as well as has attracted growing interest from scholars. In particular, it is a critical topic for established companies - also known as incumbents - that need to transform their structure, strategy, business model, and culture to remain competitive in the context of the digital revolution. In order to contribute to this discussion, this research aimed *to identify relevant dimensions of the digital transformation journey of incumbent companies in different industries.* The dissertation is developed through two articles. The first one brings a systematic literature review with the objective of *identifying main characteristics of existing research on DT in the areas of business and management*. This has led to a conceptual framework built upon the description of nine dimensions of digital transformation identified in the study. The second article aimed *to analyze the digital transformation journey of incumbents companies* and has done so by applying the digital transformation theoretical framework in three incumbent firms that are leaders in their respective sectors and have market-recognized digital initiatives. A fundamental contribution of the current study is the examination of the ongoing digital transformation journey of incumbent firms across traditional industries. Nine dimensions of the firm's digital transformation were identified and described: structure and governance, digital transformation strategy, business model, culture, technology, data, capital, people, and dynamic capabilities. Our conceptual framework can be applied to guide future studies and to serve as a powerful tool for executives in charge of digital transformation processes in established firms. Thesis findings also contribute to existing studies by further explaining how established companies sense and seize opportunities in a digital transformation context, as well as how they have reconfigured their structure, culture, and business model to capture the potential of digital technologies. The research results also revealed a novel definition for digital transformation as being *a journey of organizational change, in which a firm combines internal resources and dynamic capabilities to employ new digital technologies and transform its structure, business model, culture, and strategy to maintain its relevance in the digital landscape*.

Keywords: Digital Transformation. Digital Revolution. Digital Change. Dynamic Capabilities. Incumbent Firms. Traditional Sectors.

LIST OF ILLUSTRATIONS

LIST OF ABBREVIATIONS AND ACRONYMS

CEO	Chief Executive Officer
CDO	Chief Digital Officer
CIO	Chief Information Officer
CRM	Customer Relationship Management
DC	Dynamic capabilities
DT	Digital transformation
DTC	Digital transformative capability
DTS	Digital transformation strategy
IS	Information system
O2O	Online-to-offline
SLR	Systematic literature review
ERP	Enterprise Resource Planning

SUMMARY

1. INTRODUCTION

The digital revolution is currently transforming entire industries and the overall competitive landscape. An example of the digital revolution is the rise of relatively young digital firms challenging the long-time successful business models of incumbent firms. In 2005, the most valuable firms on the Standard and Poors - S&P 500 index were General Electric, Exxon Mobil, Microsoft, Citigroup, and Walmart (ETF Database, 2004) — only one of which represents a truly digital firm (Microsoft). Fifteen years later, the index has changed significantly - five digital and information-rich firms are taking the lead: Apple, Microsoft, Alphabet, Amazon, and Facebook (Siblis Research, 2019).

This context of constant changes is marked by some traits that help us to understand the size of the challenges established businesses - also called incumbents - are facing. *First*, the mobile revolution has triggered profound changes in manufacturing, commerce and communications. Furthermore, it enabled online and offline channels to be integrated in one seamless fashion with a focus on the overall seamless customer experience (Lemon and Verhoef, 2016). Second, consumer behavior is changing in response to the digital revolution. With the help of new search tools and social media, consumers have become more informed, empowered, connected and active (Lamberton and Stephen, 2016; Verhoef et al., 2017). Hence, organizations are being pressured to rethink their relationship with customers and to look for new models that help to engage with them and to create better consumer experiences. *Third*, the access to several technologies has drastically changed the competitive landscape and allowed new entrants to disrupt traditional markets. Digital technology has become cheaper and more accessible than ever, and startups are taking this opportunity to offer scalable products and services, with an intensive application of technology and innovative digital business models.

With all these challenges in place, digital transformation (DT) has become increasingly critical for established companies to survive and remain competitive. DT is especially critical for incumbent firms because they are increasingly competing with disruptive digital start-ups (Snow et al., 2017). The last ones do not need to transform digitally because they have embraced digital technologies since their inception with operating models and capabilities based on exploiting internet-era information and digital technologies as a core competency (Panetta, 2016). Incumbent companies, however, need to balance the exploitation of existing capabilities while also building digital transformation capabilities (Ghosh et al., 2022) and dynamic capabilities for DT (Warner and Wäger,

2019) to ensure business continuity. Hence this study focused on the DT journey of traditional companies.

DT is a process of using new digital technologies in everyday organizational life (Verhoef et al., 2019; Warner and Wäger, 2019) and it is often the path incumbent firms have followed to respond and to adapt to a constantly changing environment (Fitzgerald et al. 2014; Hess et al. 2016; Singh and Hess, 2017). DT is understood as a change in the business model (Hess et al., 2016; Verhoef et al., 2019), an ongoing process of strategic renewal (Warner and Wäger, 2019) and a sociocultural process (Saarikko et al., 2020) leveraged by the exploitation of digital technologies. The topic has become a strategic imperative in the agenda of CEOs and other business leaders (Fitzgerald et al. 2014; Hess et al. 2016), and has gained further strength during the COVID-19 (Wade and Shan, 2020). According to LaBerge (2020), the COVID-19 pandemic has speeded up the adoption of digital technologies by several years and many of these changes could be here for the long haul. However, "right now, we witness an incomplete DT as firms are trapped in a vacuum between the old and new normal, and the acceleration of DT initiatives is not converted into sustainable structures or strategies" (Reuschl et al., 2022, p.1328).

The DT field of research has received great attention from scholars, with fast growth of academic production since 2016. The topic emerged as an important phenomenon being studied especially in the information systems (IS) field (Bharadwaj et al., 2013; Piccinini et al., 2015; Matt et al., 2015; Hess et al.,2016) and discussed by practitioners (Fitzgerald et al., 2014; Westerman et al., 2011). In the IS literature, the debate on DT begins by addressing the differences between the prevailing view of information technology strategy and a new role for technology in the digital context. In this way, some scholars have made important contributions. Bharadwaj et al. (2013) proposed to rethink the role of IT strategy by combining it with business strategy, giving rise to what they called digital business strategy. Matt et al. (2015) reported a framework balancing four DT dimensions and highlighted the different perspectives and goals of DT strategies when compared to IT strategies. Furthermore, Hess et al. (2016) provided strategic insights and guidelines to formulate a DT strategy.

The DT phenomenon is often presented in the literature in three stages (Gobble, 2018; Verhoef, 2019). The first one, *digitization*, is the conversion of analog information into digital information (Gobble, 2018; Verhoef, 2019; Yoo et al., 2010) and "makes physical products [e.g. artifacts] programmable, addressable, sensible, communicable, memorable, traceable and associable" (Yoo et al., 2010, p.725). The second one, *digitalization* is the transformation of all those bits – the

digital information - into value (Gobble, 2018) and “creates potent digital affordances that likely have a transformative effect upon the organization of economic activity by supporting radical business model innovation” (Autio et al., 2018, p. 76). Besides that, it does not modify the way companies do business - how it thinks about, creates, and delivers value (Gobble, 2018). Finally, the third one, *digital transformation*, is a more complex step because it affects the entire company and its ways of doing business (Amit and Zott, 2001). It is also concerned with the changes digital technologies can bring about in a company's business model (Hess et al., 2016). Therefore, it can be described as a sociocultural process rather than as a technical feat (Saarikko et al., 2020).

To explore this field of study, we asked: *What are relevant dimensions of the digital transformation journey of incumbent companies?* To answer this question, the **main objective** of the present master thesis is to identify relevant dimensions of the digital transformation journey of incumbent companies in different industries. The following **specific objectives** are essential to achieve the main objective, being addressed in two distinct and interdependent papers: 1) to identify main characteristics of existing research on digital transformation in the areas of business and management and; 2) to analyze the digital transformation journey of incumbent companies. In the second article we also included a discussion on DT and dynamic capabilities as a strategy to bring the DT discussion to a strategic management perspective.

Next, we present the structure of the Master thesis, including a methodological matrix. Following that, each paper is presented and; finally, the final considerations of the master thesis.

2. MASTER THESIS STRUCTURE

The present study follows an alternative framework of multiple mixed-methods studies (Costa et al., 2019). According to Van der Velde et al. (2004), this research strategy is ideal to interpret and better understand the investigated reality and, therefore, represents an important tool to understand the phenomenon of DT of traditional companies. The Master thesis consists of two distinct and interdependent articles.

Article I is characterized as a systematic literature review that aims to identify main characteristics of existing research on DT in the areas of business and management. This review was important because DT is a phenomenon with a conceptual foundation still under construction,

although with great interest from researchers in the last years. The results of the systematic literature review allowed us to build a conceptual framework describing the DT dimensions, which includes a novel conceptual definition for DT. The framework served as the basis for the construction of the second paper.

Article II is a multiple case study that aims to analyze the DT journey of incumbent companies. The analysis of multiple cases provides a robust consensus (Yin, 2014) and allows us to identify DT similarities and particularities across sectors. In Figure 1 presents the Methodological Matrix adapted from Costa et al. (2019) with the justification for the distinction of the studies, including the title and the general purpose of each study, as well as the justification for interdependence, involving the type and sequence or simultaneity of the research, the method and the procedures for data collection and analysis.

Figure 1 - Methodological Matrix

GENERAL OBJECTIVE OF THE MASTER THESIS: ***To identify relevant dimensions of the digital transformation journey of incumbent companies in different industries***							
Justification of distinction		**Justification of interdependence**					
Title of each study	**General objective**	**Sequential research**	**Mixed methodology**	**Data Collection Procedures**	**Data Analysis Procedures**	**Theoretical Background**	**Publication status**
A Business Perspective of Digital Transformation: a Systematic Literature Review	To identify main characteristics of existing research on digital transformation in the areas of business and management	Building the theoretical framework of digital transformation journey	Systematic Literature Review	Systematic Literature Review	Qualitative and quantitative analysis	Digitization Digitalization Digital transformation	Submitted for publication in journal Technological Forecasting and Social Change
Digital Transformation of Incumbent Companies: a cross-case analysis	To analyze the digital transformation journey of incumbent companies	Empirical application of the framework	Case Studies	Semi-structured interviews and secondary data	Cross-case and content analysis	Digital Transformation Dynamic Capabilities	Not submitted

Source: Structure adapted from Costa et al. (2019).

Therefore, by the combination of a systematic literature review and a multiple case study, we deeper understood the DT phenomenon and to provide theoretical and managerial contributions to scholars and practitioners community.

3. ARTICLE I

A BUSINESS PERSPECTIVE OF DIGITAL TRANSFORMATION: A SYSTEMATIC LITERATURE REVIEW

Wagner Lopes

Fernanda Reichert

ABSTRACT

Digital transformation has gained great interest from researchers and practitioners and has become one of many trending topics in recent years. In this regard, we carried out a systematic literature review to identify main characteristics of existing research on digital transformation in the areas of business and management. By doing so, we were able to identify how the phenomenon has been discussed in a multidisciplinary perspective and map digital transformation dimensions from the business point of view. Our findings revealed that digital transformation requires stronger conceptual constructs because (1) its academic discussion is in its early stage; (2) these papers' methodological procedures are dominated by case studies; and (3) most publications emphasize practice-based research. In an attempt to start building these constructs, we presented a conceptual framework highlighting the multidimensionality of digital transformation, which, in turn, allowed us to propose a novel conceptual definition for digital transformation. Our results revealed that digital transformation is a journey of organizational change, in which a firm combines internal resources and dynamic capabilities to employ new digital technologies and transform its structure, business model, culture, and strategy to maintain its relevance in the digital landscape.

Keywords: Digital transformation. Digitization. Digitalization. Systematic Literature Review. Digital Change. Business Transformation.

1. INTRODUCTION

In a myriad of definitions and in the face of the increased interest among academics in discussing digital transformation (DT), we explore this phenomenon to identify its main dimensions in the business context. The digital revolution has generated profound shifts in business in various sectors. The advance of new digital technologies, such as big data, artificial intelligence, cloud computing, machine learning, and the internet of things (Iansiti and Lakhani, 2014; Ng and Wakenshaw, 2017), in addition to the decreased gap in access to technology and the popularization of mobile devices (Verhoef et al., 2017), represent both risks and opportunities for established companies to restructure themselves in the digital context. After the start of the COVID-19 pandemic, the topic of digitalization within organizations gained even more notoriety. In this regard, Wade and Shan (2020) highlighted the role of the COVID-19 pandemic as an accelerator of this digital revolution and noted that the prioritization of DT among organizations has significantly increased during this period.

Also called the 4th Industrial Revolution, this phenomenon has forced organizations to reflect on their organizational structures and business models in the face of new demands from increasingly connected, informed, empowered, and active consumers (Lamberton and Stephen, 2016; Verhoef et al., 2017). Just like the companies, customers were strongly affected by the pandemic, which forced them to adopt habits related to internet shopping and using digital tools for communication in their daily routines. Consequently, companies have felt the impact of this consumer behavior change, representing an external pressure for their DT.

There are essentially two types of business in the digital scene: born-digital companies and established ones looking to digitally transform themselves. According to Panetta (2016), the first group represents firms whose operating models and capabilities are based on exploiting internet-era information and digital technologies as core competencies. Firms of this generation have embraced digital technologies since their inception and are known as leaders of the digital revolution and causing the biggest disruptions in their markets. Examples of such firms include Amazon, founded in 1994, Netflix (1997), Google (1998), Alibaba (1999), Linkedin (2002), and Facebook (2004). The second group includes incumbent firms that have the challenge of adapting their business to a digital environment that did not exist when they were conceived. They are seen as bureaucratic, hierarchic, and integrated companies emphasizing financial capital, mechanization, automation, economies of

scale, and fixed employment (Schultze and Orlikowski, 2001). These organizations belong to traditional sectors such as retail and financial services that were financially successful in the pre-digital economy (Ross et al., 2016), but to which the digital economy poses a tremendous challenge. Is it possible for established companies to participate in or even lead the digital revolution? The answer to such an important question has been drawing the attention of scholars in the last years and involves understanding the DT journey of these companies, the topic that will be the focus of the present article.

In recent years, researchers have shown increasing interest in understanding the DT phenomenon and its impact on organizations (Warner and Wäger, 2019; Verhoef et al., 2019; Ghosh et al., 2022). With growing interest in the topic, different definitions and interpretations of DT have also emerged. Therefore, a greater understanding of the phenomenon is required to seek conceptual convergences that will settle the basis for constructing a new field of research.

Examples of these different approaches may be found in many business disciplines. Marketing literature has focused on the influence of new technologies on marketing and the development of multi-channel and omni-channel services (Kumar et al., 2020; Verhoef et al., 2015). In the field of information systems, researchers have discussed the definition and implementation of digital transformation strategies (Hess et al., 2016; Matt et al., 2015; Sebastian et al., 2017). The strategic management literature has focused mainly on conceptualizing, operationalizing, and renewing (digital) business models (Foss and Saebi, 2017; Osterwalder and Pigneur, 2010). Recent studies have also discussed the role of dynamic capabilities (Warner and Wäger, 2019; Ghosh et al., 2022) and absorptive capacity (Siachou et al., 2021) in the DT process.

Just as in the theoretical field, DT has received special attention from executives in the practical field, and it has appeared as a strategic imperative on business leaders' agendas (Fitzgerald et al., 2014; Hess et al., 2016; Singh and Hess, 2017). Traditional organizations have struggled to implement digital technologies and their subsequent transformation initiatives (Loonam et al., 2018). However, current practice shows that most of them fail in DT or at least in attempts to achieve it (Beugelsdijk et al., 2006). This reinforces the need to shed more light on a complex phenomenon that is multidisciplinary and sociocultural (Verhoef et al., 2019; Saarikko et al., 2020). These organizations generally stay focused more on the "digital" perspective and underestimate the changing aspects of DT. Westerman (2017) noted that the key to DT is focusing on the transformational aspect rather than the digital one, requiring organizational agility in systems, processes, structure, setup, and people with the right mindset and culture.

To explore this multidisciplinary landscape of DT, our study aimed *to identify main characteristics of existing research on digital transformation in the areas of business and management.* To map and evaluate the existing intellectual territory and manage the diversity of knowledge for this specific academic investigation (Tranfield et al., 2003), we carried out a systematic literature review. This strategy allowed us to reflect deeply on the DT phenomenon and provide multidisciplinary and multidimensional perspectives on the DT agenda.

Our study makes two main contributions to the literature. It first shows there is an opportunity to build a robust theoretical framework on the topic, such as a) academic studies on DT are in their initial stage with increasing interest in the subject; b) DT has been studied mainly from a practice-based approach, focusing on case studies; and c) there are still diffused definitions for DT, indicating the need for stronger conceptual models. We identified that the discussion on DT was born in the literature on information systems with a practice-based approach, which allows us to demonstrate that there is a space for a broader theoretical discussion about DT in the strategic management field.

The second contribution is that we attempt to systematize the dimensions of DT in a way to provide guidance to a more concurrent field of research. In doing so, we have reinforced the existing dimensions already mentioned in previous frameworks and present novel dimensions, which should require further investigation.

Next, we present a conceptual discussion on DT, specifically exploring the DT in incumbent firms and the concepts of digitization, digitalization, and digital transformation. Afterward, we explain the research methods and procedures employed in this systematic literature review, followed by combining both quantitative and qualitative approaches to analyze the results and present key research findings. Lastly, we present our study's main conclusions, including topics for further research in this novel field.

2. THEORETICAL BACKGROUND

2.1 Incumbent companies in a digital era

The DT journey of established companies can be analyzed from different perspectives. They are at a disadvantage compared to born-digital companies since their business model was not

structured around digital technologies. However, industrial players control the customer relationship, the intellectual property, and the complementary assets and therefore are better positioned to capture value from new technological innovations (Jacobides et al., 2006; Teece, 2018). Disposing of a path dependence built over decades represents a critical challenge for digital transformation and, above all, an important barriers to be overcome (Ghosh, 2022). In this regard, researchers have been working to identify these organizations' resistance mechanisms that work to prevent the transformation. The model of Warner and Wäger (2019) highlighted rigid strategic planning, change resistance, and a high level of hierarchy as core barriers that influence DT. In addition, Cichosz et al. (2020) studied logistics service providers and emphasized the lack of resources, including skilled resources, technology adoption, data protection, and security breach, as the primary DT barriers.

One way to overcome such barriers is by establishing strategic partnerships and alliances. This strategy is related to the firm's capacity to "strategically align with partners who have already established specific knowledge to facilitate DT processes to reduce the risk of failure" (Siachou et al., 2021, p. 416), which may include consultants and service provider (Chanias et al., 2019). So much of what DT requires (e.g., idea generation, learning by doing, rapid iteration) comes from methods that entrepreneurs have been using for years (Guinan, 2019), which is why establishing partnerships with startups is another strategy commonly used by incumbents. Given that traditional organizations are rarely transformed digitally by themselves, they need to develop this strategic partnership and absorptive capacity to acquire the technical knowledge they might lack for overall long-term DT (Siachou et al., 2021).

