European Management Journal 41 (2023) 821–844

Contents lists available at ScienceDirect

European Management Journal

journal homepage: www.elsevier.com/locate/emj

Digital transformation: A review and research agenda

Dmitry Plekhanov *, Henrik Franke, Torbjørn H. Netland

ETH Zürich, Department of Management, Technology, and Economics, Chair of Production and Operations Management, Weinbergstrasse, 56/58, 8092, Zürich, Switzerland

ARTICLE INFO

Keywords:
Digital transformation
Digitalization
Digital ecosystems
Organizational change
Literature review

ABSTRACT

The ongoing and ubiquitous digital transformation challenges the raison d'être of firms and forces managers to rethink business strategies and operations and academics to reconsider related theories. To aid these efforts, we conduct a systematic review of research on firms' digital transformation, generating a database of 537 peer-reviewed academic articles and analyzing it using a novel multi-layered framework. The framework separates three layers: an organization's core activities, its peripheral activities, and its external environment. We find that firms that have come far in their transformations are more embedded in platform ecosystems with unclear business boundaries. Relatedly, we identify a tension between decentralizing versus centralizing power across organizational layers during a firm's digital transformation and how this dynamic affects corporate strategies and firms' internal and external boundaries.

1. Introduction

When firms use digital technologies to create new or modify existing business models and processes or to support the transformation of organizational structures, resources, or relationships with internal and external actors, scholars refer to this as *digital transformation* (DT) (Brynjolfsson & Hitt, 2000; Frank et al., 2019; Loebbecke & Picot, 2015; Vial, 2019). The adoption of digital technologies influences almost all areas of modern firms, including, but not limited to, production, organizational hierarchies, and relationships with partners, suppliers, and customers (Autio et al., 2018; Beverungen et al., 2019; Kretschmer et al., 2022; Majumder et al., 2022; Warner & Wäger, 2019; Yoo et al., 2010). Due to the literature's accelerating scope and complexity, we set out to review and examine DT literature using a new multi-layered perspective.

DT's roots can be traced back to the 1980s and early 1990s, when researchers examined the effects of adopting information technology (IT) on organizational structures and hierarchies, and on innovation and performance (Bloomfield & Coombs, 1992; Drucker, 1988; Johnston & Vitale, 1988; Robey, 1981). With the commoditization of computer technology and the proliferation of the Internet, IT-enabled business transformation gained prominence in the 1990s (Chatfield & Andersen, 1997; El Sawy et al., 1999; Markus & Benjamin, 1997) and has recently been revived due to global crises like COVID-19. With the broadening scope and power of IT systems, DT research has extended across many business, management, and economic disciplines. Today, DT is an interdisciplinary research field with contributions from IT, entrepreneurship, strategic management, operations management, marketing, and organization science, among others.

A few earlier works have reviewed DT contributions and made significant headway in building a better understanding of the literature (Hanelt et al., 2021; Reis et al., 2018; Verhoef et al., 2021; Vial, 2019; Zhu et al., 2021) (see Appendix A.1). The reviews have mainly contributed to the discovery of central themes in DT research through an explorative process (Henriette et al., 2015; Reis et al., 2018; Schallmo et al., 2017). More recent reviews sought to bring systematization to DT research and offer a holistic view of the phenomenon (Caputo et al., 2021; Verhoef et al., 2021; Vial, 2019; Zhu et al., 2021). Hanelt et al. (2021) extended the arguments of Vial (2019) and Verhoef et al. (2021) on structural changes by contending that the emergence of digital business ecosystems drives the shift toward new organizational designs.

Existing DT literature reviews underlined the significance of organizational changes and restructuring under the impact of technological progress. Yet, despite the importance of this topic, academic research still lacks an informed understanding of how advancements in digital technologies contribute to organizational redesign and changes in the nature of the firm (Menz et al., 2021). Specifically, several of the earlier reviews have taken an Input–Process–Output perspective on DT, as in a causal model. This lens is helpful, but DT is more complex than a three-step process. DT affects the internal structure and hierarchies of

* Corresponding author.
E-mail addresses: dplekhanov@ethz.ch (D. Plekhanov), hfranke@ethz.ch (H. Franke), tnetland@ethz.ch (T.H. Netland).

https://doi.org/10.1016/j.emj.2022.09.007
Received 21 January 2022; Received in revised form 15 September 2022; Accepted 16 September 2022
Available online 24 September 2022

organizations, which is not strongly reflected in today's reviews. Therefore, our guiding research question is as follows: *How does DT affect different organizational layers of the firm?* Thus, a key objective of this paper is to provide a multilayered organizational view of DT literature.

We review the DT literature using a new multilevel perspective to uncover the complexity of DT-related organizational changes. Our approach is unique, considering that extant literature reviews mainly have used the firm as a unit of analysis and have not taken a perspective that considers multiple organizational layers of the firm and its environment (see Appendix A.1). Our study emphasizes DT's effects on different layers of the firm and the trends that shape them. Thus, our work complements literature reviews by Vial (2019) and Verhoef et al. (2021), which derived process (or "flow") models of DT, or more specialized reviews that have drawn on additional case studies (Schallmo et al., 2017) or used a bibliometric approach (Reis et al., 2018). The recent review by Hanelt et al. (2021)—similar to other comprehensive reviews (Mathieu et al., 2008; Vial, 2019)—provided a causal framework that included antecedents, processes, and outcomes. Our study complements the extant literature by introducing a *multilayered* lens to derive new and more granular insights. Appendix A.1 shows this unique contribution in tabular format vis-à-vis several already published studies.

Our analysis demonstrates how firms are being transformed from stand-alone entities into part of digital ecosystems, thereby contributing to the theory of the firm in the digital age. Our research suggests a more dynamic view of DT that considers how digital technologies can enable power and resource shifts among organizational layers, which also change layers' relationships with each other. As DT ultimately results in tight interconnectivity with the external environment, the transformation's success largely depends on the firm's ability to steer redefinition of its internal and external boundaries, and mitigate conflicts that may arise when boundaries blur or change as a result of the DT journey. Emerging from the discussion of the reviewed literature, we propose a set of promising future research avenues for DT on organizational power and emerging forms of organization in the digital economy.

The remainder of this paper is structured as follows. Section 2 presents the conceptual background and Section 3 the methodology. In Section 4, we summarize the findings—presented according to our multi-layered framework: organizational core, organizational periphery, and the external environment. In Section 5, we discuss the findings, highlighting, in particular, the power (de)centralization dynamics and emerging types of economic organization. Section 6 gives directions for future research and Section 7 presents our conclusions and limitations.

2. Conceptual background

We grounded our approach in a layered model of the firm and its surroundings, rooted in the organizational design literature on firm boundaries. Academic research offers several lenses for "the theory of the firm" through which such boundaries can be explained, and the fundamental question of why firms exist as independent entities can be answered (Foss, 2000; Rumelt et al., 1994). *Transaction cost theory* argues that firms exist because the costs of coordinating important activities are lower in a hierarchical organization than in a market (Coase, 1937; Williamson, 1975, 1981). This angle has informed managerial decisions on whether to internalize or outsource certain operations, but it also offers evidence of boundary choice and a firm's spheres of influence (Hart, 1995). By analyzing the costs of governing their activities, firms aim to optimize their boundaries and scope of control (Argyres, 1996; Forcadell et al., 2020).

Complementing the economic view, the *knowledge-based view of the firm* defines firm boundaries through knowledge management capabilities. This theory recognizes knowledge as the primary source of competitive advantage, and firms as the most optimal medium for knowledge generation, aggregation, and use (Grant, 1996; Kogut & Zander, 1992; Nonaka, 1994). Superior capabilities in knowledge management define demarcation lines (i.e., boundaries) between the firm and the external environment. The theoretical streams on transaction costs and knowledge management recognize that factual firm boundaries often surpass the legal boundaries of the firm in the drive for higher effectiveness and efficiency (Argyres, 1996; Argyres & Zenger, 2012; Zack, 2003). Furthermore, researchers also offer a broader conceptualization of firm boundaries, including resource availability, the behavioral theory of the firm, organizational identity, and power and control through ownership and non-ownership mechanisms (Gavetti et al., 2012; Helfat, 1997; Jensen & Meckling, 1976; Kogut, 2000; Santos & Eisenhardt, 2005).

Regardless of what concepts the different streams draw on to define boundaries, they usually provide a clear division between the firm and the external environment. In line with such literature, we distinguished the firm from its external environment. Furthermore, in alignment with several earlier studies, we divided the firm into more differentiated layers (Amburgey et al., 1993; Gulati & Kletter, 2005). Thus, we followed the tradition in organizational and innovation research of conceptualizing the firm as a hierarchical organization with discrete layers (Acemoglu et al., 2007; Amburgey et al., 1993; Bloom et al., 2014; Gulati & Kletter, 2005; Wu et al., 2019). Specifically, *within* the firm's boundaries, we divided the firm into its *core* and *periphery* activities (Gulati & Kletter, 2005).

Building on the work of Acemoglu et al. (2007), we conceptualized the core as a centralized control zone controlled by a principal (owners or executive agents) and the periphery as a decentralized control zone controlled by operational managers. Based on a set of tightly linked components, the core provides key functionality features, whereas loosely coupled peripheral elements make complementary contributions (Constantinides et al., 2018). The core is characterized by high independence and high influence on peripheral components (Siggelkow, 2002). Changes in the core spark cascades of related changes in the entire system (Hannan et al., 1996). For example, the core may encompass the executive leadership and their strategizing, as well as a small set of overarching business functions, such as finance and accounting. However, peripheral elements can be changed with relatively fewer subsequent changes and adjustments in other elements of the system. The periphery may encompass the functions that manage the value chain, such as procurement, operations, and sales and marketing.

The topic of organizational periphery appears in management research under different names. For instance, Kostova et al. (2008) referred to intraorganizational institutional fields to describe subunits within firms that support value creation. Lawrence and Lorsch (1967) referred to organizational subsystems—organizational units that perform specialized tasks to support the firm's effective performance (e.g., sales, research, and production). These subsystems—what we refer to as the "organizational periphery"—operate in distinct institutional logics, interact with each other, and compete for influence (Greenwood et al., 2011). We chose the word *periphery* to express the supporting function of products and processes to realize the business model, which we viewed as part of the core.

Applying the core-periphery concept to the DT realm, we understand *DT of the organizational core* as changes in how the firm intends to capture value and accommodate technologies in organizational structures and culture through digital technology. Consistently, we address DT of *the organizational periphery* as changes in how the firm creates this value at the micro-level through improvements to products and processes via digital technology. Finally, we understand DT of *the external environment* as changes induced by digital technologies concerning interactions between the firm and external partners, suppliers, intermediaries, and customers, and the resulting outcomes, e.g., competition and the emergence of digital ecosystems. The third layer enables us to shed light on how the external environment affects the adoption and use of digital technologies in the firm and vice versa.

Fig. 1 shows the resulting layered model of the firm and its

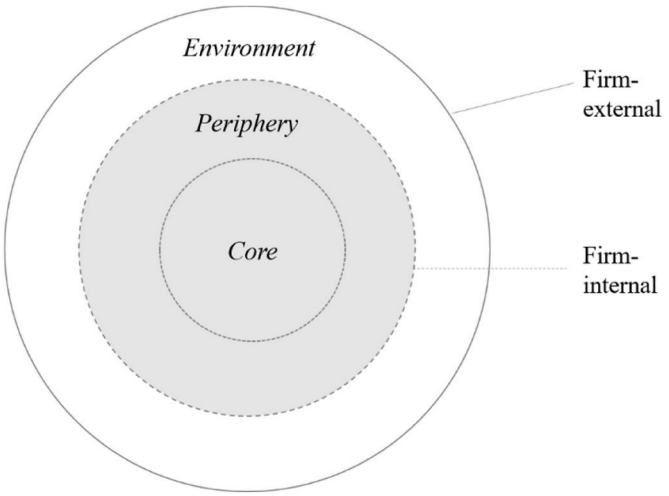


Fig. 1. A multi-layered model of the firm.

environment, which served as our deductive entry point into the DT literature. We associate each layer with emergent themes and discuss observations made within and between the layers in this study. The following sections describe the sampling, selection, and analysis processes used to derive findings *within* the *ex ante* defined layers and finally discuss implications that reach *across* the layers.

3. Methodology

We deductively approached the DT literature with our three-layered framework of the firm and, within these layers, inductively derived themes from articles related to firms' DT. Therefore, we applied the guidelines for systematic literature reviews by Denyer and Tranfield (2006) and followed the *Scientific Procedures and Rationales for Systematic Literature Reviews* (*SPAR-4-SLR*) protocol (Paul et al., 2021). Accordingly, we executed the literature review in five steps. First, we defined our review's scope based on a careful review of other published literature surveys (as discussed in the Introduction). Second, we implemented our search strategy, which identified an extensive list of relevant research contributions. Third, we nominated the included contributions based on clearly defined selection criteria, which we describe in the following paragraphs. Fourth, we verified the robustness of the coding wherever it did not rely on objective criteria and obtained satisfactory interrater reliability. Fifth, we structured the literature according to our layered conceptual framework and engaged in content analysis within and across layers. Finally, we used this to derive implications for theory and practice, and to suggest avenues for future research.

3.1. Sampling process

We used the bibliographic databases Scopus and Web of Science for the search, encompassing roughly 20,000 and 13,500 journals, respectively. These databases cover the discussion of economic and business-related research issues most effectively, based on previous research (Martín-Martín et al., 2018; Mongeon & Paul-Hus, 2016), and are recommended for their comprehensiveness and interdisciplinary character (Archambault et al., 2009; Harzing & Alakangas, 2016; Paul & Criado, 2020). Only articles published in peer-reviewed journals were included in the literature search. We did not consider other communication formats, such as books, book chapters, and conference proceedings (see Vial (2019) for a review with emphasis on Information Systems' Conference Proceedings), consistent with earlier review studies (Dalenogare et al., 2018; Franke & Foerstl, 2018; Quarshie et al., 2016). This criterion was implemented to safeguard our review from the inclusion of materials that had not undergone rigorous peer review before publication and could compromise our results' reliability.

We applied the following search terms in our search among titles, abstracts, and keywords: "digital transformation," or "digitalisation"/"digitalization," or "digitisation"/"digitization." We recognize that the closely related concepts of digitalization and digitization often are used interchangeably with DT in the literature (Karimi & Walter, 2016; Nambisan et al., 2017; Trantopoulos et al., 2017). *Digitalization* refers to "the manifold sociotechnical phenomena and processes of adopting and using [digital] technologies in broader individual, organizational, and societal contexts" (Legner et al., 2017, p. 301). With *digitization*, one can understand the transition from analog to digital information (Loebbecke & Picot, 2015; Verhoef et al., 2021). DT can be defined as *"strategic transformations targeting organizational changes implemented through digitalization projects, with the goal of enabling major business improvements"* (Caputo et al., 2021, p. 490). All three concepts are interlinked tightly and often used interchangeably; therefore, they took equally important positions in our sampling strategy. We set no temporal criteria for the search, which was conducted in 2021.

3.2. Inclusion and exclusion criteria

Our inclusion and exclusion criteria are based on the *Scientific Procedures and Rationales for Systematic Literature Reviews* (*SPAR-4-SLR*) protocol (Paul et al., 2021). The initial literature search returned 45,382 articles. As a next step, we narrowed our search's scope by using research field filters available in the databases. In Scopus, we included articles on "social sciences," "decision sciences," "business, management, and accounting," and "economics, econometrics, and finance." In the Web of Science, we used the fields "management," "business," "economics," "business, finance," "social sciences interdisciplinary," and "operations research/management science." We ensured that only research fields that were irrelevant to our research questions were excluded. These excluded fields that were far beyond business and management, e.g., "surgery" and "environmental sciences." Fig. 2 provides an overview of the search and selection process.

Ensuring data quality in review studies is paramount for distilling valid insights from the literature (Durach et al., 2017). Consequently, we chose to apply a quality gate using the *InCites Journal Citation Reports (JCR)*, which aggregates publication and citation data from the *Web of Science Core Collection* citation index. We considered only articles published in journals ranked in Quartiles 1 and 2 (Q1 and Q2) of the highest-ranked journals in the JCR. This choice was motivated by meta-analytic evidence that found a significant relationship between journal rankings and methodological transparency and rigor in published articles (Aytug et al., 2012), as well as the notion of exclusivity in Denyer and Tranfield (2006). Notably, this choice is also consistent with several literature surveys that used journal ranking benchmarks (e.g., Boscari et al., 2018; Franke & Foerstl, 2018; Netland & Aspelund, 2014; Vanneste et al., 2014).

By including only articles published in Q1 and Q2 journals and removing duplicates, we narrowed our corpus of academic articles to 2228. We then excluded articles that did not focus on DT, but merely referred to this phenomenon and did not offer concrete insights into how the adoption and use of digital technologies can affect firms (1156 articles). We also excluded articles that focused on narrow technological applications that do not concern organizational transformation (148 articles), e.g., the application of "big data" for specific tasks. We did not include articles that do not explicitly relate to the DT of firms, but instead focus on organizational and technological impacts for the *public* sector (371 articles). Our literature review also did not include editorials or research commentaries (16 articles). As a result, our final database comprised 537 articles.

