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Differential effects of information technology on competitive positioning

Effects of IT on
competitive
positioning

1923

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Abstract

Purpose – Information technology (IT), combined with complementary resources, can contribute to companies' competitive positioning. However, to assess the contribution of IT to value with respect to the contribution of complementary resources, it is crucial to understand the means by which IT creates value.

Design/methodology/approach – This paper synthesizes empirical research on the inherent capabilities of IT and their moderating role to build an integrative model.

Findings – We found that IT creates value through three inherent capabilities: transactional, exchange and codification capabilities. These capabilities can be regarded as moderators of the relationship between IT and competitive advantage. This moderating role of IT in competitive positioning is illustrated by examples from previous empirical publications.

Research limitations/implications – The paper contributes to IT business value (ITBV) literature by developing an integrative model that (1) conceptualizes an aspect of IT value creation, which, thus far, has received only limited attention (namely, inherent capabilities) and (2) illustrates the moderating role of these capabilities in competitive positioning.

Practical implications – Inherent capabilities provide the theoretical foundation for a nuanced understanding of IT contribution with respect to complementary resources. This understanding may support IT executives in deriving adequate measurements and, thus, account for the differential effects of IT.

Originality/value – Compared to the literature, the proposed model represents a more coherent and holistic perspective of ITBV. Thus, the model may constitute a foundation for future ITBV research and promote more detailed analytic perspectives of ITBV.

Keywords Business value, Competitive advantage, Information technology, Inherent capabilities, Value creation

Paper type Research paper

1. Introduction

Contrary to early studies (Hackett, 1990), recent studies have reported a positive and significant relationship between information technology (IT) investments and productivity (Byrd *et al.*, 2006; Chou *et al.*, 2014; Dedrick *et al.*, 2003) and other operational performance measurements (Hong and Ghobakhloo, 2013; Meixell, 2006). As statistical evidence of the value of IT has become more common, the focus has shifted from *whether* IT creates value to *how* and *why* IT creates value (Neumeier *et al.*, 2017). Researchers commonly agree that IT does not create value, *per se*. It only creates value in combination with complementary resources, such as humans and processes (Liang *et al.*, 2010; Neumeier *et al.*, 2017). This, in turn, means that IT must be effectively implemented in organizational structures. Therefore, much of the recent IT value research has emphasized contextual factors that influence the effectiveness of IT. Such complementary factors include job training (Barczak *et al.*, 2007), business process engineering (Altinkemer *et al.*, 2011) and management (Khayer *et al.*, 2020;

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Lai *et al.*, 2006). Researching contextual factors not only contributes to a better understanding of how to improve return on IT investment but also helps to explain the varying IT effects across individual firms (Wiengarten *et al.*, 2013).

This research path, however, examines only one aspect of IT value. The other aspect – how and why IT creates value – is the actual value contribution of IT in proportion to the contribution of complementary resources. In other words, value can be regarded as the outcome of a multivariable equation in which IT accounts for only one variable despite other complementary resources. The IT variable and its effectiveness can vary as the IT variable is dependent on contextual factors. However, the means by which IT creates value are implicit and fragmented in the current body of literature. Therefore, this paper examines the means by which IT creates value. To avoid confusion with the capabilities of IT departments, which are typically referred to as IT or IS capabilities (Hong and Ghobakhloo, 2013; Ravichandran, 2018), this paper uses the term *inherent capabilities of IT*. This term was selected because the means by which IT creates value are inherent in IT and only create value in combination with other resources (Liang *et al.*, 2010). Therefore, the inherent capabilities of IT are the actual value creators of IT.

The research perspective described above is widely neglected in the literature, but it is important to advancing our understanding of IT value creation and, thus, developing a more nuanced account of the differential effects of IT (Kim *et al.*, 2018; Schryen, 2013). The need for further research within this field was best described by Mistry (2006), who suggests that “any analysis of the impact of IT in the IT literature may be incomplete if it does not disaggregate the IT variable and examine the impact of IT differentially [on firm performance]” (p. 341). In addition, “each IT [...] type requires a different duration to achieve its value on firm performance because each type has unique characteristics” (Kim *et al.*, 2018, p. 465). This means that different types of IT affect firm performance differently in duration and firm performance measurements. Therefore, this conceptualization aims to provide the theoretical foundation to holistically disaggregate the total IT investments of firms into IT types to account for the differential effects of IT.

