

## Digital transformation in business and management research: An overview of the current status quo

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### ABSTRACT

It is no surprise that research on digital transformation (DT) has raised vast interest among academics in recent decades. Countries, cities, industries, companies, and people all face the same challenge of adapting to a digital world. The aim of the paper is twofold. First, map the thematic evolution of the DT research in the areas of business and management, because existing research in these areas to date has been limited to certain domains. To achieve this, articles were identified and reviewed that were published in the Chartered Association of Business Schools' (ABS)  $\geq$  2-star journals. Based on these findings, the second objective of this paper will be to propose a synergistic framework that relates existing research on DT to the areas of business and management, which will help form the evolutionary perspective taken in this paper. Considering the emerging development of the topic under investigation, the framework is understood as a sound basis for continued discussion and forthcoming research.

### 1. Introduction

The industrial world is evolving into a digital one (Parviainen, Tihinen, Kääriäinen, & Teppola, 2017). The COVID-19 pandemic has accelerated this phenomenon (Priyono, Moin, & Putri, 2020). Digital transformation (DT) has gone from being a technological opportunity to a pure necessity for managing the needs and expectations of the world's growing population (Kraus et al., 2021). These developments have led to considerable changes in many organizations, with DT introducing new processes and mechanisms that can affect the key structures of how a company does business. According to Heavin and Power (2018), the primary aim of DT is to solve challenges concerning efficiency and effectiveness, while Hess, Benlian, Matt, and Wiesböck (2016) state that companies that do not rapidly develop and implement DT strategies are unlikely to keep pace and compete in the new digital reality. The transition to this new reality should however not be underestimated because, like every change process, it contains several risks and challenges (Andriole, 2017; Horváth & Szabó, 2019; Vial, 2019). We know

from past research that any change is difficult to implement in organizations (Deline, 2018), and up to 70% of large organizational changes fail (Barrett & Stephens, 2016, 2017; Burke, 2011). It is also known that companies are slow to respond to change (Wright, Van Der Heijden, Bradfield, Burt, & Cairns, 2004), decreasing the likelihood of companies adopting DT and implementing DT strategies. Additionally, reports by Kane, Palmer, Phillips, Kiron, & Buckley, 2015 and Carr (2003) claim that there is a general misconception that technology drives DT when, according to the authors, it is a strategy instead. The COVID-19 pandemic, on the other hand, has shown the impact of a crisis (here, an external one) on the rapid adaptation of DT (Dwivedi et al., 2020; Fletcher & Griffiths, 2020; Iivari, Sharma, & Venta-Olkkonen, 2020; Kodama, 2020; Osiyevskyy, Shirokova, & Ritala, 2020; Papagiannidis, Harris, & Morton, 2020; Rowe, 2020).

DT represents a substantial challenge not only for individual companies, but also for national economies (Švarc, Lažnjak, & Dabić, 2020). To become a digital nation, i.e. a country in which citizens, governments, and companies live in a digital society that interacts and creates

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value benefitting all stakeholders, national governments can/must learn from the experiments conducted in smart cities (Cukusic, 2021; Kar, Ilavarasan, Gupta, Janssen, & Kothari, 2019; Manfreda, Ljubi, & Groznik, 2021; Tangi, Janssen, Benedetti, & Noci, 2021; Zekic-Susac, Mitrovic, & Has, 2021), and the experiments of entrepreneurs in particular (Kraus, Richter, Papagiannidis, & Durst, 2015).

DT research tends to be very specialized and restricted to particular domains. It is currently seeing a rapidly growing number of publications that annually present results from different disciplines and points of view. Due to this, the larger field of DT has become very complex and difficult to comprehend (Hanelt, Bohnsack, Marz, & Antunes Marante, 2021; Hausberg, Liere-Netheler, Packmohr, Pakura, & Vogelsang, 2019).

With all of this in mind, it is not surprising to observe an increasing number of researchers from different management and business fields such as accounting, marketing, entrepreneurship, or manufacturing interested in contributing to the topic of DT and its evolution. It also shows that expectations are high, with initial reviews of the topic already available. For example, Hofacker, Golgeci, Pillai, and Gligor (2020) conducted a review in which they examined the relevant literature on digital marketing and B2B relationships. Li (2020b) performed a systematic literature review to examine how digital technologies facilitate business model innovation in creative industries, while Knudsen (2020) conducted a systematic literature review that focused on digitalization in accounting. The extant reviews have in common that they primarily focus on very limited areas of business and management; they are very narrow in perspective. Additionally, these reviews have not determined the evolution of the term DT in the areas of business and management. The rigorous study of DT is generally still at an early stage (Chanias, Myers, & Hess, 2019), and the studies conducted on it are too often overly optimistic about it (Kar et al., 2019).

In this context, the objective of this study is to provide a comprehensive review of the existing research on DT in the areas of business and management. More precisely, the overall purpose of this paper is to structure existing research, identify its current trends, and offer an overview of recent research strands and topics in DT to determine their thematic evolution as represented in the business and management literature. The following research questions are posed: (i) How has the topic of DT evolved in the areas of business and management? (ii) What themes have been studied in the extant business and management literature regarding digital transformation? The emphasis is here placed on business and management to consider the importance ascribed to these areas in conjunction with DT (Heavin & Power, 2018; Matt, Hess, & Benlian, 2015). This study is divided into two parts: (1) mapping the thematic evolution of the DT research in the areas of business and management by focusing on papers that were published in the Chartered Association of Business Schools' (ABS)  $\geq$  2-star journals during the period 2010–2020; (2) based on the findings of the first part, proposing a synergistic framework that relates existing research on DT to the areas of business and management.

This paper contributes to DT research in the areas of business and management by providing detailed information on its evolution. The main results are summarized within a synergistic framework. Taking into account the emerging state of the topic, the proposed framework is viewed as a solid basis for discussion, critique, and/or support of future research.

The paper is structured as follows. In the next section, DT is introduced and differentiated from other related terms to facilitate a common basis of understanding. This section also provides varying definitions of DT. Section three outlines the methodology. This is followed by sections four and five that present the different results of the study. Section six highlights the paper's contribution to theory, while section seven concludes the paper, and also discusses the limitations of the study, as well as future research directions.

## 2. Defining digital transformation in business and management

Before analyzing the thematic evolution of the research on DT in business and management, it is useful to differentiate DT from other related terms that are often used interchangeably (Hagberg, Sundstrom, & Egels-Zandén, 2016; Hess et al., 2016; Horváth & Szabó, 2019; Parviainen et al., 2017). These include (i) digitization, (ii) digitalization, and (iii) digital transformation. According to the Gartner IT Glossary, digitization is the process of changing from analog to digital form. Hess et al. (2016), and Horváth and Szabó (2019) also view the automation of processes through information technologies as digitization.

The turn of the millennium saw vast progress made with technologies such as mobile phones, data processors, distributed computing, storage, and digital cellular networks (Evans & Price, 2020; Heavin & Power, 2018). These digital conversions are more advanced than digitization, and are categorized on the next level that is associated with the term digitalization. Digitalization calls for new ways of workplace communication and collaboration, and can be understood as the use of digital technologies and data (digitized and natively digital) to create revenue, improve business, and replace/transform business processes (not simply digitizing them). According to Schwarzmüller, Brosi, Duman, and Welpé (2018), it also creates an environment for digital business. Digital transformation in turn can be defined as the integration of digital technology into all aspects and operations of an organization, which in turn leads to infrastructural changes in how the organization is operated and delivers value to its customers (McGrath & Maiye, 2010; Vial, 2019). Some researchers (e.g., Bouncken, Kraus, & Roig-Tierno, 2021 and Vial, 2019) argue that DT goes even further, and fundamentally changes business operations, products, and processes, which in some cases leads to completely new business models. Organizations, regardless of their type and size, need to be prepared to align or even replace their current business processes with new ones (Horváth & Szabó, 2019) which they might not necessarily be comfortable with (Benjamin & Potts, 2018). According to Kane et al. (2015), this needs to occur at a fast pace. Kane et al. (2015) also stressed that DT requires a change in leadership, culture and mindsets, attitudes towards risks, as well as new ways of working, new technologies, and a willingness to accept ambiguity and constant change.

Increases in sales and productivity, innovations in value creation, as well as novel forms of interaction with customers are examples of potential gains in a successful DT according to Matt et al. (2015). Heavin and Power (2018) highlight that DT brings technologies such as machine learning and analytics, which in turn can mean endless opportunities for organizational solutions and increased internal efficiency.