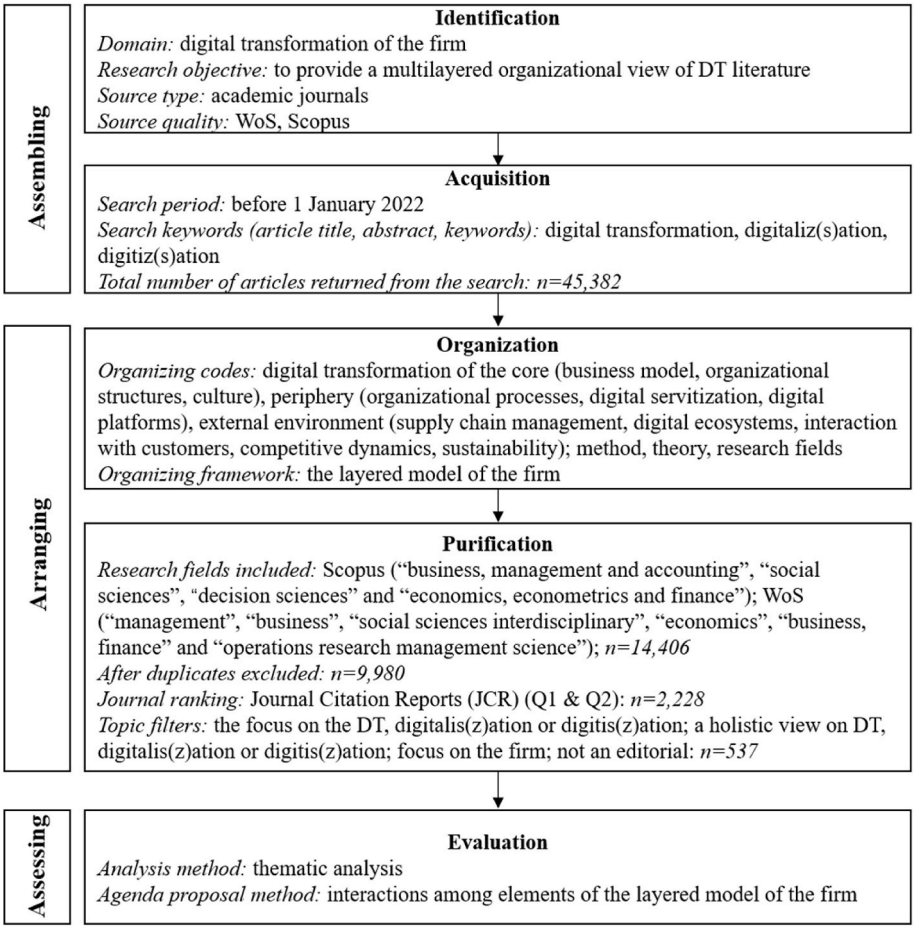
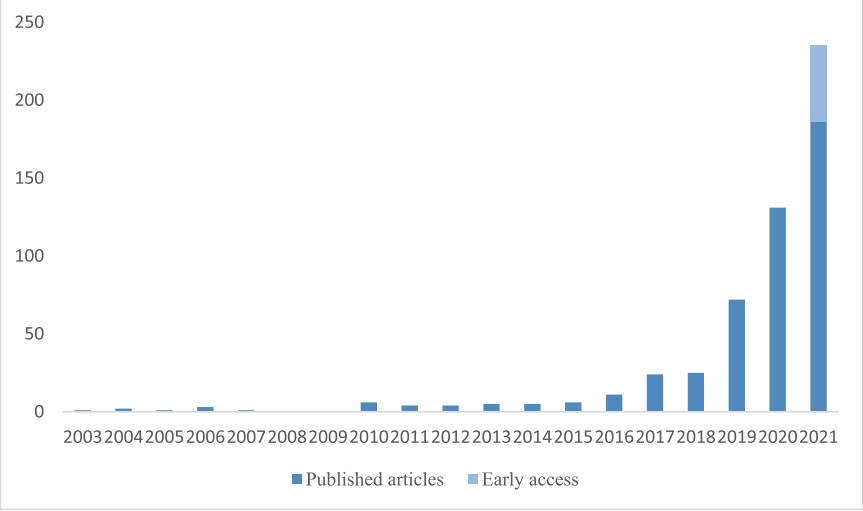


Fig. 2. Search and selection process for journal articles.

3.3. Analytical process and robustness check

All articles were analyzed first by associating them with one of the study's three deductive categories (i.e., organizational layers) and, second, by identifying emergent themes within the layers. The identification of themes followed an inductive and grounded logic by clustering important issues from single contributions into overarching themes that reflect the literature content. We were guided by the idea of *thematic analysis*, which entails condensing themes from articles based on meaning. It aims to produce themes that are more than the mere sum of their parts (Campbell et al., 2003; Tranfield et al., 2003). The themes selected for this study were comparable to "topic fields" or "future



Note: Early access articles were accepted for publication in 2021 and will appear in the journals in 2022 or later.

Fig. 3. Growth in the number of DT publications (N = 537).

research themes" addressed in other reviews and meta-studies (Schorsch et al., 2017; Wieland et al., 2016).

As coding is usually the most unreliable step in the literature review process, we ran a reliability test: Two of the authors and an independent coder individually recoded 50 randomly selected references. The inter-rater reliability score was calculated to 80%, which is acceptable and above the reliability threshold of 75% suggested by Dean et al. (2019). We engaged in discussions to establish coherence within each category where there were disagreements.

4. Findings

Fig. 3 shows the increase in the number of articles discussing the layers over time. DT was not an important academic term until about 2017. In 2021, 241 unique articles on DT were published, and the term is clearly trending. An acceleration in the volume of articles during the past four years hints at the topic's increasing relevance. Most of the articles examined DT of the organizational core (271 articles). The second-largest focus is the organizational periphery (269 articles), followed by the external environment (196 articles) (some articles were included in more than one layer). All layers have roughly the same coverage across the years.

Most of the articles in our review were published in technology management and general management journals. They appeared most frequently in the *Journal of Business Research* (39), *Technological Forecasting and Social Change* (33), *Journal of Manufacturing Technology Management* (24), *Production Planning and Control* (24) and *International Journal of Production Economics* (19) (see Appendix A.2). We included 124 journals that have published DT research, indicating very broad interest in the topic. From a disciplinary perspective, we found that most articles were published in the research fields of *management information systems and knowledge management*, *innovation management*, *production and operations management*, and *general and strategic management* (Fig. 4; categories adopted from harzing.com). The research fields also were distributed unevenly across the layers. While *general and strategic management* was found to be the most prominent in the organizational core, *production and operations management* had the largest share for both the organizational periphery and the external environment.

We organized the presentation of our content analysis findings into (1) organizational core, (2) organizational periphery, and (3) external environment. Fig. 5 provides a summary of the thematic areas that we identified in our analysis and describe in detail below.

4.1. Organizational core

4.1.1. Business models

The first theme detected in the literature analysis was business models. Digital business models are distinguished by the accelerated pace of value creation and changes in resource management (Bourreau et al., 2012; Paiola & Gebauer, 2020). Some authors claim that DT requires fundamental changes in business models, rather than incremental improvements in processes and operations (Loebbecke & Picot, 2015). Many industries are shifting toward shorter innovation cycles thanks to advancements in computer simulations, reduced product-creation costs, and shorter time-to-market requirements (Govindarajan & Immelt, 2019; Rossi et al., 2020).

In the digital economy, the literature argues that stand-alone firms and their business models are becoming progressively more connected through ownership rights, increasing exchange of data, and technological infrastructure (Kauffman et al., 2010; Sommarberg & Mäkinen, 2019). The fluidity of digital innovation processes allows innovation activities to evolve non-linearly, concurrently, and with frequent iterations and feedback loops (Kohli & Melville, 2019; Nambisan et al., 2017). These complexities unravel simultaneously with the more distributed nature of value creation, thereby making digital innovation an increasingly collective effort (e.g., in online communities) (Nagaraj, 2021).

This growing interconnectivity between firms results in a higher mutual reliance on other firms' business models (Barua et al., 2004; Kohtamäki et al., 2020). As a result, changes in micro-activities, such as resource management, ultimately could affect other firms' business models, leading to resource redistribution (Kumar et al., 2020). For instance, digitalization of car components shifts strategic resources from car manufacturers to software firms (Rahmati et al., 2021). The literature indicates that the alignment of heterogeneous resources is an important measure in achieving higher competitiveness for firms wanting to capture maximum value from their business models. To do so, firms need to identify resource complementarities with other firms to capture maximum value (Nambisan, Wright, & Feldman, 2019). In the search for such complementarities, *data* are becoming a key resource and a source of competitive advantage (Bürger et al., 2019). Firms need to develop strategies for how to manage data, share it with others, and

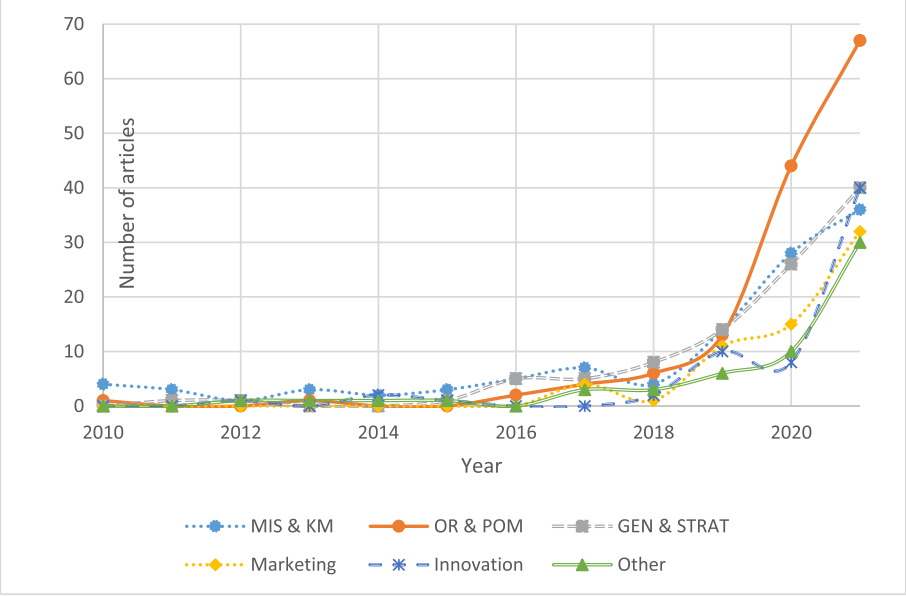


Fig. 4. Research fields of journal articles on DT (N = 537).

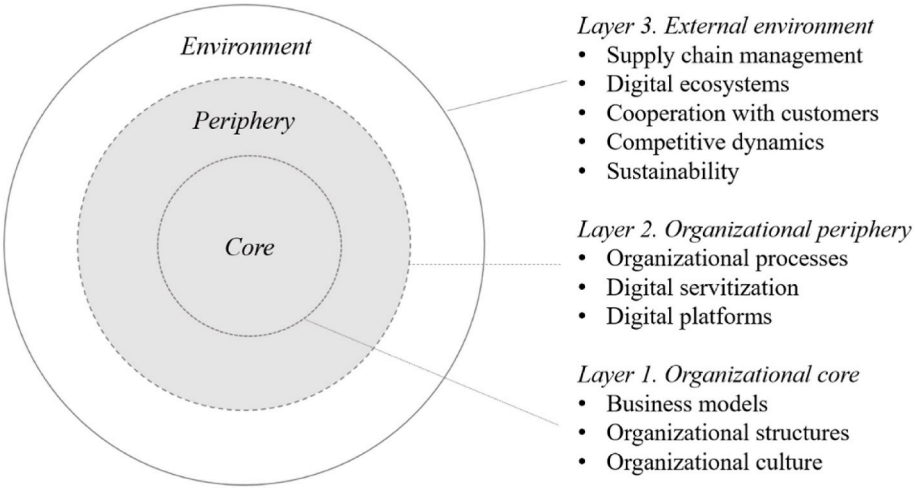


Fig. 5. The identified DT themes placed in the three organizational layers.

extract value from it (Hanelt et al., 2021; Saarikko et al., 2020; Tortorella et al., 2020).

The literature also illustrates that specific synergies across business models—in areas such as value propositions, pricing mechanisms, and technological standards—can lead to significant advantages (Kohtamäki et al., 2020). Specifically, by strengthening interoperability with technological infrastructures and complementarities with external providers while protecting technological know-how, firms try to attain central positions in their networks and raise their competitiveness levels (Banalieva & Dhanaraj, 2019; Xue et al., 2013).

To enable and accelerate business model innovations, firms need to develop effective collaboration channels with external actors (Zhu et al., 2020). Firms are shifting from the exclusive use of digital assets that they fully control to the use of a variety of digital solutions developed internally and externally or co-designed with external partners (Gregory et al., 2018). A firm's introduction of disruptive digital technologies requires openness to external knowledge and simultaneous efforts toward internal knowledge production (Cozzolino et al., 2018; Di Vaio et al., 2021).

Conventional views of business model innovations might no longer hold during the DT era (Hinings et al., 2018; Matarazzo et al., 2021). Adoption and use of digital technologies stimulate loose connections between product components, leading to greater autonomy of innovation activities from path-dependent forces and legacy infrastructures (Neirotti & Pesce, 2019; Saarikko et al., 2020). Furthermore, the digitalization of business models has a tendency to trigger follow-up innovations, contributing to a chain reaction of interconnected and codependent innovation activities (Wiesbock & Hess, 2019). Moreover, digital business model innovations are complex not only due to increasing speed and chain reactions, but also to unpredictability. For instance, Yoo (2010) found that changes in product architectures led to a redefinition of the firm's organizing logic. Thus, the effects from digital innovations often go beyond the initial expectations of their creators, and reactions to unexpected consequences can result in further organizational turbulences (Yoo, 2010).

To summarize, the arena in which digital business model innovations are developed broadens from single firms into interconnected digital ecosystems of many firms. Digital solutions' functionality and value tend to be determined by a network of co-creators, rather than by a single firm (Kohtamäki et al., 2020).

4.1.2. Organizational structures

Organizational redesign can evolve along top-down or bottom-up scenarios. These forces always co-exist with a varying degree of prominence. The top-down scenario entails that corporate headquarters initiate adjustments and reforms of organizational structures, whereas in a bottom-up scenario, changes originate from business units. The existing literature suggests that top-down approaches and rigid hierarchies are less suitable for DT (Dremel et al., 2017; Yoo et al., 2012). In line with the more distributed nature of value creation and digital innovation as an increasingly collective effort, firms are advised to adopt hyper-adaptive organizational forms that simply cannot be governed solely top-down to adapt to external opportunities and threats fast enough (Hanelt et al., 2021; Volberda et al., 2021). However, the literature still actively discusses top-down organizational restructuring in response to DT.

To enable the effective adoption and use of digital technologies, firms alter their organizational structures by establishing innovation labs, corporate innovation centers, and so-called Digital Business Units that have higher autonomy and designated budgets to catalyze organizational practices and technological know-how (Salvi et al., 2021; Seran & Bez, 2021; Wiesbock & Hess, 2019). Studies have found that autonomous business units established to explore digital opportunities enable fast learning and experimentation, while mitigating conflicts related to cannibalization of business models (Smith & Beretta, 2021; Verhoef et al., 2021). Consistently, autonomous teams also can contribute to higher organizational agility, shorter innovation cycles, and flexibility (Del Giudice et al., 2021; Verhoef et al., 2021; Volberda et al., 2021).

Another top-down approach documented in the literature is to create C-suite positions, such as chief information officer (CIO) or chief digital officer (CDO), to coordinate digitalization initiatives across the entire firm (Björkdahl, 2020; Gerth & Peppard, 2016; Kunisch et al., 2020; Tumbas et al., 2018; Wiesbock & Hess, 2019). Thus, structural changes include not only new cross-functional organizational units, but also new *liaison roles* that transcend functional and organizational boundaries (Neirotti et al., 2021; Sjödin et al., 2020). For instance, IT departments are likely to grow from their process-supporting function into an orchestrating role of value creation that would expand their influence significantly within the firm (Verhoef et al., 2021).

The literature indicates that the proliferation of digital technologies is likely to cause power and resource centralization, putting various business units under tighter control by corporate headquarters. For example, the progressing functionality of digital tools and access to data on customers, employees, and products can enable top managers to increase their power positions at their firms (Colli et al., 2021; Nell et al., 2021; Sklyar et al., 2019). However, managers' cognitive abilities do not increase at a comparable rate with technological progress. Therefore, the increasing depth and scope of analytical results provided by digital tools can result in information overload and conflicts between corporate headquarters and business units, and ultimately destroy value (Canhoto

& Clear, 2020; Nell et al., 2021).

As a counter-trend, in addition to formal organizational changes, DT sparks the emergence of informal organizational networks in firms that evolve along bottom-up scenarios. Digital innovations can necessitate uniting specialists from several business units to work on resolving joint problems (Lanzolla et al., 2021). These informal networks can work around relatively inefficient formal organizational hierarchies or organizational barriers to foster the acquisition of required knowledge or skills (Bonanomi et al., 2019; Chanias et al., 2019; Do Vale et al., 2021). Consistently, such informal organizational structures tend to respond more effectively to rising technological complexity (Kamalaldin et al., 2020). However, when emerging informal roles are misaligned with formal organizational structures, the resulting organizational conflicts and power struggles can hinder DT (Bonanomi et al., 2019; Lanzolla et al., 2021). The inability to mitigate these conflicts might result in employee turnover (Bonanomi et al., 2019) or hinder successful implementation of DT altogether (Seran & Bez, 2021).

Regardless of whether the changes induced by DT happen bottom up or top down, the literature suggests that firms eventually will evolve into interconnected networks of collaborative relationships and decentralized communication channels that do not abide by the rules of a traditional vertical hierarchy (Rodriguez-Lluesma et al., 2021). Specifically, the proliferation of platforms and AI technology enhances the decision-making capabilities and power of employees and their units vis-à-vis headquarters (Nell et al., 2021; Rossini et al., 2021). Therefore, digitally transformed firms can function as "internal markets" with significantly diminished roles under corporate headquarters' control (Rodriguez-Lluesma et al., 2021).

To address power shifts that result from organizational restructuring and DT, firms need to find a balance between reinforcing the clarity of governance structures and allowing reconfigurations that foster flexibility and responsiveness (Sjödin et al., 2020). Thus, the literature indicates that governance structures can be both enablers and inhibitors of value creation in the digital economy. It also suggests that commitment and trust are useful behavioral mechanisms for lowering internal transaction costs and overcoming rigid control mechanisms (Kamalaldin et al., 2020).

The literature also provides evidence of structural changes in organizations that were not purposefully top-down or bottom-up adaptations, but imposed by exogenous factors. Specifically, technological expertise or analytical capabilities can elevate the status of some units vis-à-vis other units as the DT increases their relevance. These technological shifts help blur boundaries between corporate departments, e.g., data analytics, IT, and marketing departments attain more control over the accounting domain (Diller et al., 2020; Knudsen, 2020).

To address the organizational turbulence caused by shifting power structures that result from organizational restructuring and DT, firms need to strike a balance between reinforcing the clarity of governance structures and allowing reconfigurations that foster flexibility and responsiveness (Sjödin et al., 2020). Thus, the literature indicates that governance structures can be both enablers and inhibitors of value creation in the digital economy. It also suggests that commitment and trust are useful behavioral mechanisms for lowering internal transaction costs and overcoming rigid control mechanisms (Kamalaldin et al., 2020).

4.1.3. Organizational culture

The third theme in the organizational core concerns organizational culture. Similar to organizational structures, the sample indicated that organizational culture can serve as both an accelerator and inhibitor of DT. The transition toward an organizational culture that favors change and supports a firm's DT requires constant adjustments, recalibrations, and a pioneering spirit, while avoiding a follower culture that will struggle to achieve overarching strategic objectives (Eden et al., 2018; Westerman & Bonnet, 2015). However, making cultural change is difficult because business models, organizational structures, and organizational culture are linked (Eller et al., 2020). Due to this complexity, the underlying foundations of a firm's culture often remain untouched during DT, although culture is critical to how effectively a firm fits into the digital economy (Westerman & Bonnet, 2015).

To change an organization successfully, Alos-Simo et al. (2017) emphasized that all stakeholders should be involved to foster their acceptance of cultural and other changes in the firm. An additional complexity in this process is that cultural changes within a firm can result in divergent subcultures that operate at different speeds (Schneider, 2018). Therefore, alignment of cultural changes across all departments is essential to enabling a frictionless transition to the digital pathways of value creation. An adaptive culture focused on a digital discovery process, rather than on planning and control (Alos-Simo et al., 2017; Tronvoll et al., 2020), can enable firms to develop capabilities for constant learning and openness to external knowledge and expertise (Rothmann & Koch, 2014; Siachou et al., 2021). However, Govindarajan and Immelt (2019) emphasized that not only creativity, but also discipline and integrity, are crucial components of digital culture, as they enable capturing digital technologies' potential for value creation.

Achieving the required openness levels is a challenge due to organizational resistance or the inertia created by individuals. Employees might oppose the adoption of new technological solutions due to a fear of losing their jobs or resistance to learning new knowledge and skills (Horváth & Szabó, 2019). On higher levels, firm owners and senior managers can resist changing existing business models or be hesitant about launching risky projects with uncertain results that might endanger their positions at their firms (Andriole, 2017). Thus, risk aversion and inertia are also relevant to the adoption and success of DT.