To investigate the inherent capabilities of IT and their impact on business value, this research applied Porter’s generally accepted building blocks of competitive advantage (Dewett and Jones, 2001; Porter, 1985), i.e. *efficiency*, *quality*, *innovation* and *customer responsiveness*. Thus, this research goes beyond the typical economic measurements, such as productivity, profitability and revenue, by linking IT to the four differentiating paths on which a company can focus. Specifically, value is defined as an improvement of one of the four dimensions of competitive advantage. Furthermore, the study builds on the widely acknowledged view that IT moderates the relationship between organizational characteristics and organizational outcomes (Dewett and Jones, 2001; Liang *et al.*, 2010). In other words, the intention of this research is to define and describe the moderating role of IT by determining the inherent capabilities of IT (i.e. how IT creates value) and their impact on the four dimensions of competitive advantage (i.e. the value contribution of IT).

The paper contributes to IT business value (ITBV) research by providing a detailed account of the inherent capabilities of IT and describing the moderating role of IT in competitive positioning. Specifically, we organize the ways in which IT can produce business value, which provides future research with a more coherent and holistic perspective of the business value of IT. Although previous researchers have touched on the effect of IT on some of the four dimensions of competitive advantage (Lai *et al.*, 2006), a model that concisely illustrates a holistic view of competitive advantage, moderated by IT, is absent from the literature (Dewett and Jones, 2001; Schryen, 2013). Thus, we aim to develop a model that can be used as a basis for future research to ensure a more comprehensive approach to investigating ITBV.

2. Methodology

The purpose of the literature search was to identify empirical studies that could be used as the basis for classifying the inherent capabilities of IT with respect to their value contributions to competitive advantage. These aspects have not yet been explicitly collected and organized within the literature, a gap we seek to fill. The review followed [Leidner and Kayworth's \(2006\)](#) methodological approach of developing (1) a strategy for searching the literature, (2) criteria for selecting literature for this review and (3) a scheme for documenting and analyzing the selected literature.

Regarding the search strategy, we decided not to limit the search to articles that explicitly mentioned the term ITBV, as many studies deal with the topic without using this term. However, as ITBV refers only to certain types of value, a general search for *value* in the context of IT was considered too broad. To identify relevant terms for the literature search, literature on ITBV was inspected, and possible search strategies were discussed with other researchers in the field. The development process of the search string was iterative, alternating between brainstorming keywords and adding additional keywords generated from the literature. This process gave rise to a search delimitation with the purpose of excluding literature that did not address in detail the type of business value in focus. Specifically, the dimensions of [Porter's \(1985\)](#) framework of competitive advantage (i.e. efficiency, quality, innovation and customer responsiveness) were used to delimit the search. The following search string was applied in two relevant databases for management, engineering and information system literature (namely, SCOPUS and Web of Science):

“value creation” OR “IT value” OR “business value” OR “enterprise IT value” OR “IT impact” OR “IT contribution”) AND (“information technology” OR “information system”) AND (efficiency OR innovation OR quality OR “customer responsiveness”).

After duplicates were removed, the search results included 481 journal articles written in English, retrieved on April 24, 2019. The remaining papers were grouped by journal, which, in turn, were sorted from high- to low-ranking journals, according to the Scimago Institutions Rankings 2017 [1]. To limit the number of articles, we focused on articles from the top 20 journals, as well the remaining five journals of the IS basket of eight journals ([Lowry et al., 2013](#)) that did not fall among the top 20 journals. The underlying assumption for this selection criterion was that significant inherent capabilities of IT could be derived from this literature selection alone. Thus, the limited article selection comprised 136 papers from 25 journals ([Table 1](#)).

After an abstract review of the 136 selected journal articles, 64 articles remained, which discussed the creation of IT value and detailed the value contribution. There were two criteria for full-text reading: the paper had to detail the way in which (*how*) IT creates value and had to specify the contribution of IT to competitive advantage. After the full-text reading, 30 papers from 12 journals remained (indicated by* in [Table 1](#)). These provided the empirical backbone for this paper to describe value creation and the contribution of IT. The results of the literature search and selection strategy are illustrated in [Figure 1](#).

The remaining 30 articles were analyzed using a coding procedure to highlight concepts and sentences related to the inherent IT capabilities. To process the concepts identified, they were grouped into themes, which subsequently were aggregated into dimensions ([Gioia et al., 2012](#)). The analysis process is further described in the next section.