Although the discussion about DT tends to have a positive connotation – and has been heavily promoted by large consulting companies such as McKinsey and Boston Consulting, possible negative effects are also increasingly addressed, with emphasis for example on the relevance of responsible approaches towards managing DT (O'Halloran & Griffin, 2019), or societal and ethical issues (Royackers, Timmer, Kool, & van Est, 2018).

The existing literature suggests that research on DT aims to capture recent trends and developments; it generally represents a field of research that has begun to prosper. However, and not surprisingly, there is to date no commonly accepted definition of the term DT (Knudsen, 2020; Kraus, Roig-Tierno, & Bouncken, 2019; Schallmo, Williams, & Lohse, 2019; Schallmo, Williams, Boardman et al., 2019). Table 1 summarizes the DT definitions identified in the business and management journals covered in the present study.

As seen in Table 1, the focus of DT definitions varies from the adoption and use of new technologies; to improvements in processes, operations, customer relations, and performance; to the creation of new business models; all the way to possible outcomes and impacts on several actors and environments. DT is expected to be the trigger for the development of new organizations. This can be realized in the form of new market entrants, as well as with incumbent organizations that have

**Table 1**  
Definitions of Digital Transformation.

Author(s)	Definition
Liu, Chen, and Chou (2011), p.1728	Digital Transformation is an organizational transformation that integrates digital technologies and business processes in a digital economy.
Matt et al. (2015), p. 339	Digital transformation strategies take on a different perspective and pursue different goals. Coming from a business-centric perspective, these strategies focus on the transformation of products, processes, and organizational aspects owing to new technologies.
Hess et al. (2016)	Digital transformation (also known as digitalization), however, is concerned with the changes that digital technologies can bring about in a company's business model, products, processes and organizational structure.
Parviainen et al. (2017), p. 64	Digital transformation is defined as changes in ways of working, roles, and business offering caused by the adoption of digital technologies in an organization, or in the operation environment of the organization.
Bondar, Hsu, Pfouga, and Stjepandić (2017), p. 33	Digital Transformation is a consistent networking of all economic sectors and as adaption of actors to new circumstances of the digital economy.
Schallmo et al. (2019); Schallmo, Williams, Boardman et al. (2019), p. 4	The DT framework includes the networking of actors such as businesses and customers across all value-added chain segments, and the application of new technologies. As such, DT requires skills that involve the extraction and exchange of data as well as the analysis and conversion of that data into actionable information. This information should be used to calculate and evaluate options, in order to enable decisions and/or initiate activities. In order to increase the performance and reach of a company, DT involves companies, business models, processes, relationships, products, etc.
Hinings, Gegenhuber, and Greenwood (2018), p. 53	Digital Transformation is the combined effects of several digital innovations bringing about novel actors (and actor constellations), structures, practices, values, and beliefs that change, threaten, replace or complement existing rules of the game within organizations, ecosystems, industries or fields.
Heavin and Power (2018), p. 40	While digital transformation has its challenges, existing research indicates that the digital phenomenon is an opportunity to innovate and redefine how organizations do business. The two main aspects of digital transformation are defined in terms of (1) technology and (2) customer or user.
Vial (2019), p. 121	Digital transformation is a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies.
Warner & 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.

the opportunity to aspire to the business next level.

Having laid a basic understanding of DT, the next section will present the methodology utilized to reach the overall objectives of this paper.

### 3. Methodology

The authors followed a systematic review as outlined by Tranfield, Denyer, and Smart (2003) and Kraus, Breier, and Dasí-Rodríguez (2020) to achieve the aim of structuring extant research on DT in the areas of business and management. This procedure included the following three steps: (1) planning the review, (2) conducting the review, and (3) reporting the review. The last step is presented in Section 4 (Results). The authors followed Kumar, Kar, and Ilavarasan (2021) and Kushwaha, Kar, and Dwivedi (2021) to structure the analysis.

#### 3.1. Planning the review

A literature review protocol was developed that included the selection criteria of the study. Relevant articles (data) for this study were collected and compiled from the online Web of Science (WoS) database. Created in 1960 and owned by the Clarivate analytics company, the WoS is a platform based on web technology. It has collected a wide range of bibliographic databases, citations, and scientific publication references from countless scientific, technological, humanistic, and sociological disciplines since 1945. The WoS consists of more than 12,000 live journals, 23 million patents, 148,000 congressional proceedings, and more than 40 million, and 760 million, sources of cited references (Sánchez, Rama, de la, & García, 2017). It provides a comprehensive view of worldwide research production (Mongeon & Paul-Hus, 2016; Sánchez et al., 2017).

The authors proceeded from here as follows: A search for publication titles, keywords, and abstracts for the initial downloading of published research literature between 2010 and 2020 was commenced. In step one, the query result led to 3414 research papers. In the second step, the authors restricted the analysis only to articles; this reduced the number of possible contributions to 1667. In step three, the authors limited the search further by focusing only on those contributions published in the areas of business and management. This reduced the number of research papers to 398. In the fourth step, the authors restricted the search to articles published in English, which reduced the articles to 376. In step five, only 2-, 3-, and 4-star journals as listed in the Chartered Association of Business Schools' ranking were selected to further restrict the search to higher quality articles, further diminishing the number of suitable papers to 231. In the sixth step, the authors screened the titles, keywords, and abstracts of the remaining papers to exclude those that were not relevant for achieving the aim of the paper. The final set of papers covered 217 articles that appeared appropriate for structuring the research on DT in the fields of business and management. Fig. 1 summarizes the various steps taken for selecting relevant contributions.

#### 3.2. Conducting the review

This section includes more detailed insights into how relevant articles were identified. It also provides information about the final number of articles involved in the study.

To identify relevant articles, the searches were carried out using the following expressions included in the title, abstract, or keywords:

TS= ("digita\* transfor\*").

Refined by: DOCUMENT TYPES: (ARTICLE OR REVIEW) AND WEB OF SCIENCE CATEGORIES: (BUSINESS OR MANAGEMENT) AND LANGUAGES: (ENGLISH).

The search syntax was derived from steps 1–4 as presented in Fig. 1. The searches carried out resulted in 217 relevant articles published between 2010 and 2020 (online). Table 2 provides a descriptive summary of the articles included in the present study. The articles involved were produced by 593 authors (641 author appearances), of which 22 articles were published by a single author, and 571 articles were published as part of a co-authorship.

