Digital strategy patterns in information systems research

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Abstract

Organizations use digital strategy to take advantage of their existing strengths and capabilities. Digital strategy has a wide range of scope and operates in a highly dynamic context in which the organization operates. There is increasing attention to digital strategy in academic research while questions surrounding digital strategy arise, such as issues related to differences between digital strategy and information technology (IT)/information systems (IS) strategy or aspects of digital strategy. In this paper, we conduct a systematic literature review in the basket of eight senior IS journals and the proceedings of the International Conference on Information Systems (ICIS) conference, aiming at understanding insights into digital strategy and its related issues. The findings indicate several aspects of digital strategy concerning environments, challenges, approaches, stakeholders, and capabilities. We also provide insights into the relations among these aspects, as well as the distinction between digital and IT/IS strategy.

Keywords: Digital strategy, digital business strategy, digital transformation strategy, systematic literature review

Introduction

We are living in a digital world. This results in rapidly digitalizing, creating new opportunities while disrupting traditional successful business models. It is predicted that 40% of today's Fortune 500 companies on the S&P 500 will wipe out by 2025 due to technological changes (Nanterme 2016; Vayghan 2018). It urges organizations to adopt new strategies based on digital technologies (e.g., cloud, mobile, analytics, and social media) to digitalize and transform business models and provide new revenue and value-producing opportunities (Ross et al. 2016). Such new strategies are frequently referred to as digital strategy. However, the digital strategy term is ambiguous and incongruent among academia, practitioners, and consultants (Bharadwaj et al. 2013; Stockhinger and Teubner 2018). For example, a digital strategy means "as a business strategy, inspired by the capabilities of powerful, readily accessible technologies, intent on delivering unique, integrated business capabilities in ways that are responsive to constantly changing market conditions." (Ross et al. 2016, p.3), or it is defined as "simply that of organizational strategy formulated and executed by leveraging digital resources to create differential value." (Bharadwaj et al. 2013, p.473). In this paper, we view digital strategy to mean a business strategy, inspired by digital technologies, digital capabilities, and digital resources, to provide revenue and value-producing opportunities.

Scholars, practitioners, and consultants use different terms to indicate digital strategy, such as digital strategy (c.f., Ross et al. 2016; Seo 2017; Stockhinger and Teubner 2018), digital business strategy (c.f.,

Bharadwaj et al. 2013; Oestreicher-Singer and Zalmanson 2013; Woodard et al. 2013), or digital transformation strategy (c.f., Chanias et al. 2018; Hess et al. 2016; Singh and Hess 2017). Moreover, several terms are also used that are related to digital strategy. They include, for instance, digital infrastructures (c.f., Bogusz and Morisse 2018; Tilson et al. 2010), digital transformation (c.f., Li et al. 2017; Onay et al. 2018), digital options (c.f., Sambamurthy et al. 2003; Sandberg et al. 2014), and digital innovation (c.f., Fichman et al. 2014; Nambisan et al. 2017; Tumbas et al. 2018). This raises several issues regarding digital strategy. For example, what different between digital strategy and traditional IT/IS strategy is (c.f., Baiyere et al. 2017), or is that digital strategy as a functional-level strategy or to one that reflects a fusion between IT strategy and business strategy (c.f., Bharadwaj et al. 2013).

Although there are studies that touch those issues or the concept of digital strategy (Bharadwaj et al. 2013; Kahre et al. 2017; Stockhinger and Teubner 2018), there is a need to study on the contents of digital strategies, as well as the position of this term compared to other established traditional IS terms (Baiyere et al. 2017; Stockhinger and Teubner 2018). Examining this matter will help us understand insights into digital strategy and its related issues (Sebastian et al. 2018; Weill and Woerner 2015). As a result, this study focuses on digital strategy in IS research. Our research questions are: What are differences between digital strategy and IT/IS strategy and what are the aspects of digital strategy in IS research?

We aim at illustrating the current state of digital strategy research within the leading senior basket of eights IS journals (e.g., MISQ, ISR, JMIS, JSIS, ISJ, EJIS, JAIS, JIT) and the leading IS conference (e.g., ICIS). We chose those outlets because they are globally recognized as reputable with significant contributions to the IS field. We retrieved 42 papers discussing digital strategy in IS research. We focus only on research and empirical papers. In other words, we eliminated other types of papers, such as we did not select opinion papers, commentary papers or editorial papers, as well as literature review papers regarding digital strategy.

Our contribution is providing insights into the emerging concept of digital strategy and its aspects, as well as gaps related to digital strategy research. For example, we provide the insights into debates related to IS strategy and digital strategy, challenges when implementing digital strategy into organizations, digital strategy environments, approaches to design digital strategy, stakeholders who involve in the processes of implementing strategy, and conditions under which a digital strategy can contribute to achieving strategic advantages and transforms into market performance.

The paper is organized as follows; we next illustrate the background and methods sections. This is followed by the findings chapter; the paper ends with discussion and conclusion sections.

Background

There are several well-established research streams or theoretical concepts in the traditional IS research that related to digital strategy, such as IS strategy, IS infrastructure, IS capability, and IS innovation (Besson and Rowe 2012; Iivari et al. 2018; Moeini et al. 2019; Rojas et al. 2016; Steininger 2018). However, it is growing trends of using "digital" term before the traditional one in IS community, including, for instance, digital strategy, digital infrastructure, digital capability, and digital innovation (Drnevich and Croson 2013; Setia et al. 2013; Tumbas et al. 2018; Whelan et al. 2013). While we recognize that digital strategy is changing ways of doing things that it never happened before (Sebastian et al. 2018; Weill and Woerner 2015), several questions arise, such as what different or unique between established terms and the emerging terms are or what aspects we should consider when studying the emerging term and its contents. In this paper, we will focus particularly on aspects of the digital strategy in the IS literature to understand the term, its contents and social-technical phenomena surrounding the organizations that implement digital strategy.

There is no universal agreement on the definition of digital strategy, and in fact, literature has used different terms to indicate digital strategy (c.f., Bharadwaj et al. 2013; Chanias et al. 2018; Hess et al. 2016; Ross et al. 2016). Furthermore, it seems that there are three terms can be used interchangeable to indicate digital strategy phenomenon, that is digital strategy (c.f., Ross et al. 2016; Seo 2017; Stockhinger and Teubner 2018), digital business strategy (c.f., Bharadwaj et al. 2013; Oestreicher-Singer and Zalmanson 2013; Woodard et al. 2013), and digital transformation strategy (c.f., Chanias et

al. 2018; Singh and Hess 2017). Here are two examples of definitions. Ross et al. (2016, p.3) defined a digital strategy as "a business strategy, inspired by the capabilities of powerful, readily accessible technologies, intent on delivering unique, integrated business capabilities in ways that are responsive to constantly changing market conditions.", while Bharadwaj et al. (2013, p.473) indicated digital business strategy is "simply that of organizational strategy formulated and executed by leveraging digital resources to create differential value." We try to understand digital strategy and its aspects that are discussed in the major IS literature outlets.

Methods

We conducted a systematic literature review (Webster and Watson 2002), to identify aspects of digital strategy and generate insights into the meaning of those aspects. We also considered several techniques when conducting the literature reviews to increase trustworthiness of reviews, minimize errors and biases, as well as ensure reliability (c.f., Paré et al. 2015; Templier and Paré 2018; Webster and Watson 2002). The review process consists of six main steps, including developing a review plan, searching the literature, selecting studies, assessing the quality of included studies, extracting key aspects from included studies, and analyzing data, and formulating conclusions (Paré et al. 2016). The paper aims at providing an analysis of the field rather than providing a descriptive overview (Paré et al. 2016).

Developing a review plan, searching the literature, selecting studies

Searching the literature (a) focuses on the digital strategy with empirical and research papers, and (b) has specifically stated the term "digital * strateg*", "digital transformation", "digitalization", digital transformation, "digital disruption" in the title, abstract, keywords, and/or the body of the paper.

We searched the paper by focusing on the AIS "basket of eight" IS journals, including Management Information Systems Quarterly (MISQ), Information Systems Research (ISR), European Journal of Information Systems (EJIS), Information Systems Journal (ISJ), Journal of Association for Information Systems (JAIS), Journal of Information Technology (JIT), Journal of Management Information Systems (JMIS), and Journal of Strategic Information Systems(JSIS). Those outlets are recognized as top journals in the IS field. Furthermore, we also conducted searching on the proceedings of the International Conference on Information Systems (ICIS), ICIS is considered as a leading IS conference. It is noted that we only considered papers presented from 2016-2019 for the proceedings of the ICIS as we assume that earlier papers would have appeared in journal outlets.

Three main databases or sources were considered for searching the papers. They include Web of Science, AIS Electronic Library (AIS e-Lib), and the Journals' website or portal. In particular, "Topic" was used for Web of Science, "Title", "Abstract", and "Subject" for AIS e-Lib and the Journals' website or portal. We also acknowledged that there are papers that have not indicated the term in its topic, title, abstract. However, it appeared in the content of the papers themselves or in other terms. As a result, we added additional keywords in order to increase the possibility of the papers covering the relevant topic. Here are examples of those terms: "digital transformation", "digitalization", and "digital disruption". The details can be seen on the Appendix.