As a final aspect of organizational culture, the emergence of digital ecosystems that span the boundaries of several firms calls for the development of new approaches to manage diverse cultures. Cultural norms can serve as an important governance mechanism that may align diverse ecosystem members toward common goals, technological standards, and joint practices (Seran & Bez, 2021). However, if cultural norms are misaligned (e.g., Pesce et al., 2019; Westerman et al., 2019), the opposite may occur.

4.2. Organizational periphery

4.2.1. Organizational processes

Digital technologies and the growing availability of data create the need to adjust processes, particularly when digital innovations are broad and affect various business lines (Warner & Wäger, 2019). The literature pointed out that processes need to evolve differently, depending on the types of transformed business operations and value chain stages. In particular, marketing, advertising, and supply chain management are early targets of DT, as they can elicit fast and sizable gains for firms (Ghobakhloo, 2020; Guenzi & Habel, 2020; Taylor, 2017). For instance, a shift to digital communication channels, such as social media, enables outreach to a larger audience and the delivery of content tailored to specific customers' needs, thereby improving marketing efficacy (Weking et al., 2020).

The literature suggests that the codification of production and R&D processes—both traditionally viewed as partly tacit and challenging to transmit—can be enhanced via digitalization (Henfridsson et al., 2014; Szalavetz, 2019). The resulting ease in the transfer of knowledge on product and process innovations has the potential to increase the sharing and replication of innovative approaches and methods (Henfridsson et al., 2014). Therefore, Wiesbock and Hess (2019) pointed out that the development of digital processes must precede the launch of digital products or services.

Firm-internal processes are commonly subject to change due to DT; this applies to both customer-facing and internal-integration processes (Hess et al., 2016; Zhou et al., 2021). The goal is to allow for faster decision making and coordination between all levels, from the shop floor to top management, via processes that are digitalized and, thus, not (or

less) dependent on human judgment (Ghobakhloo, 2020; Kohtamäki et al., 2020). Dalenogare et al. (2018) mentioned enterprise resource planning (ERP) systems, manufacturing execution systems (MES), and supervisory control and data acquisition systems (SCADA) as examples of IT systems that ensure greater transparency and support decision-making processes across different hierarchical levels of the firm. By exposing information on job tasks, digital technologies uncover new interdependencies among tasks and provide means for their precise measurements, which eventually can contribute to more effective task grouping (Kretschmer & Khashabi, 2020).

The literature acknowledges that the introduction of such IT systems is complicated, and that they need to replace existing processes gradually. Ambidexterity can be employed, which is the exploitation of available solutions in tandem with the exploration of new technological opportunities (Park et al., 2020). Specifically, firms need to manage old and new technological infrastructures and operations simultaneously to enable an uninterrupted transition toward new technological solutions; they also need to replace legacy systems and analog processes gradually while avoiding customer downtime and business disruptions (Cenamor et al., 2019; Park et al., 2020). However, Åkesson et al. (2018) highlighted that the confrontation between legacy arrangements and novel practices can be far from a linear process, and that uncertainty exists concerning which trend will dominate. The continual disorderly reconfiguration of the old and the new causes shifts in existing organizational structures and established business models; this calls for adaptation of corporate strategies and objectives to recent advancements in digital technologies (Kretschmer & Khashabi, 2020; Åkesson et al., 2018).

The literature points out that agile approaches based on frequent and fast experimentation can improve firms' ability to respond to technological changes and competitive pressures (Mak & Shen, 2020; Sjödin et al., 2020; Wiesbock & Hess, 2019). Organizational agility is the firm's ability to respond proactively to changing customer demands and market trends by adapting and reconfiguring organizational processes and the delivery of products and services (Brock & Von Wangenheim, 2019). In the context of DT, agility means learning from failure and increasing the speed of iterations during the development of digital products and services (Baiyere et al., 2020; Dremel et al., 2017). These development processes require proper structures that allow for quick adaptation and can capitalize on opportunities stemming from digital technologies (Horváth & Szabó, 2019). Specifically, Sjödin et al. (2020) pointed out that multiple agile and short process cycles are essential for accelerating innovations that are always up-to-date with technological progress and customers' preferences. Diverse approaches can be used to help firms achieve agility, including Scrum; autonomous cross-functional teams; and constant feedback loops (Guinan et al., 2019).

4.2.2. Digital servitization

DT creates opportunities for evolution from stand-alone products and services to integrated systems in which products, services, and software interact (Kohtamäki et al., 2020). This development includes a dematerialization of physical resources and a shift toward software-centric services, which the literature refers to as digital servitization (Sklyar et al., 2019). Digital servitization is the business transformation of manufacturing firms toward value creation based on increasing digital service offerings designed atop physical products (Cenamor et al., 2017; Coreynen et al., 2017; Sjödin et al., 2020). Digital technologies help reach higher differentiation from competitors and avoid the "commodity trap," when even highly complex physical goods become increasingly commoditized (Linde et al., 2021).

Digital servitization broadens access to customer data and enables mass customization and individualization (Bürger et al., 2019; Seyedghorban, Tahernejad, et al., 2020; Weking et al., 2020). Aside from changes in the firm-customer relationship, digital services also allow for easier horizontal integration with external value co-creators in the context of digital servitization (Andal-Ancion et al., 2003; Gebauer et al., 2020; Warner & Wäger, 2019; Yoo, 2010). However, the additional complexity introduced by digital servitization is accompanied by some disadvantages.

The development of digital services does not immediately lead to productivity gains, but may result in decreased performance, a phenomenon often referred to as the servitization paradox (Kamalaldin et al., 2020; Kohtamäki et al., 2019). With limited capabilities and resources, stand-alone firms trying to servitize their product lines digitally often must rely on value co-creation with customers and other firms (Sjödin et al., 2020; Struyf et al., 2021). Aside from this challenge, firms need to strengthen their interoperability with external solutions and foster data-sharing opportunities, e.g., on digital platforms (Srai et al., 2016; Tronvoll et al., 2020).

4.2.3. Digital platforms

Digital platforms provide new ways to own resources and source, exchange, and apply knowledge jointly (Nambisan, Zahra, & Luo, 2019). By creating markets and infrastructures for information and resource exchange, digital platform owners can collect rents based on the economic activities that they mediate (Sadowski, 2020). By leveraging the resources and capabilities of multiple actors, platforms can create unique value propositions and new avenues for global expansion (Duch-Brown & Rossetti, 2020; Nambisan, Zahra, & Luo, 2019). Regardless of the type of participant, digital platforms are grounded in the interactions of different groups of users that co-create value (Schwanholz & Leipold, 2020). They seek to maximize user participation, considering that their ability to generate value depends on the number of active users (Grabher & Van Tuijl, 2020).

The literature describes digital platforms as multisided market structures that can have direct or indirect network effects (Cennamo, 2021). Direct effects occur when benefits for users depend on the number of users on the same market side, whereas indirect effects take place when the benefits of being part of a user group (a market side) on a platform are defined by the number of users on another cross-market side (Nambisan, Zahra, & Luo, 2019). Going beyond the matching of supply and demand, digital platforms actively foster price regimes (Grabher & Van Tuijl, 2020). The latest research on digital platforms demonstrates that by using different platforms simultaneously, users create connections and interdependencies among multiple actors, thereby creating ecologies of platforms (Grabher & Van Tuijl, 2020). This practice of multihoming challenges regular managerial approaches and standard organizational hierarchies (Grabher & Van Tuijl, 2020).

4.3. External environment

4.3.1. Supply chain management

Many supply chain management processes, such as comparing bids for commodity suppliers against fixed criteria or creating regular purchase orders, are the first targets of DT (Hartley & Sawaya, 2019). Shorter information flows, increased interconnectivity of heterogeneous stakeholders, and increased analytical capabilities enable firms to be more proactive and agile in their responses to supply chain changes (De Giovanni, 2021; Grover & Ramanlal, 2004; Gupta et al., 2020; Mak & Shen, 2020). By analyzing demand and exchanging valuable insights across the tiers of their supply chains, firms can align the efforts of all participants, including upstream manufacturers and consumers, and channel these efforts toward common goals (Ishfaq et al., 2021; Mak & Shen, 2020).

Beyond adaptability and incentive alignment, the literature also names DT as a driver of classic operational capabilities. DT contributes to improved inventory control, dynamic resource allocation, advanced ripple effect control, anticipatory intelligence, and better traceability of products across entire value chains (Björkdahl, 2020; Garay-Rondero et al., 2019; Ivanov et al., 2019). However, Vendrell-Herrero et al. (2017) pointed out that these benefits from DT can be attained fully only

if supply chain members are integrated horizontally and vertically for a frictionless exchange of information and autonomous decision-making. Furthermore, supply chain members need to be able to process and interpret all the information they receive from their integrated partners. In alignment with this, Ivanov et al. (2019) suggested that the present and future competitiveness of firms and their supply chains depend substantially on their ability to use advanced algorithmic prediction methods (e.g., machine learning) to make sense of large data volumes generated in supply chains.

The literature emphasizes that digital technologies enable greater transparency, making possible trust gains among stakeholders and reducing coordination and control costs (Di Vaio & Varriale, 2020). As the supply chain becomes more transparent and collaborative, supply chain managers shift their perceptions of the value chain from linear and hierarchical views to a supply network view (Garay-Rondero et al., 2019). Firms tend to abandon linear processes and replace them with distributed and interconnected forms of production, in which activities occur concurrently (Bürger et al., 2019; Kusiak, 2021; Srai et al., 2016). With this new paradigm in mind, firms need to design concerted approaches that take into account potential synergies and complementarities within the entire network. The literature names the seamless integration of data across suppliers and customers as a success factor. It improves inventory management and production flow monitoring, and it enables higher efficiency and better traceability of products (Björkdahl, 2020; Garay-Rondero et al., 2019).

The operational advancements sought through digital technologies demonstrate a common characteristic: They strengthen interactions between producers and consumers. Consequently, the literature discusses how this trend may make supply chains more local, decentralized, and closer to end-users (Weking et al., 2020). The notion of "distributed manufacturing" is one of the prominent findings from the DT literature. This is a special type of localized production network that leverages distributed manufacturing facilities through digital solutions (Srai et al., 2020). Thus, the increasing modularization of products and fragmentation of supply chains via DT changes the very nature of relations with external partners (Butollo, 2021; Nambisan & Luo, 2021). DT can even result in the exclusion of intermediaries from supply chains, thereby enabling direct communication between providers and customers, and radically decreasing transaction costs (Hartley & Sawaya, 2019; Holmström et al., 2019; Seyedghorban, Samson, & Tahernejad, 2020; Tronvoll et al., 2020; Weking et al., 2020). This notion provides an antidote to the otherwise strong emphasis on inclusion and collaboration in the literature: DT also can lead to the exclusion and obsolescence of firms in their own supply chains.

Continuing the "dark side" of DT for supply chains, the literature describes how DT may disrupt existing power relations between suppliers and OEM customers by strengthening control of incumbents over network-level resources (Mosch et al., 2021) and enabling new entrants to dissolve existing hierarchies (Holmström et al., 2019; Vendrell-Herrero et al., 2017). However, not only newly digitalized entrants can disrupt supply chains: DT can redefine existing supply chains (Nambisan & Luo, 2021; Oliveira et al., 2021): Technologically superior firms attain high negotiation powers in supply chains and can claim disproportionate value shares, while technologically inferior firms must comply to maintain access to value chains (Mosch et al., 2021; Son et al., 2021). Such opportunistic behaviors and profit migration caused by an uneven DT pace consequently leads to substantial economic and relational damage in supply chains.

4.3.2. Digital ecosystems

The literature on external actors emphasizes that DT leads to the emergence of so-called digital ecosystems, which are distinct from digital platforms. While digital platforms are represented by sets of shared technologies and solutions that enable different groups of stakeholders to create value, digital ecosystems are groups of interlinked and interdependent actors distinguished by co-specialization and complementary skills, resources, and capabilities (Nambisan, Zahra, & Luo, 2019). Digital ecosystems are dynamic and constantly evolving networks formed by independent actors interconnected through digital technologies (Kolloch & Dellermann, 2018). Digital ecosystems include a broad range of co-creators, extending from traditional participants (i.e., customers and suppliers) to online communities (Magistretti et al., 2019). Within such ecosystems, technology's role is shifting. Rather than playing a sheer support function, technology is an orchestrator of relationships that shapes and controls technological infrastructures (Eller et al., 2020) and can reduce typical problems, such as inefficiencies from social interaction opportunistic behaviors (Lumineau et al., 2021).

The main determinants of relationship intensity suggested in the literature are the interoperability of employed digital systems and common technological standards (Tronvoll et al., 2020). Ghobakhloo (2020) describes interoperability as digital infrastructures' ability to interact, exchange data, and jointly operate with each other freely. By strengthening interoperability with technological infrastructures and complementarities with external providers while protecting technological know-how, firms try to attain central positions in their networks and raise their competitiveness levels (Banalieva & Dhanaraj, 2019; Xue et al., 2013). Given the complexity of digital ecosystems and the involvement of multiple stakeholders, firms need to develop new managerial approaches based on orchestration and self-governance that create the right sets of incentives and foster relationships among ecosystem members (Baraldi & Nadin, 2006; Das & Dey, 2021). The aforementioned notion of network emergence and the simultaneous flattening of the internal hierarchy stood out during our analysis as a succinct multilevel connection point between the themes of *organizational structure* and *digital ecosystems*.

The membership of a digital ecosystem not only affects governance and organizational structures (as described above), but also tangibly impacts a firm's production system. In a conventional understanding, manufacturing linearly transmits inputs stage-by-stage into outputs. In digital ecosystems, firms tend to replace such linear processes with distributed and interconnected forms of production, in which activities occur concurrently (Bürger et al., 2019; Srai et al., 2016). Incorporating data and feedback from all ecosystem members—including customers—makes production systems more dynamic and responsive to changes in business environments (Ghobakhloo, 2020).

4.3.3. Interaction with customers

In a digital economy, relationships between customers and firms are undergoing major changes. The scope of changes that we detected in our analysis included new power dynamics between firms and customers, close engagement, and new lifestyles that directly impact consumption patterns. In addition to their role as consumers, customers become co-creators of digital solutions (Ziaie et al., 2021). Customers are involved either through a passive offer of feedback on improvement suggestions or through active participation in designing and improving digital solutions. Customers' engagement in the co-design of products and services is becoming an important innovation strategy for firms, making customers active co-creators, or "prosumers" (Srai et al., 2020).

Customers' value in co-creation stems from their understanding of their needs or from their knowledge of how solutions can be improved to better serve them. This indicates a symbiotic relationship in which customers extract more value from firms and, thus, increase firm profits (Crittenden et al., 2019). Therefore, as customers become value co-creators, they also increasingly become a resource (Koh et al., 2019). Close relationships with end-users play an important role in strengthening firms' competitive positions in the digital economy (Mosch et al., 2021). The literature on digital envelopes or customers' digital footprints (Koh et al., 2019) demonstrates how valuable information on customer activities and their information inputs can be for product innovations and the development of radically new products.

To engage customers in value co-creation, firms must offer appropriate incentives and contribution rewards that are either financial or

intangible stimuli, such as being part of the community. Firms try to foster intimacy in relationships with customers (Saarikko et al., 2020) and aim to make customers feel like they are part of the firm (Crittenden et al., 2019). With such loyalty-enhancing practices, firms can gain continuous access to customer data and simultaneously retain subscribers to digital solutions (Crittenden et al., 2019). Along with loyalty and intimacy, the literature mentioned trust, reciprocity, and reputation as important relational goods that attract customers toward digital services (Rodriguez-Lluesma et al., 2021; Vial, 2019). Thus, in a digital economy, the building blocks of competitive advantages increasingly are linked to intangible subjective perceptions.

Customers' new roles as co-creators or resources drive a power redistribution between firms and their customers. Some researchers have argued that adoption and use of digital technologies erode customers' power, while others claim the opposite. Firms face the need to reconsider conventional product-centered business models and focus more closely on customer engagement. Thus, DT strengthens the customer's role in value creation and contributes to greater customer autonomy and negotiating power vis-à-vis producers (Gregory et al., 2018; Kamalaldin et al., 2020).

4.3.4. Competitive dynamics

Researchers have paid considerable attention to DT's effects on market competition, and vice versa (Cenamor et al., 2017; Kohtamäki et al., 2020; Quinton et al., 2018; Sjödin et al., 2018). Generally, the proliferation of digital technologies is contributing to more information symmetries and transparency in marketplaces, thereby diminishing incumbents' competitive advantages and empowering new entrants (Hinings et al., 2018). Specifically, DT can dismantle incumbents' competitive advantages, potentially leading to hypercompetition, with uncertain consequences for existing firms (Neirotti & Pesce, 2019; Saarikko et al., 2020). Simultaneously, while the fast-mover advantage still matters in the digital economy, it is becoming more difficult to sustain due to increases in transparency, imitation capabilities, and availability of information on competing firms' offers (Grover & Kohli, 2013).

DT enables both start-ups and large technology firms to avoid competing with incumbents in their home markets, where they feel comfortable, and instead redefine existing markets and create new ones, rendering dominant firms insignificant. For instance, Saarikko et al. (2020) described how the newspaper and music markets suffered a mass-extinction of firms triggered by disruptive digital innovations. DT can lead to winner-take-all dynamics that solidify advanced technology users' competitive advantages and broaden the technology diffusion gap with laggard firms (Langley et al., 2021; Li, 2020). Due to these changes' self-reinforcing nature, digitalized market incumbents' competitive positions in a digital economy will be difficult to contest, given discriminatory access to data and accumulated expertise in digital technologies. By leveraging network effects from digital business models, incumbents can expand their activities toward adjacent markets as part of their diversification strategy (Cennamo, 2021), leading to increasing convergence of markets and industries.

The literature indicates that these competitive threats can drive the initiation of DT projects at firms, emphasizing that the interpretation of such external pressures remains subject to managerial perceptions (Cenamor et al., 2017; Kohtamäki et al., 2020). Specifically, individual analytical capabilities and sensitivity to changes in the external environment result in a broad array of potential actions by firms regarding the use of digital technologies (Mishra et al., 2007). Finally, Hinings et al. (2018) found evidence of isomorphism via competition, describing how firms may use their direct competitors or market leaders in other industrial sectors as exemplars, frames of reference, and sources of inspiration. Consequently, commonalities in the adoption of digital technologies and the choice of corporate reforms may be evident across competing firms (Johnson & Bharadwaj, 2005), contributing to the emergence of industry-specific technology regimes. These studies, together with that of Sjödin et al. (2020), have sparked a discussion on DT and institutional forces.

The literature also indicates that DT changes not only the intensity of competition, but also its qualities. Data's ubiquitous nature and digital technologies' generalizability provide an opportunity to apply technological know-how and accumulated expertise across multiple business lines and industrial contexts (Sjödin et al., 2020). This flexibility allows firms with advanced digital capabilities to expand across industries, ultimately broadening competition and dismantling differences among industrial sectors. The emergence of digital ecosystems that often transcend traditional industry structures has accelerated this trend (Kohtamäki et al., 2020).