3. An integrative model of IT value creation

Much research effort has focused on the quantification of business value in economic terms; far less effort, however, has been devoted to the moderating role of IT in competitive positioning. To be competitive and viable in the long run, a company must differentiate itself

Table 1.
Top 25 journals,
alphabetically

Journal	Articles per journal	
Academy of Management Review	1	
Accounting Review	1	
California Management Review	3	
European Journal of Information Systems*	7	1*
European Journal of Operational Research	3	
Information Systems Journal	2	
Information Systems Research*	22	4*
International Journal of Production Economics*	7	4*
Journal of Information Technology*	7	2*
Journal of Management*	1	1*
Journal of Management Information Systems*	26	5*
Journal of Operations Management*	4	1*
Journal of Product Innovation Management*	4	2*
Journal of Service Research	1	
Journal of Strategic Information Systems*	12	2*
Journal of the Academy of Marketing Science	1	
Journal of the Association of Information Systems	5	
Journal of the Travel Research	1	
Management Science*	6	4*
Manufacturing and Service Operations Management	1	
MIS Quarterly: Management Information Systems*	15	3*
Omega	2	
Organization Science*	2	1*
Production and Operations Management	1	
Review of Financial Studies	1	
25 journals / 12 journals*	136	30*

Note(s): *Journals and articles that remained after a full-text reading

Figure 1.
Steps for selecting
articles

by pursuing either a low-cost or differentiation strategy (Porter, 1985). Both strategies are affected by the four dimensions of competitive advantage: efficiency, quality, innovation and customer responsiveness. As indicated by the number of unique articles identified in the search results ($n = 481$), researchers have extensively addressed the relationship between IT and competitive advantage on some dimensions of competitive advantage individually

(Dewett and Jones, 2001; Dong and Wu, 2015; Leidner *et al.*, 2010; Mithas *et al.*, 2011). However, the current body of knowledge on the business value of IT, which views IT as a moderator for competitive positioning, is fragmented. Thus, an integrative model that would concisely describe the value creation of IT (i.e. how IT creates value) with respect to the four dimensions of competitive advantage is absent.

Of the 64 articles selected based on the abstract review, only 30 provided adequately detailed descriptions of value creation related to one or more dimensions of competitive advantage. Specifically, although many of the discarded articles examined and even measured the effect of IT on one or more dimensions of competitive advantage, they did not detail how IT created value nor did they specify the nature of the IT under investigation. Therefore, we could not include these papers, as they did not offer empirical evidence sufficient for our inductive work to determine the inherent capabilities of IT.

To increase the transparency of the inductive work, Pang *et al.*'s (2014) research was taken as an example. The authors describe how governments apply "integrated systems and communication technologies (assets) that enable [the] exchange [of] information [...] with external organizations" (p. 196). Furthermore, they stated that seamless information exchange between municipalities and local municipal agencies, such as fire departments and police, is crucial for guaranteeing effective emergency response services. Therefore, IT in the form of integrated systems and communication technologies "improve[s] the quality of public safety services throughout the county" (Pang *et al.*, 2014, p. 196) through information exchange. This means that one inherent capability of IT is exchanging information, and, as seen in this example, IT can contribute to increased quality.

Table 2 shows the antecedents of the 16 inherent capabilities of IT after abstraction from the application area and industry type, following the previously exemplified procedure. The antecedents, however, were still dependent on the dimensions of efficiency, quality, innovation and customer responsiveness. After we removed redundant categories and performed further abstraction of the competitive advantage dimensions, three predominant categories emerged: transactional, exchange and codification capabilities.

The quantitative part of the analysis is detailed in Table 3. The analysis was constructed as follows: First, each paper that discussed the inherent capabilities of IT and their contribution to competitive advantage received a count. Various combinations of inherent capabilities of IT and the dimensions of competitive advantage could be mentioned within a paper; thus, one paper could obtain multiple counts for various combinations. However, in the event the same combination of inherent capabilities of IT and dimensions of competitive advantage occurred multiple times within a single article, the combination was counted only once. The full table, which is the backbone of this paper, can be found in Appendix 1.

As seen in Table 3, IT as a contributor to efficiency was mentioned most frequently within the articles reviewed (73%). This was to be expected, given the large amount of extant research on productivity gains from IT investments (Aral *et al.*, 2012). Quality improvements were discussed in 40% of the papers. As IT typically requires standardized data and processes, increased quality was also expected (Angst *et al.*, 2012). The fostering of innovation by IT was mentioned in only 20% of the articles and was typically derived from knowledge exchange and increased market insights due to increased information processing (Barczak *et al.*, 2007). Finally, customer responsiveness appeared in 27% of the articles in association with gathering, storing and processing customer insights to better serve customers' needs (Mithas *et al.*, 2011).