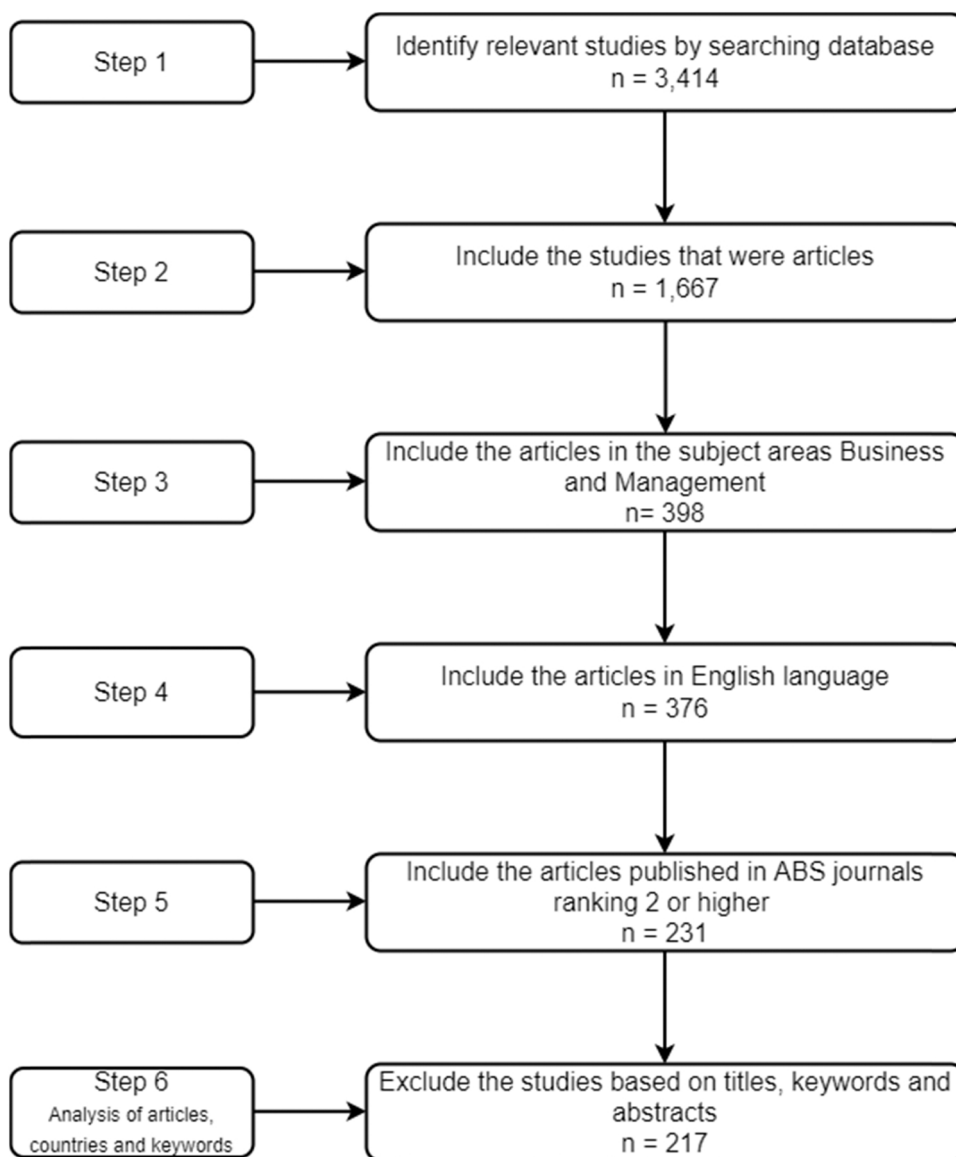


Fig. 1. The data selection process.

**Table 2**  
Summary of articles resulting from the searches.

Description	Results
Documents	217
Sources (journals, books, etc.)	71
Keywords plus (ID)	612
Author's keywords (DE)	757
Period	2010–2020
Average citations per document	24.01
Authors	593
Author appearances	641
Authors of single-authored documents	22
Authors of multi-authored documents	571
Documents per author	0.366
Authors per document	2.73
Co-authors per document	2.95

### 3.3. Methods

The authors of this study used different methods and procedures. To determine the thematic evaluation of the research on DT in the areas of business and management, they determined the annual distributions of

the papers involved, the number of citations, the names of authors most frequently cited, as well the journals in which the papers were published (with a focus on ABS  $\geq 2$  stars journals). The countries from which the most articles came were also identified. In a second step, the articles were analyzed to identify the most frequently mentioned words in the title and keywords of the papers; these helped establish an adequate description of the content of an article, and in turn identified patterns and trends in a specific discipline (Cambrosio, Limoges, Courtial, & Laville, 1993; Evans, Foster, & Guo, 2013). In a further step, the authors utilized a co-occurrence word analysis bibliometric methodology. Co-occurrence word analysis links two articles that cite the same articles. The more papers they share, the more likely these two publications cover the same research topic. If a set of articles shares keywords, it is a likely sign that the same or similar ideas are covered in these articles. More generally, these articles are expected to depict central topics and intellectual structures of an area of knowledge (Leydesdorff & Vaughan, 2006). While mapping the co-occurrence word analysis, the authors used social network theory to determine the position of each keyword in the network (Freeman, 1978; Otte & Rousseau, 2002). In a final step, the articles were grouped into different compact sets based on their content.

### 4. Results

Section 4 is structured as follows. The Section 4.1 provides a characterization of the articles covered in this paper. To do this, an analysis provides (1) the chronological evolution of both the number of articles published, and the number of citations in the areas of business and management regarding DT since 2010. This is followed by (2) an overview of the top-cited articles; this also comprises information about the publications at the national and international levels. In Section 4.2, the results of the keyword analysis are presented to show the conceptual structure of the articles included in this study, while Section 4.3 is dedicated to the analysis of co-occurring words, which also allows the establishment of dominant themes.

#### 4.1. Analysis of findings by the number of articles

Fig. 2 summarizes the evolution of both the number of articles and citations regarding the research on DT in the areas of business and management since 2010. The average year of publication was 2019.0. Fig. 2 also indicates that the papers published before 2017 can be seen as forerunners laying the foundation for the research domain. The increasing interest in research on DT in the two areas started only in the past decade, most notably as of 2016. Fig. 2 also demonstrates that, since 2019, the topic has gained considerable momentum, with around 81.0% of all articles published (29.0% in 2019, and 52.0% in 2020).

In terms of the number of citations, the articles involved in this study were cited an average of 24.0 times out of a total number of 5208 citations. Delving deeper, it's seen that six articles (2.8%) had no citations, 70 articles (32.3%) were cited between one and five times, and 51 articles were cited 25 times or more (23.5%).

Table 3 lists the ten articles with the highest number of citations. Four of the most cited articles were published in 2019, and one paper was published in 2010. The articles with the highest number of citations in the given set of articles are the works by Agarwal, Gao, Gordon, DesRoches, and Jha (2010) (292 citations), Hess et al. (2016) (128 citations), Hagberg et al. (2016) (118 citations), and Vial (2019) (109 citations).

To structure the research on DT, the authors also organized the studied articles based on the countries in which different DT topics have been studied (Table 4). As seen, Germany (55 articles), followed by the USA (47 articles) and Italy (51 articles) are the most active countries (in

**Table 3**  
Top publications in the DT field.

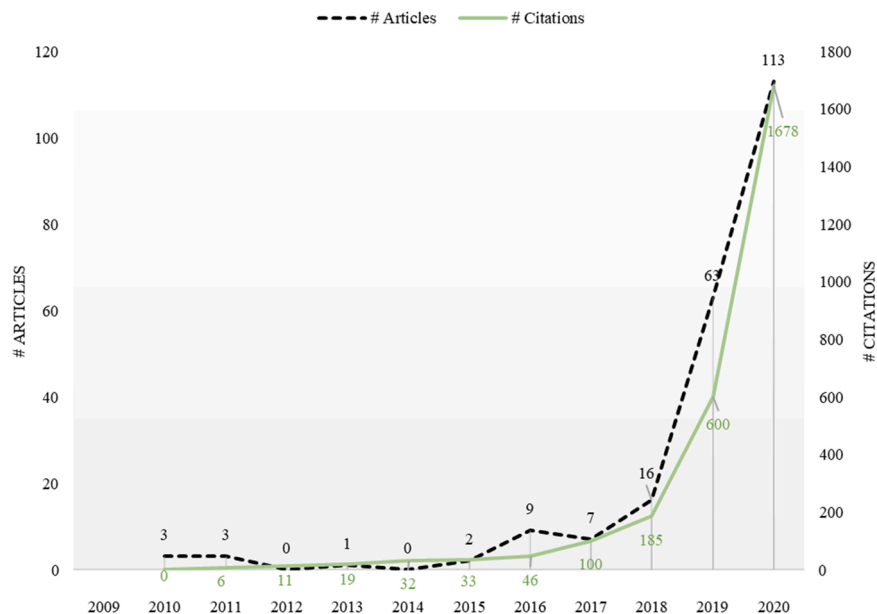
Article	# Citations
Agarwal et al. (2010)	292
Hess et al. (2016)	128
Hagberg et al. (2016)	118
Vial (2019)	109
Kathan, Matzler, and Veider (2016)	105
Bogers, Chesbrough, and Moedas (2018)	97
Karimi and Walter (2015)	85
Singh and Hess (2017)	82
Hinings et al. (2018)	77
Sebastian et al. (2017)	76
Trantopoulos, Von Krogh, Wallin, and Woerter (2017)	76

**Table 4**  
List of countries with the largest number of articles on DT.

Country	# Articles
Germany	55
USA	47
Italy	40
UK	32
Sweden	17
Canada	13
France	13
Denmark	12
Finland	12
Austria	9
Netherlands	9
Spain	9
Switzerland	9

terms of number of articles). All of the countries listed in Table 5 are industrialized nations.