The selection process as follows: we first read and assessed the papers based on their title, abstract, and keywords. To minimize biases, we did two rounds of assessment at every paper; we also paid attention to the papers that fit with our research aims and the papers that we eliminated. During this process, some papers were difficult to categorize (either elimination or not). For this situation, we re-assessed the papers by reading the whole text to make sure the right decisions. As a result, we found 1631 papers in totals for the first round. We had 100 papers on the second round, those papers that focus on digital strategy and its relevant issues. We then eliminated the papers that only focused on the concepts, or commentaries or opinions. After this round, we selected 42 papers for the study. Those are 35 papers from the AIS basket of eight journals and 7 papers from the ICIS conference. The process of choosing studied papers is summarized in Figure 1.
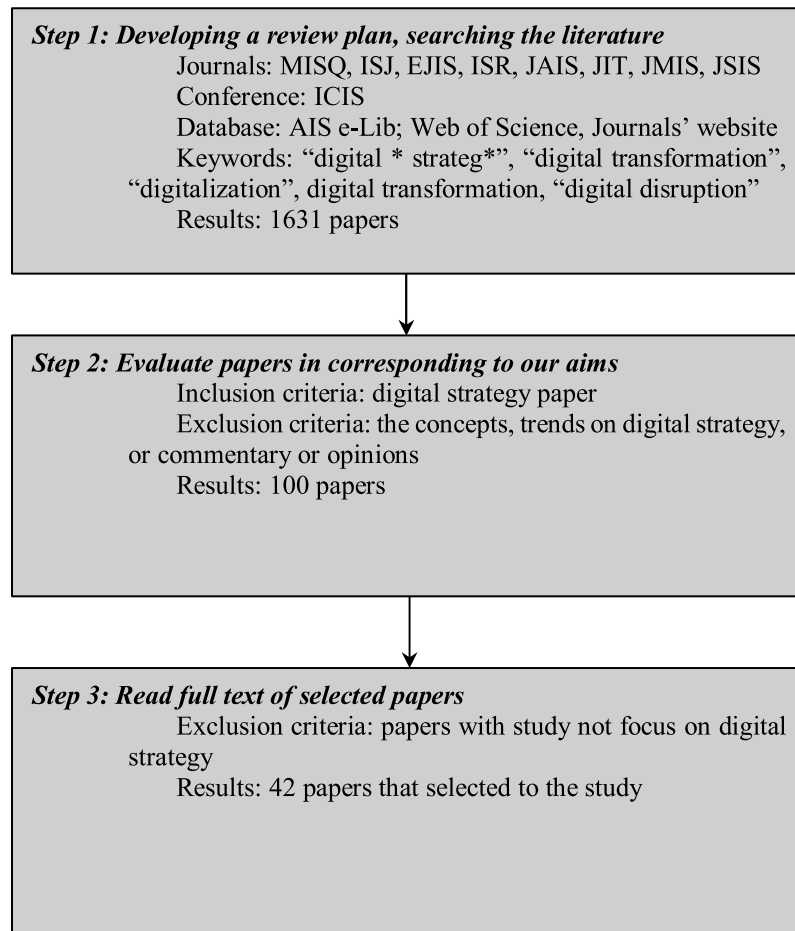
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┌─────────────────────────────────────────────────────────┐
│ Step 1: Developing a review plan, searching the literature │
│           Journals: MISQ, ISJ, EJIS, ISR, JAIS, JIT, JMIS, JSIS │
│           Conference: ICIS                                 │
│           Database: AIS e-Lib; Web of Science, Journals' website │
│           Keywords: "digital * strateg*", "digital transformation", │
│     "digitalization", digital transformation, "digital disruption" │
│           Results: 1631 papers                             │
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│ Step 2: Evaluate papers in corresponding to our aims      │
│           Inclusion criteria: digital strategy paper       │
│           Exclusion criteria: the concepts, trends on digital strategy, │
│     or commentary or opinions                              │
│           Results: 100 papers                              │
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│ Step 3: Read full text of selected papers                 │
│           Exclusion criteria: papers with study not focus on digital │
│     strategy                                               │
│           Results: 42 papers that selected to the study    │
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Figure 1. Process of choosing studies papers

Assessing, extracting, analyzing, and formulating conclusions

We went through several iterative processes of coding (e.g., open and selective coding), analyzing and identifying aspects of digital strategy, as well as collecting evidence and concerns in the selected papers (Paré et al. 2015; Templier and Paré 2018; Webster and Watson 2002). Those tasks were done in order to meet our aims of providing insights into the emerging concept of digital strategy and its relevant contents.

Our analysis was guided by a review framework (see the Appendix). The framework was formed by five main issues, including (a) core idea of the paper; (b) conceptualization of the terms; (c) methods that the author(s) has been used; (d) theory(s) is used or developed and (e) the future research or suggestions. We organized all codes that emerged during the iterative process of coding throughout 42 papers, all contents or issues that related to the research aims were coded and recorded, such as definitions or views of the term, differences between IT/IS strategy and digital strategy. Moreover, codes were categorized into categories and marked with appropriate labels; during this process we refined the codes when necessary. Finally, those categories were grouped into broader aspects or categories, which illustrates in the finding sections.

Findings

Digital strategy and IT/IS strategy

There is increasing interest in using 'digital' terms before established concepts in the IS field (Baiyere et al. 2017). Those terms include digital infrastructures (c.f., Bogusz and Morisse 2018; Tilson et al. 2010), digital transformation (c.f., Li et al. 2017; Onay et al. 2018), digital options (c.f., Sambamurthy et al. 2003; Sandberg et al. 2014), and digital innovation (c.f., Fichman et al. 2014; Nambisan et al. 2017; Tumbas et al. 2018), just to name a few. While we are acknowledged that digital strategy provides organizations game-changing opportunities for companies doing business (Ross et al. 2017; Sebastian et al. 2018), it seems that it is not clearly what is difference between those terms and well-established IS concepts, such as the differences between a digital strategy and an IT/IS strategy in term of research and practice. As a result, there is a call for looking into conceptual clarity of digital strategy (Baiyere et al. 2017; Tilson et al. 2010). This section responds to this call.

There is a dominant view that IT strategy as functional-level strategies that align and subordinate to business strategy. In this view, business strategy directed IT strategy and IT strategy has been positioned at a functional-level strategy and IT strategy must be aligned with organization's chosen business strategy (Bharadwaj et al. 2013; Henderson and Venkatraman 1993; Venkatraman 1994). This view is represented in many studies, such as IT outsourcing, IT business values, and business process (Bharadwaj et al. 2013; Chan and Reich 2007; Moeini et al. 2019).

Digital technologies provide groundbreaking opportunities to organizations the ability to reposition value propositions. Those digital technologies include, for example, social, mobile, analytics, cloud and Internet of things [IoT] technologies (Ross et al. 2017; Sebastian et al. 2018). Digital technologies are fundamentally reshaping established companies by providing tools for them to enrich products, services and customer relationships (Sebastian et al. 2018; Susarla et al. 2012). It also helps born digital companies, such as Facebook and Google have become a key player in the world (Sebastian et al. 2018). Moreover, digital technologies also create turbulent environments surrounding companies that never happened before, and also it provides an ability for companies to move beyond companies' traditional industry boundaries, create cross-boundary industry changes and disruptions (Pavlou and Sawy 2006; Sebastian et al. 2018; Seo 2017; Singh and Hess 2017).

Consequently, many scholars view that the role of IT strategy should move from a functional-level strategy to a fusion between IT strategy and business strategy. For example, Bharadwaj et al. (2013) coined "digital business strategy" to mean "organizational strategy". In this view, the authors do not separate IT and business strategy as in a traditional IS strategy research. Similar vein, Chanias et al. (2018) used the term "digital strategy" to encompass a fusion view of IS and business strategy, in which there is no clear distinction between business strategy and IS strategy (Chanias et al. 2018).

As seen, there are certain characteristics that distinguish IS strategy and digital strategy. *First*, it seems that digital strategy has more organizational-wide ranging scopes for all levels of an organization compared to traditional IS strategy (Chanias et al. 2018; Mithas et al. 2013). *Second*, all stakeholders are involved in the business strategy with distinct governance structures in comparison to the IS strategy (Bharadwaj et al. 2013; Chen et al. 2010). *Finally*, IS strategy seems to focus on technology-oriented, while digital strategy is business- and customer-oriented (Chanias et al. 2018; Sebastian et al. 2018). It can be argued that a digital strategy does not necessarily replace any other strategies, but it is necessary to align with others (Chen et al. 2010; Drnevich and Croson 2013).

Digital strategy aspects

The following aspects of digital strategy were retrieved from selected papers. These aspects were identified following the coding process that described in the methods section.

Digital strategy environment

Digital strategy is influenced or triggered under pressures of organizational environments (external and internal environment). There are three key industrial environments (external environment) that likely

drive or influence digital strategy, that is, industry turbulence, industry competition, and industry growth (Mithas et al. 2013; Pavlou and Sawy 2006; Wade and Hulland 2004). Industry turbulence refers to atmospheric instability, industry competition refers to a rival against another, and industry growth refers to the opportunities for growth (Melville et al. 2007; Mithas et al. 2013; Pavlou and Sawy 2006; Wade and Hulland 2004). Other factors associated with external environment issues include regulatory changes, external digital trends, and could impact strategy in organizations (Bharadwaj et al. 2013).

There are two forms of internal environment that seems influence to digital strategy in organizations, that is general IT investment (e.g., how much a firm invests in IT), and IT outsourcing investment (e.g., what percentage of its IT budget it spends on outsourced services) (Mithas et al. 2013). In addition, organizational shifts, such as limitations of traditional business models, and the trans-functional role for IT can also drive digital strategy (Bharadwaj et al. 2013).

Digital strategy challenges

Organizations face challenges when they consider pursuing or proposing an appropriate digital strategy in order to take advantage of both their existing strengths and the capabilities offered by digital technologies (Ross et al. 2017; Sebastian et al. 2018; Weill and Woerner 2015). This is because the uncertainty of digital technologies makes radical and disruptive changes in organizations at multiple levels and services, as well as create a highly dynamic context of both business and IT perspectives (Berghaus and Back 2017). Literature indicates that misalignments is one of the most challenges in digital strategy (Chan et al. 2019; Yeow et al. 2018). The alignment issue is challenging because organizations operate in the dynamic environments in the context of digital strategy and digital strategies involve in multi-levels and functions of organizations that require a large scale of changes across organizations (Bharadwaj et al. 2013; Peppard et al. 2014; Yeow et al. 2018). The second challenge is dealing with paradoxes issues, such as efficiency versus innovation (i.e., portfolio), standardization versus differentiation (i.e., platform), integration versus replacement (i.e., architecture), program agility versus project stability (i.e., planning), program control versus project autonomy (i.e., governance), and program delivery versus project isolation (i.e., delivery) (Gregory et al. 2010).

