



Sariseelia Sore

**IMPACT OF INFORMATION SYSTEM CAPABILITIES
ON BUSINESS VALUE CREATION:
ASPECTS OF IT-PRODUCING AND
IT-CONSUMING COMPANIES**



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Abstract

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As information technology (IT) continues to offer new business opportunities with its evolution, companies are increasingly looking to exploit IT solutions in their business. When it comes to leveraging these opportunities, small- and medium-sized enterprises (SMEs) face challenges in keeping pace with larger companies and thus need external assistance. To develop an IT-enabled business, seeking the support of an IT-producing company is an excellent option. However, despite the obvious need, very little is known about the role of IT-producing companies in the value creation of their B2B customers. This dissertation thus aimed to gain a comprehensive understanding of IT-producing and IT-consuming companies' information system (IS) capabilities on the business value creation of the latter.

The study is based on five scientific publications and follows the explanatory sequential design of mixed methods research. The quantitative data for the first four publications were collected from Finnish small- and medium-sized online store operators using a structured online questionnaire, and the qualitative data for the fifth publication were collected by conducting ten interviewees in two IT-producing companies operating in Finland.

As the results show, to provide their customers with the best possible business value, IT-producing companies believe that they need to shift their focus of investment in IS capabilities from technical expertise to long-term relationship capabilities. As for IT-consuming companies, they feel that relationship capabilities mainly affect their innovation performance, while other IS capabilities have a wider impact on their IS business value. The results offer new insights and guidance for managers on how IS capabilities can help create business value.

This thesis contributes to the performance management and IS management literature by introducing an innovative framework for IS capabilities, providing empirical evidence on the impact of each capability on business value creation for IT-consuming companies, and clarifying the differing views between IT-producing and IT-consuming companies on the importance of IS capabilities for business value creation. These new insights offer interesting prospects for further research on the mechanisms through which IT-producing and IT-consuming companies can create business value.

Keywords: IS capabilities, IS business value, value creation, B2B, IT-producing company, IT-consuming company, SME

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Since my youth, I have held a strong desire to explore phenomena in depth. During my studies, this passion turned into a desire to pursue a doctorate. When, as a mathematics student, I found that I enjoyed spending long hours in the library researching things, I realised that my wish could come true, even if the time was not right at that time. I had put the idea of pursuing a doctorate on the backburner, until I started working at the Lahti University of Applied Sciences. In 2015, I finally had the opportunity to begin realising this ambition, when I began work on a joint project with LUT University.

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Lahti, Finland

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Abstract

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List of publications

This dissertation is based on the following papers. The rights have been granted by publishers to include the papers in the dissertation.

- I. Saunila, M., Ukko, J., Nasiri, M., Rantala, T. and Sore, S. (2021). Managing supplier capabilities for buyer innovation performance in e-business. *Journal of Global Operations and Strategic Sourcing*, 14(3), 567-583.
- II. Saunila, M., Ukko, J., Sore, S., Rantala, T. and Nasiri, M. (2019). Managing buyer-supplier relationships in e-commerce projects: Implications for relationship value. *Supply Chain Forum: An International Journal*, 20(4), 299-309.
- III. Sore, S., Saunila, M. and Ukko, J. (2022). The view of IT-consuming firms on the key digital service capabilities of IT-producing firms. *Interdisciplinary Journal of Information, Knowledge, and Management*, 17, 577-600.
- IV. Ukko, J., Saunila, M., Sore, S., Rantala, T. and Nasiri, M. (2018). Turning e-business operations for business value. In *Proceedings of the 20th International Working Seminar on Production Economics*. Innsbruck, Austria, 19-23 February 2018. pp. 547-558.
- V. Sore, S., Saunila, M. and Ukko, J. (2017). Digital service capabilities in B2B value creation. In *Proceedings of the 18th International CINet Conference*. Potsdam, Germany, 10-12 September 2017. pp. 571-580.

Author's contribution

In paper I, Sariseelia Sore was responsible for designing and conducting the research (i.e., the literature review, empirical data collection, and methodology). She participated in the writing and forming conclusions together with the co-authors.

In papers II and IV, Sariseelia Sore was responsible for designing and conducting the research (i.e., literature review, empirical data collection, and methodology). She participated in the data analysis, writing, and forming conclusions together with the co-authors.