Due to the proliferation of platforms and digital ecosystems, firms are now in rivalries with networks of firms rather than with stand-alone firms (Cenamor et al., 2017; Nuccio & Guerzoni, 2019). The development of digital ecosystems and platforms creates network effects, making it difficult for competitors to appropriate value. Within these networks, competitive interactions take more complex forms as the boundaries between competitors and collaborators partly blur (Subramaniam et al., 2019). Direct competitors may become partners, or partners may become competitors in a digital ecosystem, leading to the phenomenon of coopetition (He et al., 2020). As a result, studies have called for the development of more agile management approaches with shorter product and innovation life cycles that can capitalize on synergies with external actors and simultaneously address competitive pressures (Cenamor et al., 2017; He et al., 2020; Kohtamäki et al., 2019).

4.3.5. Sustainability

Many firms are facing the challenge of aligning sustainability requirements with business needs and available technological opportunities (Gregori & Holzmann, 2020). Specifically, sustainability encompasses societal impact, environmental impact, and economic efficiency resulting from firms' long-term functioning (Forcadell et al., 2020; Ricci et al., 2020). Several sources have concluded that by enabling automation, designing intelligent solutions, and facilitating direct communication between producers and customers, DT has the potential to increase business operations' sustainability significantly (Dalenogare et al., 2018; Mishra et al., 2007; Sklyar et al., 2019; Vendrell-Herrero et al., 2017).

However, the literature differs in its discussion on how this can be achieved, given that DT affects sustainability through five pathways: (1) immediate operational efficiency; (2) product and service innovations; (3) distributed manufacturing; (4) sharing economy; (5) and alignment of stakeholders. The resulting improvements in productivity and operational efficiency have the potential to contribute to more sustainable manufacturing via improvements in resource use, optimization of energy consumption and distribution, extended product life spans, and waste reduction (Bokrantz et al., 2017; Bürger et al., 2019; Kathan et al., 2016). Digital technologies promise improvements in operational efficiency to extents that were not possible in the past (Chen et al., 2016; Frishammar et al., 2018; Sarkis et al., 2021). For instance, studies have illustrated that preemptive maintenance scheduled via artificial intelligence can identify problems before they actually emerge (Sjödin et al., 2020), and smart grids and smart metering can optimize the use of renewable energy (Duch-Brown & Rossetti, 2020).

Advancements in digital technologies also give rise to sustainable product designs and manufacturing processes, thereby reducing negative environmental impacts and ultimately supporting a faster transition to a circular economy (Kusiak, 2018; Srai et al., 2016). The product-as-a-service movement (see the *digital servitization* theme) is a vehicle contributing to the replacement of conventional business models built on short product life cycles and essentially opposing the idea of the circular economy. The objective is to prolong physical products' life cycles to enable long-term subscriptions to services, thereby making digital servitization a high-potential driver toward sustainability (Vendrell-Herrero et al., 2017). According to Kathan et al. (2016), DT also

contributes to the sharing economy by decreasing ownership costs for underused assets while creating opportunities for more sustainable growth (Kathan et al., 2016; Pouri & Hilty, 2021). However, that study cautioned that the sustainability potential can be offset if sharing business models incentivizes customers to consume more than they did previously (Kathan et al., 2016).

The *sustainability* theme relates to that of *organizational processes*. Specifically, and in addition to product and service innovations, DT enables novel forms of organization of manufacturing processes. The distributed model of production can help realize digital technologies' sustainability potential by creating favorable conditions for the development of resource-efficient and sustainable manufacturing (Kumar et al., 2020). Distributed manufacturing's contribution to sustainability is realized through shorter lead times; an emphasis on production to order, rather than make-to-stock; and a modular production process (Srai et al., 2020).

The *sustainability* theme also relates to the *digital ecosystems* theme. Digital platform ecosystems decrease information asymmetries and enable new interactions that previously were not possible due to the lack of information exchange channels among diverse stakeholders (Duch--Brown & Rossetti, 2020). Improved information flows, combined with increased capabilities to analyze complex data sets, aid consolidation efforts and help reach consensus among diverse stakeholders, creating positive socioeconomic and environmental impacts (Ghobakhloo et al., 2021; Gregori & Holzmann, 2020).

The academic literature in our sample investigated DT's positive impact on sustainability. While few contributions have shed light on the negative effects from single digital technologies (e.g., bitcoin and energy consumption), researchers have not studied whether and how DT can impact sustainability negatively. Another possible research avenue is opened when the perspective is reversed, leading to an examination of how sustainability affects DT. For instance, sustainability may impose coercive or normative pressures on the conceptualization or implementation of DT, or it may alter firms' priority-setting and decision-making arrangements.

5. Discussion

DT redefines markets and firms, including their relational mechanisms, knowledge management, and value creation, rendering existing competitive advantages less significant (Goduscheit & Faullant, 2018; Langley et al., 2021; Lanzolla et al., 2021; Monaghan et al., 2020). DT poses considerable strategic management challenges both for academics and business practitioners. In previous sections, we described 11 prominent themes that we identified in the DT literature: three for the organizational core; three for the organizational periphery; and five for the external environment. The main aim of this broadly scoped paper is to bridge the different discussions and spot possibilities for integrating ongoing DT research. Thus, in this discussion, we focus less on research potentials *within* each theme and layer, which narrower studies can identify as well, and more on interesting intersections *beyond* the themes and layers.

5.1. Power (de)centralization dynamics

One interesting discussion based on our analysis focuses on digital changes in the relationship between the organizational core and periphery. Two forces coexist and seem to work against each other. In one respect, adoption of digital solutions and data-driven approaches contributes to the detailed codification of processes and operations, enabling *higher levels of control* for top management. This dynamic transfers more power and decision-making authority to the boardroom. However, the proliferation of digital technologies creates conditions for business units to develop unique capabilities and skills to gather and analyze data and execute tasks *autonomously* (Horváth & Szabó, 2019). DT's complexity and entrenched uncertainty call for collaboration across all activities and business units, thereby enabling higher levels of autonomy in the organizational periphery. Furthermore, DT creates opportunities for greater employee participation in the formulation of corporate strategic actions, and it enables real-time collective intelligence. These dynamics, in turn, transfer more power and authority to the frontline of the organization. Furthermore, a recent uptake in teleworking that the COVID-19 pandemic triggered stands to increase the dispersion of corporate headquarters and business units even further (Menz et al., 2021).

Shifting power distribution within firms also leads to some essential theoretical development potentials involving interactions with external actors. The decentralization of R&D activities, accompanied by higher levels of collaboration with external actors, can increase subsidiaries' R&D competence levels, thereby strengthening their autonomy (Szalavetz, 2019). Thus, DT creates conditions for the emergence of decentralized networks in which competencies for value creation are distributed across a network of autonomous actors.

The ultimate consequence of this scenario is the weakening of the parent firm's authority vis-à-vis its subsidiaries and suppliers. However, if this is true for all actors in the value chain (linear view) or ecosystem (network view), authority gradually will move from the respective boardrooms ("core") toward the linkages between members and the people who operate them. This development ultimately would lead to value chains and ecosystems that are steered autonomously via self-organization. Consistent with this, the operations management domain has theorized (Choi et al., 2001), modeled (Zhao et al., 2019), and abductively approached such complex and adaptive structures in the field (Nair et al., 2016).

Our study's results offer encouragement, but also caution, on this line of research. If parent firms achieve advanced digital competency, they will assume more power over other participants in value co-creation. For instance, by installing sensors on physical products created by subsidiaries or suppliers, a parent firm can acquire unique insights into product behaviors and knowledge about which improvements should be made to create better value for customers. Access to unique and granular knowledge has the potential to strengthen parent firms' authority, thereby creating conditions for increased market concentration.

5.2. Emerging types of economic organization

Owing to advancements in digital technologies, the organizational core is becoming more exposed to influences from external actors. Our literature review indicated that in the digital economy, value is created less often within firm boundaries and more often outside them through interactions with partners, suppliers, customers, and online communities. Van Alstyne and Parker (2021) referred to this emerging value creation model as "inverted firms." As a consequence, business models, organizational structures, and culture—all central features of the organizational core—are becoming more outward oriented and dependent on external actors. Simultaneously, the firm's increasing interconnectivity is contributing to the emergence of digital platform ecosystems that create new value sources and redefine terms that traditionally were viewed as lying within singular firms' control, such as competitive advantage and resource management (Jacobides et al., 2018; Kretschmer et al., 2020; McIntyre et al., 2020; Volberda et al., 2021). In short, the manifold changes in firm structures and boundaries induced by DT result in a transition from stand-alone firms to ecosystems of value co-creators.

Digital technologies enable such large-scale collaborations and make them sustainable and productive (Benkler, 2002). Raising intensity and depth in internal and external collaboration in tandem with reduced transaction costs, increased automation, and improved process control helps firms increase their scales and scopes far beyond conventional firm boundaries (Menz et al., 2021). Simultaneously, increasingly permeable and expanding boundaries make firms more vulnerable and sensitive to

external control. Traditionally viewed as very distinctive categories, firms and markets indicate a tendency toward gradually merging in a digital economy. This development gives birth to hybrid organizations such as digital ecosystems of interconnected value co-creators. These hybrid organizations incorporate firms and markets' governance mechanisms into knowledge management, resource distribution, value creation, and transaction cost management. One of the defining features of digital ecosystems is that, in addition to formal and relational governance mechanisms, they are also governed by technological systems. Some examples include the application of blockchain for decision-making (Lansiti & Lakhani, 2017; Lumineau et al., 2021) and the use of learning algorithms for autonomous and dynamic price setting (Calvano et al., 2020; Schwalbe, 2018).

Digital ecosystems exist in technology-intensive industries and markets. Industrial sectors with low technology intensity (e.g., agriculture, real estate, and mining) fall behind in the adoption and use of digital technologies (Calvino et al., 2018). As a result, emerging forms of economic organizing are concentrated in technologically advanced sectors (e.g., IT services, telecom, finance, and insurance). Under the impact of digital ecosystems, technology-intensive industries indicate a tendency to converge over time, whereas sectors with a low uptake of digital technologies remain stationary. Some of these dynamics can be found in e-commerce firms establishing their presence in insurance markets or IT firms investing increasingly in developing banking and payment ecosystems. Blurring boundaries across technology-intensive sectors enables entry of new firms and substantially raises competition levels.

6. Directions for future research

6.1. Organizational power

The inherent conflict between the concentration and distribution of power within the firm induced by DT leads to promising avenues for future research. The duality of (de)centralization tendencies in the firm caused by DT should be better understood to help firms design effective organizational actions that support a smooth transition to digital value creation methods. Further research on this topic may prove essential for understanding how deep adoption of digital technologies redefines firms from the inside.

As an alternative to the conflict-based view, with two opposing or substituting dynamics, we also found evidence of positive synergies resulting from the simultaneous decentralization of power and top management authority. The conflict-based hypothesis builds on the idea that the decentralization of firms occurs independently of top management when organizational units take control during technological change processes (Singh et al., 2019). Contrasting this bottom-up perspective, we found evidence of controlled decentralization initiated by top management. Specifically, top management actively may initiate reforms aimed at flattening organizational hierarchies and increasing the decentralization of decision making to enable greater resilience and timely responses to technological changes. DT introduces coexisting forces that can increase the power of both senior management/headquarters and frontline workers/units. Future research should examine the relationship between these forces (i.e., substitution, conflict, or moderation).

The paradoxical active decentralization of power facilitated by digital technology and the acceptance of the resultant power loss by top management are also a possible starting point for future research. In particular, researchers could investigate the implications of digitally induced decentralization on firm productivity and performance. DT requires simultaneous emphasis on autonomy among business units while ensuring a required level of centralized control of a firm's digitalization approach. Future research can address the dynamic co-alignment of both formal strategies and informal actions that can balance autonomy and control as firms undertake DT.

Uneven accumulation and distribution of digital resources and competencies across organizational layers and the external environment can cause subsequent power shifts that reshape internal structures and firm boundaries. These power shifts evolve along with the duality of centralizing and decentralizing dynamics, with uncertain outcomes on who will orchestrate the transformation and gain the largest share of value from it. The question of who ultimately will be in control is essential for future research. Future studies could determine under which conditions powerful headquarters attain orchestrator positions that enable them to dictate the entire network and under which conditions headquarters lose their information supremacy to the network—putting network segments in control.

6.2. The nature of the firm in the digital economy

Scholars have studied how new organizational forms are conceptualized under different terms, e.g., extended enterprises or meta-organizations (Aron & Singh, 2005; Gulati et al., 2012). However, DT accelerates this phenomenon and brings new dynamics into the management of knowledge and other types of strategic resources. As a result, DT renders conventional theories (which we reviewed at the outset of this paper) that explain the existence of firms as less applicable, e.g., transaction cost theory and the knowledge-based view. This development calls for the formulation of alternative approaches to study firms and their improvements when facing the digital economy's needs.

According to Coase (1937), firms exist because the transaction costs within the firm are lower than the transaction costs in a market. Dissolving organizational boundaries that, in turn, lead to the emergence of digital ecosystems challenges this notion. Manifold examples from our literature review, such as the redefinition of pricing mechanisms or decreasing information asymmetry, demonstrate that effective channels for value co-creation lower the transaction costs of exchanges with external actors to a new minimum. This resonates with prior findings (Benkler, 2017; Gulati et al., 2012; Puranam et al., 2014) on the positive effects from peer production and open innovation (e.g., crowdsourcing, user innovations, and open-source software) on the emergence of new forms of economic activities and the decrease in transaction costs through decentralized digital channels.

Unlike in traditional hierarchical organizations, power in digital ecosystems stems from controls over technological solutions, data sources, and the relational centrality to value co-creators (Kretschmer et al., 2020). Increases in powers of platform ecosystems can raise revenues for their owners at the expense of performance outcomes of ecosystem complementors (Rietveld et al., 2020), and vice versa. To better understand the emergence of digital ecosystems and their functioning principles, academic research needs to develop theories to examine organizational power from the point of resource control, power's cognitive and behavioral effects, and effects from technological affordances on power distribution with value co-creators' ecosystems. Available theories, such as resource dependence theory (RDT), can be useful for examining a firm's capabilities to control resources (Hillman et al., 2009) and, therefore, interdependencies and relationships within firm networks in a digital economy. However, existing theoretical frameworks might not be sufficient to reflect the complexity of DT effects on organizational power. Due to organizational boundaries' growing ephemerality and digital artifacts' fluidity (Kallinikos et al., 2013; Yoo et al., 2010), novel theoretical frameworks should focus on interorganizational relationships, rather than bounded actors (Baygi et al., 2021).

7. Conclusion

This study reviewed the literature on how advancements in digital technologies affect firms' corporate strategy and theoretical foundations. We *ex ante* sketched a layered model for DT with three layers: (1) organizational core (e.g., corporate headquarters); (2) organizational

periphery (business units); and (3) external environment (e.g., customers and competitors) (Fig. 1). Through our literature review, we populated this framework with themes across the layers that summarized the DT literature (Fig. 5), and we derived several theoretical implications that inform future scholarship.

We contend that firms undergoing DT face opposing forces of internal and external power (de)centralization, and that the boundaries between the layers become less noticeable. Specifically, the firm boundaries gradually shift to include external actors (the third layer) due to the much deeper nature of relations and interactions with the external environment imposed by digital communication channels. This trend indicates a departure from stand-alone firms to networks of firms that share resources and operate a distributed model of value co-creation. In particular, our implications call for a reconceptualization of the firm.

Digital technologies contribute to power and resource shifts within and beyond firm organizational boundaries. These shifts evolve along decentralizing and centralizing dynamics with uncertain outcomes on who will govern emerging ecosystems of value co-creators and gain the largest share of the economic pie. Future research needs to investigate the phenomenon of organizational powers in the digital economy.

Our analysis of the DT literature in the business sector has several limitations. Our sampling frame was based partly on journal impact and rankings, thereby limiting our literature review. This choice led to the exclusion of several possibly relevant articles from our analyses. We justify this exclusion with our general aim to analyze and report only research that had undergone a rigorous review process. Furthermore, we acknowledge that our qualitative content analysis, guided by the principles of thematic analysis, was subjective in nature. We made efforts to reduce the inherent subjectivity by examining our procedures' reliability. Finally, we recognize that the layers may not always have clear-cut boundaries in practice. Our study's logic was first to build on the static view of firm boundaries (i.e., to be able to classify the literature) and to relax this assumption in our data analysis, which specifically sought evidence of dynamism caused by DT. With this novel perspective on the DT literature, we hope to spark future research that addresses the many nuanced challenges of DT, particularly when they refer to changes in power dynamics.