Similar vein, established firms or organizations face several concerns when they implement digital strategy, such as capability (e.g., existing versus requisite), focus (e.g., product versus process), collaboration (e.g., internal versus external), and governance (e.g., control versus flexibility)—and these concerns are systemically interrelated (Svahn et al. 2017). These concerns should be taken into consideration if organizations intend to enhance digital strategy. To deal with challenges in digital strategy, several approaches can be used. For example, misalignment issues can be solved by using dynamic capability approaches (Yeow et al. 2018), as this approach can help organizations quickly changing their resources to respond to and adapt with environmental turbulence (Eisenhardt and Martin 2000; Stefano et al. 2014; Yeow et al. 2018). Furthermore, ambidextrous strategizing can be used for dealing with paradoxes issues, such as portfolio decisions, platform design, and architecture change (Chan et al. 2019; Gregory et al. 2010).

Digital strategy approaches

There are several approaches to design a digital strategy. Ross et al. (2016) indicated three key elements that established a successful digital strategy, including clearly defining value propositions that the organization will pursue, an operational backbone that provides capabilities for operational excellence, and a digital services backbone that facilitates rapid innovation and responsiveness to new market opportunities.

Berghaus and Back (2017) proposed several approaches to design a digital strategy. They include bottom-up approach (e.g., starting with scattered initiatives in various business units), IT-centered approach (e.g., the first place as a technology-focused project), innovation-centered approach (e.g., developing innovative solutions and pushing forward industry standards), channel-centered approach (e.g., building and improving their digital channels as first key activity of their digital strategy), and centralized approach (e.g., a holistic approach to digital strategy). Moreover, Chanias et al. (2018) argued that formulation and implementation of a digital strategy has become a key concern for many

established companies. The authors found that the process of strategy making is highly dynamic and involving iterating between learning and doing (Chanias et al. 2018). Moreover, design of digital artifacts should also consider capital and design moves (Woodard et al. 2013).

To design a successful digital strategy, organizations should also consider using different types of mobilizabilities, which refers to "organizations' ability to actively organize or influence other organizations on the emergence and evolution of fields and the field orders and rules in a field" (Seo 2017, p.688). They include political, social, and technological mobilizabilities to take advantages against others (Seo 2017). Political mobilizability refers to policies that organizations can use to take advantages, social mobilizability refers to common meanings and identities, such as business goals, values, and models, and technological mobilizability refers to using a certain digital technology (Seo 2017). Furthermore, if organizations integrate social media into their businesses, they should take a strategic rather techno-centric view, as well as focusing on digital contents with user participation. This may help organizations take advantages in comparison to those that use social media as a substitute for offline soft marketing (Oestreicher-Singer and Zalmanson 2013).

Considering conditions under which a digital business strategy can contribute to achieving strategic advantages and transform into market performance, scholars indicated several aspects. For example, to get high market performance, organizations should take into account customer heterogeneity, technological turbulence, and share of business services according to digital strategy (Leischnig et al. 2016). Similar vein, digitally enabled solutions will help organizations a hand to deal with environmental challenges. For instance, social media can be used to enhance achieving environmental sustainability and community-driven environmental sustainability (Tim et al. 2018). Moreover, technological flexibility and digital eco-innovation enhance the efficiency of the business processes, and thus achieving organizational sustainability goals (Hanelt et al. 2017).

Digital strategy implementation affects to multi-level in organizations (Bharadwaj et al. 2013; Lyytinen et al. 2016; Sebastian et al. 2018; Singh and Hess 2017), understanding digital technologies and how digital technologies influence digital strategy and its processes are important (Lyytinen et al. 2016; Yoo et al. 2010). This is because of digital strategy involving digital technologies overtime (Lyytinen et al. 2016; Yoo et al. 2010). As a result, several characteristics of digital technologies are similar to digital strategies that organizations have to deal with, such as dynamic, uncertain and equivocal, as well as subject to political and power influences (Lyytinen et al. 2016). The notion of digital option indicates managers should think about which IT capability investments may provide performance gains, could also be considered in the context of digital strategy (Sandberg et al. 2014).

To deal with digital disruption during the process of implementing digital strategy, organizations should have abilities to move quickly in order to achieve boundary openness and organizational adaptability to balance tensions (Chan et al. 2019; Yeow et al. 2018). In other words, there is a need for organizations agility in responding to environmental changes. Digital strategy influences work-life changes of stakeholders who are involved or influenced by the processes of implementing strategy. This is because jobs can be moved, re-arranged, or outsourced to other communities or parties (Sandeep and Ravishankar 2018). Those issues may lead to stakeholders facing difficulties of transitioning from their traditional communities or environment to the new one in the workplace. In that sense, compartmentalization and integration strategies could be used to manage those difficulties in the community and the workplace (Sandeep and Ravishankar 2018).

Key stakeholders in digital strategy

There are several stakeholders who take part in the processes of implementing digital strategies. We focus on three main stakeholders that are mentioned in the selected papers.

First, when organizations use digital strategy term, it signifies that something is different compared to the traditional practice (Baird and Raghu 2015; Ciriello et al. 2017; Fichman et al. 2014; Flath et al. 2017; Lucas and MeinGoh 2009; Tumbas et al. 2018). As a result, many organizations have established a new job title and new roles in association with digital strategy in the digital era — the Chief Digital Officer (CDO) (Rickards et al. 2015; Singh and Hess 2017; Tumbas et al. 2018). However, this title, its roles, and meaning are different among organizations and the possibility overlaps with other established

professions, such as Chief Information Officer (Singh and Hess 2017; Tumbas et al. 2018). It seems that Chief Digital Officers intentionally distance themselves from established professional roles in order to gain legitimacy of the job (Tumbas et al. 2018). Furthermore, there are two main roles of CDOs in organizations, that is, CDOs articulate and develop the emerging digital logics (e.g., focusing on new initiatives, revenue enhancing, among others), and CDOs integrate those logics to business strategies (Tumbas et al. 2018).

Second, managers (CEOs, senior managers) are also an important stakeholder that are involved in the digital processes. This is because a managerial issue is seen as more important than a technical issue in digital strategy (Besson and Rowe 2012), as after all, managers drive and decide their strategy. Li et al. (2017) indicated the important of dynamic managerial capabilities for managers, including managerial cognition capabilities (e.g., personal beliefs and mental models for decision-making), managerial social capital capabilities (e.g., formal and informal relationships with others), and managerial human capital capabilities (e.g., background, expertise, skills) (Helfat and Martin 2015; Li et al. 2017).

Third, e-leadership in the digital age defined as "a social influence process embedded in both proximal and distal contexts mediated by digital technology that can produce a change in attitudes, feelings, thinking, behavior and performance" (Li et al. 2016, p.186). It ranges from micro (individuals, groups) to macro level. E-leadership enables organizations to successfully achieve digital strategy through strategy alignment, technology alignment, competitive alignment, and service-level alignment (Li et al. 2016).

Digital strategy capability

Capability is one of the important factors that help organizations drive and conduct their successful digital strategy, they include, for example, dynamic managerial capabilities and organizational capabilities (Li et al. 2017; Sandberg et al. 2014). Dynamic managerial capabilities help facilitate organizational strategic changes successfully when they implement digital strategy (Helfat and Martin 2015; Li et al. 2017). Dynamic managerial capabilities refer to "the capabilities with which managers build, integrate, and reconfigure organizational resources and competences" (Adner and Helfat 2003, p. 1012). Dynamic managerial capabilities include managerial cognition (e.g., personal beliefs and mental models for decision-making), managerial social capital (e.g., formal and informal relationships with others), and managerial human capital (e.g., background, expertise, skills) (Helfat and Martin 2015; Li et al. 2017). Organizational capability refers to the organizational capacity to "perform a particular activity in a reliable and at least minimally satisfactory manner" (Helfat and Winter 2011, p. 1244).

Market intelligence capability is also considered as one component that may help organizations achieve strategic advantages and high market performance when organizations implement a digital strategy (Leischnig et al. 2017). This is because market intelligence capability enables organizations abilities to adapt with changes surrounding the organizational environment, as well as capability to respond to opportunities and threats (Adner and Helfat 2003; Eisenhardt and Martin 2000; Leischnig et al. 2017). Furthermore, in order to implement a successful organization's customer-side digital strategy, two capabilities are considered, that is, customer orientation capability and customer response capability (Setia et al. 2013). Those capabilities help an organization to locally sense and respond to customer needs, as well as enhance customer service performance through digital design of information quality (Pavlou and Sawy 2006; Setia et al. 2013).

Discussion

Digital strategy aspects in IS literature

One of the aims in this paper is identifying aspects of digital strategy and generating insights into the meaning of these aspects. The key aspects illustrate in Figure 2.

First, digital strategy environment factors affect digital strategy, including external and internal factors. External factors, for example, industrial environment includes industry turbulence, industry

competition, and industry growth (Mithas et al. 2013; Pavlou and Sawy 2006; Wade and Hulland 2004). Also, internal environment factors include organizational shifts (Bharadwaj et al. 2013), general IT investment (e.g., how much a firm invests in IT), and IT outsourcing investment (e.g., what percentage of its IT budget it spends on outsourced services) (Mithas et al. 2013).