Furthermore, the aggregation of the inherent capabilities of IT across the four dimensions of competitive advantage represented transactional (90%), exchange (63%) and codification (63%) capabilities (Table 3). The predominant inherent capability of IT per dimension of competitive advantage was the transactional capability to achieve efficiency gains,

Dimensions of competitive advantage	Initial capabilities grouped by the final three inherent capabilities of IT (themes)	References
<i>Transaction capability</i>		
Efficiency	Increased ability to process and analyze information for decision-making Increased ability to automate processes for increased output	Müller <i>et al.</i> (2018), Tambe (2014), Trantopoulos <i>et al.</i> (2017) Adjerid <i>et al.</i> (2018), Aral and Weill (2007), Chwelos <i>et al.</i> (2010), Davamanirajan <i>et al.</i> (2006), Fazlollahi and Franke (2018), Mukhopadhyay <i>et al.</i> (1997), Müller <i>et al.</i> (2018), Zhu and Kraemer (2005) Gardner <i>et al.</i> (2015), Leidner <i>et al.</i> (2010), Zhu and Kraemer (2005)
Quality	Increased ability to process information (error processing) to achieve better product or service quality Increased ability to automate alerts (error identification)	Angst <i>et al.</i> (2012), Thorogood <i>et al.</i> (2004)
Innovation	Increased ability to process information to identify competitive strength or innovations Increased ability to process information to visualize the design	Saldanha <i>et al.</i> (2017) Mauerhoefer <i>et al.</i> (2017)
Customer responsiveness	Increased ability to process information (strategic processing) to meet customer needs	Gardner <i>et al.</i> (2015), Po-An Hsieh <i>et al.</i> (2011), Roberts and Grover (2012)
<i>Exchange capability</i>		
Efficiency	Increased ability to communicate and collaborate to achieve information synergies	Chou <i>et al.</i> (2014), Davamanirajan <i>et al.</i> (2006), Dewett and Jones (2001), Fazlollahi and Franke (2018)
Quality	Increased ability to communicate and collaborate to achieve higher product or service quality	Feller <i>et al.</i> (2011), Pang <i>et al.</i> (2014), Reyes <i>et al.</i> (2012)
Innovation	Increased ability to communicate and collaborate to achieve information synergies Increased ability to coordinate and manage remote processes to achieve better outcomes	Dewett and Jones (2001), Dong and Wu (2015), Joshi <i>et al.</i> (2010) Mauerhoefer <i>et al.</i> (2017)
Customer responsiveness	Increased ability to coordinate and manage remote processes to achieve quicker responsiveness	Barczak <i>et al.</i> (2007), Mithas <i>et al.</i> (2011), Roberts and Grover (2012)
<i>Codification capability</i>		
Efficiency	Increased ability to access information quickly	Devaraj and Kohli (2003), Dominguez-Péry <i>et al.</i> (2013)
Quality	Increased ability to access information in a consistent manner to achieve better decision-making	Devaraj and Kohli (2000)
Innovation	Increased ability to access organizational memory to achieve innovation	Saldanha <i>et al.</i> (2017)
Customer responsiveness	Increased ability to access market requirements to achieve increased responsiveness	Barczak <i>et al.</i> (2007), Mithas <i>et al.</i> (2011)

Table 2.
Antecedents of
inherent capabilities of
information
technology

Inherent capability per dimension of competitive advantage	Absolute article count (<i>n</i> = 30)	Relative article count (<i>n</i> = 30)	Effects of IT on competitive positioning
<i>Efficiency</i>			
Transactional capability	21	70%	1929
Exchange capability	12	40%	
Codification capability	11	37%	
<i>Quality</i>			
Transactional capability	10	33%	
Exchange capability	5	17%	
Codification capability	9	30%	
<i>Innovation</i>			
Transactional capability	4	13%	
Exchange capability	4	13%	
Codification capability	4	13%	
<i>Customer responsiveness</i>			
Transactional capability	5	17%	
Exchange capability	6	20%	
Codification capability	6	20%	
Aggregated results	Absolute article count (<i>n</i> = 30)	Relative article count (<i>n</i> = 30)	Table 3. Analysis results of the reviewed articles
<i>Dimensions of competitive advantage</i>			
Efficiency	22	73%	
Quality	12	40%	
Innovation	6	20%	
Customer responsiveness	8	27%	
<i>Inherent capabilities of IT</i>			
Transactional capability	27	90%	
Exchange capability	19	63%	
Codification capability	19	63%	

mentioned in 70% of the articles (Table 3). The least-mentioned was the combination of all three inherent capabilities of IT regarding increased innovation, which was mentioned only four times in the literature.