APPENDIX

Appendix A.1. Comparison of DT Review Studies

Factor	*Zhu* et al. (2021)	Verhoef et al. (2021)	Hanelt et al. (2021)	Vial (2019)	Reis et al. (2018)	This study
Theoretical framing	Clustering analysis	Flow model	'input-process-output'	Grounded theory/ Process view	–	Multilevel lens
Keywords	digital transformation, digital strategy, digital disruption, digital business strategy	digital transformation, digitalize, digitize, IT transformation, IS transformation	digital transformation and digital AND transformation	digital, transform, disrupt	digital transformation	digital transformation, digitiz(s)ation, digitaliz(s)ation
Use of rankings	–	Journal Impact Factor >1	Financial Times (FT50), citation count on Google Scholar	Journal Citations Report (JCR), all quartiles	Journal Citations Report (JCR), all quartiles	Journal Citations Report (JCR), Q1 & Q2 (highest quality quartiles)
Sampling procedure	Citation analysis, social network analysis, main path analysis	Systematic multistep concept-centric literature search (Webster & Watson, 2002)	Systematic review method based on Tranfield et al. (2003) and Mayring (2000; 2014)	Systematic literature review based on Wolfswinkel et al. (2013)	Bibliometric analysis and content analysis	Systematic literature review based on Denyer and Tranfield (2006)
Types of research outputs	Academic articles and conference proceedings	Academic articles	Academic articles	Academic articles and conference proceedings	Academic articles and conference proceedings	Academic articles
Years covered	2000–2020	2000–2018	2000–2018	1992–2018	1968–2017	2003–2021
Databases	Web of Science	42 academic journals with the impact factor>1	EBSCO Business Source Complete (BSC)	AIS Library, EBSCO Business Source Complete (BSC), ScienceDirect	Web of Science	Scopus and Web of Science
Proposed theory	–	–	Punctuated equilibrium theory, cyclical change theory, theories of institutional design, institutional theory	Dynamic capabilities	–	Power theories
Research avenues	–	DT stages, digital resources, organization structure, digital growth strategies, metrics & goals	Development of malleable organizational designs	The strategic relevance of ethics in DT	Adaptation of business strategies to digital reality	New forms of economic organization. The duality of centralizing and decentralizing power dynamics during DT.
N	**828**	**84**	**279**	**282**	**206**	**537**

Appendix A.2. Data across Academic Journals

Journal title	Number of articles
Journal of Business Research	39
Technological Forecasting & Social Change	33
Journal of Manufacturing Technology Management	25

(*continued on next page*)

(*continued*)

Journal title	Number of articles
Production Planning & Control	24
International Journal of Production Economics	19
Business Horizons	17
Industrial Marketing Management	16
MIS Quarterly Executive	16
International Journal of Operations & Production Management	13
MIS Quarterly	13
California Management Review	12
Long Range Planning	12
Journal of Cleaner Production	11
MIT Sloan Management Review	11
Electronic Markets	10
European Journal of Innovation Management	10
International Journal of Production Research	10
IEEE Transactions on Engineering Management	9
Industrial Management & Data Systems	9
Journal of Strategic Information Systems	9
Technology in Society	9
Technovation	9
Management Decision	8
International Journal of Information Management	7
Journal of Production Innovation Management	7
European Journal of Information Systems	6
Information & Organization	5
International Journal of Entrepreneurial Behavior & Research	5
Journal of International Business Studies	5
Journal of Management Studies	5
Decision Support Systems	4
Engineering Construction & Architectural Management	4
Journal of Enterprise Information Management	4
Review of Management Science	4
Annals of Operations Research	3
Electronic Commerce Research & Applications	3
European Management Journal	3
Global Networks	3
Industry & Innovation	3
Information and Management	3
Information Systems Research	3
Journal of Construction Engineering & Management	3
Journal of Industrial Information Integration	3
Journal of Knowledge Management	3
Journal of Service Management	3
Journal of Small Business Management	3
Journal of the Knowledge Economy	3
Organization Science	3
TQM Journal	3
Business Strategy & the Environment	2
Competition & Change	2
European Journal of Development Research	2
European Journal of Operational Research	2
Harvard Business Review	2
Information Economics & Policy	2
International Journal of Accounting Information Systems	2
International Journal of Physical Distribution & Logistics Management	2
Journal of Intellectual Capital	2
Journal of Management Information Systems	2
Journal of Manufacturing Systems	2
Journal of the Academy of Marketing Science	2
Marketing Intelligence & Planning	2
Research Policy	2
Scandinavian Journal of Management	2
Small Enterprise Research	2
Strategic Entrepreneurship Journal	2
Academy of Management Perspectives	1
Academy of Management Review	1
Accounting & Business Research	1
American Economic Review	1
Antipode	1
Applied Economic Review	1
Applied Ergonomics	1
Behaviour & Information Technology	1
British Food Journal	1
British Journal of Educational Technology	1
British Journal of Management	1
Business Ethics	1
Central European Journal of Operations Research	1

(*continued on next page*)

(*continued*)

Journal title	Number of articles
Computers & Education	1
Current Issues in Tourism	1
Energy Policy	1
Enterprise Information Systems	1
Environment and Planning A	1
Environmental Innovation and Societal Transitions	1
European Journal of Management and Business Economics	1
European Planning Studies	1
Industrial & Corporate Change	1
International Business Review	1
International Journal of Computer Integrated Manufacturing	1
International Journal of Conflict Management	1
International Journal of Contemporary Hospitality Management	1
International Journal of Electronic Commerce	1
International Journal of Entrepreneurial Behaviour & Research	1
International Journal of Human Resource Management	1
International Journal of Lean Six Sigma	1
International Journal of Logistics Management	1
International Journal of Management Reviews	1
International Journal of Project Management	1
International Journal of Retail & Distribution Management	1
International Review of Economics & Finance	1
Internet Research	1
Journal of Business & Industrial Marketing	1
Journal of Business Logistics	1
Journal of Competitiveness	1
Journal of Cultural Economics	1
Journal of Economic Perspectives	1
Journal of Information Technology	1
Journal of Management in Engineering	1
Journal of Management & Organization	1
Journal of Marketing Management	1
Journal of Purchasing & Supply Management	1
Journal of Service Theory & Practice	1
Journal of Services Marketing	1
Knowledge Management Research & Practice	1
Management Review Quarterly	1
Management Science	1
Production &Operations Management	1
R & D Management	1
Strategic Management Journal	1
Supply Chain Management	1
Technology Analysis & Strategic Management	1
Telecommunications Policy	1
Total Quality Management & Business Excellence	1
n	**537**

Appendix A.3. Theoretical Frameworks

Topics of theories (frequency)	Theoretical framework	Count
Resource (46)	Resource-based View (RBV)	21
	Dynamic Capabilities	18
	Resource Dependency Theory (RDT)	5
	Knowledge-based View (KBV)	3
	Resource configuration theory	1
Economic (15)	Transaction Cost Theory	7
	Game Theory	2
	Commitment-Trust Theory	1
	Human Capital Theory	1
	Penrosian Growth Theory	1
	Price Theory	1
	Rent Theory	1
	Theory of the Growth of the Firm	1
Innovation & Technology (14)	Disruptive Innovation Theory	3
	Technology Acceptance Model (TAM)	3
	Combinatorial Technology Evolution Theory	2
	Diffusion of Innovation	2
	Architectural Theory of Digital Innovation	1
	Employee-driven Innovation (EDI)	1
	Theory of Inventive Problem Solving (TRIZ)	1
	Theory of the Technology-based Firm	1
Relational (11)	Network theory	3

(*continued on next page*)

(*continued*)

Topics of theories (frequency)	Theoretical framework	Count
	Technology-Organization-Environment (TOE) Framework	3
	Configurational Theory	1
	General Systems Theory	1
	Modular Systems Theory	1
	Relational View	1
	Role Theory	1
	Systems Theory	1
Behavioral (7)	Behavioral Theory of the Firm	1
	Decision Comprehensiveness Theory	1
	Theory of Planned Behavior	1
	Risk Taking Theory	1
	Self-Determination Theory	1
	Decision theoretic approach	1
	Social Cognitive Theory	1
Other (33)	Institutional Theory	7
	Grounded Theory	4
	Affordance Theory	3
	Contingency Theory	2
	Path-dependence Theory	2
	Service-Dominant Logic	2
	Actualization Theory	1
	Assemblage Theory	1
	Change Management	1
	Dominant Design Theory	1
	Instrumentalization Theory	1
	Internationalization Theory	1
	Loose Coupling Theory	1
	Middle-range Theory	1
	Partnering Flower Theory	1
	Pattern Theory	1
	Practice Theory	1
	Sequential Adoption Theory	1
	Socio-Technical Theory	1
	Strategic Fit Theory	1
	Theory of Knowing in Practice	1
	Theory of Organizational Power	1
	Theory of Triple Bottom Line	1

Notes: 419 studies featured no particular theoretical angle. One article can use more than one theoretical framework.

Appendix A.4. Additional Descriptive Data Analysis

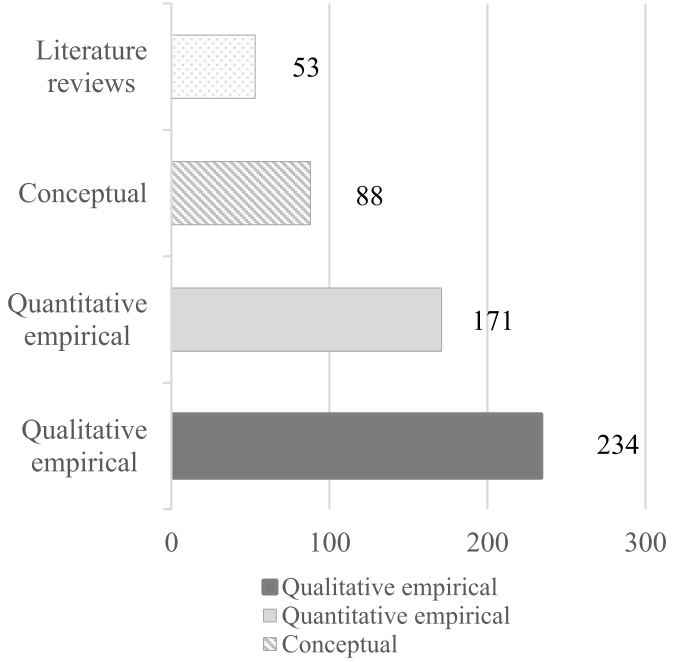
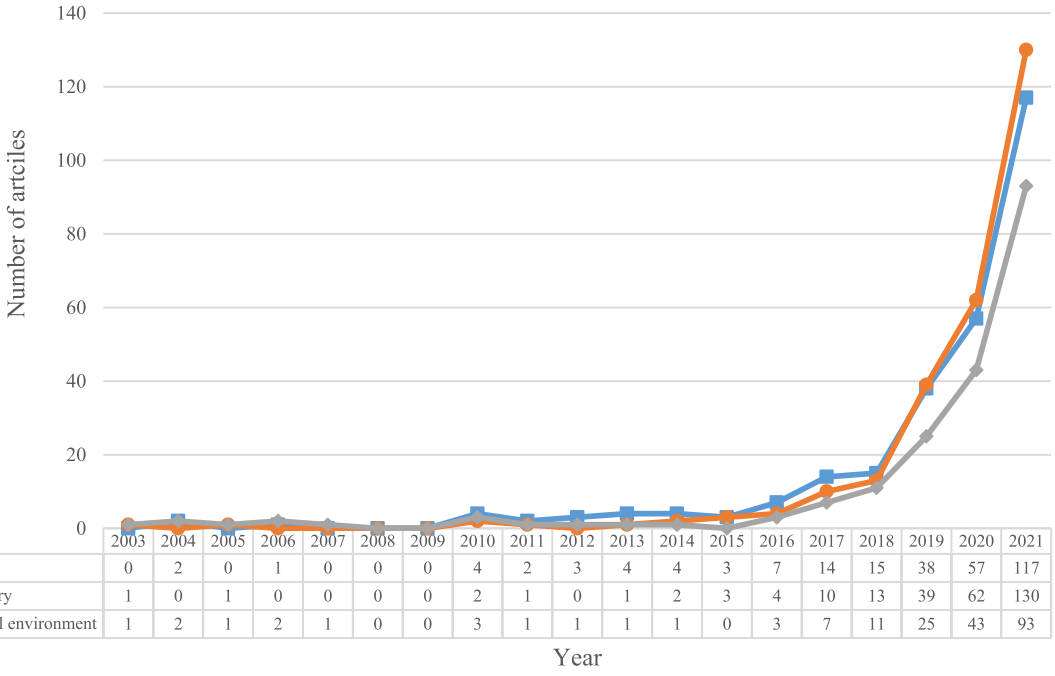
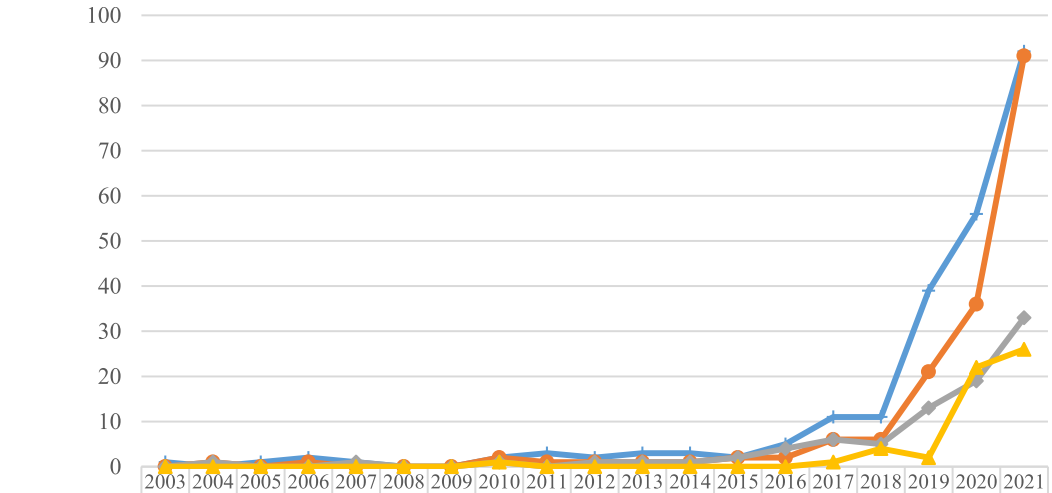


Fig. A.4.1. Distribution of qualitative and quantitative methods.



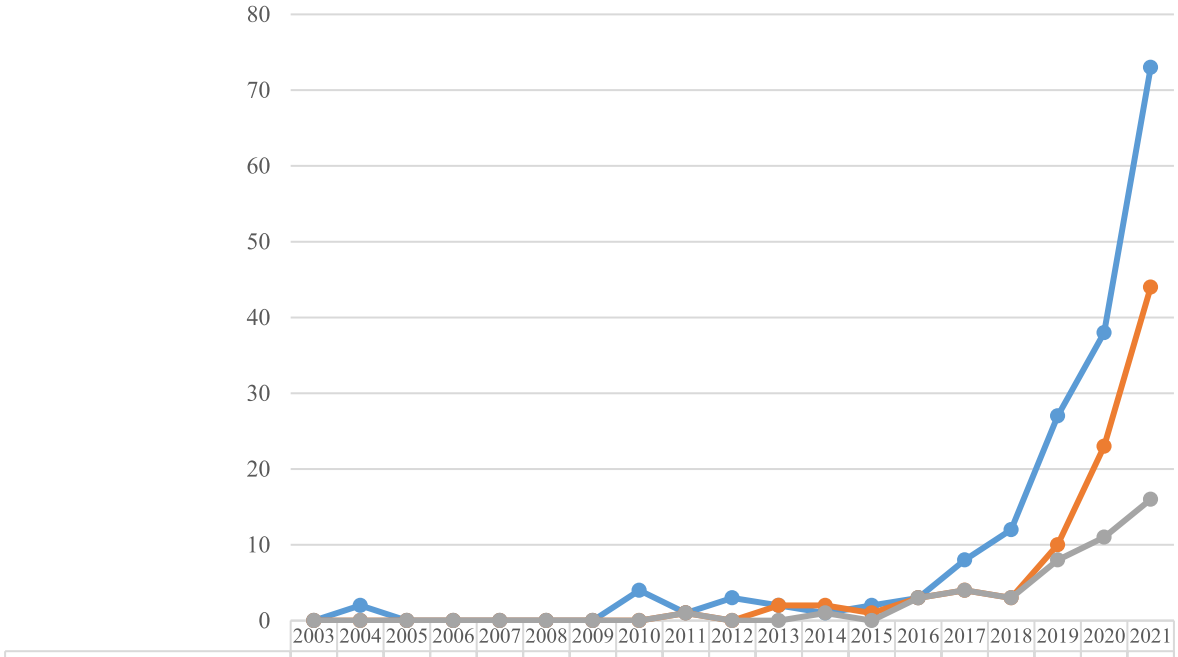
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Core	0	2	0	1	0	0	0	4	2	3	4	4	3	7	14	15	38	57	117
Periphery	1	0	1	0	0	0	0	2	1	0	1	2	3	4	10	13	39	62	130
External environment	1	2	1	2	1	0	0	3	1	1	1	1	0	3	7	11	25	43	93

Fig. A.4.2. Growth in the number of DT publications. Publications are split into layers (N = 537), and some articles were included in more than one layer.



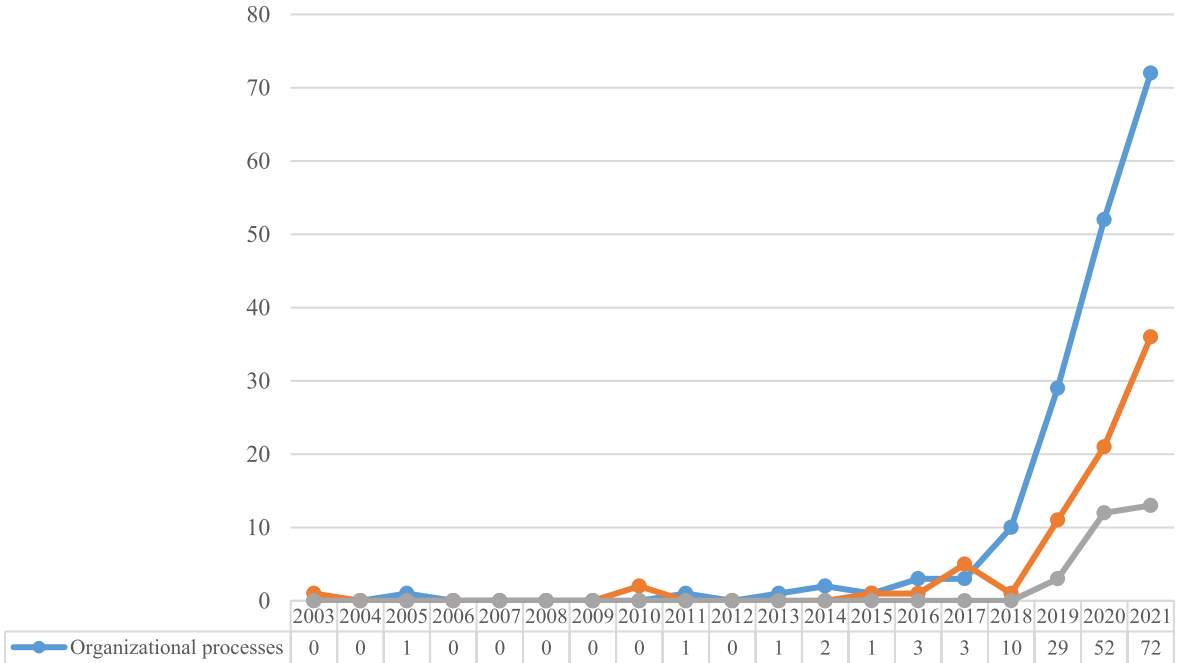
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Qualitative Empirical	1	0	1	2	1	0	0	2	3	2	3	3	2	5	11	11	39	56	92
Quantitative Empirical	0	1	0	1	0	0	0	2	1	1	1	1	2	2	6	6	21	36	91
Conceptual	0	1	0	0	1	0	0	1	0	1	1	1	2	4	6	5	13	19	33
Literature review	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	4	2	22	26

Fig. A.4.3. Distribution of research methods used over time.



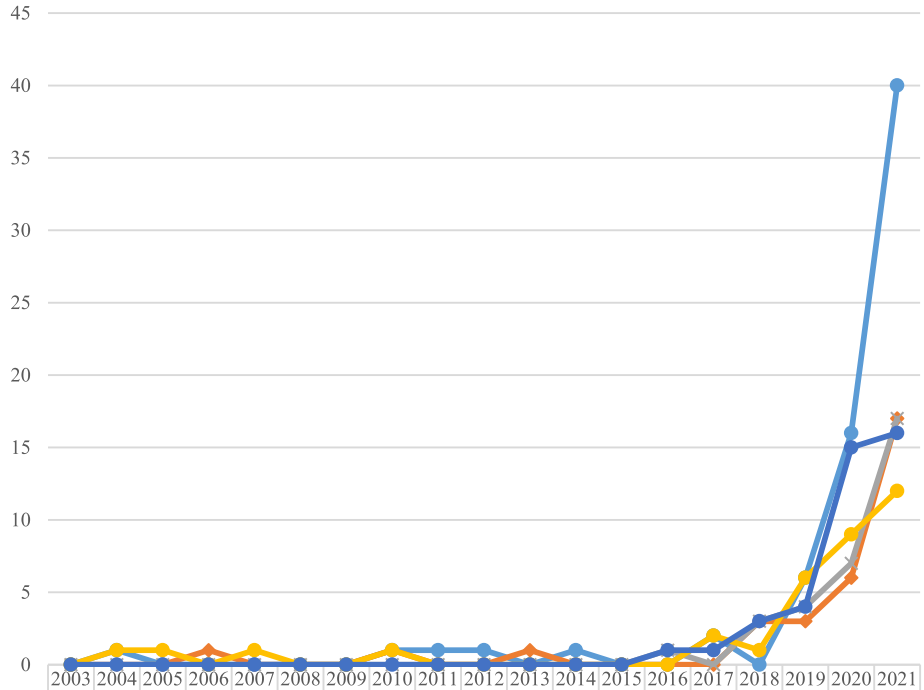
	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Business model	0	2	0	0	0	0	0	4	1	3	2	1	2	3	8	12	27	38	73
Organizational structures	0	0	0	0	0	0	0	0	1	0	2	2	1	3	4	3	10	23	44
Culture	0	0	0	0	0	0	0	0	1	0	0	1	0	3	4	3	8	11	16

Fig. A.4.4. Distribution of themes in the organizational core.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Organizational processes	0	0	1	0	0	0	0	0	1	0	1	2	1	3	3	10	29	52	72
Digital servitization	1	0	0	0	0	0	0	2	0	0	0	0	1	1	5	1	11	21	36
Digital platforms	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	12	13

Fig. A.4.5. Distribution of themes in the organizational periphery.