Second, one of the biggest challenges when organizations implement digital strategy is misalignments (Chan et al. 2019; Yeow et al. 2018). This is because organizations operate in dynamic environments in the context of digital strategy and digital strategy involves multiple levels and functions of organizations that require a large scale of changes across organizations (Bharadwaj et al. 2013; Peppard et al. 2014; Yeow et al. 2018). Organizations also face challenges related to paradoxes, such as existing versus requisite capability, internal versus external collaboration, among others —and these concerns are systemically interrelated (Gregory et al. 2010; Svahn et al. 2017).
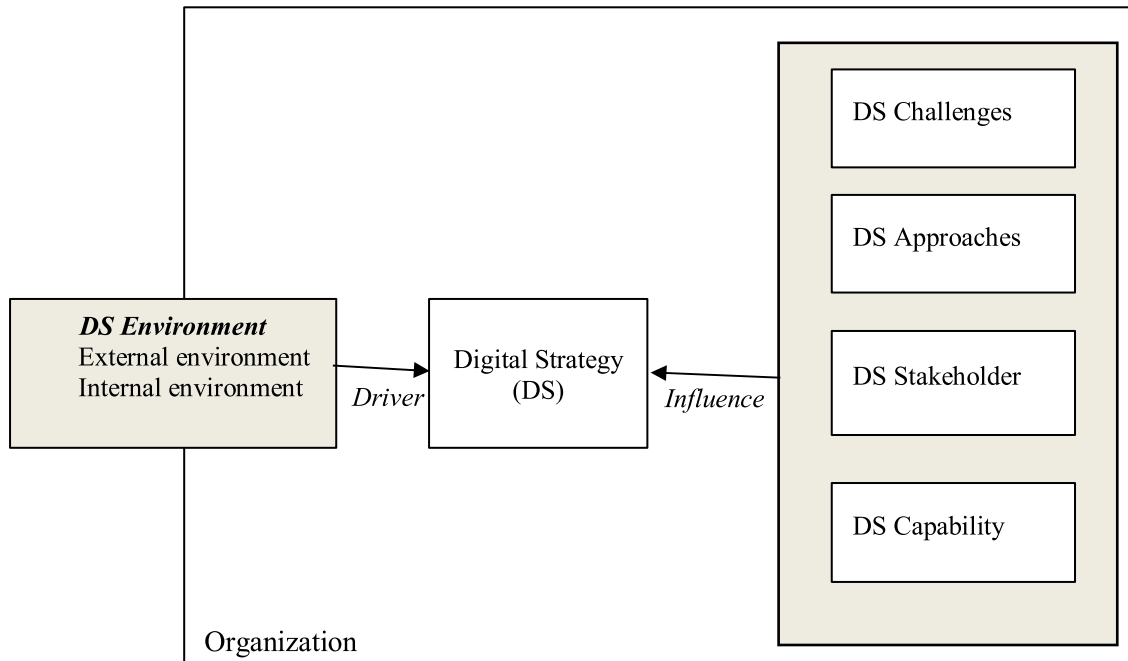

Figure 2. Aspects of digital strategy

Third, several approaches should be taken into consideration to design digital strategy (Berghaus and Back 2017), such as bottom-up approach, IT-centered approach, innovation-centered approach, channel-centered approach, and centralized approach. Furthermore, to design an effective and appropriate digital strategy, organizations should consider clearly defining value propositions that the organization will pursue, an operational backbone, and a digital service (Ross et al. 2016). Moreover, the process of strategy making should involve iterating between learning and doing (Chanias et al. 2018). Design strategy should take into account mobilizabilities capability, including political, social, and technological mobilizabilities (Seo 2017). Strategy design should focus on user participation in a strategic level rather techno-centric view (Oestreicher-Singer and Zalmanson 2013). Organizations also should consider customer heterogeneity, and technological turbulence factors (Leischnig et al. 2016), digitally enabled solutions (Tim et al. 2018), technological flexibility and digital eco-innovation (Hanelt et al. 2017), as well as abilities to move quickly for achieving boundary openness and organizational adaptability to balance tension in organizations (Chan et al. 2019; Yeow et al. 2018). Besides, understanding digital technologies and how digital technologies influence digital strategy and its processes are important (Lyytinen et al. 2016; Yoo et al. 2010), including digital options (Sandberg et al. 2014). In addition, compartmentalization and integration strategies could be used to manage difficulties in the community and the workplace (Sandeep and Ravishankar 2018).

Fourth, stakeholders and their roles should be paid attention when organizations implement digital strategy. CDOs roles include articulating and developing the emerging digital logics and integrating those logics to business strategies (Tumbas et al. 2018). Furthermore, managers (CEOs, senior managers) capabilities are important, especially dynamic managerial capabilities for managers (Helfat

and Martin 2015; Li et al. 2017). This is because after all, they drive and decide organizational strategy (Li et al. 2017). In addition, e-leaderships from micro (individuals, groups) to macro level should be noticed. It helps enabling organizations successfully achieve digital strategy (Li et al. 2016).

Fifth, capabilities influence digital strategy. They include, for example, dynamic managerial capability and organizational capability (Li et al. 2017; Helfat and Winter 2011), market intelligence capability (Leischnig et al. 2017), and capability to respond to opportunities and threats (Adner and Helfat 2003; Eisenhardt and Martin 2000; Leischnig et al. 2017). Moreover, customer orientation capability and customer response capability are important in order to implement a successful organization's customer-side digital strategy(Setia et al. 2013).

Digital strategy in digital born companies versus established companies

It is argued that born digital companies (e.g., Uber, Spotify, and Airbnb) have different value propositions in comparison to established companies (e.g., Phillips, IBM, ABB) (Sebastian et al. 2018). As a result, a digital strategy for established companies may differ from born digital companies. This is because often established companies may have to face very challenges for changing their business models, processes, and structures when they take advanced digital technologies (Bharadwaj et al. 2013; Nambisan et al. 2017; Sebastian et al. 2018; Singh and Hess 2017). However, it seems that the majority of studies on digital strategy focuses on born digital companies and its phenomena. For example, many studies on IT platforms (Markus and Loebbecke 2013; Schreieck et al. 2017), the digitization of the social network (Bogusz and Morisse 2018; Du et al. 2018; Whelan et al. 2013) and relevant issues (e.g., business models, value capture, and value creation) (Baird and Raghu 2015; Briel et al. 2018; Iivari et al. 2018).

Little studies focus on established companies in different industrial sectors, such as mining, energy sectors (Jonsson et al. 2018; Svahn et al. 2017). Firms in such industrial sectors have certain similar characteristics. For example, they create, operate, and maintain very expensive machines or systems. As a result, if something happens unplanned, the consequences are unpredictable and costly. Furthermore, machines in those industries need several stakeholders involving, such as managers, technicians, as well as machines distributed underground with time-consuming accessibility (Jonsson et al. 2018). This leads to firms investing in technologies to monitor their machines (sensors for example). Even though digital technologies have been used in those industries for decades (Tsang 2002; Yam et al. 2001), the studies, for example, how digital technologies lead to changes in work practice or how technologies influence to work practice, or how firms take advantages of both their existing strengths and the capabilities offered by digital technologies, are missed in selected papers. Further studies are needed (Jonsson et al. 2018; Sebastian et al. 2018).

Design digital strategy versus capability

The natural question is how organizations design an appropriate digital strategy that is suitable with their capability. Several approaches to design digital strategy have been discussed in the selected papers (c.f., Berghaus and Back 2017; Chanias et al. 2018; Oestreicher-Singer and Zalmanson 2013; Ross et al. 2016; Seo 2017). We categorized into three dimensions for designing digital strategy, that is, vision, scope, and practice (Figure 3). *First*, the vision to successfully design a digital strategy should clearly define the value proposition, an operational backbone, and a digital services backbone (Ross et al. 2016). *Second*, the scope of digital strategy should cover multiple levels of organizational services and procedures at a strategic rather techno-centric view (Berghaus and Back 2017; Oestreicher-Singer and Zalmanson 2013). *Third*, digital strategy in practice should consider as a process of strategy making with highly dynamic and involving iterating between learning and doing (Chanias et al. 2018), especially focusing on customer engagement and digitized solutions (Ross et al. 2016), and firms should control different types of mobilizabilities, including political mobilizability, social mobilizability, and technological mobilizability (Seo 2017). Moreover, depending on the situation, organizations also can use several digital strategy types simultaneously, such as bottom-up, IT-centered, innovation-centered, channel-centered, and centralized approach (Berghaus and Back 2017).