An example of established companies that have successfully adapted to the digital world and overcome such barriers may be found in the market. The Walt Disney Company and its theme parks are an interesting example (Gurbaxani and Dunkle, 2019). The company invested USD $ 1 billion in MyMagic+, a digital platform that optimized the digital experience at Disneyworld. The initiative significantly improved the customer experience and led to greater operational efficiency of assets, people, and revenue growth. Moreover, Disney recently saw its streaming platform Disney+ (a new digital business that reflects its digital transformation) overtake Netflix and become the largest streaming in the world. Dremel et al. (2017) analyzed the evolution of Audi's analytics competence capabilities in the industrial sector. Through a successful DT journey, the German car manufacturer harnesses digital opportunities in digital business models through data-driven services (Dremel et al., 2017). By becoming digitally conscious and adopting digital business models (Saarikko et al., 2020), established organizations like Disney and Audi are approaching the group of companies known as

FAANG (Facebook, Apple, Amazon, Netflix, and Google), organizations born in the digital era and examples of successful digital businesses. In order to further the discussion about what is behind the DT of these companies, in the next session we debate the steps needed to reach the DT stage of the firm.

2.2 The digital transformation journey

DT is a continuous process of change that employs digital technologies to develop, update, or replace a new business model (Verhoef et al., 2019; Hess et al., 2016; Warner and Wäger, 2019), the collaborative approach and culture (Warner and Wäger, 2019), and allows the creation and appropriation of more value in the company (Verhoef et al., 2019). As a result, it promotes changes in products or organizational structures (Hess et al., 2016), better customer experience, and operation optimization (Fitzgerald et al., 2014). For Saarikko et al. (2020, p. 829), it is "the sociocultural process of adapting firms to the new organizational forms and skill sets needed to remain viable and relevant in a digital landscape." Therefore, it should not be seen as a single action but as a journey (Gobble, 2018), whose script should be conducted by defining and implementing the company's DT strategy (Hess et al., 2016; Matt et al., 2015; Tekic and Koroteev, 2019).

Although its starting point is the use of digital technology, the DT journey is not merely a technological process. Hence, companies need to be cognizant that DT is also strategic-centric, customer-centric, and organizational-centric (Loonam et al., 2018). Moreover, they must be aware that the strength of digital technologies does not lie in the technologies individually but comes from how companies integrate them to transform their businesses and work (Kane et al., 2015). Therefore, scholars and practitioners must consider the "digital" side, the "transformation" perspective, and how companies reinvent themselves to adapt to the digital scenario.

Starting a DT journey is a strategic decision whose motivations include firms' external or internal elements. The change in consumer behavior, new digital technologies, and competition with disruptive competitors (Warner and Wäger, 2019; Verhoef et al., 2019), as well as maintaining or increasing the market position (Hess et al., 2016; Ferreira et al., 2019), are some of the external triggers. From an internal perspective, the decision is usually anchored in the vision of shareholders and executives concerning the potential benefits arising from the use of new technologies. In this way, some companies see DT as an alternative to optimize processes, cut costs, offer new products

and services, and even change the profile of employees (Tekic and Koroteev, 2019). Nevertheless, others use it to improve how they connect and collaborate with consumers and suppliers and increase their quality of service (Cennamo et al., 2020; Ferreira et al., 2019).

Scholars have identified and discussed DT as a broader phenomenon that manifests itself on three different levels or dimensions: digitization, digitalization, and digital transformation (Gobble, 2018; Verhoef et al., 2019; Warner and Wäger, 2019; Saarikko et al., 2020;), whose terms have often been confused with other ones and used inconsistently. Eliminating this confusion, therefore, is necessary not only as a semantic exercise but as a strategic debate about the scope and potential value of DT for business.

Digitization is a technical process of converting analog information into digital information (Tilson et al., 2010; Gobble, 2018; Verhoef, 2019; Yoo et al., 2010); it allows one to dissociate form, function, and access and is a fundamental precondition for everything from smartphones to artificial intelligence (Saarikko et al., 2020). Brennen and Kreiss (2016) explained that it is the process of converting analog and noisy information into digital data. By doing so, it enables physical products to be programmable, communicable, and traceable (Yoo et al., 2010), although it does not change activities and processes of value creation (Verhoef et al., 2019). In the legal landscape, the conversion of physical contracts into digital documents (e.g., a PDF file) that will be stored and transmitted represents an example of this process.

Digitalization refers to the socio-technical process that applies digitization techniques to broader social and institutional contexts and takes advantage of digitized products or systems to develop new business processes (Tilson et al., 2010; Tilson et al., 2010; Brynjolfsson and McAfee, 2014), business models, or business offers (Brynjolfsson and McAfee, 2014). For Gobble (2018), it is about transforming all digitized information (bits) into value. According to Westerman et al. (2011), it is used to describe changes in the organization or business model due to the increasing use of digital technologies to improve business performance and scope and create powerful digital resources that are likely to have a transformative effect on the organization of economic activity (Autio et al., 2018). While digitization describes the transition from analog to digital information, "digitalization also includes how someone captures physical activities and converts them into virtual representations" (Saarikko et al., 2020, p.828), a phenomenon that is gaining strength with the growing use of IoT wearables and devices. Returning to the example mentioned above, let us consider that the digitized contract is loaded into a tool that puts it into a certain workflow (e.g., the multinational DocuSign solution), which allows people to access or digitally sign the contract anytime and anywhere. With it,

the process gained agility and increased efficiency, creating value and allowing us to identify it as an example of legal world digitalization.

While digitization and digitalization are essentially about technology, **Digital Transformation** is about strategy and organizational change (Rogers, 2016). It is a broader and more complex process that affects the entire organization and its way of doing business, and that has, in technology, a means to transform the business and achieve strategic objectives, and not an end in itself (Tekic and Koroteev, 2019; Amit and Zott, 2001). Therefore, we can say that companies digitize information and processes and digitally transform a business and its strategy. Hence, DT requires previous steps of digitization and digitalization on the way to building a digital business.

3. METHODOLOGICAL PROCEDURES

We conducted a systematic literature review (SLR), which allows researchers to map and evaluate the existing intellectual territory and manage the diversity of knowledge for a specific academic investigation (Tranfield et al., 2003). According to Tranfield et al. (2003, p. 209), "systematic reviews differ from traditional narrative reviews by adopting a replicable, scientific, and transparent process that aims to minimize bias through exhaustive literature searches of published and unpublished studies," which allows the procedures, decisions, and conclusions of the reviewers be better understood (Cook et al., 1997).

3.1 Review plan

For data collection, a research protocol was established (Table 1). From its use, we sought not to compromise the researcher's ability to be creative in the literature review process and, at the same time, to ensure that the reviews are less open to the researcher's bias than the more traditional narrative reviews (Tranfield et al., 2003).

The articles were selected from two databases among the most well-established and recognized in the scientific community: ISI Web of Science (WoS) and Scopus.

Table 1 - Search protocol

Inclusion criteria	Web of Science	Scopus
Terms	"Digital Transformation"	"Digital Transformation"
Field	Title	Title
Period	1990 – December 2021*	1990 – December 2021*
Document type	Article	Article
Research/subject areas	Management OR Business OR Economics	Business, Management, and Accounting OR Economics, Econometrics, and Finance
Language	English	English

* The database search occurred on 02/16/2022.

Next, articles published in academic journals with a Q1 index in the SCImago Journal Rank were selected, resulting in a sample of 126 articles. During the brief reading of the remaining 126 articles, in all articles in which DT was not identified as the main object of the research (27), the lens of analysis was not the firm (21), and DT was only used as a context (18) were discarded. Of the remaining articles, the researchers eliminated another 18 papers that focused on small and medium-sized enterprises (SMEs), startups or entrepreneurs, and 19 articles comprising literature reviews. 11 articles were removed from the sample because they focused on the public sector or social issues; seven further studies were excluded because they approached applications of specific technologies. An in-depth reading of the remaining 46 articles led to the exclusion of five more papers. One article addressed fintech discussion, two studies regarded DT and climate and social issues and two discussed digitization of an internal process.

In summary, we followed the following inclusion criteria: (1) term "digital transformation" in the article title; (2) articles published between 1990 and 2021; (3) document type "Article"; (4) articles in English; (5) articles from the fields of Management, Business, Economics, Accounting, Econometrics and Finance; and (6) articles from Q1 Journals.

Table 2 – Article selection procedures

Activity	Number of articles
Search for keywords at Scopus and WoS	680
Removal of the duplicates	543
Filter by articles with index Q1	126
A brief reading of the remaining articles	46
Deep reading of the remaining articles	41

4. RESULT ANALYSIS AND KEY FINDINGS

The main results of the systematic review indicate a field in constant evolution, with great interest from researchers and accelerated publication growth in the last three years. Moreover, the topic of DT is going through an important moment of transformation and still has some challenges until it becomes a consolidated field of research. The theme is already discussed mostly in journals with an academic approach, which suggests a certain maturity of the field. However, the predominance of practice-based research, especially case studies, and the existence of multiple concepts and approaches suggest that the knowledge construction journey around the DT phenomenon is just beginning. The first article in the systematic review was a case report published in 2003 in a practitioner-focused journal that explains the effects of new information technologies (NIT) in transforming industries and value chains (Andal-Ancion et al., 2003). The first academic paper was published by Gastaldi et al. (2018) and consisted of a multi-case analysis in the healthcare sector that understood how digital technologies can help organizations and improve the exploration-exploitation paradox over time. The 41 review articles received 2,927 citations in Scopus and 2,018 in WoS.

Table 3 – Articles with the highest number of citations

Authors	Year	Article	Review	Impact Factor (SJR)	WoS*	Sco*
Hess, Matt, Benlian and Wiesboeck	2016	Options for Formulating a Digital Transformation Strategy	MIS Quarterly Executive	2.001	331	520
Warner and Wäger	2019	Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal	Long Range Planning	3.239	263	326
Sebastian, Ross, Beath, Mocker, Moloney, and Fonstad	2017	How Big Old Companies Navigate Digital Transformation	MIS Quarterly Executive	2.001	195	295
Singh and Hess	2017	How Chief Digital Officers Promote the Digital Transformation of their Companies	MIS Quarterly Executive	2.001	161	218
Hansen and Sai	2015	Hummel's Digital Transformation Toward Omnichannel Retailing: Key Lessons Learned	MIS Quarterly Executive	2.001	108	167
Chanias; Myers and Hess	2019	Digital transformation strategy making in pre-digital organizations: The case of a financial services provider	Journal of Strategic Information Systems	4.021	103	152
Andal-Ancion, Cartwright, and Yip	2003	The digital transformation of Traditional Businesses	MIT Sloan Management Review	0.654	82	133

Dremel, Wulf and Brenner	2017	How AUDI AG Established Big Data Analytics in Its Digital Transformation	MIS Quarterly Executive	2.001	80	121
Correani, De Massis, Frattini, Petruzzelli and Natalicchio	2020	Implementing a Digital Strategy: Learning from the Experience of Three Digital Transformation Projects	California Management Review	3.793	60	78
Westerman G., Bonnet D.	2015	Revamping your business through digital transformation	MIT Sloan Management Review	0.654	52	85

Note: Aiming to present the most current number of citations, a new search was realized on 09/08/2022 specifically for this data.

Five of the ten most cited articles were published in MIS Quarterly Executive, a journal emphasizing practice-based research, as shown in Table 3. Moreover, MIT Sloan Management Review – a journal focused on how management practice is transforming in the digital age – represents another important journal in the field, with six articles (15%), as presented in Table 4.

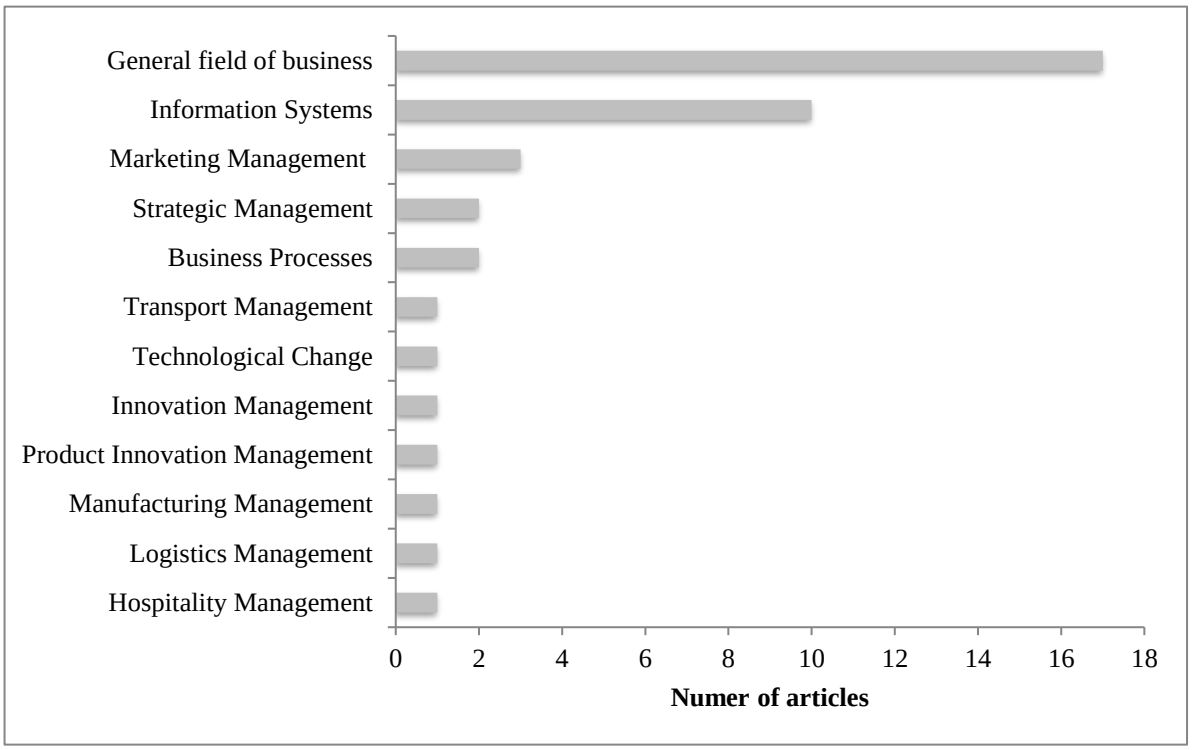
Table 4 – Journals and Reviews with the highest number of publications

Journal	No. of articles	% of 41
MIS Quarterly Executive	9	22%
MIT Sloan Management Review	6	15%
California Management Review	5	12%
Business Horizons	3	7%
Long Range Planning	2	5%
Business Process Management Journal	2	5%
Journal of Air Transport Management	2	5%

Despite this practitioners' focus, some analyses allowed us to identify that the DT field is not static and that scholars are on the way to building a more solid conceptual and academic basis for this important issue. First, even being one of the newest among the top studies most cited, the article with the second highest number of citations is an academic research published in a leading international journal for strategic management by Warner and Wäger (2019). The authors proposed a process model that explains how incumbents build dynamic capabilities for DT and provide an empirically grounded definition that conceptualizes the scope of DT. Second, despite the journals with a more practical approach appearing as first and second with the highest number of publications in DT literature, most reviewed articles (63%) came from academic journals. As shown in Figure 2, there are numerous approaches in the field, highlighting the presence of the service sector on the list. Three journals focus on different service industries (transport, logistics, and hospitality), and three journals

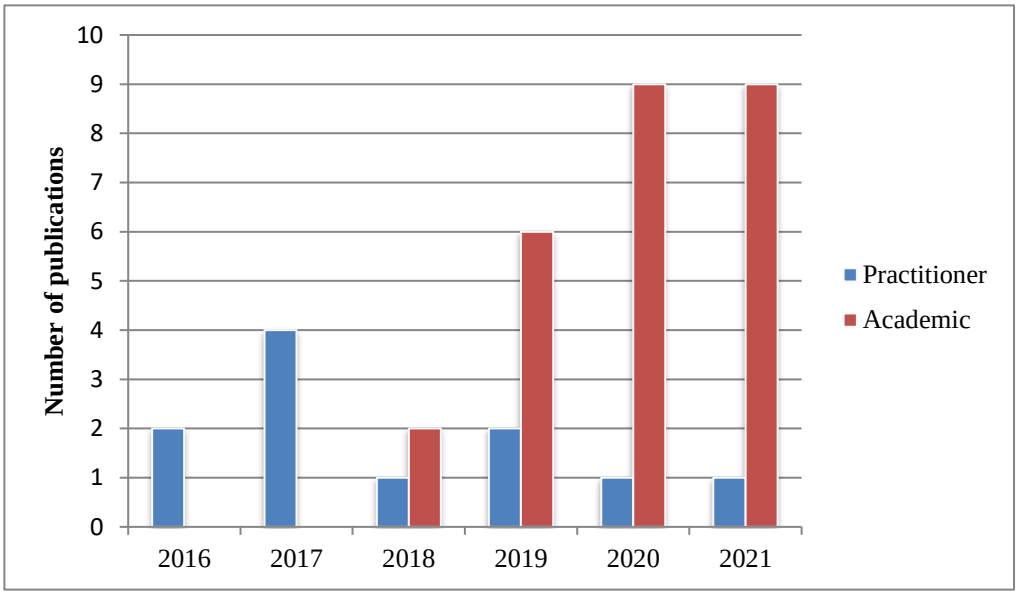
are on marketing topics, which indicates the importance of DT for this sector. Third and finally, scholars have begun to shed more light in this field of research, and since 2018, nearly 85% of the included DT studies have originated from academic journals.