The analysis results in Table 3 should be regarded as indicative rather than conclusive, as the selected sample size of empirical publications does not allow for any conclusions about importance to be drawn. This means that a higher count per relationship does not necessarily indicate greater significance. Instead, a high count per relationship simply indicates that this combination was explicitly mentioned more often than other combinations.

Based on the findings shown in Tables 2 and 3, Table 4 provides definitions and examples of the three inherent capabilities of IT. As shown, IT provides business value through these capabilities. For example, business analytics or planning systems provide transactional capabilities, meaning the ability to process, interpret and synthesize information and automate business processes. These systems contribute to efficiency, quality, innovation and customer responsiveness with their transactional capabilities depending on their context and purpose.

The organization of the literature, presented in Tables 3 and 4, led to the development of an integrative model of IT value creation (Figure 2). The model was built on the synthesis of previous research and specifies the inherent capabilities of IT and their contributions to competitive positioning.

Table 4.

Definition of inherent capabilities and information technology examples

Definition	Information technology example
<i>Transactional capability</i> The ability to automate existing business processes and process, interpret and synthesize information	Business analytics, such as data mining (Müller <i>et al.</i> , 2018) Planning systems, such as production and transportation planning (Mauerhoefer <i>et al.</i> , 2017)
<i>Exchange capability</i> The ability to exchange information within and across firms, enabling fragmented entities to connect, communicate and collaborate seamlessly	E-mail (Chou <i>et al.</i> , 2014) Enterprise service bus (Fazlollahi and Franke, 2018) Video conferencing, such as Skype (Dewett and Jones, 2001)
<i>Codification capability</i> The ability to capture and integrate information by making it easy to collect, organize, store and access across the organization	Data warehousing (Joshi <i>et al.</i> , 2010) Intranet (Dewett and Jones, 2001)

Figure 2.
Information
technology value
creation cube

To illustrate the dimensions of the model in Figure 2, a selection of examples identified in the literature is presented in Table 5. The contributions of the conceptualized inherent capabilities of IT to competitive positioning differ depending on the context.

4. Discussion

4.1 Theoretical contributions

This research contributes to the literature on ITBV by deriving an integrative model (Figure 2) that describes the actual value creation of IT in the four dimensions of competitive advantage. Specifically, this research explicitly defines how IT creates value and adds another aspect of the IT value creation process. These means are referred to in this paper as the inherent capabilities of IT, as they are inherent to IT and contribute to value only when combined with other resources. Thus, the inherent capabilities of IT illustrate how IT contributes to value (Figure 3). Three inherent capabilities of IT were derived from the selected articles (Table 3); these represent an attempt to describe how IT creates value (Neumeier *et al.*, 2017).

The inherent capabilities of IT form the theoretical foundation to disaggregate the sum of IT investments. Previous researchers typically regarded a company's IT investments monolithically, meaning as one IT asset, and linked the sum of IT investments to performance measurements. However, researchers have recently shown that different IT assets affect

Effects of IT on competitive positioning	
Dimension of competitive advantage	Example from the literature
<i>Transactional capability</i>	
Efficiency	As labor accounts for the primary cost driver in many industries, IT, with its ability to automate business processes, enables firms to reduce labor costs and, thus, allows companies to operate more efficiently (Aral and Weill, 2007; Chwelos <i>et al.</i> , 2010)
Quality	Using analytical tools for information processing, such as data mining or error proofing, can lead to the detection and reduction of errors within internal processes. Once errors are detected and accurately resolved, IT contributes to process, product and service quality (Gardner <i>et al.</i> , 2015)
Innovation	Gathering, interpreting and synthesizing objective data for organizational planning enables firms to scan the competitive environment efficiently and effectively to identify innovation opportunities (Joshi <i>et al.</i> , 2010)
Customer responsiveness	Sales analysis and data mining of customer reactions to firms' offerings can help firms to improve their products and services to better address customers' needs (Aral and Weill, 2007; Roberts and Grover, 2012)
<i>Exchange capability</i>	
Efficiency	The sharing of patients' medical information between disparate healthcare providers informs the providers about previous diagnostics and treatment in a timely manner. Informed by patients' medical history, providers can avoid redundant treatments and, thus, increase the efficiency and effectiveness of the treatment process (Adjerid <i>et al.</i> , 2018)
Quality	Collaboration and seamless information exchange between local municipal agencies, such as the fire department and police, can improve the quality of public safety services (Pang <i>et al.</i> , 2014)
Innovation	IT that supports direct interaction between employees by creating seamless networks of people, devices and knowledge fosters knowledge exchange and, thus, innovation (Joshi <i>et al.</i> , 2010)
Customer responsiveness	Specifically, the use of IT tools to facilitate cooperation and disseminate knowledge about customers among team members and suppliers has been shown to have positive effects on product design and, thus, in meeting customer needs (Barczak <i>et al.</i> , 2007; Mithas <i>et al.</i> , 2011)
<i>Codification capability</i>	
Efficiency	Utilizing data access systems allows firms to search and absorb knowledge from external knowledge sources to promote efficiency-enhancing activities and lower production costs (Trantopoulos <i>et al.</i> , 2017)
Quality	Decision support systems are designed to store day-to-day care data for each admitted patient. Having documented clinical data about treatment enables operational decision-makers to identify best practices and, thus, improve the quality of care (Devaraj and Kohli, 2000)
Innovation	IT facilitates organizational memory by capturing and integrating explicit knowledge. Such organizational memory can exceed the capacity of individuals; therefore, IT creates a larger and richer pool of codified knowledge. Due to the accessibility of that codified knowledge by individuals and teams, IT promotes innovation (Dewett and Jones, 2001)
Customer responsiveness	Firms need to leverage the voice of their customer to understand and address the diverse needs of customer segments. Therefore, it is crucial to capture information about customers to gain market intelligence for increased customer responsiveness (Mithas <i>et al.</i> , 2011)