To pursue a successful digital strategy, organizations should have capabilities for operational excellence, ability to facilitate rapid changes and responsiveness to new opportunities (Ross et al. 2016). Although there are several capabilities (Adner and Helfat 2003; Helfat and Martin 2015; Helfat and Winter 2011; Stefano et al. 2014; Dang et al. 2019), it seems that four main types are mentioned in the selected papers (Figure 3). They include dynamic managerial capabilities (i.e., managerial cognition, managerial social capital, managerial human capital), organizational capabilities (e.g., channel

Design digital strategy

Vision
Value proposition
Operational backbone
Digital services backbone

Scope
Multiple level
Strategic centric view

Practice
Dynamic process,
iterating
Customer engagement
and digitized solutions
Mobilizabilities
Flexible approaches

Digital strategy capability

Dynamic managerial capability
Managerial cognition
Managerial social capital
Managerial human capital

Organizational capability
Channel management capabilities
R&D capability

Market intelligence capability
Ability to purposefully process
market information

Customer-side capabilities
Customer orientation capability
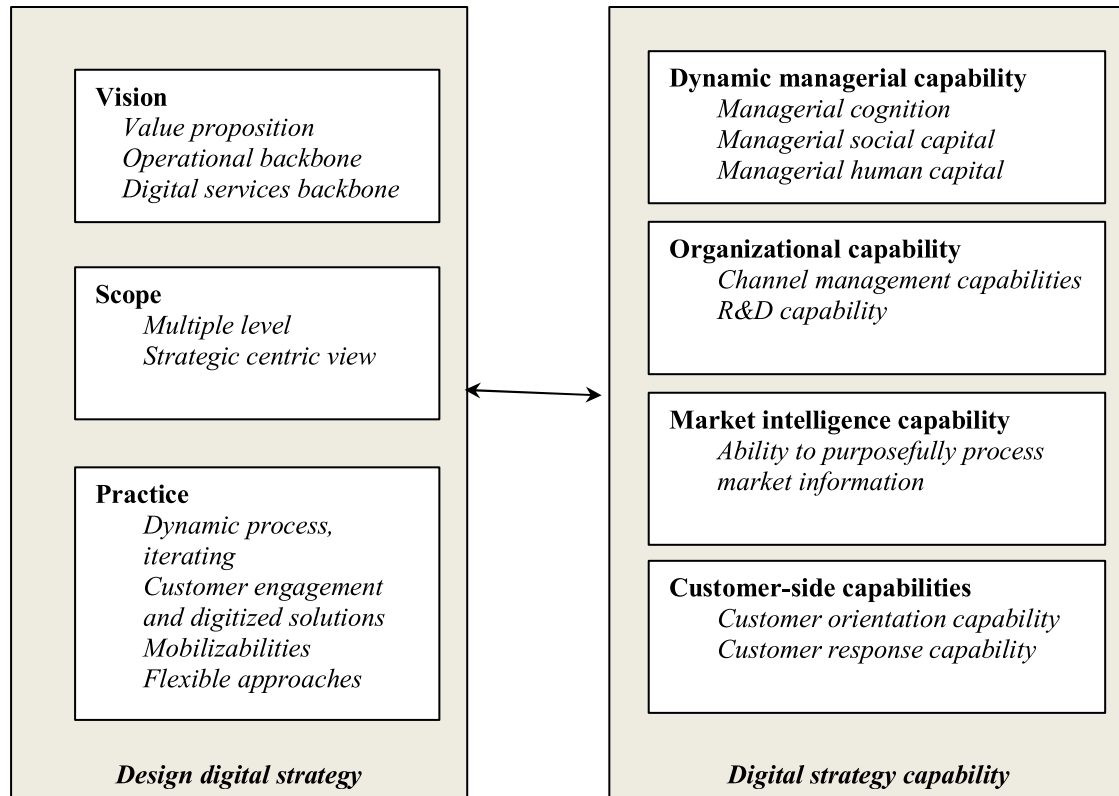*Customer response capability*

Figure 3. Digital strategy design and capability

management capabilities, R&D capability) (Li et al. 2017), market intelligence capability (e.g., ability to purposefully process market information to support managerial decision-making) (Leischnig et al. 2017), and customer-side capabilities i.e., customer orientation capability and customer response capability (Setia et al. 2013). Those capabilities will help organizations ability to respond to achieving strategic advantages and high market performance, customer needs (Leischnig et al. 2017; Setia et al. 2013).

Contradictions, challenges, and tensions in digital strategy

Organizations have to invest in technologies, as well as improve their capabilities to reposition or re-design strategy in the digital era. This may lead to changes in different levels, services, and procedures in organizations. Organizations also have to deal with several paradoxes for a successful design new digital strategy, such as existing versus requisite capability, internal versus external collaboration, and control versus flexible governance (Gregory et al. 2010; Sebastian et al. 2018; Svahn et al. 2017).

Several studies papers discussed that the digital strategy environment likely triggers paradoxical tension in organizations (Figure 4). Digital strategy environment includes internal (e.g., organizational strategy changes, resources changes), and external (e.g., industrial turbulence, competition, and industry growth) (Mithas et al. 2013; Pavlou and Sawy 2006; Wade and Hulland 2004), while paradox refers as "contradictory yet interrelated elements that exist simultaneously and persist over time." (Smith and Lewis 2011, p. 382). Paradox is considered one of the most common types of contradictions in IS (Gregory et al. 2010; Robey and Boudreau 1999). Furthermore, environment factors also drive organizations to implement digital strategy to take advantages digital technologies and revise value

propositions (Figure 4) (Hanelt et al. 2017; Jarvenpaa and Standaert 2018; Ross et al. 2016; Tim et al. 2018; Woodard et al. 2013).
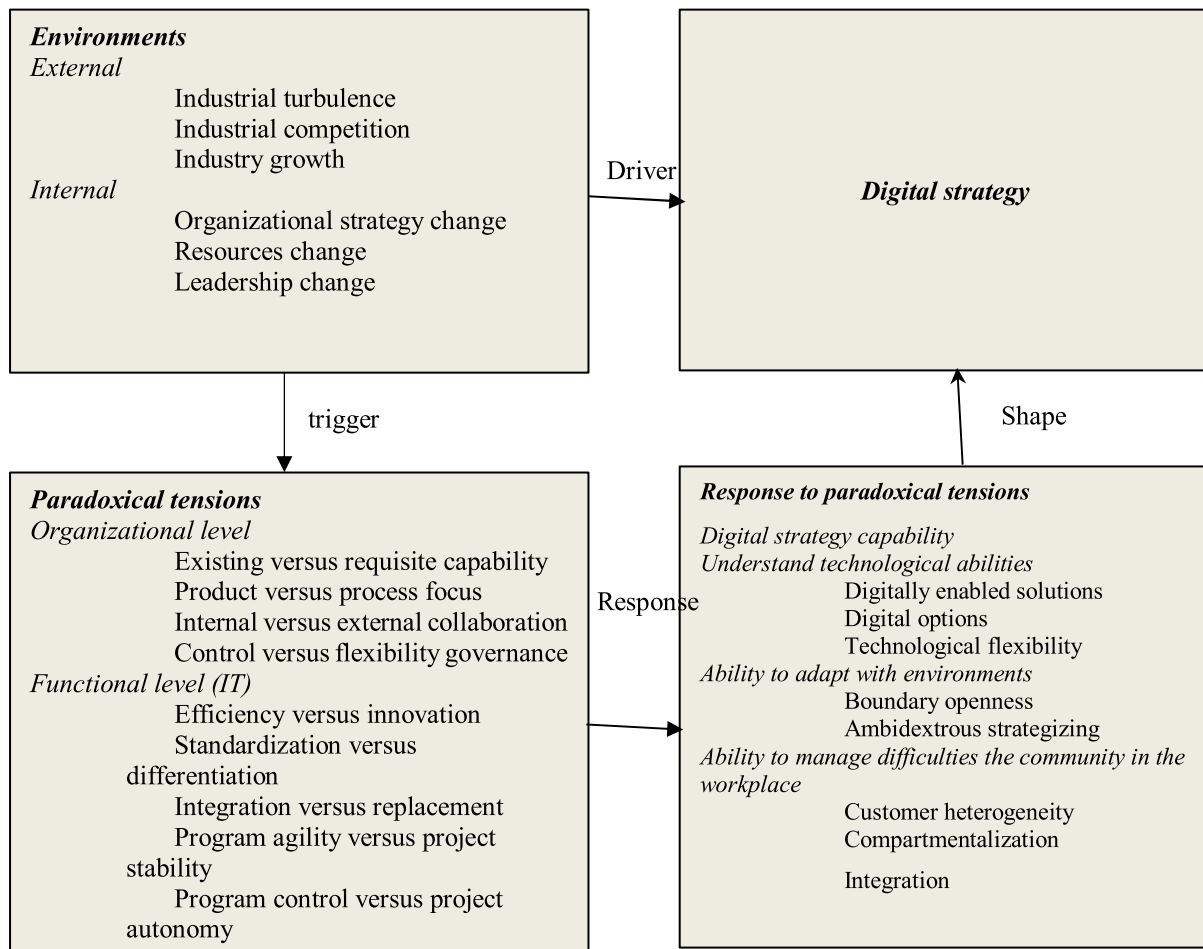

Figure 4. Environment, paradoxes, responses, and digital strategy

Paradoxes may appear in different levels during the process of implementation of digital strategy, paradoxes create several challenges, such as misalignment and tensions (Chan et al. 2019; Yeow et al. 2018). At the organizational level, four main paradoxes include existing versus requisite capability, product versus process focus, internal versus external collaboration, and control versus flexibility governance (Svahn et al. 2017). At the functional level (e.g., IT programs), paradoxes include efficiency versus innovation, standardization versus differentiation, integration versus replacement, program agility versus project stability, program control versus project autonomy, and program delivery versus project isolation (Gregory et al. 2010). It is noted that those paradoxes may also appear in other levels. It is interesting that literature has given insufficient attention to a broader issue in IS research, such as digital strategy in the context of enterprise architecture (Dang 2017; Dang 2019), and digital strategy in the public sector versus the private sector (Dang and Pekkola 2017).

As seen, several tensions emerge among paradoxes. Organizations' responses to those tensions may be a fundamental determinant of a successful organizational digital strategy, and response to paradoxes will shape digital strategy in organizations (Figure 4). Several tactics may be used. First, organizations should use the digital strategy capability that is discussed in the abovementioned section. Second, organizations should have ability to understand how technologies can be used for digital strategy and its processes i.e., digitally enabled solutions, digital options, and technological flexibility (Bharadwaj et al. 2013; Hanelt et al. 2017; Lyytinen et al. 2016; Sandberg et al. 2014; Sebastian et al. 2018; Singh and Hess 2017; Tim et al. 2018; Yoo et al. 2010). Furthermore, organizations should have abilities to adapt with quickly changing environments to balance tensions (e.g., dynamic capabilities, boundary openness, and ambidextrous strategizing) (Chan et al. 2019; Eisenhardt and Martin 2000; Gregory et

al. 2010; Stefano et al. 2014; Yeow et al. 2018). Finally, organizations should have the ability to manage difficulties in the community and the workplace in order to balance tensions (e.g., customer heterogeneity, compartmentalization and integration strategies) (Leischnig et al. 2016; Sandeep and Ravishankar 2018).