Figure 2 – Academic journals' approach



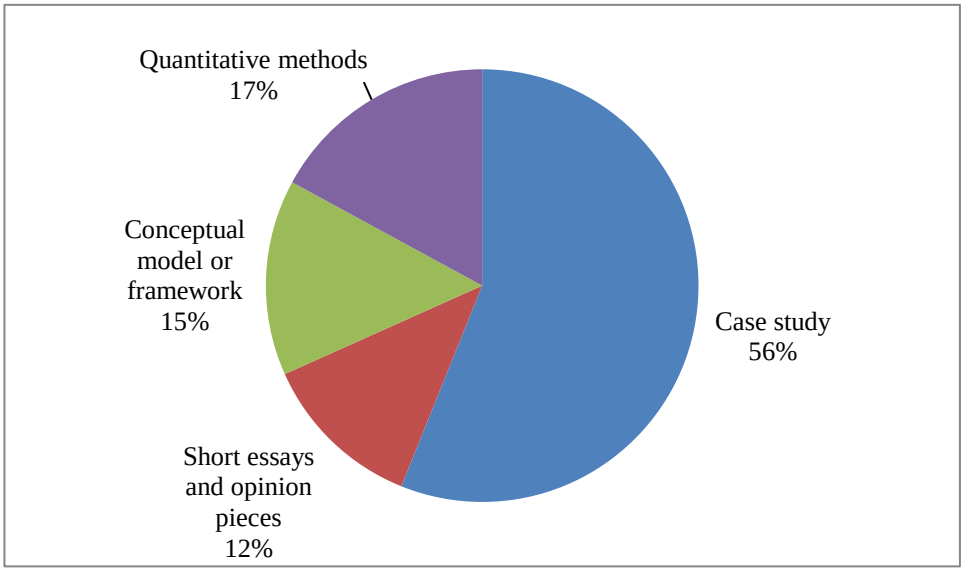
Most of the studies (28 articles, 68%) were published between 2019 and 2021, indicating that the DT field and interest are increasing each year. Ten articles were published at 2021, and one of them represents a novel perspective of the DT debate since it combines individuals' and firms' characteristics to approach the DT phenomenon. In this regard, the study by Porfírio et al. (2021), published in the Journal of Business Research, analyzed how firms' characteristics, associated with management characteristics, promote DT in Portuguese companies. The authors found that more democratic leadership styles, more coherent managers' actions towards the firm's mission, and more efficient strategic management processes are conditions that favor the development of DT processes. Their conclusions support leadership's crucial role in promoting more advanced stages of DT and shed light on a more "soft" perspective of DT.

Figure 3 – Number of Publications between 2016 and 2021 by Journal Focus



Almost 71% of the articles were based on case studies, short essays, and opinion pieces published in journals with an emphasis on practice (Figure 4). The significant use of the first is justifiable once case studies promote an understanding of what causes a phenomenon, linking causes and outcomes and fostering new hypotheses and research questions (Flyvbjerg, 2005), which is precisely what the DT field needs at this moment. Moreover, the lack of more sophisticated and quantitative research methods indicates the emerging stage of the topic, thereby indicating that scholars will require stronger conceptual formulation to make DT research a solid new field of research.

Figure 4 - Percentage of articles by methodology



In addition to more qualitative research methods, another characteristic of a research field that may indicate its initial stage is the absence of clear and disseminated definitions and different interpretations for the same phenomenon. Therefore, the following sections will focus on discussing some definitions of DT proposed by scholars and presenting an author's description of the ten dimensions of DT; this will set the basis for the conceptual framework presented at the end of the section.

4.1 Digital transformation definitions

As expected by the authors, a deeper look into the field shows that DT is a phenomenon with vastly different understandings by researchers, reflecting recent academic interest in this topic. It seems to be a consensus that digital transformation has new digital technologies as a starting point, but how it happens within the organization still points to different approaches. Hess et al. (2016) explained it as a change in the company's business model. Similarly, Verhoef et al. (2019) noted that it is about a change in how a firm employs digital technologies to develop a new digital business model. From another perspective, Warner and Wäger (2019) and Gurbaxani and Dunkle (2019) approached DT as a strategic renewal or reinvention. Finally, Saarikko et al. (2020) went further and highlighted DT as the sociocultural process of adapting firms to the new organizational forms and skills in a digital landscape. Table 5 lists the definitions employed by the authors.

Table 5 – Definitions of digital transformation

Authors	Definition	Key point of DT according to the authors
Hess et al. (2016, p. 124)	"Digital transformation is 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."	Changes in the business model
Gobble (2018, p. 66)	"Digital transformation is a journey, and a journey needs a map—in this case, a clear roadmap driven by a digital strategy."	A transformational journey
Warner and Wäger (2019, p. 344)	"Digital transformation is an ongoing process of strategic renewal that uses advances in digital technologies to build capabilities that refresh or replace an organization's business model, collaborative approach, and culture."	An ongoing process of strategic renewal
Gurbaxani and Dunkle (2019, p. 3)	"Digital transformation – the reinvention of a company's vision and strategy, organizational structure, processes, capabilities, and culture to match the evolving digital business context."	Company reinvention
Verhoef et al. (2019, p. 889)*	"A change in how a firm employs digital technologies, to develop a new digital business model that helps to create and appropriate more value for the firm;"	Changes in the business model
Saarikko et al. (2020, p. 829)	"Digital transformation is the sociocultural process of adapting firms to the new organizational forms and skill sets needed to remain viable and relevant in a digital landscape."	A sociocultural process

* Articles that correspond to other readings, identified from the systematic review, but are not part of the systematic review article group.

4.2 Digital transformation dimensions

We identified nine dimensions of the DT phenomenon, confirming the multidisciplinary character of the topic (Verhoef et al., 2019). In general, these dimensions were identified in frameworks (Hess et al., 2016; Warner and Wäger, 2019; Correani et al., 2020), theoretical constructions (Tekic and Koroteev, 2019; Solberg et al., 2020), and case studies (Sebastian et al., 2017; Lam and Law, 2019; Gurbaxani and Dunkle, 2019; Cichosz et al., 2020), all of which discussed the DT process. In addition, the frequency and how these dimensions were mentioned in the articles were considered for analysis even though they were not part of deeper theoretical constructions. This approach is justified due to the initial stage of DT research in the academic community. Lastly, we listed the main topics describing each dimension that require further studies, as shown in Table 6.

The formulation and implementation of a **digital transformation strategy** (DTS) is the first dimension and from where the DT debate emerged, especially in the information systems (IS) literature. A DTS can be defined as a clear strategic vision map (Gobble, 2018), in which both IS and business strategy are equal (Chanias et al., 2019), that guides the DT journey by leveraging digital resources to create differential value (Bharadwaj et al., 2013). Chanias et al. (2019) emphasized that a DTS is business-centric and customer-oriented in its perspective, which is why we believe that this dimension plays a crucial role in connecting the other DT dimensions. Furthermore, Hess et al. (2016, p. 125) reported that such a strategy "can act as a unifying concept to integrate all coordination, prioritization, and implementation efforts of a firm's DT efforts," reinforcing its integrating role.

A firm's approach and capability to explore and exploit new **digital technologies** and **data** are two other important DT dimensions (Hess et al., 2016). The first is related to the firm's ability to adopt technologies for creating and appropriating value, understanding it as a means for DT, and not an end in itself. The second demonstrates the organization's capacity to "carefully gather the right data for the firm's needs and to build on the benefits that they bring" (Saarikko et al., 2020, p.835), creating a data-driven culture that encourages the use of data in decision-making processes within the organization. In line with this, Dremel et al. (2017) described the journey of AUDI AG – a traditional German car manufacturer, as it adopted and assimilated big data analytics and started to use data-driven insights in its DT journey.

A business model transformation is intimately related to the DT discussion, which is why the **business model** represents our fourth dimension, although it is pointed out differently in the context of DT. Tekic and Koroteev (2019) noted that the level of readiness of a business model for digital operation is a critical dimension of digital transformation strategies. Warner and Wäger (2019) argued that the scope of each DT is contingent on the strategic renewal of an organization's business model. Finally, Cennamo et al. (2020) reported that DT results in three different types of business model transformation: data-driven processes, ecosystems, and platforms.

The development of firms' **dynamic capabilities** (DC) in the DT landscape is an emerging topic that requires further investigation but which we comprehend as being a critical dimension of the DT journey. From 2019 onwards, exploring DC in the context of DT has been of great scholarly interest (Warner and Wäger, 2019; Ellström et al., 2022; Ghosh et al., 2022). Warner and Wäger (2019) addressed DT as an ongoing process of strategic renewal that uses advances in digital technologies to build digital sensing, digital seizing, and digital transforming capabilities in the traditional industry. The authors identified nine digitally grounded microfoundations (e.g., sub

capabilities) that underpin the building of dynamic capabilities for DT and reported that incumbents must build a system of dynamic capabilities for the DT process. Ellström et al. (2022) and Ghosh et al. (2022) extended the digital framework developed by Warner and Wäger (2019), by incorporating additional factors for dynamic capabilities for DT. The first suggest that "digital transformation should be achieved through separate digitalization projects and that new digital systems and solutions need to be integrated with the existing digital infrastructure and made easily accessible for the entire" (Ellström et al., 2022, p.281). The second highlight the boundary conditions of digital transformative capabilities (DTC) and DT, expanding on critical contingencies that act in favor of (eg: ecosystem partnerships), or against (e.g. path dependency), the development of DTC in industrial businesses (Ghosh et al., 2022).

Developing dynamic capabilities to support the DT process requires investments and economic and strategic planning. Therefore, a **capital** dimension, which considers a firm's ability to finance a DT endeavor (Hess et al., 2016), must be on the agenda of practitioners and scholars. Furthermore, it is supposed to reflect a company's capacity to fund strategic digital initiatives within a context of uncertain returns (Gurbaxani and Dunkle, 2019).

Given that DT is a process that affects the whole company and its ways of doing business (Amit and Zott, 2001), it requires a **structural** modification and **governance** architecture implementation that allows DT process to occur internally with low friction levels and few barriers. Similarly, in the discussion in the innovation literature (Tushman and O'Reilly, 1996), Hess at al. (2006) noted that managers must decide whether digital structures should be integrated into existing structures or be located in independent entities. Moreover, in an ambidexterity context, Smith and Beretta (2020) highlighted that digital innovation has a higher level of complexity and ambiguity than traditional innovative activities since organizational members have to deal with various interconnected and related tensions. In terms of DT governance, scholars have highlighted the roles and responsibilities of the Chief Digital Officer and Chief Information Officer as major leaders of the DT (Hansen and Sia, 2015; Singh and Hess, 2017; Chanias et al., 2019; Singh et al., 2019; Firk et al., 2021). From an operational perspective, the need for cross-functional teams and cross-departmental processes that foster collaboration and resist silo-building is an additional special issue highlighted by scholars (Warner and Wäger, 2019; Hansen and Sia, 2015; Dremel et al., 2017; Zaki, 2019; Gobble, 2018). Besides structural changes, the organization must foster a culture that supports digitalization, encourages risk-taking and new thinking, enables autonomy, and rewards innovators (Gobble, 2018; Gurbaxani and Dunkle, 2019). Moreover, it must promote learning from doing

mindset and rapid iteration (Guinan et al., 2019), flexibly, collaboratively, and interdisciplinary (Chanias et al., 2019), which makes agile methods a central point in the DT process. By doing so, organizations will be "introducing entrepreneurial process approaches that enable them to think and act more like a startup" to overcome the cultural challenge often brought up as the main reason for poor DT performance (Guinan et al., 2019, p. 722; Wade and Shan, 2020).

Culture and **people** are intimately connected, albeit we have decided to account for the second as a specific dimension in our framework, given the latest attention this topic has received and its importance to organizations. A multilevel study by Guinan et al. (2019) revealed that the digital project team was a critical unit of analysis and the team's characteristics separated positive DT experiences from negative ones. Eden et al. (2019) identified three workforce transformation practices — flexing, deepening, and revitalizing — that facilitated an interlinked digital and workforce transformation and helped overcome the significant challenges. Moreover, Solberg et al. (2020) reported that employees' beliefs about technological change and their "digital mindsets" are likely to influence their engagement in, or withdrawal from, their company's DT initiatives. Hence, it is reasonable to take a closer look at people's issues in a DT journey; this is in line with Gobbe (2018), who observed that DT and digital strategy are more about people than anything else.

Table 6 – Digital transformation dimensions

Dimension	Description	Topics	Authors
DTS – digital transformation strategy	The digital transformation strategy is a guide for the company DT journey and, therefore, should reflect the future vision, goals, and steps needed to achieve this vision in a digital landscape. By leveraging digital technologies, DTS combines business and technology strategies to create value for the stakeholders.	● IT strategy ● Business strategy ● DTS formulation ● DTS implementation	Hess et al. (2016); Sebastian et al. (2017); Chanias et al. (2019); Correani et al. (2020); Gurbaxani and Dunkle (2019); Büyüközkan et al. (2021)
Digital technologies	It reflects a firm's ability to adopt and explore digital technologies to achieve the DT vision. Digital technologies are a condition for the DT but not its final goal. It is a means and an enabler to deliver the DTS.	● Artificial intelligence ● Big Data ● Analytics ● IOT ● Cloud computing ● Mobile	Hess et al. (2016); Warner and Wäger (2019); Lam and Law (2019); Gurbaxani and Dunkle (2019); Saarikko et al. (2020); Dremel et al. (2017); Tekic and Koroteev (2019)
Data	Data are among the most important resources of the DT process and are the basis for building a digital business model. In a digital landscape, their property and exploration capacity represent companies' competitive advantage.	● Data driven ● Analytics capabilities ● Data ownership	Correani et al. (2020); Halpern et al. (2021); Lam and Law (2019); Saarikko et al. (2020); Dremel et al. (2017)

Business model	This dimension reflects the firm capacity to renew its business model through digital technologies or to create new digital business models.	● New business models ● Digital business model	Warner and Wäger (2019); Tekic and Koroteev (2019); Cennamo et al. (2020); Correani et al. (2020); Bonnet and Westerman (2021)
Dynamic Capabilities	The firm's ability to build sensing, seizing and reconfiguring capabilities leveraged by technology which will become a source of competitive advantage.	● Dynamic capabilities ● Digital capabilities	Warner and Wäger (2019); Magistretti et al. (2021); Ellström et al. (2022)*; Ghosh et al. (2022)*
Capital	Financial capital represents another important resource of DT and reflects a firm's ability to make significant investments in a context of expressive uncertainty.	● Financial aspects	Hess et al. (2016); Lam and Law (2019); Gurbaxani and Dunkle (2019); Ekman et al. (2020)
Structure and governance	This dimension reflects all organizational arrangements, internal and external structures, processes, governance mechanisms, and roles that must be orchestrated to achieve DT outcomes.	● Integration x separation ● Organizational design ● Roles (CEO, CDO, CIO) ● Cross-functional teams	Hess et al. (2016); Sebastian et al. (2017); Singh and Hess (2017); Chanias et al. (2019); Lam and Law (2019); Singh et al. (2019); Firk et al. (2021); Sia et al. (2021)
Digital culture	Digital culture contemplates the behaviors, knowledge, and attitudes required to support the firm in an intensive business transformational process (DT). Moreover, it should foster a digital mindset inside the firm.	● Change management ● Innovation culture ● Digital mindset ● Startups culture	Warner and Wäger (2019); Chanias et al. (2019); Guinan et al. (2019); Gurbaxani and Dunkle (2019); Solberg et al. (2020); Halpern et al. (2021)
People	People dimension is about the skills, competencies and beliefs acquired or which will need to be developed by the workforce to reach DT goals.	● Digital mindset ● Workforce transformation ● Skills and capabilities	Guinan et al. (2019); Correani et al. (2020); (Gobble, 2018); Solberg et al. (2020); Porfírio et al. (2021); Warner and Wäger (2019)

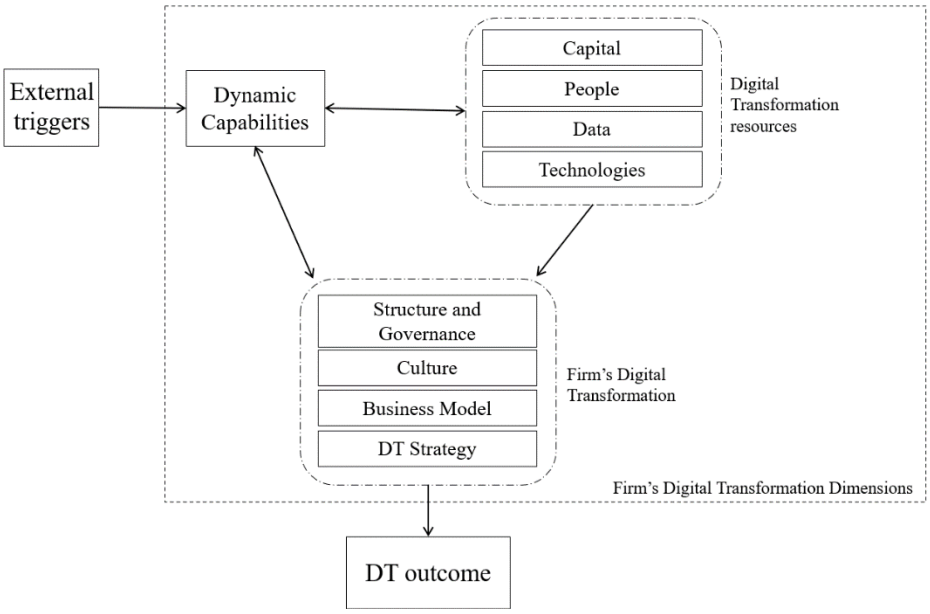
* Articles that correspond to other readings, identified from the systematic review, but are not part of the systematic review article group.

After identifying the DT dimensions, we could build a conceptual DT framework from this systematic review. As shown in Figure 5, a digital transformation journey is usually initiated from external triggers that pressure incumbent firms to rethink and reconfigure their business. Disruptive digital competitors, changing consumer behaviors, and disruptive technologies (Warner and Wäger, 2019), as well as the COVID-19 pandemic are some examples of these external forces. To formulate appropriate responses to this external environment of the digital revolution, firms need to develop and mobilize dynamic capabilities for digital transformation; for example, digital sensing, digital seizing and digital transforming (Warner and Wäger, 2019) or digital transformation capability

(Ghosh et al., 2022). The higher the level of the firm's dynamic capabilities, the greater its conditions to promote the necessary changes for the digital transformation process. Dynamic capabilities will enable the firm to modify and deploy its resource base (Helfat et al., 2007) for the digital transformation. In our framework, four dimensions – capital, people, data, and digital technologies – correspond to internal critical resources of a digital transformation journey. By mobilizing dynamic capabilities to employ internal resources, firms will be able to implement a digital transformation that we understand as the renewal of a structure, business model, culture, and strategy by employing new digital technologies. To successfully digitally transform, they should a) define and implement a digital transformation strategy that guides the firm's vision for the future; b) promote a organizational structure redesign with the implementation of governance mechanisms that facilitate transformation and inhibit barriers; c) transform the current business model into one that has technology as a business lever or to develop a new digital business model and d) promote a culture that foster digital thinking and lays the foundations for the digital organization that it seeks to achieve.

Figure 5 – The phenomenon of digital transformation: a conceptual framework.

Note: The arrows do not represent a statistical relationship or a causality found in variance models. Rather, they detail an overarching sequence of relationships identified in the literature on DT.



By building dynamic capabilities that enable the restructuring of internal resources and firm's digital transformation, the firm will be able to create and add value from its digital

transformation process. This new value, which we understand to be the result of digital transformation, can be materialized in a new digital business model, new products and services, better consumer experience and operation optimization.

5. CONCLUSION AND DIRECTIONS FOR FUTURE RESEARCH

This paper sought to elucidate the main dimensions of digital transformation in the business context to help practitioners and scholars deal with the challenges of DT. More specifically, we aimed to identify main characteristics of existing research on digital transformation in the areas of business and management.