In papers III and V, Sariseelia Sore was the principal author and investigator. She was responsible for designing and conducting the research (i.e., literature review, empirical data collection, methodology, data analysis, and methodology). She was responsible for writing the article and forming the conclusions. The papers were finalized and revised in collaboration with the co-authors.

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1 Introduction

1.1 Research background and motivation

Today, with the continuous and rapid development of information technology (IT), its impact on the business environment is greater than ever before (Burton-Jones et al., 2021; Teng and Tsinopoulos, 2021), making business development through IT unavoidable (Fernández-Portillo et al., 2022; Aydiner et al., 2019; Khin and Ho, 2019). It has been long and widely accepted that IT adds business value (e.g., Fernández-Portillo et al., 2022; Gellweiler and Krishnamurthi, 2021; Gandelman et al., 2017), although not on its own but complemented by other organizational resources (e.g., Seufert et al., 2021; Powell and Dent-Micallef, 1997). Indeed, it has been shown that information system (IS) capabilities—the collective organizational abilities that focus on leveraging IT for the efficient execution of tasks and the achievement of desired outcomes (e.g., Aydiner et al., 2019)—impact business value (e.g., Felipe et al., 2020). However, there is no consensus in the literature about which IS capabilities are the most essential or about which value creation mechanisms are most essential to business value creation (Teng and Tsinopoulos, 2021; ZareRavasan and Krčál, 2021; Schryen, 2013).

Since the impact of IT on the business environment is changing at an accelerating pace (Burton-Jones et al., 2021; Teng and Tsinopoulos, 2021), the identification of new opportunities for business value creation necessitates an ongoing review of IT developments. Companies engaged in their own business, especially small- and medium-sized enterprises (SMEs), do not always have the resources to explore new business opportunities, which limits their ability to benefit from emerging technologies (Eikebrokk and Olsen, 2020; Eller et al., 2020; Prajogo and McDermott, 2014). Value creation through IT thus requires support from outside the IT-consuming company (Eikebrokk and Olsen, 2020), and since IT-producing companies know the potential of IT, they are excellent players in this task. Thus, it is crucial to know what role an IT-producing company can play in creating value for its customers. This is important not only for IT-consuming companies but also for IT-producing companies, as research shows that when a company creates value for the customer, it ultimately creates business value for itself (Gellweiler and Krishnamurthi, 2021; Teng and Tsinopoulos, 2021; Ainin et al., 2015).

Research on IS business value has long focused on the direct economic impact of IT on IT-consuming companies (Gellweiler and Krishnamurthi, 2021; Ong and Chen, 2014; Jiménez-Zarco et al., 2006), and less attention has been paid to its non-economic impacts (Gellweiler and Krishnamurthi, 2021; Chan, 2000). However, it is now widely accepted that IS business value cannot be measured solely from an economic perspective (Priambodo et al., 2021; Gandelman et al., 2017), as the impact of IT is generally reflected in the antecedents of financial performance (Ågerfalk et al., 2020; Schryen, 2013; Kohli and Grover, 2008), such as operational efficiency (e.g., Chatterjee et al., 2021). There is, evidently, a need to examine the impact of IT not only on direct economic performance but also on various indirect business performance.

IS capabilities have been actively studied for a long time (Teng and Tsinopoulos, 2021; Aydiner et al., 2019), and several categorizations, concepts, and their interrelationships have been proposed and used, leading to ambiguity in the results obtained (Teng and Tsinopoulos, 2021; Ashrafi and Mueller, 2015; Chae et al., 2014). Most of the categorizations created and studies conducted focus on the IS capabilities needed to create business value within a single company, and only a few studies have looked at the IS capabilities needed to create value in B2B relationships—in particular, between IT-producing and IT-consuming companies. Although long-term B2B relationships have been found to positively impact the performance of the business parties (e.g., Prasetya et al., 2021; Rahmati et al., 2021; Zou et al., 2021), it remains unclear how value is created through these relationships (Skarmas et al., 2018; Grover and Kohli, 2012; Sarker et al., 2012). It is thus necessary to examine the IS capabilities of IT-consuming companies, not only in terms of the use of IT solutions but also in terms of cooperation with IT-producing companies. In turn, the IS capabilities of IT-producing companies must be examined in the new business environment, where they seek to create the best possible business value for their customers instead of merely acting as technology suppliers.