Conclusions

This research conducts a systematic literature review on digital strategy in IS research. The paper has several contributions. *First*, we identified key differences between digital strategy and IT/IS strategy, including organizational-wide scopes from macro to micro levels, distinct governance structures, business- and customer- oriented digital strategy compared to the traditional IT/IS strategy. *Second*, we retrieved five main aspects of digital strategy from selected papers and described how those aspects drive and influence to digital strategy (Figure 2). Five aspects include digital strategy environment, digital strategy challenges, digital strategy approaches, digital strategy stakeholders, and digital strategy capabilities. *Third*, we found that a majority of digital strategy literature is focusing on digital born firms, while research on digital strategy in established firms and their context seems to be overlooked. *Fourth*, this paper also illustrates the initial relation between digital capabilities and digital strategies. Figure 3 can be seen as a starting point to examine on designing a digital strategy successfully with organizational capabilities. *Fifth*, we illustrate relations between the digital strategy environment, paradoxical tensions and responses to paradoxical tensions during the process of implementing a digital strategy (Figure 4). *Finally*, it seems that scholars have given insufficient attention to digital technologies, digital resources, relations between digital strategy and firms' performance, and how it relates to other IS issues, such as digital strategy in the context of enterprise architecture, digital strategy in the public sector versus the private sector.

Limitations

This study has some limitations. We acknowledge that the basket of eight IS journals and the proceedings of the ICIS conference is not fully represented in the IS field. As a result, other contributions may appear outside our selected outlets. Moreover, we recognize that digital strategy can be found in related fields, such as strategic management, or sociology. Furthermore, it is noted that we aim at providing insights into academic debates on the emerging concept and we do not intend to make a theoretical contribution. Finally, we selected papers that contain our selected terms in their title, abstract, keywords, or body. This might lead to questioning whether the phenomenon can be addressed with those labels. Further study is needed to address mentioned limitations, such as expansion of the searching database (e.g., DSS, MIS Quarterly Executive, and CAIS Journals; ECIS, AMCIS and PACIS conferences) or searching terms.

References

Adner, R., and Helfat, C. E. 2003. "Corporate Effects and Dynamic Managerial Capabilities," *Strategic Management Journal* (24:10), pp. 1011-1025.

Baird, A., and Raghu, T. S. 2015. "Associating Consumer Perceived Value with Business Models for Digital Services," *European Journal of Information Systems* (24:1), pp. 4–22.

Baiyere, A., Grover, V., Gupta, A., Woerner, S., and Lyytinen, K. J. 2017. "Digital "X" - a New Tune for IS Research or Old Wine in New Botles?," in: *ICIS*. South Korea.

Berghaus, S., and Back, A. 2017. "Disentangling the Fuzzy Front End of Digital Transformation: Activities and Approaches," in: *ICIS*. South Korea.

Besson, P., and Rowe, F. 2012. "Strategizing Information Systems-enabled Organizational Transformation: A Transdisciplinary Review and new Directions,"*JSIS* (21:2), pp. 103-124.

Bharadwaj, A., Sawy, O. A. E., Pavlou, P. A., and Venkatraman, N. 2013. "Digital Business Strategy: Toward a Next Generation of Insights," *MIS Quarterly* (37:2), pp. 471-482.

Bogusz, C. I., and Morisse, M. 2018. "How Infrastructures Anchor Open Entrepreneurship: The Case of Bitcoin and Stigma," *Information Systems Journal* (28:6), pp. 1176-1212.

Briel, F. v., Recker, J., and Davidsson, P. 2018. "Not All Digital Venture Ideas Are Created Equal: Implications for Venture Creation Processes," *Journal of Strategic Information Systems* (27:4), pp. 278-295.

Chan, C. M. L., Teoh, S. Y., Yeow, A., and Pan, G. 2019. "Agility in Responding to Disruptive Digital Innovation: Case Study of an SME," *Information Systems Journal* (29:2), pp. 436-455.

Chan, Y. E., and Reich, B. H. 2007. "It Alignment: What Have We Learned?," *Journal of Information Technology* (22:4), pp. 297-315.

Chanias, S., D.Myers, M., and Hess, T. 2018. "Digital Transformation Strategy Making in Pre-Digital Organizations: The Case of a Financial Services Provider," *Journal of Strategic Information Systems*.

Chen, D. Q., Mocker, M., Preston, D. S., and Teubner, A. 2010. "Information Systems Strategy: Reconceptualization, Measurement, and Implications," *MIS Quarterly* (34:2), pp. 233-259.

Ciriello, R. F., Richter, A., and Schwabe, G. 2017. "The Paradoxical Effects of Digital Artefacts on Innovation Practices," *European Journal of Information Systems*. DOI: 10.1080/0960085X.2018.1524418

Dang, D. 2017. "Enterprise Architecture Institutionalization: A Tale of Two Cases," in: *In Proceedings of the 25th European Conference on Information Systems (ECIS)*. Guimarães, Portugal.

Dang, D. 2019. "Institutional Logics and Their Influence on Enterprise Architecture Adoption," *Journal of Computer Information Systems*, pp. 1-11, DOI: 10.1080/08874417.2018.1564632.

Dang, D. D., and Pekkola, S. 2017. "Systematic Literature Review on Enterprise Architecture in the Public Sector," *Electronic Journal of e-Government* (15:2), pp. 130-154.

Drnevich, P. L., and Croson, D. C. 2013. "Information Technology and Business-Level Strategy: Toward an Integrated Theoretical Perspective," *MIS Quarterly* (37:2), pp. 511-536.

Du, W. D., Pan, S. L., Zhou, N., and Ouyang, T. 2018. "From a Marketplace of Electronics to a Digital Entrepreneurial Ecosystem (DEE): The Emergence of a Meta-Organization in Zhongguancun, China," *Information Systems Journal* (28:6), pp. 1158-1175.

Eisenhardt, K. M., and Martin, J. A. 2000. "Dynamic Capabilities: What Are They?," *Strategic Management Journal* (21:10/11), pp. 1105-1121.

Fichman, R. G., Santos, B. L. D., and Zheng, Z. E. 2014. "Digital Innovation as a Fundamental and Powerful Concept in the Information Systems Curriculum," *MIS Quarterly* (38:2), pp. 329-353.

Flath, C. M., Friesike, S., Wirth, M., and Thiesse, F. 2017. "Copy, Transform, Combine: Exploring the Remix as a Form of Innovation," *Journal of Information Technology* (32:4), pp. 306-325.

Gregory, R. W., Keil, M., Muntermann, J., and Mähring, M. 2010. "Paradoxes and the Nature of Ambidexterity in It Transformation Programs," *Information Systems Research* (26:1), pp. 57-80.

Hanelt, A., Busse, S., and Kolbe, L. M. 2017. "Driving Business Transformation toward Sustainability: Exploring the Impact of Supporting Is on the Performance Contribution of Eco-Innovations," *Information Systems Journal* (27:4), pp. 463-502.

Helfat, C. E., and Martin, J. A. 2015. "Dynamic Managerial Capabilities: Review and Assessment of Managerial Impact on Strategic Change," *Journal of Management* (41:5), pp. 1281–1312.

Helfat, C. E., and Winter, S. G. 2011. "Untangling Dynamic and Operational Capabilities: Strategy for the (N)Ever-Changing World," *Strategic Management Journal* (32:11), pp. 1243–1250.

Henderson, J. C., and Venkatraman, N. 1993. "Strategic Alignment: Leveraging Information Technology for Transforming Organizations," *IBM Systems Journal* (32:1), pp. 4-16.

Hess, T., Matt, C., Benlian, A., and Wiesböck, F. 2016. "Options for Formulating a Digital Transformation Strategy," *MIS Quarterly Executive* (15:2), pp. 123-139.

Iivari, N., Kinnula, M., Molin-Juustila, T., and Kuure, L. 2018. "Exclusions in Social Inclusion Projects: Struggles in Involving Children in Digital Technology Development," *Information Systems Journal* (28:6), pp. 1020-1048.

Jarvenpaa, S., and Standaert, W. 2018. "Digital Probes as Opening Possibilities of Generativity," *Journal of the Association for Information Systems* (19:10), pp. 982-1000.

Jonsson, K., Mathiassen, L., and Holmström, J. 2018. "Representation and Mediation in Digitalized Work: Evidence from Maintenance of Mining Machinery," *JIT* (33:3), pp. 216–232.

Kahre, C., Hoffmann, D., and Ahlemann, F. 2017. "Beyond Business-It Alignment - Digital Business Strategies as a Paradigmatic Shift: A Review and Research Agenda," in: *HICSS-50*. Hawaii.

Leischnig, A., Woelfl, S., and Ivens, B. S. 2016. "When Does Digital Business Strategy Matter to Market Performance?," in: *ICIS*. Dublin.

Leischnig, A., Wölfl, S., Ivens, B., and Hein, D. 2017. "From Digital Business Strategy to Market Performance: Insights into Key Concepts and Processes," in: *ICIS*. South Korea.

Li, L., Su, F., and Zhang, W. 2017. "Digital Transformation by Sme Entrepreneurs: A Capability Perspective," *Information Systems Journal* (28), pp. 1129-1157.

Li, W., Liu, K., Belitski, M., Ghobadian, A., and O'Regan, N. 2016. "E-Leadership through Strategic Alignment: An Empirical Study of Small- and Mediumsized Enterprises in the Digital Age," *Journal of Information Technology* (31), pp. 185–206.

Lucas, H. C., and MeinGoh, J. 2009. "Disruptive Technology: How Kodak Missed the Digital Photography Revolution," *Journal of Strategic Information Systems* (18:1), pp. 46-55.