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Supply chain management	0	1	0	0	0	0	0	1	1	1	0	1	0	0	2	0	6	16	40
Digital ecosystems	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0	3	3	6	17
Cooperation with customers	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	4	7	17
Competitive dynamics	0	1	1	0	1	0	0	1	0	0	0	0	0	0	2	1	6	9	12
Sustainability	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3	4	15	16

Fig. A.4.6. Distribution of themes in the external environment.

References

Acemoglu, D., Aghion, P., Lelarge, C., Van Reenen, J., & Zilibotti, F. (2007). Technology, information, and the decentralization of the firm. *Quarterly Journal of Economics, 122*(4), 1759–1799. https://doi.org/10.1162/qjec.2007.122.4.1759

Åkesson, M., Sorensen, C., & Eriksson, C. I. (2018). Ambidexterity under digitalization: A tale of two decades of new media at a Swedish newspaper. *Scandinavian Journal of Management, 34*(3), 276–288. https://doi.org/10.1016/j.scaman.2018.06.004

Alos-Simo, L., Verdu-Jover, A. J., & Gomez-Gras, J. M. (2017). How transformational leadership facilitates e-business adoption. *Industrial Management and Data Systems, 117*(2), 382–397. https://doi.org/10.1108/IMDS-01-2016-0038

Amburgey, T. L., Kelly, D., & Barnett, W. P. (1993). Resetting the clock - the dynamics of organizational change and failure. *Administrative Science Quarterly, 38*(1), 51–73. https://doi.org/10.2307/2393254

Andal-Ancion, A., Cartwright, P. A., & Yip, G. S. (2003). The digital transformation of traditional businesses. *MIT Sloan Management Review, 44*(4), 34–41, 2-s2.0-17644403654.

Andriole, S. J. (2017). Five myths about digital transformation. *MIT Sloan Management Review, 58*(3), 20–22, 2-s2.0-85019077787.

Archambault, É., Campbell, D., Gingras, Y., & Larivière, V. (2009). Comparing bibliometric statistics obtained from the Web of science and Scopus. *Journal of the American Society for Information Science and Technology, 60*(7), 1320–1326. https://doi.org/10.1002/asi.21062

Argyres, N. S. (1996). Evidence on the role of firm capabilities in vertical integration decisions. *Strategic Management Journal, 17*(2), 129–150. https://doi.org/10.1002/(SICI)1097-0266(199602)17:2<129::AID-SMJ798>3.0.CO;2-H

Argyres, N. S., & Zenger, T. R. (2012). Capabilities, transaction costs, and firm boundaries. *Organization Science, 23*(6), 1643–1657. https://doi.org/10.1287/orsc.1110.0736

Aron, R., & Singh, J. V. (2005). Getting offshoring right. *Harvard Business Review, 83*(12), 135–142, 2-s2.0-29044432277.

Autio, E., Nambisan, S., Thomas, L. D., & Wright, M. (2018). Digital affordances, spatial affordances, and the genesis of entrepreneurial ecosystems. *Strategic Entrepreneurship Journal, 12*(1), 72–95. https://doi.org/10.1002/sej.1266

Aytug, Z. G., Rothstein, H. R., Zhou, W., & Kern, M. C. (2012). Revealed or concealed? Transparency of procedures, decisions, and judgment calls in meta-analyses. *Organizational Research Methods, 15*(1), 103–133. https://doi.org/10.1177/1094428111403495

Baiyere, A., Salmela, H., & Tapanainen, T. (2020). Digital transformation and the new logics of business process management. *European Journal of Information Systems, 29*(3), 238–259. https://doi.org/10.1080/0960085X.2020.1718007

Banalieva, E. R., & Dhanaraj, C. (2019). Internalization theory for the digital economy. *Journal of International Business Studies, 50*(8), 1372–1387. https://doi.org/10.1057/s41267-019-00243-7

Baraldi, E., & Nadin, G. (2006). The challenges in digitalising business relationships. The construction of an IT infrastructure for a textile-related business network. *Technovation, 26*(10), 1111–1126. https://doi.org/10.1016/j.technovation.2005.09.016

Barua, A., Konana, P., Whinston, A. B., & Yin, F. (2004). An empirical investigation of net-enabled business value. *MIS Quarterly, 28*(4), 585–620. https://doi.org/10.2307/25148656

Baygi, R. M., Introna, L. D., & Hultin, L. (2021). Everything flows: Studying continuous sociotechnological transformation in a fluid and dynamic digital world. *MIS Quarterly, 45*(1), 423–452. https://doi.org/10.25300/MISQ/2021/15887

Benkler, Y. (2002). Coase's penguin, or, linux and the nature of the firm. *The Yale Law Journal, 112*(3), 369–446. https://doi.org/10.2307/1562247

Benkler, Y. (2017). Peer production, the commons, and the future of the firm. *Strategic Organization, 15*(2), 264–274. https://doi.org/10.1177/1476127016652606

Beverungen, D., Müller, O., Matzner, M., Mendling, J., & vom Brocke, J. (2019). Conceptualizing smart service systems. *Electronic Markets, 29*(1), 7–18. https://doi.org/10.1007/s12525-017-0270-5

Björkdahl, J. (2020). Strategies for digitalization in manufacturing firms. *California Management Review, 62*, 17–36. https://doi.org/10.1177/0008125620920349

Bloomfield, B. P., & Coombs, R. (1992). Information technology, control and power: The centralization and decentralization debate revisited. *Journal of Management Studies, 29*(4), 459. https://doi.org/10.1111/j.1467-6486.1992.tb00674.x, 459.

Bloom, N., Garicano, L., Sadun, R., & Van Reenen, J. (2014). The distinct effects of information technology and communication technology on firm organization. *Management Science, 60*(12), 2859–2885. https://doi.org/10.1287/mnsc.2014.2013

Bokrantz, J., Skoogh, A., Berlin, C., & Stahre, J. (2017). Maintenance in digitalised manufacturing: Delphi-based scenarios for 2030. *International Journal of Production Economics, 191*, 154–169. https://doi.org/10.1016/j.ijpe.2017.06.010

Bonanomi, M. M., Hall, D. M., Staub-French, S., Tucker, A., & Talamo, C. M. L. (2019). The impact of digital transformation on formal and informal organizational structures of large architecture and engineering firms. *Engineering Construction and Architectural Management, 27*, 872–892. https://doi.org/10.1108/ECAM-03-2019-0119

Boscari, S., Bortolotti, T., Netland, T. H., & Rich, N. (2018). National culture and operations management: A structured literature review. *International Journal of Production Research, 56*(18), 6314–6331. https://doi.org/10.1080/00207543.2018.1461275

Bourreau, M., Gensollen, M., & Moreau, F. (2012). The impact of a radical innovation on business models: Incremental adjustments or big bang? *Industry & Innovation, 19*(5), 415–435. https://doi.org/10.1080/13662716.2012.711026

Brock, J. K. U., & Von Wangenheim, F. (2019). Demystifying AI: What digital transformation leaders can teach you about realistic artificial intelligence. *California Management Review, 61*(4), 110–134. https://doi.org/10.1177/1536504219865226

Brynjolfsson, E., & Hitt, L. (2000). Beyond computation: Information technology, organizational transformation and business performance. *The Journal of Economic Perspectives, 14*(4), 23–48. https://doi.org/10.1257/jep.14.4.23

Bürger, O., Häckel, B., Karnebogen, P., & Töppel, J. (2019). Estimating the impact of IT security incidents in digitized production environments. *Decision Support Systems, 127*, 113–144. https://doi.org/10.1016/j.dss.2019.113144

Butollo, F. (2021). Digitalization and the geographies of production: Towards reshoring or global fragmentation? *Competition and Change, 25*(2), 259–278. https://doi.org/10.1177/1024529420918160

Calvano, E., Calzolari, G., Denicolo, V., & Pastorello, S. (2020). Artificial intelligence, algorithmic pricing, and collusion. *The American Economic Review, 110*(10), 3267–3297. https://doi.org/10.1257/aer.20190623

Calvino, F., Criscuolo, C., Marcolin, L., & Squicciarini, M. (2018). *A taxonomy of digital intensive sectors*. Paris: OECD Publishing. https://doi.org/10.1787/18151965

Campbell, R., Pound, P., Pope, C., Britten, N., Pill, R., Morgan, M., & Donovan, J. (2003). Evaluating meta-ethnography: A synthesis of qualitative research on lay experiences of diabetes and diabetes care. *Social Science & Medicine, 56*(4), 671–684. https://doi.org/10.1016/S0277-9536(02)00064-3

Canhoto, A. I., & Clear, F. (2020). Artificial intelligence and machine learning as business tools: A framework for diagnosing value destruction potential. *Business Horizons, 63*(2), 183–193. https://doi.org/10.1016/j.bushor.2019.11.003

Caputo, A., Pizzi, S., Pellegrini, M. M., & Dabic, M. (2021). Digitalization and business models: Where are we going? A science map of the field. *Journal of Business Research, 123*, 489–501. https://doi.org/10.1016/j.jbusres.2020.09.053

Cenamor, J., Parida, V., & Wincent, J. (2019). How entrepreneurial SMEs compete through digital platforms: The roles of digital platform capability, network capability and ambidexterity. *Journal of Business Research, 100*, 196–206. https://doi.org/10.1016/j.jbusres.2019.03.035

Cenamor, J., Sjödin, D., & Parida, V. (2017). Adopting a platform approach in servitization: Leveraging the value of digitalization. *International Journal of Production Economics, 192*(1), 54–65. https://doi.org/10.1016/j.ijpe.2016.12.033

Cennamo, C. (2021). Competing in digital markets: A platform-based perspective. *Academy of Management Perspectives, 35*(2), 265–291. https://doi.org/10.5465/AMP.2016.0048

Chanias, S., Myers, M. D., & Hess, T. (2019). Digital transformation strategy making in pre-digital organizations: The case of a financial services provider. *The Journal of Strategic Information Systems, 28*(1), 17–33. https://doi.org/10.1016/j.jsis.2018.11.003

Chatfield, A., & Andersen, N. (1997). The impact of IOS-enabled business process change on business outcomes: Transformation of the value chain of Japan airlines. *Journal of Management Information Systems, 14*(1), 13–40. https://doi.org/10.1080/07421222.1997.11518152

Chen, Y., Jaw, Y., & Wu, B. (2016). Effect of digital transformation on organisational performance of SMEs. *Internet Research, 26*(1), 186–212. https://doi.org/10.1108/intr-12-2013-0265

Choi, T. Y., Dooley, K. J., & Rungtusanatham, M. (2001). Supply networks and complex adaptive systems: Control versus emergence. *Journal of Operations Management, 19*(3), 351–366. https://doi.org/10.1016/S0272-6963(00)00068-1

Coase, R. H. (1937). The nature of the firm. *Economica, 4*(16), 386–405. https://doi.org/10.1111/j.1468-0335.1937.tb00002.x

Colli, M., Stingl, V., & Waehrens, B. V. (2021). Making or breaking the business case of digital transformation initiatives: The key role of learnings. *Journal of Manufacturing Technology Management, 33*(1), 41–60. https://doi.org/10.1108/jmtm-08-2020-0330

Constantinides, P., Henfridsson, O., & Parker, G. G. (2018). Introduction—platforms and infrastructures in the digital age. *Information Systems Research, 29*(2), 381–400. https://doi.org/10.1287/isre.2018.0794

Coreynen, W., Matthyssens, P., & Van Bockhaven, W. (2017). Boosting servitization through digitization: Pathways and dynamic resource configurations for manufacturers. *Industrial Marketing Management, 60*, 42–53. https://doi.org/10.1016/j.indmarman.2016.04.012

Cozzolino, A., Verona, G., & Rothaermel, F. T. (2018). Unpacking the disruption process: New technology, business models, and incumbent adaptation. *Journal of Management Studies, 55*(7), 1166–1202. https://doi.org/10.1111/joms.12352

Crittenden, A. B., Crittenden, V. L., & Crittenden, W. F. (2019). The digitalization triumvirate: How incumbents survive. *Business Horizons, 62*(2), 259–266. https://doi.org/10.1016/j.bushor.2018.11.005

Dalenogare, L. S., Benitez, G. B., Ayala, N. F., & Frank, A. G. (2018). The expected contribution of Industry 4.0 technologies for industrial performance. *International Journal of Production Economics, 204*, 383–394. https://doi.org/10.1016/j.ijpe.2018.08.019

Das, A., & Dey, S. (2021). Global manufacturing value networks: Assessing the critical roles of platform ecosystems and industry 4.0. *Journal of Manufacturing Technology Management, 32*(6), 1290–1311. https://doi.org/10.1108/jmtm-04-2020-0161

De Giovanni, P. (2021). Smart Supply Chains with vendor managed inventory, coordination, and environmental performance. *European Journal of Operational Research, 292*(2), 515–531. https://doi.org/10.1016/j.ejor.2020.10.049

Dean, H., Larsen, G., Ford, J., & Akram, M. (2019). Female entrepreneurship and the metanarrative of economic growth: A critical review of underlying assumptions. *International Journal of Management Reviews, 21*(1), 24–49. https://doi.org/10.1111/ijmr.12173

Del Giudice, M., Scuotto, V., Papa, A., Tarba, S. Y., Bresciani, S., & Warkentin, M. (2021). A self-tuning model for smart manufacturing SMEs: Effects on digital innovation. *Journal of Product Innovation Management, 38*(1), 68–89. https://doi.org/10.1111/jpim.12560

Denyer, D., & Tranfield, D. (2006). Using qualitative research synthesis to build an actionable knowledge base. *Management Decision, 44*(2), 213–227. https://doi.org/10.1108/00251740610650201

Di Vaio, A., Palladino, R., Pezzi, A., & Kalisz, D. E. (2021). The role of digital innovation in knowledge management systems: A systematic literature review. *Journal of Business Research, 123*, 220–231. https://doi.org/10.1016/j.jbusres.2020.09.042

Di Vaio, A., & Varriale, L. (2020). Digitalization in the sea-land supply chain: Experiences from Italy in rethinking the port operations within inter-organizational relationships. *Production Planning & Control, 31*(2–3), 220–232. https://doi.org/10.1080/09537287.2019.1631464

Diller, M., Asen, M., & Späth, T. (2020). The effects of personality traits on digital transformation: Evidence from German tax consulting. *International Journal of Accounting Information Systems, 37*. https://doi.org/10.1016/j.accinf.2020.100455

Do Vale, G., Collin-Lachaud, I., & Lecocq, X. (2021). Micro-level practices of bricolage during business model innovation process: The case of digital transformation towards omni-channel retailing. *Scandinavian Journal of Management, 37*(2), Article 101154. https://doi.org/10.1016/j.scaman.2021.101154

Dremel, C., Herterich, M. M., Wulf, J., Waizmann, J. C., & Brenner, W. (2017). How AUDI AG established big data analytics in its digital transformation. *MIS Quarterly Executive, 16*(2), 81–100, 2-s2.0-85020132577.

Drucker, P. (1988). The coming of the new organization. *Harvard Business Review, 66*(1), 45–53.

Duch-Brown, N., & Rossetti, F. (2020). Digital platforms across the European regional energy markets. *Energy Policy, 144*, 11. https://doi.org/10.1016/j.enpol.2020.111612

Durach, C. F., Kembro, J., & Wieland, A. (2017). A new paradigm for systematic literature reviews in supply chain management. *Journal of Supply Chain Management, 53*(4), 67–85. https://doi.org/10.1111/jscm.12145

Eden, R., Jones, A. B., Casey, V., & Draheim, M. (2018). Digital transformation requires workforce transformation. *MIS Quarterly Executive, 18*(1), 1–17. https://doi.org/10.17705/2msqe.00005

El Sawy, O. A., Malhotra, A., Gosain, S., & Young, K. M. (1999). IT-Intensive value innovation in the electronic economy: Insights from marshall industries. *MIS Quarterly, 23*(3), 305–335. https://doi.org/10.2307/249466

Eller, R., Alford, P., Kallmunzer, A., & Peters, M. (2020). Antecedents, consequences, and challenges of small and medium-sized enterprise digitalization. *Journal of Business Research, 112*(1), 119–127. https://doi.org/10.1016/j.jbusres.2020.03.004

Forcadell, F. J., Aracil, E., & Ubeda, F. (2020). Using reputation for corporate sustainability to tackle banks digitalization challenges. *Business Strategy and the Environment, 29*(6), 2181–2193. https://doi.org/10.1002/bse.2494

Foss, N. J. (2000). *The theory of the firm: Critical perspectives on business and management* (Vol. 4). London: Taylor & Francis.