Table 5.
Contextual examples of
inherent capabilities

Figure 3.
Inherent capabilities of
information
technology in context

different performance measurements (Kim *et al.*, 2018; Mistry, 2006). Therefore, with the conceptualization of the inherent capabilities of IT, this paper contributes to a nuanced understanding of IT value creation and, thus, may provide a theoretical foundation for future studies to “propose more exhaustive frameworks [...] to further advance the understanding of IT capital’s differential effects on firm performance” (Kim *et al.*, 2018, p. 465).

Furthermore, this research extends beyond the financial value of IT by illustrating the diverse facets of the moderating role of IT in competitive positioning (Table 4). Although previous researchers have touched on the effect of IT on some of the four dimensions of competitive advantage (Lai *et al.*, 2006), a model that concisely illustrates a holistic view of competitive advantage, moderated by IT, is absent in the literature (Dewett and Jones, 2001; Schryen, 2013). Therefore, we conceptualized an integrative model that, first, details the inherent capabilities of IT, thus describing how IT creates value, and second, illustrates the moderating role of IT in competitive positioning on the four dimensions of competitive advantage. This work constitutes a novel attempt to shed light on the value creation process of IT and the value contribution of IT to competitive positioning.

In summary, this paper contributes to the ITBV literature by providing a detailed account of the inherent capabilities of IT and describing the moderating role of IT in competitive positioning. Specifically, the developed model provides future researchers with a more coherent and holistic perspective of the business value of IT. This model may be used as a basis for future research to ensure a more nuanced approach to investigating ITBV. Specifically, no existing studies that considered all 16 inherent capabilities of IT were identified in the literature, only subsets. Therefore, use of the proposed model may promote research with a more detailed analytic perspective of ITBV.

4.2 Contributions to practice

Practitioners may use this research as an overview of the differential effects of IT, which extend beyond the typically assumed efficiency and productivity gains (Aral and Weill, 2007). Specifically, the integrative model (Figure 2) may draw managers’ attention to two central aspects of IT value creation: (1) applied in the right context, IT may contribute to efficiency, quality, innovation and customer responsiveness improvements; and (2) IT may

have a moderating role in competitive positioning. The emphasized aspect of IT value creation (namely, the inherent capabilities of IT) and its implications for the differential impact of IT may sensitize managers when they measure the value of IT. Put differently, IT investments do not necessarily affect firms' productivity through efficiency enhancements if the IT investment has an effect on service quality or customer responsiveness.

The inherent capabilities of IT may also provide practitioners with additional insights into the effect of IT at the process level, which may lead to a more nuanced understanding of IT value creation and its potential effects. Overall, the nuanced view on value creation combined with the overview of the differential effects of IT may advance knowledge on the effects of IT and possibly enable practitioners to perform a complete assessment of the benefits of IT (Kim *et al.*, 2018; Melville *et al.*, 2004; Mistry, 2006; Schryen, 2013; Xue *et al.*, 2012). The practical relevance of the model of inherent capabilities is illustrated by examples from the literature (Table 5).