First, our research identified that DT is in its initial stage and has great opportunities as a field to be investigated. Of interest to more and more researchers, with an academic production in accelerated growth and among the priorities of executives and companies, this topic is still dominated by case studies in journals with an emphasis on practice-based research, which sheds light on the need for conceptual stronger constructs. Nevertheless, some clues demonstrate that this scenario is changing, including a large number of citations in the study by Warner and Wäger (2019) and the fact that researchers have started to bring attention to the field (since 2018, nearly 85% of the DT studies included in the systematic review have originated from academic journals).

A central contribution of our study is the identification and consolidation of DT dimensions in a multidisciplinary perspective that considers “hard” dimensions, and this is usually regarding DT origin in the information systems literature as well as “soft” dimensions, which shed more light on the necessity to understand people, culture, and leadership issues also as important topics in DT field. These dimensions may help guide practitioners and scholars in dealing with the challenges of DT. For companies and executives, this represents a complete map to guide the development of digital transformation strategies to guarantee that all topics regarding a DT journey will be on the agenda. For scholars, it illustrates different approaches to the phenomena and a range of options for further investigations and future research. Finally, as a result of this study, we contribute to the literature by providing a conceptually grounded definition that conceptualizes the digital transformation phenomenon as follows:

Digital transformation is a journey of organizational change, in which a firm combines internal resources and dynamic capabilities to employ new digital technologies and transform its structure, business model, culture, and strategy to maintain its relevance in the digital landscape.

Despite our promising findings, this study has some limitations that must be considered. The main limitations could be related to the methodology. Although we searched for papers in two databases among the most well-established in the scientific community, we could not examine all of the literature. For future research, we suggest researchers use more papers for quality assessment in order to enhance the consistency and acceptance of the work on DT. Moreover, the accelerated growth of the field requires future studies to capture the directions it is taking.

To advance this work, future research could also explore individually and deeply the nine DT dimensions identified, contributing to a better understanding of the phenomenon. Lastly, other topics that deserve attention by scholars are the risks and boundaries of the use of data by companies and adopting platform business models as vehicles for digital transformation processes.

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APPENDIX 1 - Systematic Literature Review Articles

Paper ID	Article
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2	Andriole, S.J. (2017). Five Myths About Digital Transformation. *MIT Sloan Management Review*, 58(3), 20–22.
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35	Solberg, E., Traavik, L. E., Wong, S. I. (2020). Digital Mindsets: Recognizing and Leveraging Individual Beliefs for Digital Transformation. *California Management Review*.

36	Tekic, Z., Koroteev, D. (2019). From disruptively digital to proudly analog: A holistic typology of digital transformation strategies. *Business Horizons*, 62(6), 683–693.
37	Wade, M., Shan, J. (2020). Covid-19 Has Accelerated Digital Transformation, but May Have Made It Harder Not Easier. *MIS Quarterly Executive*, 19(3), 7.
38	Warner, K.S.R., Wäger, M.(2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, 52, 326-349.
39	Westerman, G., Bonnet, D. (2015). Revamping Your Business Through Digital Transformation, *MIT Sloan Management Review*, 56(3), 10–13.
40	Westerman, G. (2016). Why digital transformation needs a heart. *MIT Sloan Management Review*, 58(1).
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4. ARTICLE II

DIGITAL TRANSFORMATION OF INCUMBENT COMPANIES: A CROSS-CASE ANALYSIS

Wagner Lopes

Fernanda Reichert

ABSTRACT

The digital revolution is transforming the industrial landscape. More specifically, it has presented a key challenge to established companies that need to balance exploiting existing capabilities while also building digital capabilities. To overcome these challenges, incumbents have get on board of digital transformation journeys and transformed their strategy, structure, culture, and business model. This phenomenon has been of great interest to academics and practitioners, yet few studies have analyzed digital transformation from the lens of dynamic capabilities. In order to advance this discussion, we analyzed the digital transformation journey of incumbent companies through a cross-case analysis. Our results reveal the dynamics of the digital transformation process and its characteristics in incumbent firms from the analysis of the dimensions of digital transformation. We also demonstrated how incumbent firms have mobilized dynamic capabilities to employ internal resources to take advantage of the digital revolution, and identified data and technologies as key resources in a digital transformation journey. Finally, our study also highlights the key outcomes and innovations resulting from a digital transformation process.

Keywords: Digital transformation. Digital Revolution. Dynamic Capabilities. Cross-sector Analysis. Incumbent Companies.

1. INTRODUCTION

The digital revolution is changing the industrial landscape. Due to new digital technologies, both competition and consumer behavior are changing dramatically in response to this revolution (Verhoef et al., 2019). In this scenario, digital technologies can be either transformative or disruptive depending on one's ability to harness its potential. (Saarikko et al., 2020). The COVID-19 pandemic has accelerated transformation (Priyono et al., 2020), but also has created a unique condition wherein transformation resistance ceased as it became inevitable for survival (Reuschl et al., 2022). Thus, more and more organizations are embarking on transformation journeys to remain competitive in the digital world.

Digital transformation (DT) has become a strategic topic on leadership agendas (Singh and Hess, 2017) and has been chosen by established companies as the path to adapt to the digital landscape. DT is especially critical for incumbent firms because they are increasingly competing with disruptive digital start-ups (Snow et al., 2017). The last ones do not need to transform digitally because they have embraced digital technologies since their inception with operating models and capabilities based on exploiting internet-era information and digital technologies as a core competency (Panetta, 2016). Incumbent companies, however, need to balance the exploitation of existing capabilities while also building DT capabilities (Ghosh et al., 2022) and dynamic capabilities for DT (Warner and Wäger, 2019) to maintain their competitiveness.

Even if senior leadership teams are internally motivated, incumbent firms face significant challenges to support the DT of business models, structures, and processes (Hess et al., 2016). And despite its great potential, managers have reported that more than 70% of DT projects fail (Saldanha, 2019) once incumbent firms often struggle with DT due to complex information technology setups and organizational inertia (Vial, 2019). On the one hand, incumbents are at a disadvantage when compared to new startups that are often built on new digital technologies. On the other hand, industrial players should be better positioned to capture the additional value that the latest technological innovations can create (Markman et al., 2019). In that regard, prior research has highlighted that firms that control the customer relationship, the intellectual property, and the complementary assets are better positioned to capture value from new technological innovations (Jacobides et al., 2006; Teece, 2018).

As with every recent phenomenon of interest, DT still has different interpretations. According to Fitzgerald et al. (2014), it can be defined as the use of new digital technologies to enable major business improvements (e.g. improving customer experience or optimizing operations). Verhoef et al. (2019) define it as a change in the way a company employs digital technologies to develop a new digital business model that helps to create and appropriate more value for the firm. Warner and Wäger (2019, p.334) argue that is "an ongoing process of strategic renewal that uses advances in digital technologies to build capabilities that refresh or replace an organization's business model, collaborative approach, and culture." In the present study, we consider DT as **a journey of organizational change, in which a firm combines internal resources and dynamic capabilities to employ new digital technologies and transform its structure, business model, culture and strategy to maintain its relevance in the digital landscape.**

Firms need to develop some specific capabilities to exist and to thrive (Zawislak et al., 2012), and the dynamic capabilities (DC) provide a consistent approach for studying DT (Ellström et al., 2022), especially because they brings the discussion about DT into the strategic management domain, given DT origins in information systems literature. DC contributions have been found most useful in contexts marked by environmental turbulence and rapid change (Teece, 2007), precisely the conditions faced by incumbents in DT. Moreover, adaptation to technological change has often been studied from the lens of DC (Teece, 2007; Warner and Wäger, 2019). From 2019 onwards, exploring DC in the context of DT has been of great scholarly interest (Vial, 2019; Warner and Wäger, 2019; Ellström et al., 2022; Kraus et al., 2022; Ghosh et al., 2022). For instance, Kraus et al. (2022) identified that the topic "dynamic capabilities" was a driver keyword in 2019 and 2020 in DT studies. Vial (2019) proposes DC as a theoretical foundation to study those mechanisms that enable firms to engage with DT to enable strategic renewal. Ellström et al. (2022, p.275) highlight that "the two concepts of DC and DT coincide as digital technologies can fundamentally reshape traditional businesses and require firms to respond to new market opportunities". While Kraus et al. (2022, p.13) highlight DC "as key capabilities, not only in terms of being ready for DT, but also able to exploit its potential".

Thus, to better understand what is behind this phenomenon that has been heavily impacting so many incumbent firms, a study is needed to delve into the characteristics of digital transformation in different industries. Consequently, in this paper, our main objective is *to analyze the digital transformation journey of incumbent companies.* To address this question, we present multiple case research on the DT of three incumbent firms that are leaders in their industry and actively engaged in

digital transformation initiatives. The study draws on interviews with senior leaders (Whittington, 2006), thus emphasizing the leader's point of view concerning the practice of strategic activities for DT. This method allowed us to identify the similarities and differences in terms of DT practices across industries, which is in line with some studies that identified that DT and the adoption of new digital processes may differ depending on the particular sector (i.e.: Carcary et al., 2016; Ferreira et al., 2019).

This paper is structured as follows. Section 2 presents a theoretical background focused on DT frameworks and dynamic capabilities literature. In the next section, we present the methodological procedures. In section 4 our results and main findings are presented and discussed. Finally, a debate and conclusion is stated in section 5.

2. THEORETICAL BACKGROUND

2.1 Digital transformation frameworks

The DT field of research has received great attention from scholars, with fast growth of academic production from 2016. The issue emerged as an important phenomenon to be studied in Information Systems research (Bharadwaj et al., 2013; Piccinini et al., 2015; Matt et al., 2015; Hess et al.,2016) as well as by practitioners (Fitzgerald et al., 2014; Westerman et al., 2011). More recently, the topic has also been discussed from a strategic management perspective, as noted in the work of Warner and Wäger (2019). In the next paragraphs, we will present an overview of some conceptual frameworks that seek to explain the phenomenon of digital transformation.

Hess et al. (2016) developed a conceptual framework for formulating a digital transformation strategy and identified four key dimensions for digital transformation: (a) *use of technologies*, which reflects a firm's capability to explore and exploit new digital technologies; (b) *changes in value creation* derive from the way in which digital technologies alter a firm's business; (c) *structural changes* refer to the modifications in organizational structures, processes and skill sets that are necessary to deal with DT; and (d) *financial resources* will be necessary to carry out transformational initiatives. The article has some limitations as it does not consider dimensions that are recognizably

important such as the strategic use of data (Correani, 2020) and an organizational strong digitally oriented culture that encourages the transformation (Warner and Wäger, 2019).

Another perspective from the IS field of research was presented by Vial (2019), summarizing current knowledge on DT. The author analyzed eight overarching building blocks that detail a sequence of relationships described by the literature on DT. According to Vidal (2016, p.118), digital transformation is "a process where digital technologies create disruptions triggering strategic responses from organizations that seek to alter their value creation paths while managing the structural changes and organizational barriers that affect the positive and negative outcomes of this process". Although the article presents a perspective from IT-enabled transformation, the author approaches the innovation literature once it presents a research agenda proposing the study of how Dynamic Capabilities contribute to DT. This approach is also present in the study of other researchers (Warner and Wäger, 2019; Ellström et al., 2022; Kraus et al., 2022; Ghosh et al., 2022) and will be used as a theoretical lens for analyzing the digital transformation of incumbent firms.

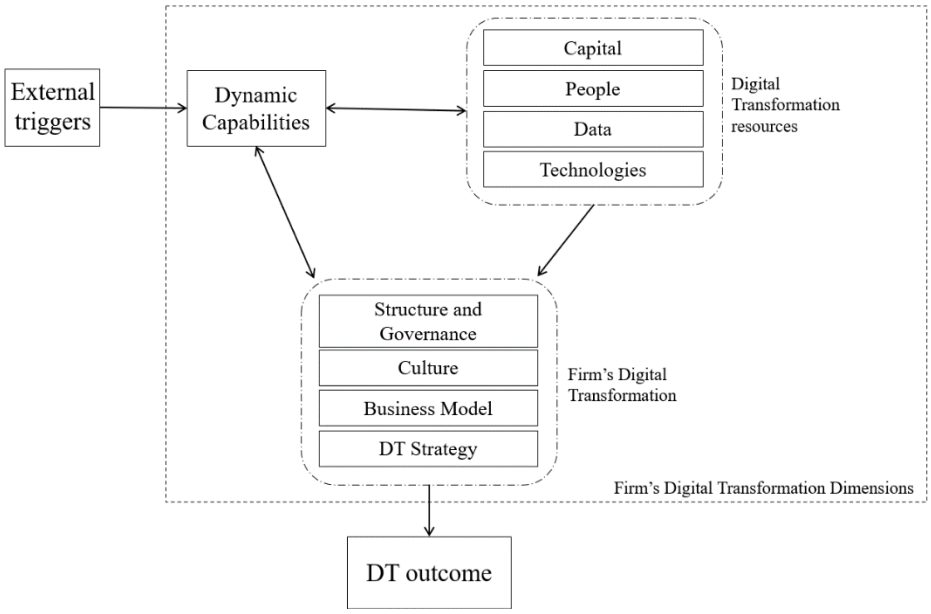
The exploration of how incumbent firms in traditional industries build dynamic capabilities for digital transformation is central in Warner and Wäger (2019) research. The authors propose a process model comprising nine micro foundations to reveal the generic contingency factors that trigger, enable, and hinder the building of dynamic capabilities for digital transformation. Warner and Wäger (2019, p. 338) explain that DT "often starts with the strategic renewal of the incumbent's business model and changes in business models, tending to lead to wider changes in the firm's collaborative approach, which, if executed correctly, will eventually lead to deeper changes in organizational culture." In sum, the paper advances the discussion about DT once it provides empirical insights into what types of digitally based dynamic capabilities might be required for DT.

Extending the digital transformation framework developed by Warner and Wäger (2019), Ghosh et al. (2022) propose an integrative framework for Digital Transformative Capability (DTC) after an exploratory qualitative study with five of the world's largest technology companies undertaking digital transformation. The authors highlight capabilities required for digital transformation and the critical aspects that need to be in place for success in developing DTC. Moreover, the integrative framework "demonstrates how the three core capabilities of digital sensing, digital seizing, and digital reconfiguring manifest through associated capabilities of Strategic Sensing, Rapid Prototyping, Organization Structure, Business Model Transformation, and Cultural/Mindset Transformation" (Ghosh et. al, 2022, p.1).

Finally, our theoretical framework of digital transformation highlights the relationships between external triggers, dimensions of the firm, internal resources, and firm's capabilities, as shown in Figure 6.

Figure 6: The phenomenon of Digital transformation: a conceptual framework.

Note: The arrows do not represent a statistical relationship or a causality found in variance models. Rather, they detail an overarching sequence of relationships identified in the literature on DT.



According to article 1, DT journey is initiated from external triggers that pressure incumbent firms to reconfigure their business. To formulate appropriate responses to this external environment of the digital revolution, firms need to develop and mobilize dynamic capabilities that will enable the firm to modify and deploy its resource base for the DT. Capital, people, data, and digital technologies are understood as resources dimensions of the DT process. By mobilizing dynamic capabilities to employ internal resources, firms will be able to implement a DT that we understand as the renewal of a structure, business model, culture, and strategy by employing new digital technologies. Then firms will be able to generate a new value from their DT process in the form, for example, of a new digital business model, new products and services, better consumer experience, operation optimization. See article one for more detail on the framework.

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2.2 Dynamic Capabilities

The Dynamic Capabilities (DC) framework has become one of the most important topics in the business literature once it provides elements to explain how firms respond to rapid technological and environmental change (Eisenhardt and Martin, 2000; Teece, 2007; Teece et al., 1997). This view of the firm identifies DC as an important source of sustainable competitive advantage in a changing and turbulent landscape (Teece and Pisano, 1994; Teece et al., 1997), such as those influenced by digital technologies.

Dynamic Capabilities are defined as 'the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments (Teece et al., 1997, p.516). They are harder to replicate (Teece, 2014), support evolutionary fitness (Helfat et al., 2007) and govern the rate of change in a firm's ordinary capabilities (Teece, 2007). In contrast, ordinary capabilities enable the firm to perform operational tasks such as accounting, human resources management, logistics, and marketing, but they are easily replicable in a digital environment and no longer support a durable competitive advantage. Helfat and Winter (2011, p.1244) highlight that operational capabilities are ordinary in the sense they help a firm to maintain its status quo, but this leaves the firm vulnerable to environmental changes. Therefore, in a changing environment, firms need DC to reconfigure ordinary capabilities in order to fit new challenges, deploy new capabilities and maintain and increase competitiveness (Alves et al., 2017).

Teece (2007) describes DC as a firm's capacity to sense opportunities and threats, to seize opportunities and to transform the organization's business model. When necessary, this capacity allows the reconfiguring of a business enterprise's intangible and tangible assets, as needed to innovate and respond to changes in the market (Teece, 2007). Strong DC can serve as a firm foundation for sustainable competitive advantage and this is especially true the more deeply the capabilities are in the organization and the less they are resident only in the top management team (Teece, 2007). DC are hard for rivals to replicate because they are built on the idiosyncratic characteristics of entrepreneurial managers and the history-honed routines and culture of the organization (Teece, 2014). Similarly, Teece and Leih (2016, p.7) emphasize that DC must be built rather than bought because "ordinary capabilities are about doing things right, DC are about doing the right things." In sum, DC enables firms to innovate and to adapt to changes in their environment through three main mechanisms (Teece, 2007): sensing, seizing and transforming.

Sensing (and shaping) new opportunities (and threats) comprise activities that help firms constantly scan, create, learn, filter and interpretative activity that analyzes diverse information about trends in the business ecosystem (Teece, 2007). In that regard, sensing capabilities require access to data, facts, and information and the ability to interpret and shape new developments (Chirumalla, 2021). Hence, sensing should occur at all organizational levels, with lower levels helping to provide information about and insights into external trends to middle and top managers (Teece and Linden, 2017). By sensing and analyzing the new context of the customer, this capacity enables companies to gain deep insight into customer motivations and to create personalized customer value (Goerzig and Bauernhansl, 2018), reason why it is strategic for enterprises since customers are sometimes amongst the first to perceive the potential for applying new technology (Teece, 2007).

Seizing capabilities includes those activities that facilitate the development of a new product, new process technology, and services from sensed opportunities (Teece, 2007). According to Teece (2007, 1326) "addressing these opportunities involves maintaining and improving technological competences and complementary assets and then, when the opportunity is ripe, investing heavily in the particular technologies and designs most likely to achieve marketplace acceptance." Seizing opportunities requires understanding resource needs, making decisions pertaining to investing in technology and other resources, and then managing appropriate changes (Chirumalla, 2021). For that reason, firms should not only be flexible, agile, and dynamic to exploit opportunities, but also understand the bigger picture and underlying limitations for the changes (Warner and Wäger, 2019). Hence, building a firm's digital leveraging competences and internal infrastructures to enable various agile responses is key for seizing opportunities (Sambamurthy et al., 2003).