Frank, A. G., Dalenogare, L. S., & Ayala, N. F. (2019). Industry 4.0 technologies: Implementation patterns in manufacturing companies. *International Journal of Production Economics, 210*(1), 15–26. https://doi.org/10.1016/j.ijpe.2019.01.004

Franke, H., & Foerstl, K. (2018). Fostering integrated research on organizational politics and conflict in teams: A cross-phenomenal review. *European Management Journal, 36*(5), 593–607. https://doi.org/10.1016/j.emj.2018.08.003

Frishammar, J., Cenamor, J., Cavalli-Bjorkman, H., Hernell, E., & Carlsson, J. (2018). Digital strategies for two-sided markets: A case study of shopping malls. *Decision Support Systems, 108*, 34–44. https://doi.org/10.1016/j.dss.2018.02.003

Garay-Rondero, C. L., Martinez-Flores, J. L., Smith, N. R., Caballero Morales, S. O., & Aldrette-Malacara, A. (2019). Digital supply chain model in Industry 4.0. *Journal of Manufacturing Technology Management, 31*(5), 887–933. https://doi.org/10.1108/jmtm-08-2018-0280

Gavetti, G., Greve, H. R., Levinthal, D. A., & Ocasio, W. (2012). The behavioral theory of the firm: Assessment and prospects. *The Academy of Management Annals, 6*(1), 1–40. https://doi.org/10.5465/19416520.2012.656841

Gebauer, H., Fleisch, E., Lamprecht, C., & Wortmann, F. (2020). Growth paths for overcoming the digitalization paradox. *Business Horizons, 63*(3), 313–323. https://doi.org/10.1016/j.bushor.2020.01.005

Gerth, A. B., & Peppard, J. (2016). The dynamics of CIO derailment: How CIOs come undone and how to avoid it. *Business Horizons, 59*(1), 61–70. https://doi.org/10.1016/j.bushor.2015.09.001

Ghobakhloo, M. (2020). Determinants of information and digital technology implementation for smart manufacturing. *International Journal of Production Research, 58*(8), 2384–2405. https://doi.org/10.1080/00207543.2019.1630775

Ghobakhloo, M., Iranmanesh, M., Grybauskas, A., Vilkas, M., & Petraitė, M. (2021). Industry 4.0, innovation, and sustainable development: A systematic review and a roadmap to sustainable innovation. *Business Strategy and the Environment, 30*(8), 4237–4257. https://doi.org/10.1002/bse.2867

Goduscheit, R. C., & Faullant, R. (2018). Paths toward radical service innovation in manufacturing companies: A service-dominant logic perspective. *Journal of Product Innovation Management, 35*(5), 701–719. https://doi.org/10.1111/jpim.12461

Govindarajan, V., & Immelt, J. R. (2019). The manufacturers only way can survive. *MIT Sloan Management Review, 60*(3), 24–33, 2-s2.0-85071362128.
Grabher, G., & Van Tuijl, E. (2020). Uber-production: From global networks to digital platforms. *Environment & Planning A, 52*(5), 1005–1016. https://doi.org/10.1177/0308518X20916507
Grant, R. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal, 17*, 109–122. https://doi.org/10.1002/smj.4250171110
Greenwood, R., Raynard, M., Kodeih, F., Micelotta, E. R., & Lounsbury, M. (2011). Institutional complexity and organizational responses. *The Academy of Management Annals, 5*(1), 317–371. https://doi.org/10.1080/19416520.2011.590299
Gregori, P., & Holzmann, P. (2020). Digital sustainable entrepreneurship: A business model perspective on embedding digital technologies for social and environmental value creation. *Journal of Cleaner Production, 272*, Article 122817. https://doi.org/10.1016/j.jclepro.2020.122817
Gregory, R. W., Kaganer, E., Henfridsson, O., & Ruch, T. J. (2018). IT consumerization and the transformation of IT governance. *MIS Quarterly, 42*(4), 1225–1253. https://doi.org/10.25300/MISQ/2018/13703
Grover, V., & Kohli, R. (2013). Revealing your hand: Caveats in implementing digital business strategy. *MIS Quarterly, 37*(2), 655–662, 2-s2.0-84876832271.
Grover, V., & Ramanlal, P. (2004). Digital economics and the e-business dilemma. *Business Horizons, 47*(4), 71–80. https://doi.org/10.1016/S0007-6813(04)00050-3
Guenzi, P., & Habel, J. (2020). Mastering the digital transformation of sales. *California Management Review, 62*(4), 57–85. https://doi.org/10.1177/0008125620931857
Guinan, P. J., Parise, S., & Langowitz, N. (2019). Creating an innovative digital project team: Levers to enable digital transformation. *Business Horizons, 62*(6), 717–727. https://doi.org/10.1016/j.bushor.2019.07.005
Gulati, R., & Kletter, D. (2005). Shrinking core, expanding periphery: The relational architecture of high-performing organizations. *California Management Review, 47*(3), 77–104. https://doi.org/10.2307/41166307
Gulati, R., Puranam, P., & Tushman, M. (2012). Meta-organization design: Rethinking design in interorganizational and community contexts. *Strategic Management Journal, 33*(6), 571–586. https://doi.org/10.1002/smj.1975
Gupta, H., Kumar, S., Kusi-Sarpong, S., Jabbour, C. J. C., & Agyemang, M. (2020). Enablers to supply chain performance on the basis of digitization technologies. *Industrial Management & Data Systems, 24*. https://doi.org/10.1108/imds-07-2020-0421
Hanelt, A., Bohnsack, R., Marz, D., & Marante, C. A. (2021). A systematic review of the literature on digital transformation: Insights and implications for strategy and organizational change. *Journal of Management Studies, 58*(5), 39. https://doi.org/10.1111/joms.12639
Hannan, M. T., Burton, M. D., & Baron, J. N. (1996). Inertia and change in the early years: Employment relations in young, high technology firms. *Industrial and Corporate Change, 5*(2), 503–536. https://doi.org/10.1093/icc/5.2.503
Hart, O. (1995). *Firms, contracts, and financial structure*. Oxford: Clarendon press. https://doi.org/10.1093/0198288816.001.0001
Hartley, J. L., & Sawaya, W. J. (2019). Tortoise, not the hare: Digital transformation of supply chain business processes. *Business Horizons, 62*(6), 707–715. https://doi.org/10.1016/j.bushor.2019.07.006
Harzing, A. W., & Alakangas, S. (2016). Google scholar, Scopus and the Web of science: A longitudinal and cross-disciplinary comparison. *Scientometrics, 106*(2), 787–804. https://doi.org/10.1007/s11192-015-1798-9
Helfat, C. E. (1997). Know-how and asset complementarity and dynamic capability accumulation: The case of R&D. *Strategic Management Journal, 18*(5), 339–360. https://doi.org/10.1002/(SICI)1097-0266(199705)18:5<339::AID-SMJ883>3.0.CO;2-7
He, Q., Meadows, M., Angwin, D., Gomes, E., & Child, J. (2020). Strategic alliance research in the era of digital transformation: Perspectives on future research. *British Journal of Management, 31*(3), 589–617. https://doi.org/10.1111/1467-8551.12406
Henfridsson, O., Mathiassen, L., & Svahn, F. (2014). Managing technological change in the digital age: The role of architectural frames. *Journal of Information Technology, 29*(1), 27–43. https://doi.org/10.1057/jit.2013.30
Henriette, E., Feki, M., & Boughzala, I. (2015). The shape of digital transformation: A systematic literature review. In *Paper presented at the MCIS 2015 proceedings*.
Hess, T., Benlian, A., Matt, C., & Wiesböck, F. (2016). Options for formulating a digital transformation strategy. *MIS Quarterly Executive, 15*(2), 123–139, 2-s2.0-85011959099.
Hillman, A. J., Withers, M. C., & Collins, B. J. (2009). Resource dependence theory: A review. *Journal of Management, 35*(6), 1404–1427. https://doi.org/10.1177/0149206309343469
Hinings, B., Gegenhuber, T., & Greenwood, R. (2018). Digital innovation and transformation: An institutional perspective. *Information and Organization, 28*(1), 52–61. https://doi.org/10.1016/j.infoandorg.2018.02.004
Holmström, J., Holweg, M., Lawson, B., Pil, F. K., & Wagner, S. M. (2019). The digitalization of operations and supply chain management: Theoretical and methodological implications. *Journal of Operations Management, 65*(8), 728–734. https://doi.org/10.1002/joom.1073
Horváth, D., & Szabó, R. Z. (2019). Driving forces and barriers of industry 4.0: Do multinational and small and medium-sized companies have equal opportunities? *Technological Forecasting and Social Change, 146*, 119–132. https://doi.org/10.1016/j.techfore.2019.05.021
Ishfaq, R., Davis-Sramek, B., & Gibson, B. (2021). Digital supply chains in omnichannel retail: A conceptual framework. *Journal of Business Logistics, 43*(2), 169–188. https://doi.org/10.1111/jbl.12277
Ivanov, D., Dolgui, A., & Sokolov, B. (2019). The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics. *International Journal of Production Research, 57*(3), 829–846. https://doi.org/10.1080/00207543.2018.1488086
Jacobides, M., Cennamo, C., & Gawer, A. (2018). Towards a theory of ecosystems. *Strategic Management Journal, 39*(8), 2255–2276. https://doi.org/10.1002/smj.2904
Jensen, M. C., & Meckling, W. H. (1976). Theory of firm - managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305–360. https://doi.org/10.1016/0304-405x(76)90026-X
Johnson, D. S., & Bharadwaj, S. (2005). Digitization of selling activity and sales force performance: An empirical investigation. *Journal of the Academy of Marketing Science, 33*(1), 3–18. https://doi.org/10.1177/0092070304266119
Johnston, H. R., & Vitale, M. R. (1988). *Creating competitive advantage with interorganizational information-systems MIS Quarterly, 12*(2), 153–165. https://doi.org/10.2307/248839
Kallinikos, J., Aaltonen, A., & Marton, A. (2013). The ambivalent ontology of digital artifacts. *MIS Quarterly, 37*(2), 357–370. https://doi.org/10.25300/MISQ/2013/37.2.02
Kamalaldin, A., Linde, L., Sjödin, D., & Parida, V. (2020). Transforming provider-customer relationships in digital servitization: A relational view on digitalization. *Industrial Marketing Management, 89*, 306–325. https://doi.org/10.1016/j.indmarman.2020.02.004
Karimi, J., & Walter, Z. (2016). Corporate entrepreneurship, disruptive business model innovation adoption, and its performance: The case of the newspaper industry. *Long Range Planning, 49*(3), 342–360. https://doi.org/10.1016/j.lrp.2015.09.004
Kathan, W., Matzler, K., & Veider, V. (2016). The sharing economy: Your business model's friend or foe? *Business Horizons, 59*(6), 663–672. https://doi.org/10.1016/j.bushor.2016.06.006
Kauffman, R. J., Li, T., & Van Heck, E. (2010). Business network-based value creation in electronic commerce. *International Journal of Electronic Commerce, 15*(1), 113–144. https://doi.org/10.2753/JEC1086-4415150105
Knudsen, D. R. (2020). Elusive boundaries, power relations, and knowledge production: A systematic review of the literature on digitalization in accounting. *International Journal of Accounting Information Systems, 36*, Article 100441. https://doi.org/10.1016/j.accinf.2019.100441
Kogut, B. (2000). The network as knowledge: Generative rules and the emergence of structure. *Strategic Management Journal, 21*(3), 405–425. https://doi.org/10.1002/(sici)1097-0266(200003)21:3<405::Aid-smj103>3.0.Co;2-5
Kogut, B., & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science, 3*(3), 383–397. https://doi.org/10.1287/orsc.3.3.383
Koh, B., Hann, I. H., & Raghunathan, S. (2019). Digitization of music: Consumer adoption amidst piracy, unbundling, and rebundling. *MIS Quarterly, 43*(1), 23–45. https://doi.org/10.25300/misq/2019/14812
Kohli, R., & Melville, N. P. (2019). Digital innovation: A review and synthesis. *Information Systems Journal, 29*(1), 200–223.
Kohtamäki, M., Parida, V., Oghazi, P., Gebauer, H., & Baines, T. (2019). Digital servitization business models in ecosystems: A theory of the firm. *Journal of Business Research, 104*, 380–392. https://doi.org/10.1016/j.jbusres.2019.06.027
Kohtamäki, M., Parida, V., Patel, P. C., & Gebauer, H. (2020). The relationship between digitalization and servitization: The role of servitization in capturing the financial potential of digitalization. *Technological Forecasting and Social Change, 151*, 1–9. https://doi.org/10.1016/j.techfore.2019.119804
Kolloch, M., & Dellermann, D. (2018). Digital innovation in the energy industry: The impact of controversies on the evolution of innovation ecosystems. *Technological Forecasting and Social Change, 136*, 254–264. https://doi.org/10.1016/j.techfore.2017.03.033
Kostova, T., Roth, K., & Dacin, M. T. (2008). Institutional theory in the study of multinational corporations: A critique and new directions. *Academy of Management Review, 33*(4), 994–1006. https://doi.org/10.5465/amr.2008.34422026
Kretschmer, T., & Khashabi, P. (2020). Digital transformation and organization design: An integrated approach. *California Management Review, 62*(4), 86–104. https://doi.org/10.1177/0008125620940296
Kretschmer, T., Leiponen, A., Schilling, M., & Vasudeva, G. (2020). Platform ecosystems as meta-organizations: Implications for platform strategies. *Strategic Management Journal, 43*(3). https://doi.org/10.1002/smj.3250
Kretschmer, T., Leiponen, A., Schilling, M., & Vasudeva, G. (2022). Platform ecosystems as meta-organizations: Implications for platform strategies. *Strategic Management Journal, 43*(3), 405–424. https://doi.org/10.1002/smj.3250
Kumar, M., Tsolakis, N., Agarwal, A., & Srai, J. S. (2020). Developing distributed manufacturing strategies from the perspective of a product-process matrix. *International Journal of Production Economics, 219*(1), 1–17. https://doi.org/10.1016/j.ijpe.2019.05.005
Kunisch, S., Menz, M., & Langan, R. (2020). Chief digital officers: An exploratory analysis of their emergence, nature, and determinants. *Long Range Planning, 55*(2), Article 101999. https://doi.org/10.1016/j.lrp.2020.101999
Kusiak, A. (2018). Smart manufacturing. *International Journal of Production Research, 56*(1–2), 508–517. https://doi.org/10.1080/00207543.2017.1351644
Kusiak, A. (2021). Universal manufacturing: Enablers, properties, and models. *International Journal of Production Research, 60*(8), 2497–2513. https://doi.org/10.1080/00207543.2021.1894370
Langley, D. J., van Doorn, J., Ng, I. C., Stieglitz, S., Lazovik, A., & Boonstra, A. (2021). The Internet of everything: Smart things and their impact on business models. *Journal of Business Research, 122*, 853–863. https://doi.org/10.1016/j.jbusres.2019.12.035
Lansiti, M., & Lakhani, K. R. (2017). The truth about blockchain. *Harvard Business Review, 95*(1), 119–127, 2-s2.0-85018292153.

Lanzolla, G., Pesce, D., & Tucci, C. L. (2021). The digital transformation of search and recombination in the innovation function: Tensions and an integrative framework. *Journal of Product Innovation Management, 38*(1), 90–113. https://doi.org/10.1111/jpim.12546

Lawrence, P. R., & Lorsch, J. W. (1967). Differentiation and integration in complex organizations. *Administrative Science Quarterly, 12*(1), 1–47. https://doi.org/10.2307/2391211

Legner, C., Eymann, T., Hess, T., Matt, C., Böhmann, T., Drews, P., … Ahlemann, F. (2017). Digitalization: Opportunity and challenge for the business and information systems engineering community. *Business and Information Systems Engineering, 59*(4), 301–308. https://doi.org/10.1007/s12599-017-0484-2

Li, F. (2020). Leading digital transformation: Three emerging approaches for managing the transition. *International Journal of Operations & Production Management, 40*(6), 809–817. https://doi.org/10.1108/ijopm-04-2020-0202

Linde, L., Frishammar, J., & Parida, V. (2021). Revenue models for digital servitization: A value capture framework for designing, developing, and scaling digital services. *IEEE Transactions on Engineering Management*. https://doi.org/10.1109/tem.2021.3053386

Loebbecke, C., & Picot, A. (2015). Reflections on societal and business model transformation arising from digitization and big data analytics: A research agenda. *The Journal of Strategic Information Systems, 24*(3), 149–157. https://doi.org/10.1016/j.jsis.2015.08.002

Lumineau, F., Wang, W., & Schilke, O. (2021). Blockchain governance — a new way of organizing collaborations? *Organization Science, 32*(2), 500–521. https://doi.org/10.1287/orsc.2020.1379

Magistretti, S., Dell'Era, C., & Petruzzelli, A. M. (2019). How intelligent is watson? Enabling digital transformation through artificial intelligence. *Business Horizons, 62*(6), 819–829. https://doi.org/10.1016/j.bushor.2019.08.004

Majumder, M., Gupta, S., & Paul, J. (2022). Perceived usefulness of online customer reviews: A review mining approach using machine learning & exploratory data analysis. *Journal of Business Research, 150*, 147–164. https://doi.org/10.1016/j.jbusres.2022.06.012

Mak, H. Y., & Shen, Z. J. (2020). When triple-A supply chains meet digitalization: The case of JD.com's C2M model. *Production and Operations Management, 30*(3), 656–665. https://doi.org/10.1111/poms.13307

Markus, M. L., & Benjamin, R. I. (1997). The magic bullet theory in IT-enabled transformation. *MIT Sloan Management Review, 38*(2), 55–68.

Martín-Martín, A., Orduna-Malea, E., Thelwall, M., & Delgado López-Cózar, E. (2018). Google scholar, Web of science, and Scopus: A systematic comparison of citations in 252 subject categories. *Journal of Informetrics, 12*(4), 1160–1177. https://doi.org/10.1016/j.joi.2018.09.002

Matarazzo, M., Penco, L., Profumo, G., & Quaglia, R. (2021). Digital transformation and customer value creation in made in Italy SMEs: A dynamic capabilities perspective. *Journal of Business Research, 123*, 642–656. https://doi.org/10.1016/j.jbusres.2020.10.033

Mathieu, J., Maynard, T. M., Rapp, T., & Gilson, L. (2008). Team effectiveness 1997-2007: A review of recent advancements and a glimpse into the future. *Journal of Management, 34*(3), 410–476. https://doi.org/10.1177/0149206308316061

McIntyre, D., Srinivasan, A., Afuah, A., Gawer, A., & Kretschmer, T. (2020). Multi-sided platforms as new organizational forms. *Academy of Management Perspectives, 35*(4), 566–583. https://doi.org/10.5465/amp.2018.0018

Menz, M., Kunisch, S., Birkinshaw, J., Collis, D. J., Foss, N. J., Hoskisson, R. E., & Prescott, J. E. (2021). Corporate strategy and the theory of the firm in the digital age. *Journal of Management Studies, 58*(7), 1695–1720. https://doi.org/10.1111/joms.12760

Mishra, A. N., Konana, P., & Barua, A. (2007). Antecedents and consequences of Internet use in procurement: An empirical investigation of US manufacturing firms. *Information Systems Research, 18*(1), 103–120. https://doi.org/10.1287/isre.1070.0115

Monaghan, S., Tippmann, E., & Coviello, N. (2020). Born digitals: Thoughts on their internationalization and a research agenda. *Journal of International Business Studies, 51*(1), 11–22. https://doi.org/10.1057/s41267-019-00290-0

Mongeon, P., & Paul-Hus, A. (2016). The journal coverage of Web of science and Scopus: A comparative analysis. *Scientometrics, 106*(1), 213–228. https://doi.org/10.1007/s11192-015-1765-5

Mosch, P., Schweikl, S., & Obermaier, R. (2021). Trapped in the supply chain? Digital servitization strategies and power relations in the case of an industrial technology supplier. *International Journal of Production Economics, 236*, Article 108141. https://doi.org/10.1016/j.ijpe.2021.108141

Nagaraj, A. (2021). Information seeding and knowledge production in online communities: Evidence from openstreetmap. *Management Science, 67*(8), 4908–4934. https://doi.org/10.1287/mnsc.2020.3764

Nair, A., Yan, T., Ro, Y. K., Oke, A., Chiles, T. H., & Lee, S. Y. (2016). How environmental innovations emerge and proliferate in supply networks: A complex adaptive systems perspective. *Journal of Supply Chain Management, 52*(2), 66–86. https://doi.org/10.1111/jscm.12102

Nambisan, S., & Luo, Y. (2021). Toward a loose coupling view of digital globalization. *Journal of International Business Studies, 52*(8), 1646–1663. https://doi.org/10.1057/s41267-021-00446-x

Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital innovation management: Reinventing innovation management research in a digital world. *MIS Quarterly, 41*(1), 223–238. https://doi.org/10.25300/misq/2017/41:1.03

Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. *Research Policy, 48*(8), Article 103773. https://doi.org/10.1016/j.respol.2019.03.018