To operationalize the integrative model, practitioners may organize IT assets under the two dimensions of the integrative model: (1) the building blocks of competitive advantage and (2) the inherent capabilities of IT. To do so, two types of data should be available: (1) the IT application catalogue, depicting all IT assets (typically owned by IT asset management); and (2) the business process blueprint or business capability model to understand the context of the IT assets. If the latter is not formalized, or additional information is needed to be able to categorize individual IT assets, interviews with process and service owners should be conducted.

Based on the classification of IT assets, the implications for practitioners are twofold. First, the organization of IT assets along the two axes indicates whether the current IT landscape appropriately supports firms' strategies and where future IT investments should be placed. Therefore, the overview of IT assets allows practitioners to analyze current business–IT alignment and to derive roadmaps for future IT investments. Second, for each category of the integrative model, such as transactional capability and efficiency, appropriate key performance indicators can be developed to assess the value of IT. Using the definitions of the inherent capabilities of IT (Table 4) and the empirical examples of each category (Table 5), practitioners may assess the value of IT through an improved understanding of the actual effect of each category within the integrative model.

4.3 Limitations and future research

The article has three potential limitations. The first limitation is that the study was restricted to 25 top journals. Although these journals cover a large and significant portion of the work in this research field, wider coverage of journals could provide additional insights. However, it maybe expected that studies published in top journals, because of their rigor, would have identified the inherent capabilities of IT along the dimensions of competitive advantage.

The second limitation concerns the search strategy, which used Porter's four building blocks of competitive advantage (efficiency, quality, innovation and customer responsiveness) to delimit the search. In this context, it is possible that excluding this delimitation would have produced additional results. However, this seems unlikely, as the four building blocks are generally accepted dimensions used to describe organizational outcomes (Dewett and Jones, 2001). Furthermore, in cases where IT was linked to other organizational outcomes – such as customer satisfaction, productivity and revenue – described in detail, it can be logically asserted that the dimension of quality or customer responsiveness was mentioned when discussing customer satisfaction or revenue, whereas efficiency may have been detailed in the context of productivity.

Although the overall purpose of the paper was to advance our understanding of IT value creation, it may also have practical value. In this context, there is a limitation concerning the application of the model. Specifically, although the integrative model is based on prior

empirical research, the practical applicability remains to be tested, for example, by case study research. In this context, it should be noted that the examples identified in the literature (Table 5) support the model's practical relevance.

Another future research avenue could be to investigate whether the extent of the moderating role of IT varies according to competitive positioning. For example, IT tools with transactional capabilities and the ability to automate processes might have a stronger effect on improving efficiency than on fostering innovativeness. Similarly, IT with primarily codification capabilities might impact innovation more than efficiency. This might be because innovation is tightly coupled with knowledge and the availability of knowledge, whereas efficiency enhancements are related to process improvements. Therefore, an IT tool with codification capabilities might make a stronger contribution to innovation (as the knowledge base for innovation) than to efficiency. As the inherent capabilities of IT might differ in their effect on the four dimensions of competitive advantage, it would be interesting to determine which combination yields the strongest and weakest results. Such insights could advance the field by highlighting the "better" fit of IT tools for a given purpose, thus leading to the optimization of the "value-for-money" of IT.

Another interesting research path would be to derive meaningful measurements or key performance indicators for each individual dimension. For example, efficiency-enhancing IT can be captured in productivity gains (Thatcher and Oliver, 2001), whereas quality improvements in customer service might be measured by increased customer satisfaction or brand reputation (Mithas *et al.*, 2016). Nevertheless, there is a strong interest in expressing the value of IT in financial terms. Therefore, scholars are invited to build upon the advances made in our understanding of the differential effects of IT and to determine a financial IT value model that can account for the differential effects of firms' IT assets holistically.

5. Conclusion

To understand the value of IT, it is important to reflect on not only the conditions under which IT creates value but also the means by which it creates value. Therefore, this study contributes to IT research in two ways: (1) by improving our understanding of IT value creation by conceptualizing and defining the inherent capabilities of IT and (2) by describing the effects of these capabilities on efficiency, quality, innovation and customer responsiveness. In other words, this paper contributes by conceptualizing an aspect of IT value creation and by highlighting the moderating role of IT in competitive positioning.

The derived inherent capabilities of IT include transactional, exchange and codification capabilities, which reflect how IT moderates competitive positioning. Each IT system can be characterized by at least one of these three inherent capabilities. Depending on the context in which the IT system is deployed, the respective inherent capabilities impact efficiency, quality, innovation and customer responsiveness differently. Thus, linking the inherent capabilities of IT to the dimensions of competitive advantage constitutes a novel way of understanding IT value creation and its differential value contributions.