Sensing and seizing capabilities help create and discover opportunities, but to perform a digital strategy, firms need *transforming capabilities* to realize the full potential of strategic change (Bharadwaj et al., 2013; Teece and Linden, 2017). In that regard, *reconfiguration capabilities* include activities that combine, integrate, recombine, and reconfigure firms' internal processes, routines, assets, organizational structures, values, and culture to match seizing opportunities (Teece, 2007). Day and Schoemaker (2016, p. 65) report that an organization with "transforming capabilities is one where agile, entrepreneurial mindset is actively cultivated within, with a broad expansive approach to external network-building as well." Hence, to be successful, firms must overcome their structural rigidity, developed hierarchies, and rules and procedures over time, pursuing decentralization and considerable autonomy (Chirumalla, 2021) and including redesigned routines (Harris and Kaefer, 2013). Warner and Wäger (2019) also found that improving the workforce's digital maturity and

redesigning internal structures are fundamental for building reconfiguring capability for digital transformations.

Building sensing, seizing, and transforming capabilities thus allows a firm to craft future strategy that designs, creates, and refines a business model, guides organizational transformation, and provides a durable source for obtaining a competitive advantage (Teece, 2018). Interestingly, Warner and Wäger (2019) found that the ubiquity of new digital technologies such as blockchain, cloud computing, artificial intelligence and IoT platforms are changing the very nature and purpose of such capabilities. These process are happening for two main reasons: (1) because organizations can now scale up or scale down their operations at a speed, ease, and cost that was not possible only a decade ago; (2) the convergence and generativity of these pervasive digital technologies means that the purpose of building Dynamic Capabilities is now paramount for a wider range of organizations (Warner and Wäger, 2019). These findings, therefore, reinforces the need for more studies that seek to understand the role of DC in the context of new digital technologies adoption.

3. METHODOLOGICAL PROCEDURES

3.1 Research design and context

Our research design is based on multiple case studies that examine how established companies run their digital transformation journeys. We applied a multiple case study approach (Eisenhardt, 1989; Yin, 2014) since it is a method recommended for exploratory and theory-building research (Eisenhardt, 1989; Gammelgaard, 2017). In addition, this methodology allowed us to better understand the context, process and causes of the DT phenomenon and the identification of critical factors. According to Edmondson and McManus (2007) the case study is an effective methodological fit for the current stage of DT conceptual development.

Our intentions in analyzing multiple cases across sectors are twofold. First, we applied our conceptual model across industries in order to identify the possible differences and the DT dynamics in a diverse business context. Related to that, some researchers have identified that capabilities to support successful DT may differ depending on the particular sector (Carcary et al., 2016) and that sector of activity affects companies' adoption of new digital processes (Ferreira et al., 2019). And

second, doing such a comprehensive analysis, we aim to provide a more robust consensus (Yin, 2014) about the DT phenomenon.

According to Yin (2014), a multi-case study approach should follow a sampling logic. For that reason we decided to identify case firms by applying the following criteria: 1) established companies from relevant sectors of the economy and with different focuses for digital transformation: manufacturing (industry 4.0 and servitization), retail (omnichannel) and food service (delivery); 2) large companies with annual revenues surpassing R$ 1 billion, as they should have enough capital and size to finance a digital transformation journey that requires substantial investment; 3) public companies, to ease the access of secondary data; 4) companies with well-known and relevant DT journeys that are still ongoing; and 5) researchers' network and capacity to access company decision-makers to guarantee the highest level of information. In order to maintain the confidentiality of the organizations, fictitious names were used in the study. Table 7 provides an overview of the three companies we have analyzed in this multi-case study approach.

Table 7 - Sample profile

Company	**Fashion S.A**	**Iron S.A**	**Food S.A**
Industry	Retail	Manufacturing	Food Service
Size (employees)	≅ 6.000	15.000	11.000
Revenues (2021)	R$ 3.6 billion	R$ 13.2 billion	R$ 2.2 billion
Founded	1972	1949	1997
Firm type	Parent	Parent	Subsidiary
Type of Multinational	Brazilian multinational	Brazilian multinational	North American multinational
Market	Global	Global	Global

3.2 Data collection

Data was collected from November 2021 to August 2022, including semi-structured interviews, annual reports and company announcements related to DT. Based on the purposeful sample presented on Table 7, we interviewed nine key executives (three from each case organization). These executives are from different hierarchical positions and areas in their companies, although they

are all closely connected to the DT agenda. We interviewed professionals from digital, HR, marketing and sales, planning and communication, and innovation departments. By doing that, we were able to collect a multi perspective and rich data base that allowed us to better understand the context, process and causes of the DT phenomenon in case organizations. Table 8 presents the characteristics of the interviewees.

Table 8 - Characteristics of respondents

Case	*Acronym*	*Position*	*Company experience*	*Experience in current position*	*Leadership experience*
Fashion S.A	Fa1	Chief Digital Officer	10 years	4 years	15 years
	Fa2	Head of Digital Businesses	3 years	1 year	4 years
	Fa3	Innovation Manager	4 years	1 year	5 years
Iron S.A	Ir1	Director of Business and Digital Strategies	17 years	2 years	12 years
	Ir2	Planning and Communication Director	14 years	1,5 year	9 years
	Ir3	People and Culture Manager	2 years	2 years	2 years
Food S.A	Fo1	Chief Executive Officer	5 years	5 years	20 years
	Fo2	Head Of Business Development and Digital	6 years	3 years	18 years
	Fo3	Marketing and Sales Director	9 years	5 years	12 years

Semi-structured interviews were conducted from January 2022 to March 2022. The interviews lasted on average 1h15min each and the script is presented in Appendix 1. Interviews happened with one respondent at a time, following a mix of open and close-ended questions. The script used was divided into four large blocks. First, some questions with the objective of understanding in depth the characteristics of the business and the interviewee. Second, two open questions about the firm's and the interviewee's understanding of the digital transformation concept. Next, a group of questions to understand the dynamics of the digital transformation dimensions in the firm. Finally, a group of questions about outcomes and impact of digital transformation initiatives. For the treatment of the information obtained, we recorded and transcribed all interviews.

3.3 Data analysis

The study followed the content analysis prescriptions (Hsieh and Shannon, 2005) aiming to analyze the components of the theoretical framework of digital transformation and verify the

emerging topics. This type of design is usually appropriate when existing theory or research literature on a phenomenon is limited (Hsieh and Shannon, 2005), precisely what occurs with digital transformation phenomenon. In addition, based on this content analysis approach, the authors were able to understand the interviewees' discourse and carry out a more consistent analysis, identifying the strategies developed to promote digital transformation, the motivations that led to the proposition of these strategies, as well as the dynamics of the digital transformation within the firm and the results achieved.

We first analyzed the individual cases considering the digital transformation framework. At this stage, we cross-referenced the interviews information with secondary data from annual reports and company announcements related to digital transformation. Then, we conducted a cross-case analysis to find out the similarities and differences across the cases (Eisenhardt and Graebner, 2007).

4. FINDINGS

4.1 Fashion S.A: omnicanality and IT as the protagonist

Fashion S.A is a Brazilian multinational retailer operating in the fashion segment. Founded in 1972, the company has 13 brands under its portfolio of apparel, footwear, bags, and accessories, consolidating itself as one of the main "house of brands" in the country. It is the leader in the women's footwear and accessories segment. The company operates in different channels: franchises, company-owned stores, multi-brand stores, e-commerce, and exports. In this sense, it is positioned as a fashion, multi-brand, and multichannel company, with an increasingly strong digital presence.

Today, the company exports to multi-brand stores and global players in more than 68 countries, being the international channel 11% of the group's revenues. The North American operation represents the company's main international market, with 5 stores, e-commerce channel, and whole channel that allowed revenues of R$ 347 million in this market in 2021. Between 20211 and 2021, the company grew 4.2 times. Since 2018, it has adopted a digital transformation strategy, with significant results and a prominent performance during the COVID-19 pandemic, when the company's shares have significantly outperformed the segment.

Fashion S.A's digital transformation has been going on since 2016, but, in a more structured way, it began in 2018 after the then Director of Strategy and Innovation and the CEO returned from an immersion at Singularity University in Silicon Valley. After identifying market opportunities, they set up a strategic plan to create a structure that would connect digital with the company's strategy and be the guardian of this vision.

> We didn't have market pressure to do [the TD], but there was an external context reading that this [the TD] was accelerating and happening. (Fashion S.A – Fa2)

At that moment, a Digital Transformation Executive Director position was created, through a very emblematic move for the company to join the e-commerce area - which was part of the strategy and innovation structure - with the technology area - until then a separate structured area. This merger put IT as the protagonist of the business so that the company could have deep knowledge of the customers, with a strategy based on data, to accelerate the evolution of the fashion platform. It also enabled the convergence of the technology development roadmap and a single vision for digital.

> I understood at that point that if we did not bring these agendas [IT and E-commerce] together, we would not be able to build something bigger that had to permeate the entire company. (Fashion S.A – Fa1)

The current digital transformation strategy is closely connected with the company's strategic map, since, according to its executives, strategy does not start from technology but their business vision. In this sense, the company's strategic vision is to take the lead in the A/B fashion segment in Brazil, with a strong international presence. For this, it is creating a platform of fashion brands, a "house of brands". It is, therefore, moving from the context of a women's footwear franchise company to a fashion platform. To deliver this vision, the company has four strategic fronts: a) core business acceleration; b) business model transformation; c) development of new revenue sources and d) inorganic growth through the acquisition of new brands to expand the group's addressable market. To support this vision, a very strong work of data technology and empowerment of the teams that accelerates the consolidation process of the fashion platform and enables tools for all these businesses.

To support this strategy, the company has an organizational structure led by the Chief Digital Officer. Below him, a technology structure that encompasses systems, architecture, operations, information security, technology projects and governance; an e-commerce corporate structure that comprises all ecommerce of all brands; a retail digitalization structure that encompasses CRM, data and some squads that are working on the digitalization of the company's back office; and a digital business area with the new ventures, digital products, innovation culture and some technology labs.

According to its executives, Fashion S.A has a great capacity to deal with market changes and uncertain environment and has a good capacity to take advantage of these opportunities.

> We get stronger in times like these [of uncertainty]. No doubt it is a great characteristic of ours. (Fashion S.A – Fa1)

Some facts help explain this capacity. First, a highly efficient organizational capacity in reading and analyzing the market. An example of this efficiency was Fashion S.A 's ability to read the pre-pandemic scenario. Identifying a probable lockdown, a few weeks before March 2020 the company designed an emergency plan to send all employees to work from home, accessed R$500 million credit lines to strengthen cash and prepared the network to sell digitally. These movements allowed the company to present a performance praised by analysts and the best performance of a stock listed on the Brazilian stock exchange for the period. Second, some traits of the company's DNA, present since its foundation, help explain the company's ability to adapt. Flexibility and Bias for action, for example, are strong cultural traits that have been cultivated for decades in the company. This set of cultural traits makes it easier for teams to make decisions in times of uncertainty. Finally, although it is a publicly traded company, the company's shares are mostly concentrated in one family. This, according to its executives, is another facilitating factor, because, being an owner-owned company, it is a company that acts fast and takes action. (Fashion S.A – Fa1)

Of course, with these strong cultural traits and the organizational ability to navigate uncertain environments, Fashion S.A has also managed to develop the ability to transform itself to take advantage of these opportunities. First, it transformed the organizational structure with the creation of an executive board to lead the digital transformation vision. During the pandemic, it quickly changed its business model, putting 5,000 salespeople to sell digitally in 2 weeks. Also it increased its digital operation by 6x in the period and started to perform new release cycles every other week (what was previously performed bimonthly). Thus, many of these changes were possible because the digital transformation was already underway and several digital tools were already developed, but with little uptake. The pandemic, therefore, catalyzed the utilization of these tools.

Fashion S.A's origin goes back to a very rigid culture, formed from its industrial origins. For this reason, themes such as openness to experimentation and aversion to error had a very strong resistance in the company. With the beginning of the digital transformation process in 2018, the culture, little by little, was being modified. Not from a commissioned and planned cultural transformation process, but from a daily build and influenced by a growing digital area. The digital transformation structure, over the years, was constantly delivering solid results and growing. This

area, naturally, represented a new culture, with characteristics more connected to the digital world such as experimentation, openness to error, and team empowerment. As it grew, this new structure also contaminated the company's traditional culture, contributing to the transformation journey.

> In the first company leadership meetings I attended, 10 years ago, there were approximately 70 leaders...[]...and how many were from technology, from digital? Me and another one. A very small base. Today, in a leadership meeting, we should already represent 20 to 25%. The very size of the digital channel today already represents more than 25% of revenues. (Fashion S.A – Fa1)

Within the company's digital framework and digital transformation strategy, the topic of data is a central point. According to its executives, the company had already done solid work in recent years in terms of capturing, processing and organizing data. They have, therefore, a lot of information available from customers and franchisees. This data base began to be worked on more strongly from the creation of a data squad, the first squad of the new digital transformation structure conceived in 2018. From there, a Data Lake was structured with a reference architecture and a process to support the business areas with management information for decision making. Currently, the area also has a structure for data science that conducts some experiments with analytics and predictive analytics. The horizon, however, is still full of opportunities.

> It is a primary point, but one that still has a very large volume of opportunity. We are well organized, but we are not taking advantage of the full potential that this front certainly allows us. (Fashion S.A – Fa2)

In addition to data, the technology resource is central to Fashion S.A's strategy. According to its executives, the company's digital transformation process consists of taking technology out as a rear area and putting it as the protagonist. To this end, the area was integrated into the digital structure when it was conceived in 2018. Today the company has a more robust and less flexible technology layer that comprises the ERP and software that support the business. On the other hand, when it comes to expert solutions that are more connected to the business end, the organization is adept at recurrently testing new stacks and forms of development. The company has the capacity to develop proprietary solutions, but not in a discretionary way, since it is not positioned as a development company.

To finance this transformation, the company has increased investments both in absolute terms and as a percentage of revenue. As solutions generate more value for the company, investments are prioritized from a return on investment logic. Within some specific company structures, such as the Laboratory, there are resources that are allocated in a context of greater uncertainty and risk.

However, proportionally not significant in the amount of the company's total investment. According to its executives, most of the portfolio of the portfolio is from a clear vision of return on investment. (Fashion S.A – Fa1)

As a retail company that had to go through the COVID-19 pandemic, c's business model was and is being heavily impacted by technology. The most visible impact is the size and relevance of e-commerce for the business, which has grown from a revenue of approximately R$200 million in 2019 to R$520 million in 2020. In addition, the integration layer between online and offline - omnicanality - has grown a lot, which, within the franchise universe, is very challenging. In this context of online-office integration, e-commerce has even started to positively impact the sales of physical stores. If they were to consider the impact of e-commerce on the sales on physical point of sale, the channel's revenues in 2020 will exceed the 520 million mark.

Fashion S.A has shown solid growth in the last decade, quadrupling in size between 2011 and 2021. During this period, the company's growth was directly related to the technology base that was being developed. The company's growth is closely correlated with the company's omnichannel, consumer focus and digitalization strategy, a clear result of its successful digital transformation journey. The group's digital products, mainly the application used by the salespeople, already influence 30% of the physical store's revenues and influence the profile demanded for the company's salespeople. Technology is transforming the habits and processes of these professionals, who now have at their disposal a set of digital tools to serve the customer. Finally, "digital" is also gradually impacting the company's culture through an organizational structure that gains more relevance and that, with this, gradually positively contaminates the company's traditional culture. As a result, a company is even more open to change and agile.

4.2 Iron S.A: digital transformation from cultural transformation

Iron S.A is a Brazilian multinational company and one of the major industrial conglomerates in the country. Founded in 1949, the company develops transport solutions through four business divisions. The first division focuses on the production of truck bodies, trailers, semi-trailers and rail wagons in four industrial units in Brazil and two abroad. Another division covers friction materials and products such as brakes and pads, as well as accessories such as shock absorbers and brake

cylinders, among others. An auto parts division, usually with business in the Joint Venture model with global leaders. And a last division - financial and digital services - which includes a bank, a consortium administrator, an insurance broker, and the digital business area.

Today, the company is present on five continents with approximately 29 physical locations and commercial relations with more than 100 countries. Since 2014, it has grown approximately 140%, a period in which it also put into practice its cultural and digital transformation journey.

The origin of the company's digital transformation goes back to an organizational health diagnosis conducted in late 2014 with Fundação Dom Cabral. At that time, traits of the organizational culture were identified as being possible offenders to the perpetuity of the business. More specifically, two of them represented barriers to the development of an innovation environment: 1) a culture characterized by fear of error and 2) an organization with strong hierarchization, in some cases requiring six to seven levels for certain approvals. Based on this diagnosis, a strategic plan for the future was made and the culture transformation was started. The trigger, therefore, was not an awareness of the organization's executives regarding the need for company digital transformation.

> We were myopic and did not see the digital transformation that was coming in the middle of the road. (Iron S.A – Ir3)

What motivated this movement was the need to change symbols, behaviors, and systems that were not aligned with what the executives wanted for the company's future. The topic of digital would come up during this process, strongly motivated by a market view and the need for a culture change, and strongly supported by top management.

As part of this journey, the current Executive Vice President and Chief Transformation Officer (then Planning and HR Director) and the President (then CEO) of the company participated in immersions in Silicon Valley with the objective of monitoring market movements and their impact on traditional businesses. One of these experiences would motivate the creation of Iron X2, a multidisciplinary work group focused on innovation inspired by exponential organizations (Ismail et al., 2014). The company's strategy was to work on the digitization of highly inefficient back office processes, and not the ones linked to the core business. According to one executive, it is necessary to be very well grounded to make a change proposition in the core, while in adjacent processes companies are much more open. Furthermore, it was strategically chosen to disconnect the three Iron X2 participants from their current roles and allocate the group in a coworking space outside the

organization. After study and immersion in different innovation ecosystems in the country in 2015, Iron X2 enabled the organization to absorb an important knowledge, synthesized in the learning that:

> Companies are relating to startups. And relating is a very broad thing. Companies are hiring startups, companies are creating startups, companies are investing in startups, and companies are co-creating with startups. So it opens up a whole range of options for us. (Iron S.A – Ir1)

Iron X2 was responsible for mapping business pains and implementing eight projects using technology to reduce the inefficiency of backoffice processes. Among them, we highlight the restructuring of recruitment and selection processes and travel management from the collaboration with startups. The latter presented a cost reduction of around R$ 3 million, impacted culture, reduced costs, brought technology and broke paradigms.