1.2 Research problem and objectives

The need to harness IT to create business value is linked to business management—in particular, performance management and IS management. In practice, to operate successfully and understand how IT can best help them achieve their goals, managers must identify the business areas that should be developed through IT. Although there is little research on the causal relationship between IT and business value in performance management (Nasiri, 2021; Nudurupati et al., 2016; Melnyk et al., 2014), IS management research offers a wealth of information on the subject. However, several aspects have remained at least partially unexplored (ZareRavasan and Krčál, 2021) and conflicting findings have been produced, leading to calls for further research on the relationship between IT and business value (Teng and Tsinopoulos, 2021). In particular, the value creation process of IT in the current business environment has not been sufficiently studied in terms of performance indicators, IS capabilities, and interfirm relationships, especially between IT-producing and IT-consuming companies (ZareRavasan and Krčál, 2021; Skarmas et al., 2018; Schryen, 2013; Grover and Kohli, 2012; Sarker et al., 2012).

Knowing that IT assets need to be supported by organizational capabilities to deliver real business value (e.g., Seufert et al., 2021; Mikalef and Pateli, 2017; Chuang and Lin, 2015), these IT-related capabilities and their business value-creating effects have been studied extensively (e.g., Baird and Maruping, 2021; ZareRavasan and Krčál, 2021; Teng and Tsinopoulos, 2021; Aydiner et al., 2019). Despite the amount of research and the importance of the matter, the existing literature has not yet reached a consensus on the most crucial IS capabilities or the key mechanisms through which business value is created (Teng and Tsinopoulos, 2021; ZareRavasan and Krčál, 2021; Schryen, 2013). This study aimed to address this research gap by attempting to create a comprehensive categorization of IS capabilities that considers the needs identified in the literature from

different disciplines as well as those arising from the current IT-driven business environment. This knowledge base led to an innovative categorization that, instead of looking only at the IS capabilities of an IT-consuming company, emphasizes the IS capabilities of an IT-producing company in creating value for its customers.

Since there is no consensus in the literature regarding the performance indicators of IS business value, further research is needed to identify the performance effects of IS (Gellweiler and Krishnamurthi, 2021; Gandelman et al., 2017). In contrast to several previous studies (see Gellweiler and Krishnamurthi, 2021), this study followed the call to consider not only direct economic performance indicators but also indirect, non-economic performance indicators in IS business value (Priambodo et al., 2021; Gandelman et al., 2017). This study thus tested the developed categorization of IS capabilities in an empirical setting using several different performance indicators.

Although SMEs seek to increasingly implement different IT solutions (Zach et al., 2014), they have lagged behind large companies in adopting IT (Eller et al., 2020), and they have more difficulty realizing IT value than large companies (Eikebrokk and Olsen, 2020; Eller et al., 2020). However, the rapid development of IT may be an opportunity for SMEs, as they differ from large companies in a number of ways that are likely to positively influence the adoption and use of IT solutions. For example, compared to larger companies, SMEs are more flexible in their structures and processes and have better information flow (Zach et al., 2014). These make them relatively agile in change (Ardito et al., 2021), which, in turn, facilitates the experimentation of new business opportunities through IT (Nasiri, 2021). Given the economic importance of SMEs (Zach et al., 2014), surprisingly little is known about their use of IT in business (Eller et al., 2020) or the mechanisms of IS business value creation, particularly between companies (Eikebrokk and Olsen, 2020). In addition, as SMEs are dependent on external inputs and cooperation with other companies (Eikebrokk and Olsen, 2020), they are an important research topic in the context of this study, and SMEs were thus selected to represent IT-consuming companies.