Regarding co-authorship between countries, the Italian authors had 37 articles published with authors from other countries, followed by authors from Germany (29 articles published in co-authorship), the USA (26 articles published in co-authorship), and the UK (25 articles published in co-authorship). Within these four countries, eight articles were published by Italian authors with UK authors, seven articles were published by Italian authors with authors from the USA, and seven by



**Fig. 2.** Number of articles published and citations by year.



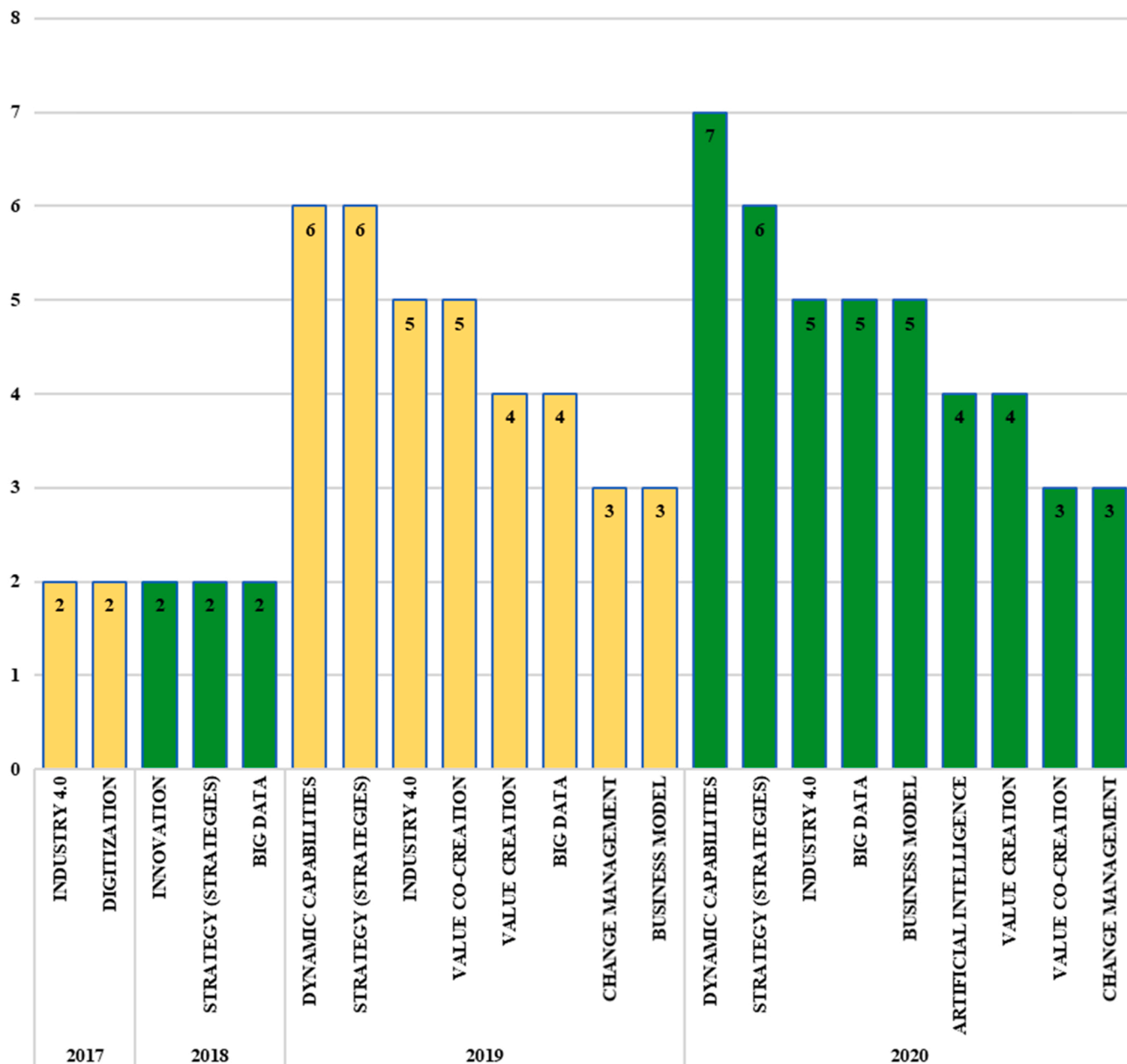


Fig. 4. Overview of the most frequently used keywords between 2017 to 2020.

healthcare systems, the impact on quality, and reduced costs in healthcare, as well as the challenges of DT in this industry. [Bogers et al. \(2018\)](#) combined DT and openness to discuss possible business and economic development effects, while [Chanias et al. \(2019\)](#) argued that DT changes business operations, products, and processes, which in some cases leads to completely new business models. [Burton-Jones et al. \(2020\)](#) explored how institutional theory offers a lens for understanding the complexities of evaluating DT in healthcare. [Cozzolino, Verona, and Rothaermel \(2018\)](#) examined the drivers and impeding factors of business model adaptation, how incumbents change their strategies to cope with different components of the process, and how a closed business model can be renewed to develop an open, platform-based business model to seize external opportunities.

[Di Gregorio, Maggioni, Mauri, and Mazzucchelli \(2019\)](#) researched how digital transformation has disrupted the marketing career path by analyzing the most in-demand marketing skills, and identifying opportunities for future marketing professionals. [Diller, Asen, and Spath](#)

[\(2020\)](#) explored the psychological factors and the relationship between tax consultants' big-five personality traits and their level of digitization. [Kohtamaki, Parida, Oghazi, Gebauer, and Baines \(2019\)](#) verified the direct and interaction effects of product uncertainty and product price on online consumers' purchase decisions. [Baiyere, Salmela, and Tapanainen \(2020\)](#) re-thought the dominant business process management logic, proposing new logics that the authors conceptualize as light touch processes (process), infrastructural flexibility (infrastructure), and mindful actors (agency). [Aibinu and Papadonikolaki \(2020\)](#) explored why and how the distribution of effort spent on various tasks over the project life cycle can be used as a metric for assessing and improving the performance of building information modeling implementation. [Baber, Ojala, and Martinez \(2019\)](#) studied how digital business models evolve when entrepreneurs move to new digital platforms, and how this evolution is related to effectuation and causation logics.

[Baptista, Stein, Klein, Watson-Manheim, and Lee \(2020\)](#) evaluated the challenges for companies when dealing with organizational changes



subsidiaries can navigate them. Based on institutional theory, [Faik, Barrett, and Oborn \(2020\)](#) developed a model of IT and social change, arguing that it is critical in an era of large-scale digital transformation. In their study, [Forcadell, Aracil, and Ubeda \(2020\)](#) found that the combination of corporate sustainability and digitalization facilitates the transformation of the organizational nature of banks by simultaneously narrowing their boundaries and expanding their scope. [Gfrerer, Hutter, Fuller, and Strohle \(2021\)](#) examined how digital knowledge and skills are distributed among managers and employees, developing a framework of change readiness toward digital readiness. [Fischer, Imgrund, Janiesch, and Winkelmann \(2019\)](#); [Fischer, Imgrund, Janiesch, and Winkelmann \(2020\)](#) examined how companies use business process management to implement digital transformation. Using a case study from the healthcare industry, [Gray, El Sawy, Asper, and Thordarson \(2013\)](#) analyzed how IT is used to create new value for both the enterprise as well as the entire ecosystem. [Hanelt et al. \(2021\)](#) clarified the boundary conditions for investigating the phenomenon of DT from the perspective of organizational change. [Gerth and Peppard \(2016\)](#) researched the reasons why CIO leaders are derailed, and what they and the CEO can do to avoid this.

To better understand the mechanisms by which IT enables or inhibits the capabilities of public organizations in attaining public value, [Goh and Arenas \(2020\)](#) adopted a conflict resolution lens to examine how IT-enabled capabilities mitigate their tradeoffs. [Hughes and Vafeas \(2019\)](#) explored changes in agency/client value co-creation during a period when digital transformation is having a major impact on the marketing communications process. [Jammulamadaka \(2021\)](#) examined the role of capacity building in reverse mentoring as an enabling routine in bringing about changes in cognition and capabilities for organizational change. Using company examples and practices, [Guinan, Parise, and Langowitz \(2019\)](#) described how digital leaders are using these levers to propel their organizations forward in the journey toward digital transformation. Based on two public sector organizations in which IS and business leaders used the participatory process model, delineated by the authors, [Hansen, Kraemmergaard, and Mathiassen \(2011\)](#) defined some assumptions about IS leadership, challenging existing IT strategies and collaboration patterns, and adapting the organization's digitization approach.