Throughout this period, the company has made structural changes to give impetus to the transformation that was underway. In 2019, the Digital Business and Strategy area was created and today encompasses the following topics: Digital Business (new digital platforms, marketplaces, and digital positional of company's products), Data Strategy and Governance and Automation and RPA (Robotic Process Automation). Currently the executive responsible for the area also leads the group's Corporate Venture Capital structure responsible for investing in startups and new businesses. In 2020 the position of CTO (Chief Transformation Officer) was created to lead the transformation process, accelerate the new organizational culture, and intensify the company's digital mindset. To some extent, the position resembles the Chief Digital Officer (Kunisch et al., 2020) role present in traditional companies going through the digital transformation process. However, in the case of Iron S.A, the scope of this position denotes a broader scope that reinforces the vision of organizational transformation, and not only digital transformation, intended by the organization. Also in 2020, CXO was created, a physical and digital space responsible for the group's open innovation programs and which also provides innovation services to the market.

According to the Director of Business and Digital Strategies, the company does not have a digital transformation strategy, but an innovation strategy of which one of the pillars is digital. The innovation process is strategically thought along two axes - incremental/evolutionary and disruptive. It happens through corporate and matrix structures or structures in the business units that work with advanced R&D, innovation for industrial processes, digital products, or relationships with startups. Table 9 below summarizes the structures:

Table 9 – Iron S.A. Innovation Structures

Structure	Objective	Source of innovation	Created at
Technology Center	Complex for the development and homologation of products for the mobility industry in the country.	R&D	2010
Institute of Science and Technology	Study of complex topics and the execution of research projects, as well as strategic alliances with other institutes, universities, and with companies in the industry.	R&D	2014
Institute of Innovation	The company is the founder of an institute formed by a group of organizations that believe in transforming the innovation ecosystem in a collaborative way.	Relationship with startups	2018
Digital Business area	Developing solutions in Robotic Process Automation (RPA), Data Science and Artificial Intelligence, Blockchain and Agile Solutions.	Digital	2019
Venture	Investment, co-investment, and acceleration of startups	Relationship with startups	2020
Open Innovation Platform (CXO)	Physical and digital space for managing open innovation programs and connecting with the ecosystem	Relationship with startups	2020
NANOX	Using nanotechnology to power products throughout the industrial chain.	R&D	2021
Iron S.A Tech Solutions Industry	Unit focused on acceleration and innovation in industrial processes. It works in the supply of solutions, special machines and smart manufacturing for the group's business units and also operates in the market, through a subsidiary.	Process Innovation	2021
R&D	Laboratories, research centers, and professionals specialized in the search for new products and innovative materials.	R&D	-

Ecosystem partnerships are crucial as the company alone cannot succeed at digital transformation (Ghosh et al., 2022). For that reason, by promoting strategic ecosystem alliance as a business transformation strategy and investing in startups, Iron S.A seeks to access a new market, access a new technology or invest in a trend or future's sign of a potentially disruptive but still nascent theme. According to the Director of Business and Digital Strategies,

> When I create an open innovation strategy, I'm not saying it's better or worse than investing in Industrial manufacturing,...[]...but rather that our range of innovation gets broader and more robust. (Iron S.A – Ir1)

Besides being part of the innovation strategy, these structures are also the basis of the capacity that Iron S.A has acquired over the years to analyze and monitor the environment in which it operates.

In addition, a corporate Foresight area is allocated within the planning department with the objective of providing analysis on trends and signals, as well as building different future scenarios. The Foresight team has a direct relationship with the group's Venture and the Digital Business area, the latter of which was responsible for the development of the digital services value proposition track.

The company's ability to transform itself in recent years, promoting the modification of some traits of the culture, as well as the flattening of the hierarchy was crucial to the development of capabilities that allowed the company to quickly react and seize business opportunities:

> We have been on a very positive journey, especially in relation to more horizontal management, flattening of the hierarchy and empowerment of the teams. Today we have a great deal of autonomy from the teams to the point where they can react autonomously to some market's abrupt movements without the need to take it to a board of directors. (Iron S.A – Ir1)

Add to that the company's ability to anticipate some market movements. Before the covid-19 pandemic, for example, the organization had already done home-office pilots which facilitated and accelerated the transition of thousands of employees in March 2020 to remote work. It also had a cloud and technology structure ready to support the organization during that time.

These well-developed dynamic capabilities allowed the company to not only get through the COVID-19 pandemic without major losses, but to achieve historic results in the period. The company had net revenues of R$9.1 billion by the end of 2021, which represents a 78% growth compared to 2019. The second year of the pandemic, specifically, presented records in the company's history that were driven by a set of strategies implemented in recent years, such as revenue diversification, increased capacity, portfolio expansion, internationalization, and investment in innovation. During 2020 and 2021, in an environment of tight uncertainty, the company continued to invest heavily in innovation and launched several open innovation, R&D and process innovation initiatives, as per table 3.

> The company has designed some strategy paths ...[]...and steadfastly stayed in that strategy so much that these investments have been made. Very convinced of that defined strategy, but also very austerity with respect to spending control, for example, without cutting things that are important like Innovation. (Iron S.A – Ir2)

Iron S.A's digital transformation process was, first of all, a culture transformation process. By inserting new symbols, rites and behaviors aligned with the desired vision of the future, Iron S.A's 's leaders paved the way for the digital theme to advance in the company in the following years, mainly

through open innovation, R&D and new digital structures. Thus, the cultural dimension was key in the company's journey.

> Internally, we have always dealt much more with behavior transformation, mindset transformation, cultural transformation…[]…which also has a digital transformation. We understood that it was not a transformation just about technology. Technology enabled a series of new ways of working. (Iron S.A – Ir1)

While transforming its culture, the organization was also promoting changes in the way it mobilized its human resources. It revitalized its organizational competencies to adhere to the digital world challenges. It promoted changes in its learning strategy, focusing increasingly on microlearning through digital learning and development tools. And promoted what they called "Digital Alphabetization" with the goal of empowering employees to work more autonomously with data and decrease the team's dependence on a technical area. By promoting these actions, digital has been seen as a very important opportunity to engage people, democratize innovation, and provoke new behaviors in management. (Iron S.A – Ir2)

The company has a corporate data team with PhD professionals allocated within the Digital Business and Strategy structure, the area responsible for data governance and strategies. This team is responsible for providing data services to the group's companies and evangelizing the topic within the organization. It is also responsible for the data collection and standardization processes, while the data transformation and value creation stages are the responsibility of the area's client teams. In partnership with the HR department, the area trained more than 800 people (Digital Alphabetization) to generate information, insights, and value on data autonomously without the need of the technical team – in a self-service BI strategy. The company has been working hard on centralizing data and connecting the different databases of the group's companies, aiming to have several micro datasets within a large and robust data lake. According to the Director of Business and Digital Strategies:

> We are having a high expectation that we're getting into a third stage of now producing value and producing new information from data. (Iron S.A – Ir1)

From the technology point of view, the company made a strategic decision to separate the traditional IT from the Business and Digital Strategies area. The former is responsible for the company's ERP and for supporting business' industrial process and reports directly to the company's CFO.. The second is part of the Financial and Digital Services division and is responsible for the new digital platforms, marketplaces, and digital positioning of some products, in addition to data,

automation and RPA (Robotic Process Automation). Currently the company has several robots in administrative areas, as reported below:

> We have developed several robots over time to perform operational activities and free people from these activities. So there are several activities that today are already done by robots in the financial sector, in the registration sector, and in the communication processes. (Iron S.A – Ir3)

From a business model standpoint, the impact felt by the company is still collateral, but the organization "is not myopic to think it won't come." Although the industry segment is not as digitally mature when compared to sectors like retail (Martins et al., 2019), the company has realized that there are opportunities, even in a business-to-business relationship, for digitization and use of platforms and marketplaces, which they considered a myth 2 or 3 years ago. Moreover, recent transformation of the financial services division into financial and digital services and the company's servitization strategy point to a positive outlook for the emergence of new business models. In that regard, the company is already being demanded by new commercialization models, as related by its executive: in not too long from now it will be possible to pay per kilometer driven or per ton transported. (Iron S.A – Ir1)

The company's financial results after the period that began its cultural and digital transformation indicate the success of this journey. The company had net sales of R$ 3.1 billion in 2015 and R$ 9.1 billion in 2021, tripling in size in seven years. More than that, the representative of the main and most traditional division of the group decreased, even though the latter still grew in the period. In other words, the growth of new business lines, new products and services, diversification, and innovation allowed the company to increase its capillarity. The good financial performance during the CVODI-19 pandemic period (78% growth in net revenue), when the innovation strategy and its dynamic capabilities were put to the test, is also an important result. The change in employee behavior and mindset, mitigation of the fear-of-error culture, reduction of hierarchical levels and increased empowerment of the teams made the company more agile and attentive to market signals. This, combined with several innovation structures (product, process, and with startups), allowed the company to take advantage of important market opportunities. In this period, for example, it launched a high-tech business with a global patent applied for to exploit niobium and an electric cart that came out of advanced R&D cooperation with eight organizations, including startups and academia. Finally, the impact on the company's employer brand and the entry into the insurance market are also perceived results from the digital transformation journey mentioned by Iron S.A's executives.

4.3 Food S.A: O2O (Online-to-Offline) strategy with consumer insights, data and technology

Food S.A is a North American multinational and one of the world's largest casual dining companies with approximately 82,000 Team Members and more than 1,498 restaurants worldwide. Founded in 1988, the company is structured globally by geography and by brands. By the end of 2021, in the U.S. segment, the company owned and operated 1,013 full-service restaurants and off-premises only kitchens and franchised 157 full-service restaurants across 47 states. In the International segment, it owned and operated 156 full-service restaurants and off-premises only kitchens and franchised 172 full-service restaurants and off-premises only kitchens across 18 countries. In Brazil since 1997, the company ended 2021 with operations of 135 points and revenues of R$ 2.2 billion. It has about 11,000 employees in the country.

This study only analyzed the digital transformation journey of the Brazilian subsidiary, clearly recognized as one of the most advanced in the country's food service sector.

The company's digital transformation journey started in the 2018-2019 period strongly influenced by the arrival of a new CEO and from the building of a 5-year strategy in which "Go Digital" was one of the main blocks. More specifically, two functional issues triggered the start of the process. In Rio de Janeiro, the company was facing a scenario of falling sales due to public security problems that inhibited people from going to restaurants at night. For this reason, it acquired a minority stake in a logistics startup that allowed the company to start operating with in delivery market. On the other hand, it also realized the need to digitize internal processes to gain efficiency and better results, at a time when RPAs (Robotic Process Automation) were emanating.

> We started first by really looking at back-of-the-house platforms...of how I become more efficient and mitigate risk.(Food S.A – Fo1)

According to its CEO, the company faced digital transformation from a digital culture perspective of getting speed, hiring right people and achieve small success stories that could demonstrate the efficiency of the business to people. The investment in the logistics startup would prove to be a bad deal, after the company closing in 2021. However, it is seen by the executives as an important step towards understanding the delivery business, which would be fundamental for the development of the company own delivery operation during the COVID-19 pandemic. Although the

company had a Go Digital strategy defined and some actions implemented, it was with the COVID-19 pandemic, which hit the foodservice segment hard in 2020 and 2021, that the digital agenda actually moved forward, according to reports from its executives:

> The need is the crisis. Everything was some incipient pre-pandemic conversations, but the big accelerator was the crisis....[].... how do you convince an entire board without the crisis? You can't. Each one will have an opinion...[].... Delivery is great, but it also has its challenges. It ends up competing with some other agendas and ends up entering a traditional project logic. (Food S.A – Fo2)

> A much faster company, but much more because of a need for survival than actually because of something 100% planned. Our Delivery was that. We had planned to do it in 10 months, we did it in 10 days. (Food S.A – Fo1)

The implementation of delivery during the pandemic was successful and allowed the company to go from a pre-pandemic revenue of R$1.5 billion to R$ 2.2 billion in 2021, a year that still presented restrictions. However, the company's vision of digital transformation is not just about that, as digital transformation need to transcend and to be bigger and broader than the delivery business.

The company's current vision of digital transformation is centered on the strategy of making the consumer's journey increasingly pleasant and enjoyable, regardless of the channel or modal. In using technology to get closer to this consumer and increase interaction with him. Digitizing all points of contact to, from these captured data, get to know them better and be able to offer a customized and unique experience. With this, the company hopes that this consumer will increase his relationship with the brand, increase his loyalty, which will naturally lead to higher sales.

Today this vision on digital transformation is translated through a strategy with four pillars that together deliver what the company's digital strategy is for the near term. First, put in place an O2O (Online-to-Offline) strategy that allows the integration between the business of a physical store with the sales strategy of digital. To do this, it is necessary to own both channels (physical and digital), so that the company has ownership over the audience and enables the consumer to change between these two consumption moments. This first strategic pillar originated the F.I.X - project that aims to create the brands' unique data-driven consumer experience. The second layer of the strategy concerns the use of data in order to know the consumers in a deeper way and activate them in a customized way. Migrating from the logic of mass media to more segmented and punctual marketing strategies. In addition, broadening the vision of having a Data Lake to the vision of Single Profile, the clustering of customers into different profiles that gives the company a unique vision into their journey

> Today, if you walk into a restaurant, you walk in an anonymous way and the chance of you leaving anonymously is almost 90%. I don't know who Wagner is. I know you went in, you consumed something. I don't know if you came back the next day, if you came back with your family, what you like to eat the most. (Food S.A – Fo2)

The third strategic pillar comprises the use of digital tools and data exploration to generate Consumer Insights that enable the firm to offer consumers value offers that make them feel individualized and unique. Finally, a last strategic pillar, enabler to the previous three, is to ensure the necessary infrastructure and technology to support the company's strategic vision for digital, both physical and online.

> There's no point in me making a quantum leap, when I look online, but when I go to the physical restaurant, my transaction is still completely analog and with friction. (Food S.A – Fo2)

This strategy reflects the company's organizational structure, which has been altered at least four times in five years to meet the needs of the consumer. The Digital area currently encompasses: a) a Business Development structure, responsible for Delivery and new business; b) Consuming Insights; c) Data Analytics that encompasses Business Intelligence and Data Science and d) Information Technology, responsible for IT infrastructure, cybersecurity, software and project management. With this, the company keeps under the same management, from the generation of ideas to solve problems of the consumer journey, to the development and implementation of these technological solutions.

The organization has a set of structures and processes that enable it to monitor the environment and quickly respond to market movements. A Consumer Insights team allocated within the Digital structure with the role of analyzing the external market, global trends in the segments and technology through internal studies and purchase of market information. A Business Intelligence structure that monitors competitors, capture and market movements. A Marketing department that has proprietary methodologies for understanding consumption and consumers. An external agency that systematically monitors the power and acceptance of the group's brands. And finally, an R&D team that went through a process review during the last few years, started to apply a logic of squads and open innovation concepts to the company's product development process. With this change, it was possible to launch products in 4 weeks during the pandemic, whereas with the traditional R&D process it took 6 months to 1 year.

> Today we use a digital concept of open innovation in R&D process. In the past we had a corporate chef here who was the guy doing it. Today we don't, we invite several external chefs to help us develop and then we take the same sprint and put the client inside the restaurant. (Food S.A – Fo1)

Besides reviewing the product development processes, the company's CEO and Digital Director are also personally engaged in open innovation initiatives and relationships with startups, acting as mentors and angel investors. As a result, they have influenced the adoption of open innovation practices in the company's board and in the organization.

In the last five years, the organization has evolved its capabilities to adapt and take advantage of market opportunities, presenting a lot of willingness and openness to change, strongly enhanced during the pandemic. In parallel, it has allowed the firm to do more testing, to pivot, and to be open to error. The investment in the logistics startup, for instance, is a good example. If analyzed from the ROI point of view, it can be considered a strategic error, considering that the invested startup shut down its operation. However, if understood as a necessary experience for the organization to absorb important knowledge about the delivery operation, which would be fundamental during the pandemic period, the "error" would have another meaning.

Although it is in a more advanced state in terms of agility and adaptability, the company's executives state that:

> It is not so simple to change the rudder of a titanic of 12 thousand employees. It doesn't mean that a message you send, 2 hours later, will be incorporated and digested by the whole operation. (Food S.A – Fo2)

Therefore, they have promoted transformations in the organizational and work structure of the company. They encouraged the adoption of agile tools and work logic - working better in teams, more autonomy, sprints, squads and dailies - a movement started from the delivery project. They also encouraged the organization to think less about silos and structure, and more about allocating the right resources to solve problems, regardless of the area of operation.

> I tried to urge the company to stop thinking about budget size, about structure size, about power. Think about how many problems you can solve as the resources you have in the area, and whether you have the right resources to work on the problems ahead. (Food S.A – Fo2)

The company has a strong organizational culture with solid values that, according to its executives, favor the digital transformation process.

> Our culture is about serving well and having quality. All those fundamentals are independent of the channel. (Food S.A – Fo1)

Being a market leader, the company is constantly being pressured to be one step ahead of the market and think of new and better products. What have been happened, in the last five years and with the entry of the new CEO, have been changes, more in the way of working than in the cultural one, to adjust the company to the challenges of the digital context. These changes are related to the more shared work of the areas, with fewer silos, common goals, and with less command and control.

Data are key to the company and a fundamental pillar of the digital transformation strategy. More than that, the topic is a personal agenda of the company's CEO, a great motivator and enthusiast of it. Food S.A's data journey began with the structuring of a Data Lake and the creation of a database that allowed, at that time, the company to perform historical analysis of very basic KPIs. At that time, this information was very centralized and only accessible to the company's board. Next, a process of democratizing the data through the Power BI tool was started, allowing the organizing to gain in speed and that everyone in the office had access, including the restaurant's partners. A second important step was organizing client data and enriching the data to make it actionable, that is, information that enables decision making or strategizing within the business. Today the company is at a more incipient stage of development of some statistical models that will allow greater sales predictability and trend identification. In this sense, according to its CEO:

> What used to be simply informative, with a look in the rearview mirror, will now become a business tool on the planning, sales, and promotion fronts. (Food S.A – Fo1)

In addition, the company is about to launch an integrated SOP (sales and operations planning) model that will provide greater inventory predictability for restaurants based on a data. All these initiatives are led by the Digital area through the data team, which has a data scientist who provides services for the entire company. They are also responsible for training the company's employees to spread knowledge across the organization and reduce the dependence on the data team.