Lyytinen, K., Yoo, Y., and Boland, R. J. 2016. "Digital Product Innovation within Four Classes of Innovation Networks," *Information Systems Journal* (26), pp. 47–75.

Markus, M. L., and Loebbecke, C. 2013. "Commoditized Digital Processes and Business Community Platforms: New Opportunities and Challenges for Digital Business Strategies," *MIS Quarterly* (37:2), pp. 649-653.

Melville, N., Gurbaxani, V., and Kraemer, K. L. 2007. "The Productivity Impact of Information Technology across Competitive Regimes: The Role of Industry Concentration and Dynamism," *Decision Support Systems* (43:1), pp. 229-242.

Mithas, S., Tafti, A., and Mitchell, W. 2013. "How a Firm's Competitive Environment and Digital Strategic Posture Influence Digital Business Strategy," *MIS Quarterly* (37:2), pp. 511-536.

Moeini, M., Rahrovani, Y., and E.Chan, Y. 2019. "A Review of the Practical Relevance of Is Strategy Scholarly Research," *Journal of Strategic Information Systems*.

Nambisan, S., Lyytinen, K., Majchrzak, A., and Song, M. 2017. "Digital Innovation Management: Reinventing Innovation Management Research in a Digital World," *MIS Quarterly* (41:1), pp. 223-238.

Nanterme, P. 2016. "Digital Disruption Has Only Just Begun." Retrieved August 25, 2018, from https://www.weforum.org/agenda/2016/01/digital-disruption-has-only-just-begun/

Oestreicher-Singer, G., and Zalmanson, L. 2013. "Content or Community? A Digital Business Strategy for Content Providers in the Social Age," *MIS Quarterly* (37:2), pp. 591-616.

Onay, C., Özdinç, G., and Çavuşyan, S. 2018. "Digital Transformation: A Mutual Understanding and Strategic Alignment Perspective," in: *ICIS*. San Francisco.

Dang, D., Vartiainen, T., and Pekkola, S. 2019. "Patterns of Enterprise Architecture Adoption in the Public Sector: A Resource-Based Perspective," in: *27th ECIS*. Stockholm and Uppsala, Sweden.

Paré, G., Tate, M., Johnstone, D., and Kitsiou, S. 2016. "Contextualizing the Twin Concepts of Systematicity and Transparency in Information Systems Literature Reviews," *EJIS* (25:6), pp. 493-508.

Paré, G., Trudel, M.-C., Jaana, M., and Kitsiou, S. 2015. "Synthesizing Information Systems Knowledge: A Typology of Literature Reviews," *Information & Management* (52:2), pp. 183–199.

Pavlou, P. A., and Sawy, O. A. E. 2006. "From It Leveraging Competence to Competitive Advantage in Turbulent Environments," *Information Systems Research* (17:3), pp. 198-227.

Peppard, J., Galliers, R. D., and Thorogood, A. 2014. "Information Systems Strategy as Practice: Micro Strategy and Strategizing for Is," *Journal of Strategic Information Systems* (23), pp. 1–10.

Rickards, T., Smaje, K., and Sohoni, V. 2015. "'Transformer in Chief': The New Chief Digital Officer." Retrieved 22 February, 2019

Robey, D., and Boudreau, M.-C. 1999. "Accounting for the Contradictory Organizational Consequences of Information Technology: Theoretical Directions and Methodological Implications," *Information Systems Research* (10:2), pp. 99-195.

Rojas, M. G. A., Khuntia, J., Saldanha, T. J. V., Kathuria, A., and Krishnan, M. S. 2016. "Growth Oriented Digital Strategy and Longterm Compensation of Chief Executives," in: *ICIS*. Dublin.

Ross, J. W., Sebastian, I. M., Beath, C., Moloney, K. G., Mocker, M., and Fonstad, N. O. 2016. "Designing and Executing Digital Strategies," in: *ICIS*. Dublin.

Ross, J. W., Sebastian, I. M., and Beath, C. M. 2017. "How to Develop a Great Digital Strategy," *MIT Sloan Management Review* (58:2), pp. 7-9.

Sambamurthy, V., Bharadwaj, A., and Grover, V. 2003. "Shaping Agility through Digital Options: Reconceptualizing Ther Role of Information Technology in Contemporary Firms," *MIS Quarterly* (27:2), pp. 237-263.

Sandberg, J., Mathiassen, L., and Napier, N. 2014. "Digital Options Theory for It Capability Investment," *Journal of the Association for Information Systems* (15:7), pp. 422-453.

Sandeep, M. S., and Ravishankar, M. N. 2018. "Sociocultural Transitions and Developmental Impacts in the Digital Economy of Impact Sourcing," *Information Systems Journal* (28:3), pp. 563-586.

Schreieck, M., Wiesche, M., and Krcmar, H. 2017. "The Platform Owner's Challenge to Capture Value– Insights from a Business-to-Business It Platform," in: *ICIS*. South Korea.

Sebastian, I. M., Mocker, M., Ross, J. W., Moloney, K. G., Beath, C., and Fonstad, N. O. 2018. "How Big Old Companies Navigate Digital Transformation," *MIS Quarterly Executive* (16:3), pp. 197-212.

Seo, D. 2017. "Digital Business Convergence and Emerging Contested Fields: A Conceptual Framework," *Journal of the Association for Information Systems* (18:10), pp. 687 – 702.

Setia, P., Setia, P., Venkatesh, V., and Joglekar, S. 2013. "Leveraging Digital Technologies: How Information Quality Leads to Localized Capabilities and Customer Service Performance,"*MISQ* (37:2), pp.565-590.

Singh, A., and Hess, T. 2017. "How Chief Digital Officers Promote the Digital Transformation of Their Companies," *MIS Quarterly Executive* (16:1), pp. 1-17.

Smith, W. K., and Lewis, M. W. 2011. "Toward a Theory of Paradox: A Dynamic Equilibrium Model of Organizing," *Academy of Management Review* (36:2), pp. 381-403.

Stefano, G. D., Peteraf, M., and Verona, G. 2014. "The Organizational Drivetrain: A Road to Integration of Dynamic Capabilities Research," *Academy of Management Perspectives* (28:4), pp. 1-33.

Steininger, D. M. 2018. "Linking Information Systems and Entrepreneurship: A Review and Agenda for It-Associated and Digital Entrepreneurship Research," *Information Systems Journal* (29), pp. 1–45.

Stockhinger, J., and Teubner, R. A. 2018. "How Management Consultancies Make Sense of Digital Strategy " in: *ICIS*. San Francisco.

Susarla, A., Oh, J.-H., and Tan, Y. 2012. "Social Networks and the Diffusion of User-Generated Content: Evidence from Youtube," *Information Systems Research* (23:1), pp. 1-19.

Svahn, F., Mathiassen, L., and Lindgren, R. 2017. "Embracing Digital Innovation in Incumbent Firms: How Volvo Cars Managed Competing Concerns," *MIS Quarterly* (41:1), pp. 239-253.

Templier, M., and Paré, G. 2018. "Transparency in Literature Reviews: An Assessment of Reporting Practices across Review Types and Genres in Top IS Journals,"*European J. of IS* (27:5), pp. 503-550.

Tilson, D., Lyytinen, K., and Sørensen, C. 2010. "Digital Infrastructures: The Missing Is Research Agenda," *Information Systems Research* (21:4), pp. 748–759.

Tim, Y., Pan, S. L., and Fauzi, S. B. A. 2018. "Digitally Enabled Affordances for Community-Driven Environmental Movement in Rural Malaysia," *Information Systems Journal* (28:1), pp. 48-75.

Tsang, A. H. C. 2002. "Strategic Dimensions of Maintenance Management," *Journal of Quality in Maintenance Engineering* (8:1), pp. 7-39.

Tumbas, S., Berente, N., and Brocke, J. 2018. "Digital Innovation and Institutional Entrepreneurship: Chief Digital Officer Perspectives of Their Emerging Role,"*J. of Information Technology* (33:3), pp.188-202.

Vayghan, J. 2018. "Doing the Right Thing and Doing It the Right Way." Retrieved August 25, 2018, from https://www.forbes.com/sites/forbestechcouncil/2018/02/21/doing-the-right-thing-and-doing-it-the-right-way/#72832adf5b22

Venkatraman, N. 1994. "IT-Enabled Business Transformation: From Automation to Business Scope Redefinition," *Sloan Management Review* (35:2), pp. 73-87.

Wade, M., and Hulland, J. 2004. "Review: The Resource-Based View and Information Systems Research: Review, Extension, and Suggestions for Future Research," *MIS Quarterly* (28:1), pp. 107-142.

Webster, J., and Watson, R. T. 2002. "Analyzing the Past to Prepare for the Future: Writing a Literature Review," *MIS Quarterly* (26:2), pp. xiii-xxiii.

Weill, P., and Woerner, S. L. 2015. "Thriving in an Increasingly Digital Ecosystem," *MIT Sloan Management Review* (56:4), pp. 27-34.

Whelan, E., Golden, W., and Donnellan, B. 2013. "Digitising the R&D Social Network: Revisiting the Technological Gatekeeper," *Information Systems Journal* (23:3), pp. 197-218.

Woodard, C. J., Ramasubbu, N., Tschang, F. T., and Sambamurthy, V. 2013. "Design Capital and Design Moves: The Logic of Digital Business Strategy," *MIS Quarterly* (37:2), pp. 537-564.

Yam, R. C. M., Tse, P. W., and Tu, L. L. 2001. "Intelligent Predictive Decision Support System for Condition-Based Maintenance,"*International J. of Advanced Manufacturing Technology* (17:5), pp. 383–391.