[Kauffman, Li, and Van Heck \(2010\)](#) explored the circumstances under which value is created in business networks made possible by IT. [Latilla, Frattini, Franzo, and Chiesa \(2020\)](#) studied the relationship between business model innovation and the relevant organizational changes that can facilitate the renewal of a traditional business model. [Singh and Hess \(2017\)](#) contributed to research on strategic change, investigating the organization design parameters surrounding chief digital officers and their DT activities. [der Schaft, Lub, der Heijden, and Solinger \(2020\)](#) studied the effect of social interaction on the dynamics of psychological contracting throughout the organizational change in DT. Adopting a discovery-oriented, theories-in-use approach, [Tronvoll, Sklyar, Sorhammar, and Kowalkowski \(2020\)](#) examined the strategic organizational shifts that underpin manufacturers' digital servitization. [Wrede, Velamuri, and Dauth \(2020\)](#) explored the role and facilitating actions of top managers in response to digital transformation.

The remaining papers assigned to this cluster mainly address the approaches, responses, and actions taken by organizations to handle progressive DT (e.g., [Baum, Danner-Schroeder, Mueller-Seitz, & Rabl, 2020](#); [Guy, 2019](#); [Kane, 2019](#); [Krishnamurthy, 2020](#); [Roth, 2020](#); [Rowe, 2018](#); [Wenzel & Will, 2019](#)), its impact on business models (e.g., [Li, 2020a, 2020b](#); [Rapaccini, Saccani, Kowalkowski, Paiola, & Adrodegari, 2020](#); [Rossi, Festa, Devalle, & Mueller, 2020](#); [Schallmo, Williams, & Boardman, 2017](#); [Steinhauser, Doblinger, & Huesig, 2020](#); [Tekic & Koroteev, 2019](#)), and the required organizational configuration to increase the success of DT (e.g., [Hensmans, 2021](#); [Kretschmer & Khashabi, 2020](#); [Scholz, Czichos, Parycek, & Lampoltshammer, 2020](#); [Schwarzmueller et al., 2018](#); [vom Brocke, Schmid, Simons, & Safrudin, 2021](#); [Wenzel, Kraemer, Koch, & Reckwitz, 2020](#); [Westerman, 2016](#);

[Westerman, Soule, & Eswaran, 2019](#)).

## 5.2. Use of digital technologies

Papers assigned to this cluster address how different technologies are utilized to master DT, particularly in the contexts of B2B and Industry 4.0. [Bienhaus and Haddud \(2018\)](#) analyzed the role of digitization in procurement, and its role within the area of supply chain management, exploring potential barriers to digitizing procurement and supply chains, as well as ways to overcome them. [Bjorkdahl \(2020\)](#) discussed the digitalization efforts of a set of leading manufacturing firms, the difficulties encountered there, and how they can be handled. [Caliskan, Ozkan Ozen, and Ozturkoglu \(2021\)](#) developed a framework for understanding the 7Ps in marketing based on contemporary perspectives of Industry 4.0.

[Crupi et al. \(2020\)](#) aimed to know if and how European digital innovation hubs filling the role of knowledge brokers can support the digital transformation of small and medium-sized enterprises by triggering open innovation practices. [Culot, Orzes, Sartor, and Nassimbeni \(2020\)](#) reviewed academic publications and the most influential non-academic sources, including governmental bodies and consulting companies, about Industry 4.0 to categorize the phenomenon and its multiple facets. [Frank, Mendes, Ayala, and Ghezzi \(2019\)](#) proposed a conceptual framework connecting servitization and Industry 4.0 while taking a business model innovation perspective. [Furr and Shipilov \(2019\)](#) showed how manufacturers successfully responded to the digital challenge by making major changes to their manufacturing processes, distribution channels, or business models.

[Govindarajan & Immelt, 2019](#) explored why this is so difficult for industrial companies in particular, sharing key insights from their deep experience and research. [Handfield \(2019\)](#) developed a framework to determine the role of technology and other shifts in the supply chain ecosystem, as well as the value of buyers and sellers in the industrial landscape. [Hartley and Sawaya \(2019\)](#) researched the three technologies poised to change supply chain business processes: robotic process automation, artificial intelligence/machine learning, and blockchains. [Horváth and Szabó \(2019\)](#) show how top executives interpret the concept of Industry 4.0, the driving forces for introducing new technologies, and the main barriers to Industry 4.0. [Kaiser and Stummer \(2020\)](#) described how the German appliance manufacturer Miele met the DT challenge in 2016, discussing lessons learned during the four years after the company initiated its transformation process. [Szalavetz \(2019\)](#) investigated whether advanced manufacturing technologies can modify the upgrading patterns in manufacturing subsidiaries operating in FDI-hosting factory economies. [Garzoni, De Turi, Secundo, and Del Vecchio \(2020\)](#) analyzed how digital technologies trigger changes in the business process of small and medium-sized manufacturing enterprises (SMEs) in the Italian Apulian region.

In a holistic and structured way, [Hofmann, Samp, and Urbach \(2020\)](#) proposed four traits that characterize robotic process automation, providing orientation as well as a focus for further research. [Martinez \(2019\)](#) illustrated the procedure followed by some manufactures to introduce digital elements into their operations. [Jean, Kim, Lien, and Ro \(2020\)](#) developed and tested a theoretical framework of how to manage global supply chain relationships under digital transformation into international customer-supplier relationships. [Nasiri, Ukko, Saunila, and Rantala \(2020\)](#) investigated the approach required to achieve competitive advantages in the digital supply chain, also examining how the digital transformation of companies can fuel smart technologies, leading to improved relationship performance. [Richard, Pellerin, Bellemare, and Perrier \(2021\)](#) addressed the difficulties faced by manufacturing enterprises, providing a project portfolio management approach supporting the selection and prioritization of various Industry 4.0 projects where business process analysis is used to ensure the strategic alignment and value of the project portfolio. [Sabri, Micheli, and Nuur \(2018\)](#) analyzed the impact of digital transformation and rapid dissemination of

technological innovations along the supply chain when process and product innovation practices are implemented.

Secundo, Rippa, and Cerchione (2020) analyzed whether the entrepreneurship education centers introduced in Italy are effectively adopting the emergent digital technologies for nurturing their entrepreneurship education activities and dissemination of knowledge contamination practices among university students. Seyedghorban, Samson, and Tahernejad (2020) investigated how procurement can be reinvented by going from being digitized to digitalized, to digitally integrated, and how this contributes to business in terms of supply chain effectiveness as well as profit generation. Seepma, de Blok, and Van Donk (2021) explored how inter-organizational ICT is used in re-designing public service supply chains. Shashi, Centobelli, Cerchione, and Ertz (2020) descriptively and analytically reported how technology was addressed within the agile supply chain literature, mapping a nomenclological network of agile supply chain research. Chen, Jaw, and Wu (2016) examined the effect of a pilot implementation of an industry-specific web portal with a B2B function on textile SMEs' organizational performance. Amidst the COVID-19 crisis, Cortez and Johnston (2020) analyzed the impact of DT-related management practices on the prevalence of B2B company success.

Upadhyay and Khemka (2020) investigated the moderating role of social media use intensity on the relationship between social capital and social identity. Sivarajah, Irani, Gupta, and Mahroof (2020) researched the role of big data and social media analytics within a participatory web environment in B2B organizations, which became more profitable and remained sustainable in their strategic operations and marketing related business activities. Rahrovani (2020) showed that digitalization exposes continuous adjustment within and across three elements of digital work: embracing new uses of the platform at the user level, redesigning governance policies, and fitting uses with the platform logic underlying digital work.

Influenced by the DT of business, Taylor, Hunter, Zadeh, Delpechitre, and Lim (2020) developed a framework of marketing interactions in B2B that merges the evidence related to goal theory, perceived value, resource sharing, value propositions and their communication, marketing ecosystems, and the value co-creation process. Huber and Gärtner (2018) showed the findings of an in-depth qualitative case study conducted at a medium-sized German hospital, focusing on the hospital's information system with a particular emphasis on its operating room module. Troshani, Janssen, Lymer, and Parker (2018) researched how traditional business-to-government reporting is being eliminated, and how digital reporting is determined to replace it in light of the challenges to reduce administrative burdens without compromising regulatory effectiveness.