> It's not enough for people to have the tool, we need to teach them how to use it. So he [data scientist] is now trying to make sure that each area or each team has a process sponsor so that they are not 100% dependent on the data team. (Food S.A – Fo2)

To support this data strategy, the company has a technology team allocated within the Digital structure, which allows it to remain under the same management umbrella from ideation to delivery of digital initiatives. Part of the IT strategy consists of adopting a flexible architecture with the logic of API economy, the set of business models and practices designed around the use of APIs in today's

digital economy. From this logic, it is possible that the company seeks partners and changes them as much as necessary, without major traumas and focus efforts on its core - serve well and with quality. In this context, Food S.A has made the strategic decision not to do technological development in house, relying on technology partners that support its digital transformation journey. According to one executive (Food S.A – Fo2), "technology is entirely a means (and not an end), and the more open source the technology, the better". Finally, the company has also been investing in restaurant technologies such as IoT and robots that allow for greater efficiency, better quality product preparation, and decreased human labor.

In terms of human resources, the company has a vision of buying knowledge in the market by hiring professionals to build strategic and perennial capabilities. In addition, to acquire certain and specific knowledge, it relies on strategic partners with the ability to lead the organization on its digital transformation journey.

> If I don't have [the knowledge], I'll buy it. If I'm going to buy it's because I need it in a more perennial way, not a Plug & Play. If I am going to do a Plug & Play I prefer to go to an external supplier. Solved the problem? Disconnect. (Food S.A – Fo2)

One of the main partners is a technology hub specialized in the development of startups specialized in digital transformation that has been supporting the company with technological development, knowledge of user and customer experience, data projects and technological architecture. Besides that, the digital transformation projects are also part of the employer branding strategy and are a major attraction for hiring professionals.

To finance this entire transformation, the company tries to be very clear about the scope of the projects and focus on the business objectives from business cases that are minimally viable. According to its executives, it is possible to mitigate risks, especially in the digitalization of the back of the house, which involves the adoption of technologies to gain efficiency and better results. On the other hand, when the opportunity is greater, naturally the risk is greater and, in this scenario, the organization has evolved in the sense of allocating capital more with the mentality of Venture Capital - agents who naturally work with high-risk investments. An example of this evolution of the executives maturity in relation to allocating capital in high-risk processes was the investment made in the logistics startup in 2019 that, in 2021, closed its operation.

> We did the right off and we are fine with that. It was great because if it wasn't for that I wouldn't be able to develop in delivery and learn. And I also guarantee you that the mistakes we made there won't happen again in the next ones. (Food S.A – Fo1)

Food S.A's digital transformation journey strongly impacted the company's business model, which was enhanced by the COVID-19 pandemic that dramatically accelerated the roadmap of digital projects for retail companies. In this context, delivery became an important business and today represents almost 20% of the company's revenues. More than that, it allowed the company to enter the pandemic with revenues of R$1.5 billion and to come out of it, even in a scenario of restrictions, with revenues of R$2.2 billion. In addition, the company launched a 100% digital native brand that has shown exponential growth and has been tested some new business models for H2 and H3 innovation. Another perceived result is a better return on marketing investments from data intelligence that allowed a shift from mass media to digital media. There was also a leap in quality in payments and interaction with the consumer in the physical stores.

From the product point of view, the adoption of Open Innovation concepts transformed the company's R&D process and allowed the creation of 63 new products in 2021, most of them already launched and with important sales representation. The executives, however, reinforce a very pragmatic vision about the development of new products, because there is no point in innovating for a product that is not going to give you the profitability you need. (Food S.A – Fo1)

For this, they combine a vision of R&D (the right product), Pricing (with the expected margin space and prices), SOP (with a prepared supply chain) and Market Intelligence (with the latest market trends) to define the necessary innovation pipeline. From a strategic point of view, the view on innovation has changed in recent years.

> In the past we thought innovation was launching a new product…..a rib with another sauce was innovation. Then we got deeper into how much innovation is about understanding a customer pain and bringing a solution whether it's a product, technology or whatever to make that journey more frictionless, with more engagement and involvement...[]...I think digital transformation is an enabler. (Food S.A – Fo3)

So, for its executives, innovation is first the process of solving customer pains with results and profitability. And in the context of digital transformation, the company's view is that innovation is an enabler and a tool that enables the firm to innovate and meet customer expectations digitally.

4.4 Digital Transformation Journey Analysis

In this section, we present an analysis of the dynamic of DT from the case organizations. These are established companies and leaders in their markets, which naturally puts pressure on them to constantly seek innovation to maintain their leading position. Differently from Warner and Wäger (2019) findings, our cross-case revealed that the main trigger to a transformation journey was much more internal than external motivation. The motivation came from executives and partners' awareness of the necessity to prepare their organizations to compete in a digital context. Nevertheless, in some cases, business trips by company partners and executives to innovation ecosystems such as Silicon Valley in the US have contributed to accelerate the beginning of strategic change.

In terms of organizational structure, all the incumbent companies analyzed have transformed their structure recurrently after starting their digital transformation journey, and continue transforming it to adapt to the demands of the digital landscape. Among these changes, we found three issues that were common among them. First, the adoption of agile concepts and practices aimed at reducing organizational silos, empowering teams, and making the organization more agile. Agile methodologies are common in the software industry, but it is increasingly becoming a norm in industrial businesses as a solution to having to absorb the complexities that come along with digitalization (Ghosh et al., 2022). Second, the structuring of corporate data teams with PhD professionals whose role is to support the business teams and evangelize the data theme across the organization. Third, the establishment of Digital Business, New Business or Business Development structures, under the responsibility of the Digital executive, with the role of seeking new business opportunities from the use of digital technologies. In addition, two other structural issues, although not common to all, need to be highlighted. First, our data show that the adoption of the Chief Digital Officer (Singha et al., 2019; Kunisch et al., 2020) position is not yet unanimous among traditional Brazilian companies. Interestingly, one company has established a Chief Transformation Officer role, similar to the former, but with a broader scope that includes transformation in other areas. Second, our data indicates that it is not a consensus among companies to consolidate the traditional IT agenda and the digital one under the same organizational structure.

For the digital transformation strategy, our cases show that strategies vary greatly depending on the firm's segments and business model. Participants from Iron S.A and Food S.A emphasized that the initial strategy started from digitalizing back office and back of the house processes for efficiency gains and risk mitigation. At Fashion S.A., a retail company, this movement happened only after a first stage of physical stores digitization with a focus on increasing sales. In the cases of Fashion S.A and Food S.A, business-to-consumer companies, our findings highlight a current digital

transformation strategy with a fundamental pillar of data that enables the firm to know, interact, and provide personalized offers to its consumers. For Iron S.A, a B2B company, the digital business and strategy director reported that the company did not have a digital strategy, but rather that it was part of a company innovation strategy. Finally, our cross-case findings indicate how startups can be part of the strategy and accelerate the digital transformation of incumbent companies through collaborative relationships that materialize through investment, sourcing, product collaboration, and mentoring.

> We are going to fight in the new [market] game with the current tools and we are going to make alliances with some companies that are going to help us. I will make an alliance with a startup that adds something to me and I also add something to it. We strongly believe that this win-win strategy can take us to very interesting levels. (Iron S.A – Ir1)

To go through a successful digital transformation journey, a common theme across all interviews was that fostering a digital culture is a key and strategic issue. In that regard, the participants reported different paths their companies have taken to insert new symbols and behaviors into the company culture that were more related to a digital culture as, for example, resignify the failure and foster experimentation. Our results indicate three different culture transformation paths. In the industrial company, a cultural transformation process that was strategically designed and that had a broader scope than digital transformation, transcending the use and adoption of new technologies. In retail, an organic process of cultural change influenced by a growing digital transformation structure that, with its new ways of working, influenced the rest of the organization and its culture. And in food service, an organic transformation process also strongly influenced by the arrival of a new CEO with a data, innovation, and technology agenda.

For the business model dimension, we found two facets of the firm's business model with respect to the digital transformation framework. On the one hand, the business model is a dimension of the firm, as are culture, structure, and strategy, in that it can be impacted to a lesser or greater extent by new digital technologies. In this sense, our findings highlighted how traditional companies are transforming the way they generate and deliver value through the adoption of technologies in consolidated business models practiced for decades. On the other hand, the emergence of new business models enabled by these technologies, more like born-digital companies business models, gives this dimension also an outcome facet of the digital transformation journey. We can see this in the journey of Food S.A., which has launched a 100% digital brand with a totally innovative business model for a company that operated only with physical restaurants.

To promote strategic change, we analyze how traditional organizations mobilize four main resources for the digital transformation process. Our results reveal that two of them, human resources (people) and financial resources (capital), although necessary for any firm's internal process or transformation, presented less evidence about their strategic character to promote digital transformation. However, when asked about technology and data, respondents highlighted their importance within the company's strategy. All companies analyzed understand technology as an enabler and a *sine qua non* condition for digital transformation, but reported that it is not the end of the journey. In some cases, the IT department is part of the digital structure, which allows better integration of development roadmaps and better coordination. In another perspective, the separation of traditional IT and digital structures allows the split of an infrastructure, governance, project, and security agenda from an agenda of experimenting with new technologies and digital products developing. Regardless of the structure chosen, our results show that traditional companies do not seek to transform themselves into technology companies, but rather to leverage their assets from technology exploration. To this end, they pursue to develop internal technological development capabilities and rely on strategic technology partners that can lead them in their digital transformation journey. In no case was identified a company that had 100% in-house technology development.

In terms of data maturity level, our study identified companies that are aware of the potential of the strategic use of data, being on a journey of evolution in relation to the topic. However, they are not yet leveraging the full potential of data and cannot be considered data-driven companies. Our cross-case findings demonstrate that established companies have created data teams with dual-purpose. First, to create reports and visualizations and to help business teams extract insights from data and answer business questions. Second, evangelize data across the organization, train employees and create facilitators to reduce the organization's dependence on the data team. Furthermore, we identified that in B2C companies data is more clearly a key pillar in the digital transformation strategy than in the analyzed B2B company. In these companies, data is a fundamental resource to get closer to consumers, to increase interaction with them, to design a customized and unique buying journey, to increase loyalty and, therefore, to increase sales.

In terms of dynamic capabilities, companies mentioned several organizational structures through which they sense opportunities: strategy, business intelligence and foresight department, R&D centers, and technology labs. In addition, they talked about innovation structures such as corporate venture capital, open innovation platforms and science and technology institutes with the same role. In that regard, our results echo and extend prior research on need for established

organizations to develop strategic sensing (Ghosh et al., 2022), digital scenario planning and digital scouting (Warner and Wäger, 2019) capabilities. Interestingly, the interviewees talked about how they have made strategic alliances with startups to sense opportunities and monitor markets, as well as to accelerate the adoption of new technologies and to absorb knowledge. Within our cases, incumbents-startup collaboration was a prominent theme and was regarded as an essential capability for sensing opportunities and monitoring markets, as well as accelerating the adoption of new technologies and absorbing knowledge.

To seize opportunities, all the case companies had to change their organizational structure more than once while running their digital transformation. They aimed to reduce organizational silos, increase teams' autonomy, and develop flat organization structure (Tabrizi et al., 2019). In that regard, seizing capabilities in a digital transformation context requires firms to be capable of adapting the structure to best suit digitization (Ghosh et al., 2022). Our findings are in line with Verhoef et al. (2019), who highlighted that digital transformation requires proper organization structure and performance metrics. This organizational redesign also proved to be important so that companies could acquire strategic agility (Warner and Wäger, 2019) to quickly exploit technological and business opportunities. Thus, our results echo (Warner and Wäger, 2019, p.337) research that highlights strategic agility as a "critical dynamic capability for incumbents to seize on the latest trends and avoid potential existential threats".

Reconfiguration capabilities are a strategic capability for digital transformation in dynamic capability theory. In that regard, interviewees mentioned changes in the business model, to a lesser or greater degree, as a core capability for digital transformation (Ghosh et al., 2022). Naturally, this capability has been most strongly demanded in those industries whose business models are being most heavily impacted by technology. In addition, all respondents unanimously stated that a change in mindset and culture transformation are important issues for digital transformation. The way in which culture has been transformed varied among the cases analyzed, but there was consensus on the strategic nature of the topic. Hence, our findings eco prior research (Ghosh et al., 2022) that highlighted business model transformation and culture change capability as key capabilities for digital transformation. Our respondents also recognized the of importance ecosystem-collaboration for the redesign of their organizations. Whether through company open innovation structures or executives-entrepreneurs mentoring, companies mentioned that they have developed alliances with startups to catalyze their transformation journey. Thus, our results complement Warner and Wäger (2019)

research that highlights navigating innovation ecosystems as an essential digital transforming capability.

All companies showed solid results during the period they were transforming digitally. Moreover, especially during the COVID-19 pandemic, both companies outperformed their segments when compared to their competitors. According to the interviewees, this performance was also due to the ongoing digital transformation that had prepared the technological foundations, changed the organizational culture, and created technological tools that would be used during the pandemic. Our findings revealed, in the cases of companies in segments that were more strongly impacted by technologies (Food S.A. and Fashion S.A.), the growth in terms of representativeness and relevance of business models enabled by the intensive use of technology - ecommerce and delivery. In the industrial segment, the business model was not directly impacted but executives reported that they are already being asked about new marketing models. In Food S.A case, we also identified the emergence of a new digital business model (a 100% digital brand) as a result from the company's digital transformation process. Finally, our data also indicate results such as efficiency gains from the digitalization of back office processes and new digital products and services developed from open innovation processes. In general, the perceived results of the incumbent companies digital transformation in our samples can be translated as process, product, business model and organizational innovations. Finally, we present a summary of our main findings regarding the dynamics of digital transformation from the dimensions of our framework in Table 10.

Table 10 – Summary of Digital Transformation dynamics across Industries

		Fashion S.A	Food S.A	Iron S.A
Triggers	*Internal*	Maintain market leadership	Maintain market leadership	Maintain market leadership
	External	Immersion of executives in Silicon Valley	New CEO on the board	Immersion of executives in Silicon Valley
Structure and Governance	*Main DT Structure*	Digital Transformation	Business Development and Digital	Financial and Digital Services Division
	Main DT Leader	Digital Transformation Executive Director	Head Of Business Development and Digital	Executive Vice President & Chief Transformation Officer
	Scope of DT Structure	• IT (full scope) • E-commerce • Retail Digitalization • Digital Business	• IT (full scope) • Consumer Insights •Data Analytics (Business Intelligence + Data Science) • Business Development (Delivery + New Business)	• Digital Business and Strategies area • Open Innovation space • Corporate Venture Capital
	IT scope	Fully concentrated in Digital Structure	Fully concentrated in Digital Structure	Partially concentrated in Digital Structure
	Changes enabled by DT	• Agile implementation	• More shared work areas • Fewer organizational silos • Agile implementation	• Reduction of hierarchy levels • Increased empowerment of teams • Agile implementation
DT Strategy	*Initial vision*	Digitalization of physical retail with a focus on selling	Digitization at back of the house processes, efficiency gains, risk mitigation and database creation	Digitization of highly inefficient back office processes and not the ones linked to the core business

	Current vision	To support, through data and technology, the company's strategy of creating a leading "house of brands" platform in the A/B mode segment in Brazil	Making the consumer's journey increasingly pleasant regardless of the channel, using technology to get closer to consumers, to increase interaction with them and to offer a customized and unique experience	Digital transformation is part of a broader corporate innovation strategy with a focus on advanced R&D, industrial process innovation, and innovation ecosystem engagement
Business Model	*DT Impact*	High	High	Low
	Results	• Digital channel represents 25% of revenue • Seller App influences 30% of physical store sales	• Delivery channel represents 20% of revenue	• Company starts to be demanded by new commercialization models
Culture		• Small cultural changes happened organically influenced by Digital structure growth	• Firm's culture favored digital transformation • Small cultural changes happened organically	• Previous cultural transformation process facilitated digital transformation • Reduction of the fear of failure and empowerment of teams
Technology		• Technology is protagonist of the digital transformation strategy • Company does not position itself as a technology company, but wants to own technological development capabilities • Partial outsourced technological development through strategic partners	• Aim to develop a flexible architecture with API Economy concepts • Has been investing in restaurant technologies such as IoT and robots to gain efficiency • Fully outsourced technological development through strategic partners	• Large use of RPAS in financial and registration sector, as well as in the communication processes. • Partial outsourced technological development through strategic partners
Data	*Structure with Data Scientists*	Yes	Yes	Yes
	Data as key to digital strategy	Yes	Yes	No

	Current status	• Conducts some experiments with analytics and predictive analytics • Large opportunities to extract value from data	• Efforts to decrease dependency on data team • Starting to use data for predictability • Large opportunities to extract value from data	• Efforts to decrease dependence on data team • Large opportunities to extract value from data
Capital		• Metrics and ROI-based investments • The company has been increasing its digital investments each year, both in absolute terms and as a % of revenue.	• Prioritization of investments based on clear strategic objectives and business cases • Open to taking more risk when the opportunity is great • In recent years the company has been more open to making some investments with a VC mentality	• Even in uncertain scenarios, it maintained investments in innovation and digital • The company has not determined a % of revenue to invest in for innovation and digital initiatives, but rather evaluate each opportunity based on strategic return
People		• Focus on multitask teams combining business and tech/UX capacities	• Training the workforce to work with data more autonomously	• Training workforce in using data more autonomously • Learning strategy focused on microlearning through digital learning and development tools
Dynamic Capabilities	*Sensing*	• Scenario-reading and analyzing capabilities • Sensing customer and consumer trends • Strategy/Intelligence, Labs and R&D structures • Long-term business vision supported by digital strategy	• Scenario-reading and analyzing capabilities • Sensing customer and consumer trends • Applying open innovation to the R&D process • Consumer Insights, Business Intelligence and R&D structures • Clear short-term digital strategy	• Scenario-reading and analyzing capabilities • Sensing customer and consumer trend • A set of R&D, Foresight, Science & Technology, Digital Business, Corporate Venture Capital and Open Innovation structures • Alliance with startups as key point of business transformation

	Seizing	• Cultural traits foster adaptation • Company's stock control by founders fosters decision making • Empowering times to act • COVID-19 pandemic has accelerated digital tools acceptance	• Cultural traits foster adaptation • COVID-19 pandemic has changed R&D process	• Increased team autonomy allowed faster reaction during the COVID-19 pandemic • Innovation investment agenda continued in uncertainty scenarios
	Transforming	• Creating of a Chief Digital Transformation Officer position • Business Model transformation • Digital mindset promotion and organic cultural changing • Creation of Digital Business area	• Creating of a Head of Digital position • Business Model transformation • Interacting with startups and innovation ecosystems • Digital mindset promotion and organic cultural changing • Agile concepts implementation	• Creating of a Chief Transformation Officer position • Structured process of cultural change and digital mindset promotion • Flattening of hierarchical levels • Agile concepts implementation
Main innovation types resulting from TD		• Business Model • Process	• Business Model • Process • Product	• Organizational • Process • Product
Main Directs and Indirect Outcomes		• Solid financial results during transformation period • Digitalization of B2B channel with franchisees • Digital channel represents 25% of revenue • Seller App influences 30% of physical store sales • Digital workforce is transforming company culture • Good performance during the COVID-19 pandemic	• Solid financial results during transformation period • Delivery represents 20% of revenue • 63 new products in 2021 from Open Innovation process • 100% digital native brand launched with exponential growth • Better ROI on marketing/media investments	• Solid financial results during transformation period • Greater capillarity and revenue diversification • Efficiency gains with digitalization of back office processes • Launched of several innovation structures • Perceived culture changes • A more attractive brand for talents

DT understanding	*Taking IT out of the back office and putting it as the protagonist, so that through it we can have deep knowledge of the customers, with a strategy based on data, in order to accelerate the fashion platform evolution. Improving operation, reducing inefficiency, empowering brands and opening avenues for new business development. (Fashion S.A – Fa1)*	*Make the consumer's journey more pleasant and enjoyable, regardless of the channel or modal. Use technology to be closer to this consumer and increase interaction with him. Digitalizing all points of contact in order to, from these captured data, get to know them better and be able to offer a customized and unique experience. (Food S.A – Fo2)*	*Technology is support for a transformation that is much more cultural and people-oriented than technology-oriented. Internally we have always understood this movement as a transformation of behavior, mindset, and culture, which also includes digital transformation. We understood that it was not effectively a transformation of technology alone, but that technology enabled a series of new ways of working. (Iron S.A – Ir1)*

5. DISCUSSION AND CONCLUSION

A fundamental contribution of the current study is the examination of the ongoing DT journey of incumbent firms across traditional industries. To explain this digital context, we have drawn on the recent DT literature by analyzing a range of conceptual frameworks that aim to explain the phenomenon (Hess et al., 2016; Vial, 2019; Warner and Wäger, 2019; Ghosh et al., 2022). More specifically, we aimed to analyze the digital transformation journey of incumbent companies from the perspective of DT dimensions. We also approached the DT phenomenon from the dynamic capabilities perspective whose contributions have been found to be most useful in contexts marked by environmental turbulence and rapid change (Teece, 2007).