To summarize, since IT is evolving rapidly and constantly offering new business opportunities (Teng and Tsinopoulos, 2021), its use in business development has become a necessity to keep companies competitive (Fernández-Portillo et al., 2022; Aydiner et al., 2019; Khin and Ho, 2019). However, SMEs struggle in keeping up with large companies regarding this development (Eller et al., 2020). They need external help (Eikebrokk and Olsen, 2020), and IT-producing companies are well-suited to provide valuable support for IT-enabled business development. However, the understanding of the capabilities needed by IT-producing companies to deliver best value to their customers is still relatively limited (e.g., ZareRavasan and Krčál, 2021). To enable optimal mutual benefits between IT-producing and IT-consuming companies, it is essential for both parties to possess not only the capabilities related to IT solutions (e.g., Seufert et al., 2021; Mikalef and Pateli, 2017; Chuang and Lin, 2015), but also the capabilities to effectively interact with each other, particularly during a long-term relationship (Blocker et al., 2011). Research on the effects of these capabilities on

business value, particularly in IT-consuming SMEs, is relatively scarce (Eikebrokk and Olsen, 2020). Consequently, this brings to light the presence of a research gap, and this gap merits further exploration. Moreover, there is a growing recognition that the business benefits derived from IT are not primarily reflected directly in financial results, but rather in the preceding indirect results (e.g., Priambodo et al., 2021; Ågerfalk et al., 2020). This underscores the relevance of studying the effects of IS capabilities on both types of performance indicators.

Research on the new business environment described above has gaps that this dissertation aims to address by presenting a new construction for IS capabilities and testing it in an empirical setting by considering various performance indicators of IS business value. The main objective of this study was to discover *how IT-producing and IT-consuming companies' IS capabilities impact the business value creation for the latter*. To achieve this objective, two main research questions and sub-questions were crafted:

1. According to IT-consuming companies, which are the IS capabilities that impact their business value?
 - a. Which are the IS capabilities of the IT-producing company that impact the business value of IT-consuming companies?
 - b. Which are the IS capabilities of IT-consuming companies that impact their business value?
2. How do IT-producing companies consider achieving excellent IS capabilities that enable the creation of IS business value?

1.3 Scope of the study and key concepts

1.3.1 Scope of the study

The scope of this study was derived from two fields of literature—performance management and IS management—both of which are essential areas in management research (Franco-Santos et al., 2007). Performance management deals with developing the effectiveness and efficiency of individuals and teams to improve an organization's performance (Rao, 2016; Armstrong, 2006), while IS management considers the use of IS to help organizations achieve their goals (Laudon and Laudon, 2018; Kroenke and Boyle, 2016). According to IS management research, the difference between companies in terms of the business value created by IT depends on the company's capabilities to use IT (e.g., Felipe et al., 2020). Here, business value refers to the performance relative to a company's business objectives (Galankashi and Rafiei, 2021; Mitra et al., 2011; Franco-Santos et al., 2007). In this study, the two research fields were combined by adopting the theoretical perspective of IS capabilities and examining their effects on different areas of business value. The study, therefore, sought to connect IS management research with

performance management research while contributing to both fields of research. The scope of the study is illustrated in Figure 1.1.

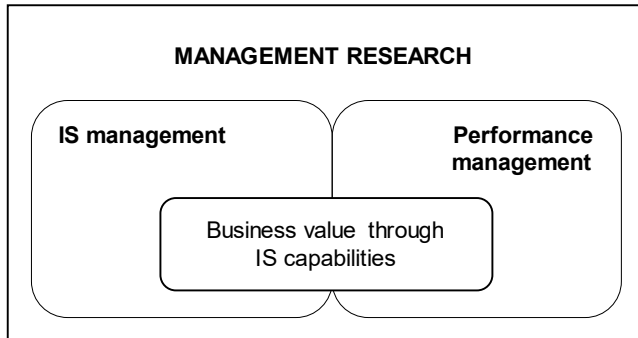


Figure 1.1: Scope of the study

Performance management

Performance management refers to the use of performance-measurement information, both financial and non-financial, in managerial activities (Pavlov et al., 2017; Franco-Santos et al., 2012; Amaratunga and Baldry, 2002). As such, performance management reaches different functions and levels of a company (e.g., Bititci et al., 1997) and does not exist in isolation (Pavlov et al., 2017; De Toni and Tonchia, 2001). Several different areas of management research—strategy, operations, IS, and human resource management—contribute to performance management (e.g., Franco-Santos et al., 2012; Richard et al., 2009; Franco-Santos et al., 2007). It can be argued that performance management promotes integration between these different business areas as well as the dissemination of business objectives throughout an organization (De Toni and Tonchia, 2001; Bititci et al., 1997).