Other authors researched the role of using technologies/datasets/tools in DT such as big data and analytics (e.g., Battisti, Shams, Sakka, & Miglietta, 2020; Brous & Janssen, 2020; Caputo, Cillo, Candelo, & Liu, 2019; Carrero, Krzeminska, & Hartel, 2019; Dremel, Herterich, Wulf, Waizmann, & Brenner, 2017; Goul, 2018; Gust, Flath, Brandt, Stroehle, & Neumann, 2017; Jackson, 2019; Kappelman, Johnson, Torres, Maurer, & McLean, 2019; Maussion & Andersson, 2019; Nuccio & Guertzoni, 2019; Roth, Schwede, Valentinov, Zazar, & Kaivo-oja, 2019; Sestino, Prete, Piper, & Guido, 2020; Ylijoki & Porras, 2019), the Internet of Things (e.g., Butschan, Heidenreich, Weber, & Kraemer, 2019; Ceipek, Hautz, De Massis, Matzler, & Ardito, 2021; Osterlie & Monteiro, 2020; Saarikko, Westergren, & Blomquist, 2020; Sandberg, Holmstrom, & Lyytinen, 2020), artificial intelligence (e.g., Brock & von Wangenheimz, 2019; Harwood & Eaves, 2020; Kronblad, 2020b, 2020a; Magistretti, Dell'Era, & Petruzzelli, 2019; Rodriguez-Lluesma, Garcia-Ruiz, & Pinto-Garay, 2021), and blockchains (e.g., Cennamo, Dagnino et al., 2020; Li, 2020a; Milian, Spinola, & Carvalho, 2019; Riasanow, Jaentgen, Hermes, Boehm, & Krmar, 2020).

### 5.3. Dynamic capabilities

This cluster contains papers that aim to develop the link between dynamic capabilities and DT, particularly from a theoretical point of view. Based on dynamic capabilities and digital innovation literature, Dong (2019) conducted an in-depth longitudinal study involving Dutch digital entrepreneurship. Endres, Helm, and Dowling (2020) derived key market knowledge sourcing determinants of the sensing capability of industrial firms in general, linking them with market dynamism and revenue growth. Karimi and Walter (2015) focused on the impact of the dynamics between routines and dynamic capabilities when adopting new technologies. Liu et al. (2011) developed a framework that provides a theoretical advancement of the resource fit literature that includes four dimensions: external resource fit, internal resource fit, external capability fit, and internal capability fit.

Michaelis, Rogbeer, Schweizer, and Oezleblebici (2021) extended dynamic capabilities research by examining the underlying and fundamental concepts of capabilities, resource allocation, fungibility, and environmental change concerning value creation and appropriation in DT environments. Drawing on the literature on dynamic capabilities and digital transformation, Sousa-Zomer, Neely, and Martinez (2020) conceptualized and investigated the relevant antecedents of the essential digital transforming capability and its effect on firm performance. Pelletier and Cloutier (2019) studied a particular group conceptualization, relating perceptions of IT issues within a service ecosystem that includes three subgroup profiles: entrepreneurs, IT professionals, and socioeconomic support professionals.

Trantopoulos et al. (2017) aimed to show the joint role of searching external knowledge sources and IT for improving knowledge absorption on process innovation performance, while Vial (2019) proposed dynamic capabilities as a theoretical foundation for studying mechanisms that enable firms to engage with DT to enable strategic renewal. Wiesboeck, Hess, and Spanjol (2020) researched the role of IT capabilities in the specific context of digital product and service innovations. Warner and Wäger (2019) developed a process model comprised of nine micro-foundations to reveal the generic contingency factors that trigger, enable, and hinder the building of dynamic capabilities for DT.

### 5.4. Consumer behavior

These papers encompass contributions to research on DT that highlight what should be done in B2C contexts. Bassano, Gaeta, Piciocchi, and Spohrer (2017) developed a model of customer behavior that explains the impact factor on the consumer-purchasing process generated by a new mode of creating information and technology-based communication. Fritze, Eisingerich, and Benkenstein (2019) conducted one quasi-experimental field study and one scenario-based online experiment to examine the endowment effect of digital services, and whether consumers form instantaneous possession attachment in electronic commerce. Hagberg et al. (2016) analyzed the digitalization of retailing by developing a conceptual framework that can be used to further delineate current transformations of the retailer-consumer interface. Hinings et al. (2018) suggest an institutional perspective as a promising lens for studying both digital innovation and transformation. Hansen and Sia (2015) researched how a European sports fashion company overcame the challenges posted by DT and successfully transitioned toward omnichannel retailing. Hazez et al. (2020) researched the barriers perceived by both customers and peer service providers of smart mobile devices and mobile applications.

Using a game theory model, Jiang and Katsamakos (2010) examined how the entry of an e-book seller affects strategic interaction in book markets, and impacts sellers and consumers. Jucevski, Ghezzi, and Arvidsson (2020) studied how mobile payment providers engaged in the innovation of their business models, identifying three pertinent aspects: rethinking the relationship management with retailers, creating partnerships with other actors in the payment ecosystem to complement and

deliver the proposed value, and integrating and using front-end mobile technology. Gurhan-Canli, Sarial-Abi, and Hayran (2018) organized and synthesized the growing literature on branding, culture, and globalization related to DT from a behavioral perspective. Gregory, Kaganer, Henfridsson, and Ruch (2018) found that the widespread adoption of digital technology in everyday life leads to everyone's IT, a new set of shared beliefs among consumers that highlights democratized access and individualized use of IT. Hwang, Bresciani, and Ferraris (2020) proposed a model for experiential interaction design with a business purpose covering a series of interactive activities. Kamalaldin, Linde, Sjodin, and Parida (2020) applied the relational view theory to a study of four provider-customer relationships engaged in digital servitization.

Kathan et al. (2016) examined why the sharing economy has the potential to produce a long-term transformation in consumption behavior, followed by a consideration of how this change might affect companies' business models. Morath and Münster (2018) studied the platform design in online markets in which buying involves a (non-monetary) cost for consumers caused by privacy and security concerns. Reinartz, Wiegand, and Imschloss (2019) analyzed how digitization initiated the decline of institutional retailing as the primary interface with customers. Santos, Louca, and Coelho (2019) examined the relationship between social media and traditional media, offering recommendations to address the societal challenges posed by the transformation of media environments. Savastano, Bellini, D'Ascenzo, and De Marco (2019) explored whether the kind of technology storage positively affects the customer experience in an omnichannel retail environment, and if the early adoption of in-store technology by retailers produces a sustainable competitive advantage. Scuotto, Arrigo, Candelo, and Nicotra (2020) analyzed the role of the use of social media platforms in ambidextrous innovation orientation at Italian fashion companies. Concerning ongoing digital transformation, Steiner and Gatzemeier (2019) drew on the literature on hedonic and experiential goods to investigate the relationship between crowd evaluations based on listening experiences and popular music chart success.

Compared with the papers assigned to the "Use of digital technologies" cluster which predominantly covers papers conducted in B2B and/or Industry 4.0 contexts, it can be concluded that in its earlier years, the study of DT had a primary focus on B2C, while more recently, the focus has shifted to studying the impact of DT on B2B. This development has certainly been supported by the emphasis placed in recent years on Industry 4.0, both in academia and by the public (as also indicated in Fig. 3).

### 5.5. Strategic responses

This last cluster contains papers that study digital businesses and DT strategies. Al-Busaidi and Al-Muharrami (2021) provided an integrated assessment that enables financial institutions to develop their strategies and assessments in terms of ICT investments, and go beyond typical, tangible financial profitability indicators. Bohnsack and Liesner (2019) provided a growth hacking framework, deconstructing its building blocks: marketing, data analysis, coding, and the lean startup philosophy.

Del Giudice, Scuotto, Garcia-Perez, and Petruzzelli (2019) evaluated the convergence of technology upgrading such as virtual reality, augmented reality, and digital and social networking platforms, as well as new strategies and solutions for small and medium-sized enterprises. Depaoli, Za, and Scornavacca (2020) produced a holistic, non-linear e-business development model for SMEs that takes into account the interactions of an organization in the pursuit of its business objectives. Echterfeld and Gausmeier (2018) presented a methodology for firms to strategically align their product portfolio with digitization, strengthen their market position, and remain competitive. Ferreira, Fernandes, and Ferreira (2019) showed in their study that there is a link between the profiles of entrepreneurs and managers, the adoption of new digital processes, and increased competitiveness.

Galindo-Martin, Castano-Martinez, and Mendez-Picazo (2019) analyzed the theoretical and quantitative effects of DT and digital dividends on entrepreneurial activity. Gastaldi, Appio, Corso, and Pistorio (2018) analyzed how digital technologies can help healthcare organizations, and improve the exploration-exploitation paradox over time. Guenzi and Habel (2020) presented a model for in-depth analysis of sales processes, goals for each process in terms of effectiveness and efficiency, and a structured set of digital responses. He, Meadows, Angwin, Gomes, and Child (2020) aimed to stimulate multidisciplinary debate and theoretical reflections to better understand emerging paradoxes and challenges that contemporary firms face in the formation, evolution, and dissolution of strategic alliances. Kohli and Johnson (2011) studied who should lead the DT effort, as well as the role of the chief information officer in executing a digital strategy. Nambisan, Wright, and Feldman (2019) researched the significant impact of digital technologies, platforms, and infrastructures on innovation and entrepreneurship at different levels, and in varying countries, industries, and companies. Regarding barriers, a lacking ability to aggregate and interpret the data linked with the digital agricultural revolution and missing data-driven strategies were stressed.