Note

1. www.scimagojr.com/journalrank.php

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JOURNAL PAPER	COMPETITIVE ADVANTAGE				EFFICIENCY			QUALITY		INNOVATION			CUSTOMER RESPONSIVENESS		
	EFFICIENCY	QUALITY	INNOVATION	CUSTOMER RESPONSIVENESS	TRANSACTIONAL CAPABILITY	EXCHANGE CAPABILITY	CODIFICATION CAPABILITY	TRANSACTIONAL CAPABILITY	EXCHANGE CAPABILITY	CODIFICATION CAPABILITY	TRANSACTIONAL CAPABILITY	EXCHANGE CAPABILITY	CODIFICATION CAPABILITY		
Adjerid <i>et al.</i> , 2018	1	0	0	0	1	1	1	0	0	0	0	0	0	0	
Angst <i>et al.</i> , 2012	1	1	0	1	1	1	0	1	1	1	0	0	0	0	
Aral and Weill, 2007	1	0	1	1	1	0	0	0	0	0	1	0	0	1	
Barczak <i>et al.</i> , 2007	0	0	0	1	0	0	0	0	0	0	0	0	0	1	
Chou <i>et al.</i> , 2014	1	0	0	0	1	1	1	0	0	0	0	0	0	0	
Chwelos <i>et al.</i> , 2010	1	0	0	0	1	0	0	0	0	0	0	0	0	0	
Davamanirajan <i>et al.</i> , 2006	1	0	0	0	1	1	0	0	0	0	0	0	0	0	
Devaraj and Kohli, 2000	1	1	0	0	1	0	1	1	0	1	0	0	0	0	
Devaraj and Kohli, 2003	1	1	0	0	1	0	1	1	0	1	0	0	0	0	
Dewett and Jones, 2001	1	1	1	0	1	1	1	0	0	1	0	1	1	0	
Dominguez-Péry <i>et al.</i> , 2013	1	1	0	0	0	0	1	0	0	1	0	0	0	0	
Dong and Wu, 2015	0	0	1	1	0	0	0	0	0	0	0	1	1	0	
Fazlollahi and Franke, 2018	1	0	0	0	1	1	0	0	0	0	0	0	0	0	
Feller <i>et al.</i> , 2011	1	1	0	0	1	0	0	1	1	0	0	0	0	0	
Gardner <i>et al.</i> , 2015	0	1	0	1	0	0	0	1	0	1	0	0	0	1	
Joshi <i>et al.</i> , 2010	0	0	1	0	0	0	0	0	0	0	1	1	0	0	
Leidner <i>et al.</i> , 2010	1	1	0	0	1	1	1	1	1	1	0	0	0	0	
Mauerhoefer <i>et al.</i> , 2017	1	0	1	0	1	1	1	0	0	0	1	1	0	0	
Mithas <i>et al.</i> , 2011	0	0	0	1	0	0	0	0	0	0	0	0	1	1	
Mukhopadhyay <i>et al.</i> , 1997	1	1	0	0	1	0	0	1	0	0	0	0	0	0	
Müller <i>et al.</i> , 2018	1	0	0	0	1	0	0	0	0	0	0	0	0	0	
Pang <i>et al.</i> , 2014	1	1	0	1	1	1	0	1	1	1	0	0	0	1	
Po-An Hsieh <i>et al.</i> , 2011	0	0	0	1	0	0	0	0	0	0	0	0	0	1	
Ravichandran, 2018	0	0	0	1	0	0	0	0	0	0	0	0	1	1	
Reyes <i>et al.</i> , 2012	1	1	0	0	1	1	1	1	1	1	0	0	0	0	
Saldanha <i>et al.</i> , 2017	0	0	1	0	0	0	0	0	0	0	1	0	0	0	
Tambe, 2014)	1	0	0	0	1	0	1	0	0	0	0	0	0	0	
Thorogood <i>et al.</i> , 2004	1	1	0	0	1	0	0	1	0	0	0	0	0	0	
Trantopoulos <i>et al.</i> , 2017	1	0	0	0	1	1	1	0	0	0	0	0	0	0	
Zhu and Kraemer, 2005	1	0	0	0	1	1	0	0	0	0	0	0	0	0	
Absolute Count	22	12	6	8	21	12	11	10	5	9	4	4	4	5	
Relative Count	71	39	19	26	68	39	35	32	16	29	13	13	13	16	
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	

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