Although DT shows growing interest among researchers, rare studies have approached it from the lens of dynamic capabilities (Warner and Wäger, 2019; Ellström et al., 2022; Kraus et al., 2022; Ghosh et al., 2022). In doing so, we add existing research about how incumbent firms in traditional industries build dynamic capabilities (Warner and Wäger, 2019) and what are the core capabilities for DT (Ghosh et al., 2022). Our results contribute to recent studies by demonstrating how established companies sense and seize opportunities in a DT context, as well as how they have transformed their structure, culture, and business models to implement their DT.

Based on a cross-sector analysis, we applied our theoretical framework of DT and described the DT journey of traditional companies that are leaders in their segments and have market-recognized digital initiatives. Consequently, we were able to analyze how the main dimensions of a DT process in incumbent companies behave, and our findings have important implications for DT research in fast-changing environments. Differently from Warner and Wäger (2019) findings, our data reveal that DT is an internal-triggered process and that traditional organizations that are leaders in their markets pursue DT to maintain their competitiveness and market leadership. Transformation of organizational structure and culture also have been identified as key dimensions of a DT process. In this sense, our findings resonate with recent studies on executive roles (Singh et al., 2019; Kunisch et al., 2020) and fostering a digital culture (Grover et al., 2022) during a DT process.

Interestingly, our data indicates that the business model is both a dimension of the digital transformation journey (once it is transformed) as well as an output of it (when a digital new

business mode is developed). In other words, our data demonstrate a dynamic of change of business model innovation (Markides, 2006) and business model transformation (Aspara et al., 2013). Moreover, our study reveals that among the firm resources employed in a DT journey, technology and data are key within the DT strategy of established firms. Our fieldwork was also able to capture how the COVID-19 pandemic influenced the resource allocation and dynamic capability building of case organizations, thus contributing to recent research on the topic (Amankwah-Amoah et al., 2021).

Finally, our findings also emphasize some interesting points between DT and innovation. First, we demonstrate how traditional organizations practice open innovation processes with startup ecosystems to accelerate their DT. For example, we observe that companies seek to cooperate with startups to access a new market, access a new technology, or invest in a trend or future signal of a potentially disruptive but still nascent topic. However, understanding how startups can accelerate DT and the development of dynamic capabilities for incumbent DT is a topic not covered and one that may be an interesting avenue for strategic management research. Second, our findings reveal the types of innovations most present as outcomes of the DT process: process innovation, business model innovation, product innovation, and organizational innovation.

From our results, we can say that established companies that intend to start a DT process should start with small initiatives that quickly demonstrate the potential value of this process (achieving "quick wins") for the entire organization. At the same time they should develop a clear DT strategic vision and foster strategic alliances (usually with born digital companies) that accelerate their transformation process and from which they can absorb relevant knowledge. Incumbent firms should invest in the development of dynamic capabilities that will be strategic to enable them to transform their strategy, structure, culture and business model through technology. In addition, while they must pay particular attention to developing a data strategy and building solid technology foundations that enable transformation, incumbent cannot focus efforts only on "digital" and underestimate "transformation." Hence before embarking on a DT, companies' leaders should deeply understand how their legacy, established culture, processes, and employee profiles may favor or hinder the DT process.

The present study has attempted to cover the main points of a DT process, however there still remain some gaps to be explored. First, it is still necessary to understand in depth how a digital business model is built in incumbent companies, which models have mostly emerged

and which capabilities the organization needs to develop for such a move. In this sense, advancing the knowledge about platform business in traditional companies is an interesting and necessary path. Second, the present study opens the way for new research that analyzes DT from comparative studies between incumbent (non-born-digital) and born-digital companies. How do born-digital companies develop dynamic capabilities in the context of the digital revolution? What can born-digital companies teach established companies in digital transformation? How can born-digital and non-born-digital companies cooperate in the context of the digital revolution? These are some questions that could guide future studies. Third, our results have shown that data is a key resource for DT, although companies are not yet exploiting its potential. However, recent events such as public scandals involving some global big-techs raise the flag about the limits of customer data use. Understanding the effects of the legal and moral limits of data use in the context of digital transformation is also a topic with room for investigation.

In terms of management implications, our paper offers a structured way to gradually enhance firms' overall long-term digital transformation vision. Our description of the digital transformation journey from a cross-sector analysis of companies with recognized digital transformation trajectories provides practitioners with a drive to strategies and actions that can be used as a benchmark in their organizations. Furthermore, the detailed nine dimensions of digital transformation in established companies also provide a systematized guide on where to start, what to focus on, and what not to do in a digital transformation process.

The research has several limitations. First, the study has been designed to understand the digital transformation journey of established companies in traditional sectors. We interviewed relevant informants from three companies, all of which are engaged in digital transformation initiatives. However, a large sample of organizations cases from a greater variety of industries should be considered for validating our results. Second, our focus was on a practitioner's viewpoint, meaning we used qualitative methods to analyze processes rather than used quantitative methods to measure the effects of digital transformation on variables. Hence, we suggest quantitative survey research to provide new insights into the effects of digital transformation on firm innovation. Finally, our study focused on large companies in traditional sectors. To advance this work, future research could explore the digital transformation journey of SMEs.

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APPENDIX 1 – SURVEY QUESTIONNAIRE

ID	Group	Research question
1.1	Entrevistado	Qual a sua posição na empresa?
1.2	Entrevistado	Há quanto tempo encontra-se nesta posição?
1.3	Entrevistado	Quanto tempo de experiência em cargos de gestão/liderança?
2.1	Empresa	Em que ano a empresa foi fundada?
2.2	Empresa	Qual o porte da empresa?
2.3	Empresa	Qual o segmento?
2.4	Empresa	Qual a abrangência de mercado?
2.5	Empresa	Qual foi o faturamento em 2020?
2.6	Empresa	Quantos funcionários a empresa tem atualmente?
2.7	Empresa	Em linhas gerais, quais os principais produtos e serviços / divisão de negócios?
3.2	Entendimento sobre TD	Qual o entendimento da empresa sobre transformação digital?
3.1	Entendimento sobre TD	O que você, pessoalmente, tem a mesma visão? Ou uma visão diferente?
4.1	DT Strategy	Qual a estratégia de transformação digital da empresa? Qual a visão de futuro com esse processo? Quais os passos necessários para atingir essa visão?
4.2	External triggers	O que motivou o início da jornada de transformação digital da empresa? Quando isso aconteceu?
4.3	External triggers	Que fatores externos influenciaram essa decisão? De que forma eles impactaram o negócio?
4.4	Dynamic Capabilities (sense)	A empresa possui departamentos/estruturas de P&D, inteligência de mercado e/ou estruturas que analisem e monitorem o ambiente? Como estão estruturados? De que forma estão presentes na jornada de TD?
4.5	Dynamic Capabilities (sense)	Como a empresa monitora o mercado em relação a tendências, oportunidades e novas tecnologias?
4.6	Dynamic Capabilities (seizing)	De que forma a empresa lida com a mudança de mercado e incerteza?
4.7	Dynamic Capabilities (seizing)	Qual a capacidade da empresa DE criar, ajustar e, SE necessário, redesenhar sua estratégia frente aos desafios do cenário digital?
4.8	Dynamic Capabilities (seizing)	De que forma a empresa desenvolve novos produtos, serviços ou processos para aproveitar oportunidades decorrentes da TD?
4.9	Dynamic Capabilities (transforming)	De que forma a empresa transformou recursos internos e a estrutura organizacional para promover a TD?

4.10	Structure and Governance	De que forma a estrutura organizacional está organizada para promover essa jornada? Existe um departamento específico? A estrutura é interna ou externa à firma? Quem está à frente desse processo?
4.11	Culture	De que forma o tema da cultura está presente na jornada de transformação digital? Foi necessária uma transformação cultural para promover a TD? Como foi?
4.12	Capital	De que forma a empresa mobilizou recursos financeiros para promover a transformação digital? Como é investir em um contexto de incertezas?
4.13	People	De que forma a empresa mobilizou recursos humanos para promover a transformação digital? Quais as principais skills e competências para promover a transformação digital do negócio?
4.14	Data	Qual a importância dos dados para a jornada de transformação digital da empresa? De que forma a empresa mobilizou dados como recurso para a jornada de transformação digital? Que dados foram utilizados?
4.15	Technologies	Como a empresa utilizou novas tecnologias para promover a de transformação digital? Quais novas tecnologias foram utilizadas?
4.16	Business Model	De que forma a transformação digital influenciou no modelo de negócio da empresa? Foi criado um novo modelo de negócio com a TD?
5.1	DT Outcomes	Quais foram/estão sendo os resultados percebidos do processo de transformação digital?
5.2	DT Outcomes	Que tipo de produtos a empresa gerou a partir da transformação digital?
5.3	DT Outcomes	Que mudanças a transformação digital permitiu na empresa?
5.4	Innovation	Como o tema de inovação e transformação digital estão relacionados na empresa?
6.1	-	Você gostaria de comentar mais alguma coisa sobre o processo de transformação digital na empresa?
6.2	-	Você gostaria de comentar mais alguma coisa sobre os efeitos/impactos desse processo na empresa?

5. MASTER THESIS FINAL REMARKS

The digital revolution is changing the industrial landscape and digital transformation has been seen as the path that established companies are pursuing to remain competitive. It is a complex and multidisciplinary phenomenon that impacts the entire organization and still needs further research. In this sense, this research contributes to the understanding of digital transformation in incumbent firms, its characteristics, and main dimensions of analysis. DT is an ongoing process of strategic renewal (Warner and Wäger, 2019), as well as a sociocultural process (Saarikko et al., 2020) leveraged by the

exploitation of digital technologies and potentiated by the COVID-19 pandemic. For a better understanding of DT, it is necessary to look at the field of knowledge in formation while at the same time analyzing the evolution of the phenomenon in the industry. Therefore, choosing a master thesis in the structure of multiple mixed-methods studies (Costa et al., 2019) seemed a valid alternative to explore the phenomenon, since this research strategy is ideal to interpret and better understand an investigated reality (Van der Velde et al., 2004).

The two papers that compose this master thesis aimed to answer the following objective: **to identify relevant dimensions of the digital transformation journey of incumbent companies in different industries.** This understanding is necessary due to the growing importance of DT for companies in the current century, in addition to the growing interest from scholars.

In the first paper, entitled **A Business Perspective of Digital Transformation: a Systematic Literature Review**, we proposed to identify main characteristics of existing research on digital transformation in the areas of business and management. This first study played an important role in the development of the master thesis because DT is a topic of relatively recent theoretical building. Hence, it was necessary for the authors to have an overview of existing DT studies and map the evolution of the topic in business and management literature. This first step was fundamental for the development of the second article.

In order to achieve that purpose, we conducted a systematic literature review of DT studies in the context of business and management. The main results indicate that DT scientific field is still growing, evolving, and maturing. Researchers have shown great interest in the topic and the rate of publications is accelerated. The topic is going through an important moment of transformation and it still has some challenges until it becomes a consolidated field of research. DT studies have been published mostly in journals with an academic approach, which suggests a certain level of maturity of the scientific field. However, the predominance of practice-based research, especially case studies approach, and the existence of diffused definitions for DT, suggest that the knowledge construction journey around the DT phenomenon is just beginning. DT as an analysis objective emerged in systems theory, but nowadays it has been widely studied by strategic management scholars. In this sense, the theory of dynamic capabilities has been employed as the way to bring a discussion initially of systems into the territory of business and management. In the first study we also provide a systematization and description of nine dimensions of DT in a way to give guidance to a more convergent field of research. Consequently, we were able to build a theoretical framework that identifies, systematizes,

and describes the dimensions of the DT process. As a result, we also contribute to the literature by providing an empirically definition that conceptualizes the scope of DT journey, as follows:

> **Digital transformation is a journey of organizational change, in which a firm combines internal resources and dynamic capabilities to employ new digital technologies and transform its structure, business model, culture, and strategy to maintain its relevance in the digital landscape.**

In the second paper, entitled **Digital Transformation of Incumbent Companies: a cross-case analysis**, we aimed to analyze the digital transformation journey of incumbent companies. This second study is particularly important once previous researchers have identified that sectors affect companies' digital transformation (Carcary et al., 2016) and adoption of new digital processes (Ferreira et al., 2019). Therefore, understanding how DT behaves in a cross-sector analysis becomes critical as new digital technologies advance across all industries.

In this study, we provide a deep examination of the ongoing DT journey of incumbent firms that are leaders in different sectors and have market-recognized digital initiatives. We applied the theoretical framework of DT developed in the first paper and described how the nine dimensions of a DT process in incumbent companies behave. In doing so, we demonstrated how incumbent companies have mobilized internal resources and dynamic capabilities to seize the opportunities of digital technologies, and identified data and technologies as critical resources in a DT process. We also contribute to recent studies by explaining how established companies sense and seize opportunities in a DT context, as well as how they have reconfigured their structure, culture, and business model to capture the potential of new technologies. Finally, our findings also emphasize some interesting points between DT and innovation. First, we demonstrate how traditional organizations practice open innovation processes with startup ecosystems to accelerate their DT. Second, our findings reveal the types of innovations most present as outcomes of the DT process: process innovation, business model innovation, product innovation, and organizational innovation.

In order to synthesize our results, main contributions, limitations and suggestions for future studies of each article, we present in Figure 7 the Contribution Matrix suggested by Costa et al. (2019).

Figure 7 – Contribution Matrix

GENERAL OBJECTIVE OF THE MASTER THESIS: ***To identify relevant dimensions of the digital transformation journey of incumbent companies in different industries***			
PARTICULARIZED CONCLUSION			
Overview of the results	**Contributions to advancing knowledge.**	**Limitations**	**Proposal for future studies**
• Mapping the evolution of the topic in business and management (main authors and journals and publication profile). • Identification and consolidation of nine DT dimensions: DT strategy, business model, culture, structure and governance, digital technologies, data, capital, people and dynamic capabilities. • Proposition of a conceptual framework of digital transformation	• Detailed information about the evolution of research in DT in the areas of business and management. • Our framework can be viewed as a solid basis for discussion, critique, and/or support of future research. • Proposal of a novel definition that approaches DT from a multidimensional and broader perspective.	• The study approach did not allow the inclusion of all studies available on DT in the areas of business and management. • The focus on the areas of business and management means that insight from only very specific research areas could be provided.	• Deepen the understanding of the nine dimensions of DT. • DT and its consequences for different types of organizations and industries. • Risks and boundaries of the use of data by companies in DT. • Adopting of platform business models by incumbents as a DT strategy.
• Analysis of the DT dynamic and its characteristics in incumbent firms. • Description of how incumbents have mobilized internal resources and dynamic capabilities to take advantage of the digital revolution. • Identification of data and technologies as key resources in a DT journey. • Highlights of the main outcomes and innovations resulting from a DT process.	• Empirical description and analysis of the dynamics of the DT dimensions in incumbent firms. • Advances previous study that analyzes the DT phenomenon from the lens of the firm's dynamic capabilities.	• Limited number of sectors and companies analyzed. • Focus on a practitioner's viewpoint, meaning we used qualitative methods to analyze processes rather than used quantitative methods to measure the effects of DT on variables. • Focused on large companies in traditional sectors.	• To verify whether our conceptual framework on DT is applicable to a broader population of firms and how the dimensions of DT behave in other industries. • Quantitative survey research to provide new insights into the effects of DT on firm's performance. • To analyze the DT dimensions in SME and how the process of TD takes place in these organizations.
INTEGRATING CONCLUSION			

Source: Structure adapted from Costa et al. (2019).

By combining a literature review that systematized concepts and allowed the creation of a theoretical conceptual framework, with the empirical application of the latter in a cross-sector

analysis, we were better prepared to answer the master thesis's objective identifying relevant dimensions of the digital transformation journey of incumbent companies in different industries. At the beginning of the research, no systematic review of the literature on DT had been found with a focus on business and management, which reinforced the need for a two-stage search. In addition, this multimethod configuration of the master thesis allowed combining complementary research methods with the objective of contributing to the construction of new theoretical knowledge and practical application.

For scholars, this study provides detailed information about the evolution of DT and a view of current research. We systematized and described nine dimensions of DT and consolidated a theoretical framework that are solid grounds for discussion, critique, and/or support of future research. In addition, we provide a new definition for DT from a broader and business perspective. We also contribute to DT studies by empirically describing and analyzing the DT dynamic in incumbents and complement recent previous research that analyzes the DT phenomenon from the lens of dynamic capabilities in an attempt to bring the discussion into the strategic management territory.

In terms of management implications, our research offers a structured way to gradually enhance firms' overall long-term digital transformation vision. In this way, the conceptual framework and, specifically, the nine digital transformation dimensions offer a powerful instrument for managers and executives to deal with and to lead the DT agenda within established organizations. Finally, the description of the digital transformation journey from a cross-sector analysis of companies with recognized digital transformation trajectories also provides practitioners with a guide to strategies and actions that can be used as a benchmark in their organizations.

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