North, Aramburu, and Jose Lorenzo (2020) guided SMEs to sense and seize digitally-enabled growth opportunities, and start a project-based learning process to transform the organization to remain competitive in turbulent environments. Schaarschmidt and Bertram (2020) researched the level of strategic organizational investments in emergent and innovative digital technologies that lead to felt obligations towards the employer, and to constructive process deviance as a result.

Correani, De Massis, Frattini, Petruzzelli, and Natalicchio (2020), Gurbaxani and Dunkle (2019), Hess et al. (2016), McGrath and McManus (2020), Rane, Narvel, and Bhandarkar (2019), Schallmo et al. (2019); Schallmo, Williams, Boardman et al. (2019), Sebastian et al. (2017), and Teubner and Stockhinger (2020) developed integrated approaches for digital strategies, while Wang, Mahmood, Sismeiro, and Vulkan (2019) analyzed whether DT strategy could improve organizational performance, providing a comprehensive analysis of the necessity of implementing digital transformation in companies. Wiesboeck and Hess (2020) merged prevailing work on digital innovations into a technology-driven linking framework of digital innovations and their embedding in organizations.

## 6. Discussion

### 6.1. Theoretical contributions

Fig. 6 was developed to provide a synergistic view of existing research on DT in the areas of business and management, and thus bring together the findings presented in Sections 4 and 5 (Sections 4.2, 4.3, and 5 in particular). The framework proposed delivers a synthesized answer to the second research question: (ii) What themes have been studied in the extant business and management literature concerning digital transformation?

The framework can be read as follows. Research focusing on digital transformation in business and management is driven by work that takes an internal perspective, i.e. a resource-based view, as well as an external perspective, i.e. one of structural change, and a change in the way value is/can be created as a result. With the former, existing research has addressed the role of strategy, dynamic capabilities, and the use of big data to in particular successfully tackle digital transformation in companies. For the second aspect, extensive work in the field has dealt with different questions regarding structural change and its consequences at different levels. Against the background of the possible (and actual) consequences of change (DT) for companies, entire industries, and sectors, it is not surprising that a large number of the published contributions deal with alternative or new forms of value creation. Research regarding both perspectives was presented in Section 4, while the evolution of keywords, as depicted in Fig. 3, has illustrated this emphasis in

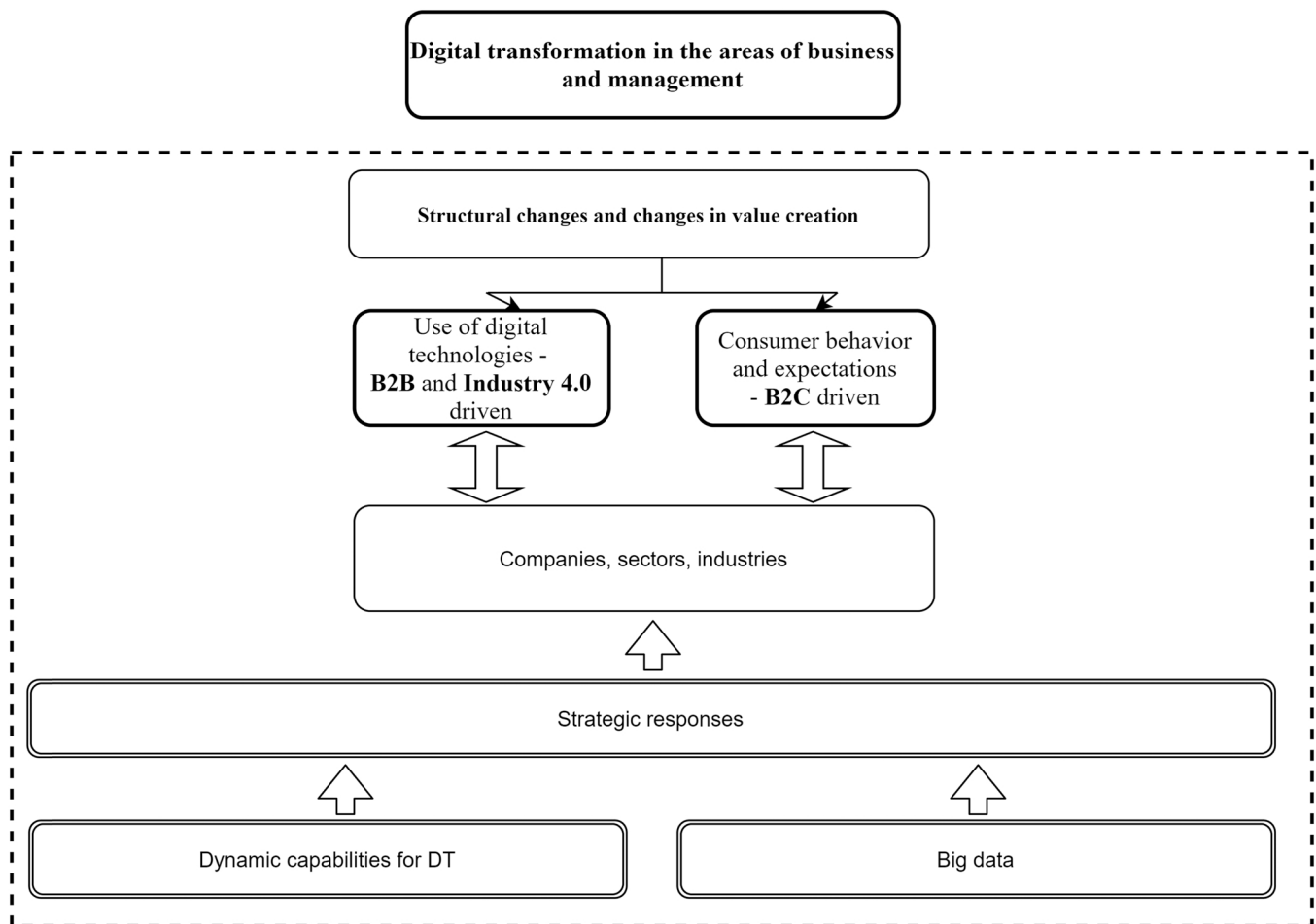


Fig. 6. Framework relating DT to the areas of business and management.

existing research in recent years.

The activities regarding the structuring of current research further indicate that the aforementioned two perspectives have been/can be studied in depth within the contexts of B2B or B2C; both are influenced by internal as well as external influences. However, existing research suggests that work in the B2B context is predominantly concerned with the use of new digital technologies to improve or enable entirely new products, processes, procedures, etc. in an organization. The research also suggests that the use of new digital technologies in the B2B context is a key factor in the development of new products, processes, and procedures. B2C work on the other hand has more of an external (customer) perspective, and is interested in how collaboration and relationships with customers can be improved/will change as a result of DT developments. It from this could perhaps be concluded that some researchers focus on technology (B2B), while others focus on people (B2C). The papers covered in this study and presented in Section 4 indicate as much, with the framework reflecting this as well.

To the knowledge of the authors, this paper is the first to address the topic of DT from an evolutionary perspective focusing on the areas of business and management. It exceeds the scope of the existing literature that so far has been limited to certain domains (see Hofacker et al., 2020 or Li, 2020b). The framework proposed is viewed as a solid basis for further discussion, criticism, and support. As the fast pace of DT is likely to support rapid change in general, and the two areas of business and management in particular, the themes identified and highlighted in the framework can also serve as a basis for additional future research.

The findings presented in this paper show the growing number of publications dedicated to DT in the fields of business and management. Focusing on publications between 2010 and 2020, the authors found

only few publications in the period between 2010 and 2015. A significant increase in publications started in 2018. The transition from 2018 to 2019 appears to have been the moment when research on DT took off, and has continued since then. Research on the topic in the two areas covered appears particularly advanced in and driven by developed countries, particularly Germany, the USA, Italy, and the UK. Researchers in these countries also appear to prefer to work with one another, probably because of the existing expertise in researching DT in the two areas, driving further work on the first research question that focuses on the evolution of the topic in the areas of business and management. Even though DT as a research field in the two areas is still in its infancy, the evidence provided does in fact show several recently published articles in ABS  $\geq 2$  stars journals from 2016 onwards, which have been cited 100 times or more.