Performance management is particularly important in the current dynamic IT-enabled business environment (Westerman et al., 2014), and the measurements must change with the development of the business (Wamba et al., 2015; Melnyk et al., 2014). Although it is argued that the performance of a future organization is inextricably linked to the development of IT (Wamba et al., 2015) and that companies that better combine IT-enabled operations with strong leadership are more successful than those that do not (Westerman et al., 2014), the impact of IT on business value has been barely studied in performance management research (Nasiri, 2021; Nudurupati et al., 2016; Melnyk et al., 2014). This has led to a lack of understanding of performance management in the IT-enabled business environment (Nudurupati et al., 2016; Melnyk et al. 2014). This study sought to fill this gap by examining which IS capabilities of IT-consuming and IT-producing companies are essential to various performance indicators of an IT-consuming company's IS business value, thus finding relevant areas to be measured and managed in an IT-enabled business environment.

IS management

IS management refers to the management and use of IS in a business to achieve goals (Laudon and Laudon, 2018; Kroenke and Boyle, 2016). Since IT spans all areas of a business, it tends to change all business processes and routines when deployed. Moreover, since IT often involves unfamiliar technical requirements, new capabilities are needed for conducting business, managing IT, and aligning IT and business (Berghout, 2020; Li et al., 2018; Tan et al., 2015). Due to the extent of the influence of IT in an organization, IS has been studied from a variety of perspectives, and several theories have been created, none of which have achieved dominance, suggesting that IS management research is a multidisciplinary field of study (Laudon and Laudon, 2018; Taylor, 2018; Halawi and McCarthy, 2006). The major disciplines contributing to IS management research follow technological and behavioral approaches, and these include disciplines such as computer science, operations research, management science, sociology, economics, and psychology study (Laudon and Laudon, 2018; Halawi and McCarthy, 2006). According to Laudon and Laudon (2019, p. 58), “no single approach effectively captures the reality of information systems,” thus suggesting adopting a sociotechnical view of systems, one that integrates the work of other disciplines, in IS management research.

The main research topics in IS management research have been IS use, which focuses on how people work with IS to achieve goals, and IS business value, which refers to the impacts of IS (Baird and Maruping, 2021; ZareRavasan and Krčál, 2021). Despite research periods spanning over the last 30 years, several aspects of the causal link between IS and business value have been partially left unaddressed (ZareRavasan and Krčál, 2021). For example, even though studies have shown that a company’s ability to exploit IT affects its business value (e.g., Felipe et al., 2020), the role and conditions of IS capabilities in the value creation process (ZareRavasan and Krčál, 2021; Schryen, 2013) as well as IS value creation in B2B relationships remain unclear (Skarmeas et al., 2018; Grover and Kohli, 2012; Sarker et al., 2012). In this context, this study aimed to fill these gaps by examining the IS capabilities of IT-consuming and IT-producing companies that affect business value creation and thus aimed to discover the role and conditions of various IS capabilities in the value creation process in a B2B setting.

1.3.2 Key concepts

In this chapter, the key concepts related to the scope of the study are introduced. The research variables are defined in Chapter 2, which covers the theoretical background.

Information technology (IT) and information system (IS)

The distinction between IT and IS remains somewhat unclear in the literature (Breznik, 2012; Boaden and Lockett, 1991), with the terms even being used interchangeably (Valacich and Schneider, 2016). Mainly, and as is also the case in this study, IT refers to technological resources such as hardware, software, and networks, and IS refers to a broader entity that includes both IT and human resources (Breznik, 2012; Wade and

Hulland, 2004; Boaden and Lockett, 1991). Since the terms information technology and information system are used generally using their abbreviations, they are also referred to as IT and IS in this study.

IT solution

The literature identifies a wide range of definitions for an IT solution. It can be considered a broad reference to all IT related to solving business problems (Chuang and Lin, 2015; Lerch and Gotsch, 2015). In this study, an IT solution refers to a software implementation to support a business solve one or more business problems.