Nambisan, S., Zahra, S., & Luo, Y. (2019). Global platforms and ecosystems: Implications for international business theories. *Journal of International Business Studies, 50*(9), 1464–1486. https://doi.org/10.1057/s41267-019-00262-4

Neirotti, P., & Pesce, D. (2019). ICT-Based innovation and its competitive outcome: The role of information intensity. *European Journal of Innovation Management, 22*(2), 383–404. https://doi.org/10.1108/EJIM-02-2018-0039

Neirotti, P., Pesce, D., & Battaglia, D. (2021). Algorithms for operational decision-making: An absorptive capacity perspective on the process of converting data into relevant knowledge. *Technological Forecasting and Social Change, 173*, Article 121088. https://doi.org/10.1016/j.techfore.2021.121088

Nell, P. C., Foss, N. J., Klein, P. G., & Schmitt, J. (2021). Avoiding digitalization traps: Tools for top managers. *Business Horizons, 64*(2), 163–169. https://doi.org/10.1016/j.bushor.2020.11.005

Netland, T. H., & Aspelund, A. (2014). Multi-plant improvement programmes: A literature review and research agenda. *International Journal of Operations & Production Management, 34*(3), 390–418. https://doi.org/10.1108/IJOPM-02-2012-0087

Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science, 5*(1), 14–37. https://doi.org/10.1287/orsc.5.1.14

Nuccio, M., & Guerzoni, M. (2019). Big data: Hell or heaven? Digital platforms and market power in the data-driven economy. *Competition and Change, 23*(3), 312–328. https://doi.org/10.1177/1024529418816525

Oliveira, L., Fleury, A., & Fleury, M. T. (2021). Digital power: Value chain upgrading in an age of digitization. *International Business Review, 30*(6), Article 101850. https://doi.org/10.1016/j.ibusrev.2021.101850

Paiola, M., & Gebauer, H. (2020). Internet of things technologies, digital servitization and business model innovation in BtoB manufacturing firms. *Industrial Marketing Management, 89*, 245–264. https://doi.org/10.1016/j.indmarman.2020.03.009

Park, Y., Pavlou, P. A., & Saraf, N. (2020). Configurations for achieving organizational ambidexterity with digitization. *Information Systems Research, 31*(4), 1376–1397. https://doi.org/10.1287/isre.2020.0950

Paul, J., & Criado, A. R. (2020). The art of writing literature review: What do we know and what do we need to know? *International Business Review, 29*(4), Article 101717. https://doi.org/10.1016/j.ibusrev.2020.101717

Paul, J., Lim, W. M., O'Cass, A., Hao, A. W., & Bresciani, S. (2021). Scientific procedures and rationales for systematic literature reviews (SPAR-4-SLR). *International Journal of Consumer Studies*. https://doi.org/10.1111/ijcs.12695

Pesce, D., Neirotti, P., & Paolucci, E. (2019). When culture meets digital platforms: Value creation and stakeholders' alignment in big data use. *Current Issues in Tourism, 22*(15), 1883–1903. https://doi.org/10.1080/13683500.2019.1591354

Pouri, M. J., & Hilty, L. M. (2021). The digital sharing economy: A confluence of technical and social sharing. *Environmental Innovation and Societal Transitions, 38*, 127–139. https://doi.org/10.1016/j.eist.2020.12.003

Puranam, P., Alexy, O., & Reitzig, M. (2014). What's "new" about new forms of organizing? *Academy of Management Review, 39*(2), 162–180. https://doi.org/10.2139/ssrn.1907542

Quarshie, A. M., Salmi, A., & Leuschner, R. (2016). Sustainability and corporate social responsibility in supply chains: The state of research in supply chain management and business ethics journals. *Journal of Purchasing and Supply Management, 22*(2), 82–97. https://doi.org/10.1016/j.pursup.2015.11.001

Quinton, S., Canhoto, A., Molinillo, S., Pera, R., & Budhathoki, T. (2018). Conceptualising a digital orientation: Antecedents of supporting SME performance in the digital economy. *Journal of Strategic Marketing, 26*(5), 427–439. https://doi.org/10.1080/0965254X.2016.1258004

Rahmati, P., Tafti, A., Westland, J. C., & Hidalgo, C. (2021). When all products are digital: Complexity and intangible value in the ecosystem of digitizing firms. *MIS Quarterly, 45*(3), 1025–1058. https://doi.org/10.25300/MISQ/2021/15384

Reis, J., Amorim, M., Melão, N., & Matos, P. (2018). Digital transformation: A literature review and guidelines for future research. In *Advances in intelligent systems and computing* (Vol. 745, pp. 411–421).

Ricci, F., Scafarto, V., Ferri, S., & Tron, A. (2020). Value relevance of digitalization: The moderating role of corporate sustainability. An empirical study of Italian listed companies. *Journal of Cleaner Production, 276*, 8. https://doi.org/10.1016/j.jclepro.2020.123282

Rietveld, J., Ploog, J. N., & Nieborg, D. B. (2020). Coevolution of platform dominance and governance strategies: Effects on complementor performance outcomes. *Academy of Management Discoveries, 6*(3), 488–513. https://doi.org/10.5465/amd.2019.0064

Robey, D. (1981). Computer information systems and organization structure. *Communications of the ACM, 24*(10), 679–687. https://doi.org/10.1145/358769.358786

Rodriguez-Lluesma, C., García-Ruiz, P., & Pinto-Garay, J. (2021). The digital transformation of work: A relational view. *Business Ethics, 30*(1), 157–167. https://doi.org/10.1111/beer.12323

Rossi, M., Festa, G., Devalle, A., & Mueller, J. (2020). When corporations get disruptive, the disruptive get corporate: Financing disruptive technologies through corporate venture capital. *Journal of Business Research, 118*, 378–388. https://doi.org/10.1016/j.jbusres.2020.07.004

Rossini, M., Cifone, F. D., Kassem, B., Costa, F., & Portioli-Staudacher, A. (2021). Being lean: How to shape digital transformation in the manufacturing sector. *Journal of Manufacturing Technology Management, 32*(9), 239–259. https://doi.org/10.1108/jmtm-12-2020-0467

Rothmann, W., & Koch, J. (2014). Creativity in strategic lock-ins: The newspaper industry and the digital revolution. *Technological Forecasting and Social Change, 83*(1), 66–83. https://doi.org/10.1016/j.techfore.2013.03.005

Rumelt, R., Schendel, D., & Teece, D. J. (1994). *Fundamental issues in strategy, a research agenda*. Boston, MA: Harvard Business School Press.
Saarikko, T., Westergren, U. H., & Blomquist, T. (2020). Digital transformation: Five recommendations for the digitally conscious firm. *Business Horizons, 63*(6), 825–839. https://doi.org/10.1016/j.bushor.2020.07.005
Sadowski, J. (2020). The Internet of landlords: Digital platforms and new mechanisms of rentier capitalism. *Antipode, 52*(2), 562–580. https://doi.org/10.1111/anti.12595
Salvi, A., Vitolla, F., Rubino, M., Giakoumelou, A., & Raimo, N. (2021). Online information on digitalisation processes and its impact on firm value. *Journal of Business Research, 124*, 437–444. https://doi.org/10.1016/j.bushor.2020.07.005
Santos, F. M., & Eisenhardt, K. M. (2005). Organizational boundaries and theories of organization. *Organization Science, 16*(5), 491–508. https://doi.org/10.1287/orsc.1050.0152
Sarkis, J., Kouhizadeh, M., & Zhu, Q. S. (2021). Digitalization and the greening of supply chains. *Industrial Management and Data Systems, 121*(1), 65–85. https://doi.org/10.1108/IMDS-08-2020-0450
Schallmo, D., Williams, C. A., & Boardman, L. (2017). Digital transformation of business models-best practice, enablers, and roadmap. *International Journal of Innovation Management, 21*(8), 1–17. https://doi.org/10.1142/S136391961740014X
Schneider, P. (2018). Managerial challenges of industry 4.0: An empirically backed research agenda for a nascent field. *Review of Managerial Science, 12*(3), 803–848. https://doi.org/10.1007/s11846-018-0283-2
Schorsch, T., Wallenburg, C. M., & Wieland, A. (2017). The human factor in SCM: Introducing a meta-theory of behavioral supply chain management. *International Journal of Physical Distribution & Logistics Management, 47*(4), 238–262. https://doi.org/10.1108/IJPDLM-10-2015-0268
Schwalbe, U. (2018). Algorithms, machine learning, and collusion. *Journal of Competition Law and Economics, 14*(4), 568–607. https://doi.org/10.1093/joclec/nhz004
Schwanholz, J., & Leipold, S. (2020). Sharing for a circular economy? An analysis of digital sharing platforms' principles and business models. *Journal of Cleaner Production, 269*, Article 122327. https://doi.org/10.1016/j.jclepro.2020.122327
Seran, T., & Bez, S. M. (2021). Open innovation's "multiunit back-end problem": How corporations can overcome business unit rivalry. *California Management Review, 63*(2), 135–157. https://doi.org/10.1177/0008125620968609
Seyedghorban, Z., Samson, D., & Tahernejad, H. (2020). Digitalization opportunities for the procurement function: Pathways to maturity. *International Journal of Operations & Production Management, 40*(11), 1685–1693. https://doi.org/10.1108/ijopm-04-2020-0214
Seyedghorban, Z., Tahernejad, H., Meriton, R., & Graham, G. (2020). Supply chain digitalization: Past, present and future. *Production Planning & Control, 3*(2–3), 96–114. https://doi.org/10.1080/09537287.2019.1631461
Siachou, E., Vrontis, D., & Trichina, E. (2021). Can traditional organizations be digitally transformed by themselves? The moderating role of absorptive capacity and strategic interdependence. *Journal of Business Research, 124*, 408–421. https://doi.org/10.1016/j.jbusres.2020.11.011
Siggelkow, N. (2002). Evolution toward fit. *Administrative Science Quarterly, 47*(1), 125–159. https://doi.org/10.2307/3094893
Sjödin, D., Parida, V., Kohtamäki, M., & Wincent, J. (2020). An agile co-creation process for digital servitization: A micro-service innovation approach. *Journal of Business Research, 112*, 478–491. https://doi.org/10.1016/j.jbusres.2020.01.009
Sjödin, D., Parida, V., Leksell, M., & Petrovic, A. (2018). Smart factory implementation and process innovation a preliminary maturity model for leveraging digitalization in manufacturing. *Research-Technology Management, 61*(5), 22–31. https://doi.org/10.1080/08956308.2018.1471277
Sklyar, A., Kowalkowski, C., Tronvoll, B., & Sorhammar, D. (2019). Organizing for digital servitization: A service ecosystem perspective. *Journal of Business Research, 104*, 450–460. https://doi.org/10.1016/j.jbusres.2019.02.012
Smith, P., & Beretta, M. (2021). The gordian knot of practicing digital transformation: Coping with emergent paradoxes in ambidextrous organizing structures. *Journal of Product Innovation Management, 38*(1), 166–191. https://doi.org/10.1111/jpim.12548
Sommarberg, M., & Mäkinen, S. J. (2019). A method for anticipating the disruptive nature of digitalization in the machine-building industry. *Technological Forecasting and Social Change, 146*, 808–819. https://doi.org/10.1016/j.techfore.2018.07.044
Son, B., Kim, H., Hur, D., & Subramanian, N. (2021). The dark side of supply chain digitalisation: Supplier-perceived digital capability asymmetry, buyer opportunism and governance. *International Journal of Operations & Production Management, 41*(7), 1220–1247. https://doi.org/10.1108/ijopm-10-2020-0711
Srai, J. S., Graham, G., Hennelly, P., Phillips, W., Kapletia, D., & Lorentz, H. (2020). Distributed manufacturing: A new form of localised production? *International Journal of Operations & Production Management, 40*(6), 697–727. https://doi.org/10.1108/ijopm-08-2019-0600
Srai, J. S., Kumar, M., Graham, G., Phillips, W., Tooze, J., Ford, S., … Tiwari, A. (2016). Distributed manufacturing: Scope, challenges and opportunities. *International Journal of Production Research, 54*(23), 6917–6935. https://doi.org/10.1080/00207543.2016.1192302
Struyf, B., Galvani, S., Matthyssens, P., & Bocconcelli, R. (2021). Toward a multilevel perspective on digital servitization. *International Journal of Operations & Production Management, 41*(5), 668–693. https://doi.org/10.1108/ijopm-08-2020-0538
Subramaniam, M., Iyer, B., & Venkatraman, V. (2019). Competing in digital ecosystems. *Business Horizons, 62*(1), 83–94. https://doi.org/10.1016/j.bushor.2018.08.013
Szalavetz, A. (2019). Industry 4.0 and capability development in manufacturing subsidiaries. *Technological Forecasting and Social Change, 145*, 384–395. https://doi.org/10.1016/j.techfore.2018.06.027
Taylor, A. (2017). Social work and digitalisation: Bridging the knowledge gaps. *Social Work Education, 36*(8), 869–879. https://doi.org/10.1080/02615479.2017.1361924
Tortorella, G. L., Cawley Vergara, A. M., Garza-Reyes, J. A., & Sawhney, R. (2020). Organizational learning paths based upon industry 4.0 adoption: An empirical study with Brazilian manufacturers. *International Journal of Production Economics, 219*, 284–294. https://doi.org/10.1016/j.ijpe.2019.06.023
Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management, 14*(3), 207–222. https://doi.org/10.1111/1467-8551.00375
Trantopoulos, K., Von Krogh, G., Wallin, M., & Woerter, M. (2017). External knowledge and information technology: Implications for process innovation performance. *MIS Quarterly, 41*(1), 287–300. https://doi.org/10.25300/MISQ/2017/41.1.15
Tronvoll, B., Sklyar, A., Sörhammar, D., & Kowalkowski, C. (2020). Transformational shifts through digital servitization. *Industrial Marketing Management, 89*, 293–305. https://doi.org/10.1016/j.indmarman.2020.02.005
Tumbas, S., Berente, N., & vom Brocke, J. (2018). Digital innovation and institutional entrepreneurship: Chief Digital Officer perspectives of their emerging role. *Journal of Information Technology, 33*(3), 188–202. https://doi.org/10.1057/s41265-018-0055-0
Van Alstyne, M., & Parker, G. (2021). Digital transformation changes how companies create value. *Harvard Business Review*.
Vanneste, B. S., Puranam, P., & Kretschmer, T. (2014). Trust over time in exchange relationships: meta-analysis and theory. *Strategic Management Journal, 35*(12), 1891–1902. https://doi.org/10.1002/smj.2198
Vendrell-Herrero, F., Bustinza, O. F., Parry, G., & Georgantzis, N. (2017). Servitization, digitization and supply chain interdependency. *Industrial Marketing Management, 60*(1), 69–81. https://doi.org/10.1016/j.indmarman.2016.06.013
Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Qi Dong, J., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research, 122*, 889–901. https://doi.org/10.1016/j.jbusres.2019.09.022
Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems, 28*(2), 118–144. https://doi.org/10.1016/j.jsis.2019.01.003
Volberda, H. W., Khanagha, S., Baden-Fuller, C., Mihalache, O. R., & Birkinshaw, J. (2021). Strategizing in a digital world: Overcoming cognitive barriers, reconfiguring routines and introducing new organizational forms. *Long Range Planning, 54*(5). https://doi.org/10.1016/j.lrp.2021.102110
Warner, K. S. R., & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning, 52*(3), 326–349. https://doi.org/10.1016/j.lrp.2018.12.001
Weking, J., Stöcker, M., Kowalkiewicz, M., Böhm, M., & Krcmar, H. (2020). Leveraging industry 4.0 – a business model pattern framework. *International Journal of Production Economics, 225*(1), Article 107588. https://doi.org/10.1016/j.ijpe.2019.107588
Westerman, G., & Bonnet, D. (2015). Revamping your business through digital transformation. *MIT Sloan Management Review, 56*(3), 2–5, 2-s2.0-84944050361.
Westerman, G., Soule, D. L., & Eswaran, A. (2019). Building digital-ready culture in traditional organizations. *MIT Sloan Management Review, 60*(4), 59–68, 2-s2.0-85071361103.
Wieland, A., Handfield, R. B., & Durach, C. F. (2016). Mapping the landscape of future research themes in supply chain management. *Journal of Business Logistics, 37*(3), 205–212. https://doi.org/10.1111/jbl.12131
Wiesbock, F., & Hess, T. (2019). Digital innovations: Embedding in organizations. *Electronic Markets, 30*(1), 75–86. https://doi.org/10.1007/s12525-019-00364-9
Williamson, O. E. (1975). *Markets and hierarchies*. New York: Prentice-Hall.
Williamson, O. E. (1981). The economics of organization: The transaction cost approach. *American Journal of Sociology, 87*(3), 548–577. https://doi.org/10.1086/227496
Wu, L., Lou, B., & Hitt, L. (2019). Data analytics supports decentralized innovation. *Management Science, 65*(10), 4863–4877. https://doi.org/10.1287/mnsc.2019.3344
Xue, L., Zhang, C., Ling, H., & Zhao, X. (2013). Risk mitigation in supply chain digitization: System modularity and information technology governance. *Journal of Management Information Systems, 30*(1), 325–352. https://doi.org/10.2753/MIS0742-1222300110
Yoo, Y. (2010). Computing in everyday life: A call for research on experiential computing. *MIS Quarterly, 34*(2), 213–231. https://doi.org/10.2307/20721425
Yoo, Y., Boland, R. J., Lyytinen, K., & Majchrzak, A. (2012). Organizing for innovation in the digitized world. *Organization Science, 23*(5), 1398–1408. https://doi.org/10.1287/orsc.1120.0771
Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). The new organizing logic of digital innovation: An agenda for information systems research. *Information Systems Research, 21*(4), 724–735. https://doi.org/10.1287/isre.1100.0322
Zack, M. H. (2003). Rethinking the knowledge-based organization. *MIT Sloan Management Review, 44*(4), 67–71, 2-s2.0-2642511740.
Zhao, K., Zuo, Z., & Blackhurst, J. V. (2019). Modelling supply chain adaptation for disruptions: An empirically grounded complex adaptive systems approach. *Journal of Operations Management, 65*(2), 190–212. https://doi.org/10.1002/joom.1009
Zhou, D., Kautonen, M., Dai, W., & Zhang, H. (2021). Exploring how digitalization influences incumbents in financial services: The role of entrepreneurial orientation, firm assets, and organizational legitimacy. *Technological Forecasting and Social Change, 173*, Article 121120. https://doi.org/10.1016/j.techfore.2021.121120

Zhu, X., Ge, S., & Wang, N. (2021). Digital transformation: A systematic literature review. *Computers & Industrial Engineering, 162*. https://doi.org/10.1016/j.cie.2021.107774

Zhu, J., Zhang, Z., Lee, A., & Hua, Y. (2020). Measurement and analysis of corporate operating vitality in the age of digital business models. *Applied Economics Letters, 27* (7), 511–517. https://doi.org/10.1080/13504851.2019.1637511

Ziaie, A., Shamizanjani, M., & Manian, A. (2021). Systematic review of digital value propositions in the retail sector: New approach for digital experience study. *Electronic Commerce Research and Applications, 47*, Article 101053. https://doi.org/10.1016/j.elerap.2021.101053