The second research question posed was interested in determining the themes that have been studied in the two areas regarding DT. The results very nicely show that with the increase in publications, and over time, the topics themselves have become more diverse. While in 2017 and 2018 only two/four topics dominated, the keyword analysis for 2019 and 2020 suggested not only new issues, but an apparently stronger focus in terms of emphasis as well. The findings also indicate that “Industry 4.0” is a dominant topic of interest regarding DT in the areas of business and management (it was studied in all the years covered in the keyword analysis but one: 2018). The topics “big data”, “strategy”, and “change management” comprised the list of the most frequently mentioned keywords in the articles studied since 2018. The driving keywords of 2019 and 2020 appear very closely linked to other prominent topics in the areas of business and management such as dynamic capabilities, business model innovation, or value creation. In

addition to the keyword analysis, and to develop a more in-depth understanding of the thematic evolution of research on DT in the two areas examined, the authors of this paper utilized further analyses which ultimately led to five dominant themes.

These findings were synthesized in Fig. 6, presenting a framework that displays thematic research areas, ranging from studies aimed at theoretically, conceptually, and empirically developing research on DT in the two areas. Existing research covers studies that highlight the structural changes required at different levels in companies, sectors, and industries to be prepared for DT. Given the structural changes required by DT, extant studies also address the impact and consequences of DT internally (i.e., change in business models or organizational configurations, or the need for developing certain DT-related dynamic capabilities) and externally (i.e., the need for new forms of collaborations with customers due to changes in behavior). Researchers are interested in studying DT within the contexts of B2C and B2B. The findings indicate that research has moved from a focus on B2C to B2B, suggesting further specialization of DT research in the two areas. From 2019 onwards, a particular interest has been the exploration of dynamic capabilities in the context of DT. These are seen as key capabilities, not only in terms of being ready for DT, but also able to exploit its potential. Finally, and also unsurprisingly, research on DT highlights the relevance of strategic responses for increasing the success of the change process in a company.

It can be concluded that this paper has developed and presented a detailed and comprehensive overview of current accomplishments in DT research in the areas of business and management published in ABS  $\geq 2$  stars journals between 2010 and 2020, and has outlined the field's thematic evolution during the time frame covered. The proposed framework brings together and links relevant and recent research avenues regarding DT in the areas of business and management. Its focus on the business and management literature in this study has broadened the limited perspective taken by other recent reviews.

## 6.2. Implications for practice

The findings of this study provide useful information to practitioners (e.g., entrepreneurs and managers) for understanding both the opportunities and challenges arising from DT – not only on the individual firm level, but on the interfirm level as well. This improved understanding can also be crucial in terms of relationships with relevant stakeholders such as customers, suppliers, and business partners, most notably when considering that DT leads to structural changes which call for even more collaboration between different actors to increase the likelihood of benefiting from DT. This improved understanding is also relevant for preparing companies internally, helping place them in a better position to cope with DT and its effects on the business and its operations. Simultaneous investments are necessary here in the areas of education, training company employees, and digital infrastructure.

Policymakers too may also find the contributions of this paper useful, especially in how they provide a fine-grained understanding of the connectivity between DT taking place at different levels and in different contexts, i.e. the firm level or sector/industry levels, and B2B and B2C. Considering that DT means change, and structural change in particular, the findings presented in this paper can be seen as relevant inputs for guiding the success of this change process. This understanding, combined with the need for developing specific dynamic capabilities and having dedicated responses in place in the form of DT strategies, can help policymakers design and implement more informed policies aimed at sustainable DT that benefits a wide variety of actors.

Education and training are also significant for DT change. The themes identified in this study that relate to it can be considered sound starting points for adapting or revising DT education in the fields of business and management in an evidence-based way. The results provide relevant information for subjects such as strategic management, marketing, consumer behavior, innovation management, and supply chain management, as well as human resource management or digital

business development.

## 7. Conclusion

Despite recent developments, research on the topic of DT is still in an early stage. The present paper has mapped the thematic evaluation of research on DT in the areas of business and management. It not only highlights the top authors and countries that have contributed to the development of the topic so far, but also outlines the journals with the highest number of articles that have focused on DT in the two areas examined. To achieve the overall aim of this paper, different methodological and analytical procedures were utilized to determine the dominating themes during the period 2010–2020. Using the Web of Science database, and including articles published in ABS journals with a rating of two stars 2 or higher gathered and provided detailed information on the high-quality work being done on the topic of DT.

The findings of different analytical phases were connected to and synthesized in a framework highlighting the current research themes regarding DT in the areas of business and management, showing where the body of knowledge has primarily been developed so far.

Like any research, the present study has its limitations. The research approach chosen did not permit the inclusion of all research available on DT in the areas of business and management. Consequently, the results presented show the field's status quo at a specific moment in time. In other words, the analysis is backward-oriented (Vallaster et al., 2019).

Moreover, and as a consequence of the methodology utilized in this study, the identified articles themselves do not provide any information about the context in which their respective research was carried out. It therefore remains unclear whether the articles were cited with positive or negative intentions. Additionally, the focus on the areas of business and management also means that insight from only very specific research areas could be provided. Efforts in other areas (including related ones) with regards to the topic of DT were not considered, even though they could be useful for complementing and advancing our understanding of this topic's evolution over time.

As shown in this study, even though research on DT in the areas of business and management has gained in interest recently (and from 2019 onwards in particular), this research field remains fragmented, entailing certain limitations which in turn open up several areas for future research.

In the process of creating a more systematic understanding of DT in the two areas, several topics appear promising and relevant for developing a complete, more integrative picture of the various aspects of DT. To begin with, more research is needed that aims at developing a universal definition of the term DT from the perspective of business and management. This is key, especially when considering how it understands the contributions of the topic not only to the two areas, but also as DT research strives for a better understanding of the contributions from these areas to its overall study, involving different fields of research and disciplines. There is also a need for more research that studies DT and its consequences for different types of organizations and industries. For example, it would be interesting to study whether and how DT can support smaller companies in coping with their vulnerability due to smallness. Future research may also study suitable strategic responses for addressing DT in start-ups or more mature firms. Considering the role of dynamic capabilities in conjunction with DT, future research could aim to discover the hindering and supportive internal and external factors that different organizations face when developing dynamic DT capabilities. In addition to capabilities and strategies, DT depends on the availability and use of digital technologies. Given the current state of research, it appears relevant to initiate more research aimed at studying the impact of certain technologies for realizing and supporting different DT-related efforts, e.g. improving processes, operations, or business models. Research designs that address different contexts such as B2B or B2C could further help advance our understanding of the role of these technologies for achieving DT-related

purposes. It would also be interesting to investigate what research on DT from a B2B context could learn from research on DT from a B2C context, and vice versa, particularly in light of how existing research suggests that different focal points are set in these “technology versus people” contexts.

Regarding different industries and their approaches to DT, future research should also investigate the consequences of progressive DT not only in more (i.e. a variety of) industries, but also within different industries to develop a more fine-grained understanding. From this, more specific solutions could be proposed. Considering the direct and indirect costs related to DT (e.g., developing new and different dynamic capabilities), it appears there is also a need for research aimed at developing the qualitative and quantitative measures companies could use to assess the success of their DT efforts. These could be crucial for smaller companies in particular.

On a higher level, there appears to be a need for wider perspectives regarding the study of DT (Kar et al., 2019; Parviainen et al., 2017). So future research considering DT as an initiator of fundamental paradigm shifts that go beyond the benefits of the individual company to focus on societal impacts appears to be very relevant as well. Against the background of the expected potentials of DT for improving not only individual companies, but entire sectors and industries, and thus their respective home countries, there is a clear need for research on DT conducted in developing or less-developed countries which could perhaps contribute to ideas promoting the prosperity of these nations. Given the expertise developed to date regarding DT in advanced countries, collaborative research projects appear promising here.

#### CRedit authorship contribution statement

**Sascha Kraus:** Conceptualization, Project administration, Writing – original draft. **Susanne Durst:** Writing – original draft, Writing – review & editing. **João J. Ferreira:** Methodology, Writing – review & editing. **Pedro Veiga:** Methodology, Data curation, Formal analysis. **Norbert Kailer:** Supervision, Writing – review & editing. **Alexandra Weinmann:** Conceptualization, Methodology.

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