Online store, e-commerce, and e-business

Online store, e-commerce, and e-business are interrelated concepts used interchangeably in the literature (Turban et al., 2015). In this study, an online store is defined as an IT solution in which trading can take place through an online channel. E-commerce, on the other hand, refers to the trading process made possible by an online store (Shandilya et al., 2022; Turban et al., 2015). E-business, the broadest concept of the three, has several definitions in the literature. It is often loosely defined to cover all use of IT solutions in both internal and external business (Jelassi and Martínez-López, 2020); however, sometimes, e-commerce is excluded from the definition (Kabrilyants et al., 2021; Turban et al., 2015). This study adopts this loose definition of e-business.

IT-producing company

In this study, IT production refers to software production. The software industry can be divided broadly into two subcategories: those that produce off-the-shelf general-purpose IT solutions that are in wide use (e.g., Microsoft), and those that develop custom IT solutions to support industry- and enterprise-specific processes (e.g., Accenture) (Rahmati et al., 2021; Guvendiren et al., 2014). The IT-producing companies in this study fall into the latter category.

IT-consuming company

An IT-consuming company refers to a company that purchases an IT solution from an IT-producing company. In the first phase of this study, an IT-consuming company refers to a Finnish SME that uses an online store as its sales channel. In the second phase of the study, an IT-consuming company refers more broadly to a company that utilizes in its business any IT solution produced by an IT-producing company.

Business performance and business value

Business performance and business value are closely intertwined concepts that are often used interchangeably. However, there is a slight difference between them (Gellweiler and Krishnamurthi, 2021; Ong and Chen, 2014; Mitra et al., 2011). Business performance refers to the measurable efficiency and effectiveness of a company per se, while business

value refers to the performance relative to a company's business objectives (Galankashi and Rafiei, 2021; Mitra et al., 2011; Franco-Santos et al., 2007). Consequently, business value is contextual and adaptable (Ågerfalk et al., 2020; Mitra et al., 2011).

IS business value

IS business value is a subset of business value that is related in one way or another with a company's IS (Gellweiler and Krishnamurthi, 2021; Seufert et al., 2021; Pathak et al., 2019; Gandelman et al., 2017; Schryen, 2013; Fink and Sukenik, 2011; Cao, 2010; Nevo and Wade, 2010; Kohli and Grover, 2008; Gregor et al., 2006; Melville et al., 2004). It comprises a set of performance indicators that are manifested at different levels and considered essential by stakeholders at any given time (Mitra et al., 2011; Nevo and Wade, 2010; Kohli and Grover, 2008; Gregor et al., 2006; Melville et al., 2004). In this study, these indicators include financial performance (e.g., Fernández-Portillo et al., 2022), operational performance (e.g., Pathak et al., 2019), sales performance (e.g., Eller et al., 2020), innovation performance (e.g., Hameed et al., 2021), and relationship value (e.g., Prasetya et al., 2021).

Organizational capabilities and IS capabilities

Organizational capabilities can be considered the outcome of harnessing and integrating an organization's collective abilities, along with other organizational resources, to efficiently execute tasks and achieve desired outcomes (Konopik et al., 2022). IS capabilities, on the other hand, represent a subset of these broader organizational capabilities specifically focused on leveraging IT (Aydiner et al., 2019; Ashrafi and Mueller, 2015; Wade and Hulland, 2004; Bharadwaj, 2000). In this study, IS capabilities recognize the capabilities of both IT-producing and IT-consuming companies that relate to their in-house operations concerning an IT solution, the production process of an IT solution, and the long-term relationship between the actors. These capabilities encompass, for example, an IT-producing company's capabilities to produce high-quality, fit-for-purpose IT solutions and to meet its customers' needs during the IT solution production process as well as the IT-consuming company's capabilities to exploit an online store technically and operate it in a customer-oriented manner.

1.4 Structure of the dissertation

The dissertation consists of two parts: the first is an introductory section offering an overview of the research; the second contains the five scientific publications on which this study is based. The introductory section first establishes the research background and motivation, the research problem, objectives, scope, the key concepts used, and the structure of the dissertation. Next, the theoretical background, consisting of the relevant literature and the conceptual framework of the study, is presented. This is followed by the research methodology chapter, which describes the research approach, the methods used, and the implementation of the research. In the next chapter, the results are presented, the publications are summarized, and the research questions are answered. The results are

then explained by evaluating their relationship with existing knowledge. The introductory section concludes by summarizing the theoretical and managerial implications, discussing the quality and limitations of the research, and suggesting directions for further research.