Yeow, A., Soh, C., and Hansen, R. 2018. "Aligning with New Digital Strategy: A Dynamic Capabilities Approach," *Journal of Strategic Information Systems* (27), pp. 43–58.

Yoo, Y., Henfridsson, O., and Lyytinen, K. 2010. "The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research," *Information Systems Research* (21:4), pp. 724–735.

Appendix. Research design and selected papers

Table 1. Review framework

Dimensions	Main questions
Core idea of the paper	What is the core research question, scopes and goals of the paper?
Conceptualization	How does the study conceptualize digital strategy, including author(s) means, definition, characteristics, opposed to traditional terms IT strategy?
Method	Methodologies and roles of theories, including approaches, data collection and analysis?
Theories	What theories have been used by the authors to substantiate their research?
Future research	What does the author(s) suggest for future research, as well as limitations?

Table 2. Selected papers

#	Selected paper
1	Baird, A., and Raghu, T. S. 2015. "Associating Consumer Perceived Value with Business Models for Digital Services," European Journal of Information Systems (24:1), pp. 4–22.
2	Berghaus, S., and Back, A. 2017. "Disentangling the Fuzzy Front End of Digital Transformation: Activities and Approaches," in: ICIS. South Korea.
3	Bharadwaj, A., Sawy, O. A. E., Pavlou, P. A., and Venkatraman, N. 2013. "Digital Business Strategy: Toward a Next Generation of Insights," MIS Quarterly (37:2), pp. 471-482.
4	Bogusz, C. I., and Morisse, M. 2018. "How Infrastructures Anchor Open Entrepreneurship: The Case of Bitcoin and Stigma," Information Systems Journal (28:6), pp. 1176-1212.
5	Briel, F. v., Recker, J., and Davidsson, P. 2018. "Not All Digital Venture Ideas Are Created Equal: Implications for Venture Creation Processes," Journal of Strategic Information Systems (27: 4), pp. 278-295.
6	Chan, C. M. L., Teoh, S. Y., Yeow, A., and Pan, G. 2019. "Agility in Responding to Disruptive Digital Innovation: Case Study of a SME," Information Systems Journal (29:2), pp. 436-455.
7	Chanias, S., D.Myers, M., and Hess, T. 2018. "Digital Transformation Strategy Making in Pre-Digital Organizations: The Case of a Financial Services Provider," Journal of Strategic Information Systems.
8	Ciriello, R. F., Richter, A., and Schwabe, G. 2017. "The Paradoxical Effects of Digital Artefacts on Innovation Practices," European Journal of Information Systems.
9	Drnevich, P. L., and Croson, D. C. 2013. "Information Technology and Business-Level Strategy: Toward an Integrated Theoretical Perspective," MIS Quarterly (37:2), pp. 511-536.
10	Du, W. D., Pan, S. L., Zhou, N., and Ouyang, T. 2018. "From a Marketplace of Electronics to a Digital Entrepreneurial Ecosystem (Dee): The Emergence of a Meta-Organization in Zhongguancun, China," Information Systems Journal (28:6), pp. 1158-1175.
11	Feller, J., Finnegan, P., and Nilsson, O. 2011. "Open Innovation and Public Administration: Transformational Typologies and Business Model Impacts," European Journal of Information Systems (20:3), pp. 358–374.
12	Feng, Y., Guo, Z., and Chiang, W.-Y. K. 2009. "Optimal Digital Content Distribution Strategy in the Presence of Consumer-to-Consumer Channel," Journal of Management Information Systems (25:4), pp. 241-270.
13	Gregory, R. W., Keil, M., Muntermann, J., and Mähring, M. 2010. "Paradoxes and the Nature of Ambidexterity in It Transformation Programs," Information Systems Research (26:1), pp. 57-80.
14	Hanelt, A., Busse, S., and Kolbe, L. M. 2017. "Driving Business Transformation toward Sustainability: Exploring the Impact of Supporting Is on the Performance Contribution of Eco-Innovations," Information Systems Journal (27:4), pp. 463-502.
15	Iivari, N., Kinnula, M., Molin-Juustila, T., and Kuure, L. 2018. "Exclusions in Social Inclusion Projects: Struggles in Involving Children in Digital Technology Development," Information Systems Journal (28:6), pp. 1020-1048.
16	Jarvenpaa, S., and Standaert, W. 2018. "Digital Probes as Opening Possibilities of Generativity," Journal of the Association for Information Systems (19:10), pp. 982-1000.
17	Jonsson, K., Mathiassen, L., and Holmström, J. 2018. "Representation and Mediation in Digitalized Work: Evidence from Maintenance of Mining Machinery," Journal of Information Technology (33:3), pp. 216–232.
18	Klecun, E. 2016. "Transforming Healthcare: Policy Discourses of It and Patient-Centred Care," European Journal of Information Systems (25:1), pp. 64–76.
19	Leischnig, A., Woelfl, S., and Ivens, B. S. 2016. "When Does Digital Business Strategy Matter to Market Performance?" in: ICIS. Dublin.
20	Leischnig, A., Wölfl, S., Ivens, B., and Hein, D. 2017. "From Digital Business Strategy to Market Performance: Insights into Key Concepts and Processes," in: ICIS. South Korea.
21	Li, L., Su, F., and Zhang, W. 2017. "Digital Transformation by Sme Entrepreneurs: A Capability Perspective," Information Systems Journal (28), pp. 1129-1157.

22	Li, W., Liu, K., Belitski, M., Ghobadian, A., and O'Regan, N. 2016. "E-Leadership through Strategic Alignment: An Empirical Study of Small- and Mediumsized Enterprises in the Digital Age," Journal of Information Technology (31), pp. 185–206.
23	Lucas, H. C., and MeinGoh, J. 2009. "Disruptive Technology: How Kodak Missed the Digital Photography Revolution," Journal of Strategic Information Systems (18:1), pp. 46-55.
24	Lyytinen, K., Yoo, Y., and Boland, R. J. 2016. "Digital Product Innovation within Four Classes of Innovation Networks," Information Systems Journal (26), pp. 47–75.
25	Mithas, S., Tafti, A., and Mitchell, W. 2013. "How a Firm's Competitive Environment and Digital Strategic Posture Influence Digital Business Strategy," MIS Quarterly (37:2), pp. 511-536.
26	Nwankpa, J. K., and Datta, P. 2017. "Balancing Exploration and Exploitation of It Resources: The Influence of Digital Business Intensity on Perceived Organizational Performance," European Journal of Information Systems (26:5), pp. 469–488.
27	Oestreicher-Singer, G., and Zalmanson, L. 2013. "Content or Community? A Digital Business Strategy for Content Providers in the Social Age," MIS Quarterly (37:2), pp. 591-616.
28	Onay, C., Özdinç, G., and Çavuşyan, S. 2018. "Digital Transformation: A Mutual Understanding and Strategic Alignment Perspective," in: ICIS. San Francisco.
29	Rojas, M. G. A., Khuntia, J., Saldanha, T. J. V., Kathuria, A., and Krishnan, M. S. 2016. "Growth Oriented Digital Strategy and Longterm Compensation of Chief Executives," in: ICIS. Dublin.
30	Ross, J. W., Sebastian, I. M., Beath, C., Moloney, K. G., Mocker, M., and Fonstad, N. O. 2016. "Designing and Executing Digital Strategies," in: ICIS. Dublin.
31	Sandberg, J., Mathiassen, L., and Napier, N. 2014. "Digital Options Theory for It Capability Investment," Journal of the Association for Information Systems (15:7), pp. 422-453.
32	Sandeep, M. S., and Ravishankar, M. N. 2018. "Sociocultural Transitions and Developmental Impacts in the Digital Economy of Impact Sourcing," Information Systems Journal (28:3), pp. 563-586.
33	Schreieck, M., Wiesche, M., and Krcmar, H. 2017. "The Platform Owner's Challenge to Capture Value– Insights from a Business-to-Business It Platform," in: ICIS. South Korea.
34	Seo, D. 2017. "Digital Business Convergence and Emerging Contested Fields: A Conceptual Framework," Journal of the Association for Information Systems (18:10), pp. 687 – 702.
35	Setia, P., Setia, P., Venkatesh, V., and Joglekar, S. 2013. "Leveraging Digital Technologies: How Information Quality Leads to Localized Capabilities and Customer Service Performance," MIS Quarterly (37:2), pp. 565-590.
36	Svahn, F., Mathiassen, L., and Lindgren, R. 2017. "Embracing Digital Innovation in Incumbent Firms: How Volvo Cars Managed Competing Concerns," MIS Quarterly (41:1), pp. 239-253.
37	Tilson, D., Lyytinen, K., and Sørensen, C. 2010. "Digital Infrastructures: The Missing Is Research Agenda," Information Systems Research (21:4), pp. 748–759.
38	Tim, Y., Pan, S. L., and Fauzi, S. B. A. 2018. "Digitally Enabled Affordances for Community-Driven Environmental Movement in Rural Malaysia," Information Systems Journal (28:1), pp. 48-75.
39	Tumbas, S., Berente, N., and Brocke, J. v. 2018. "Digital Innovation and Institutional Entrepreneurship: Chief Digital Officer Perspectives of Their Emerging Role," Journal of Information Technology (33:3), pp. 188-202.
40	Whelan, E., Golden, W., and Donnellan, B. 2013. "Digitising the R&D Social Network: Revisiting the Technological Gatekeeper," Information Systems Journal (23:3), pp. 197-218.
41	Woodard, C. J., Ramasubbu, N., Tschang, F. T., and Sambamurthy, V. 2013. "Design Capital and Design Moves: The Logic of Digital Business Strategy," MIS Quarterly (37:2), pp. 537-564.
42	Yeow, A., Soh, C., and Hansen, R. 2018. "Aligning with New Digital Strategy: A Dynamic Capabilities Approach," Journal of Strategic Information Systems (27), pp. 43–58.