The publications presented in the second part of the dissertation are based on two sequentially collected empirical datasets. The first four publications are based on quantitative data collected from Finnish small- and medium-sized online store operators using a structured online questionnaire. The interview questions used to obtain the qualitative data used in the fifth publication were designed based on the results of the first four publications. The data were collected from ten interviewees from two IT-producing companies operating in Finland. These five publications were used to answer the research questions (Figure 1.2).

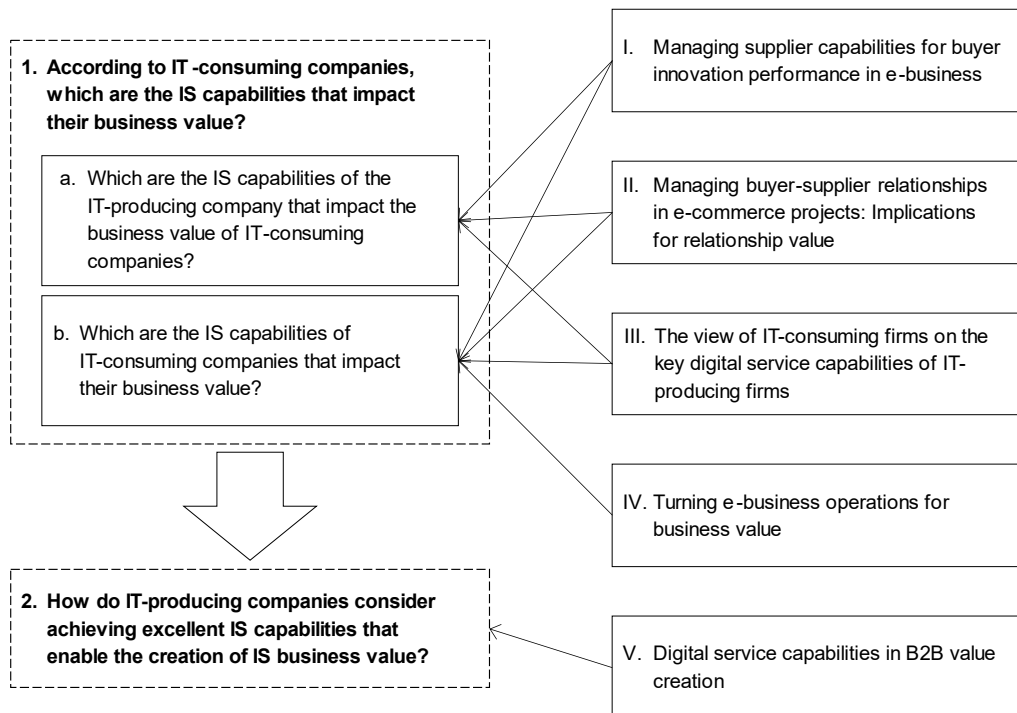


Figure 1.2: Relationships between the research questions and the publications

2 Theoretical background

This chapter introduces the capabilities related to IS and the business value they generate, forming the theoretical foundation for this research. The dimensions of this foundation have been synthesized from existing research. First, IS business value in terms of innovation, operational, sales, and financial performance as well as relationship value, are discussed. Second, IS capabilities in terms of IT solution quality, service quality, e-commerce, and relationship capabilities are introduced. Finally, the conceptual framework of the study based on the literature review is presented.

2.1 IS business value

Business development through IT has become unavoidable (Fernández-Portillo et al., 2022; Aydiner et al., 2019; Khin and Ho, 2019; Fitzgerald et al., 2014). Companies are increasingly seeking to exploit IT to respond to the changing business environment (Tallon et al., 2019; Verhoef et al., 2019), with the ultimate goal of adding business value (Gellweiler and Krishnamurthi, 2021; Eller et al., 2020). Although a few studies have questioned the value of IT for companies (Teng and Tsinopoulos, 2021), most researchers have found theoretical rationale and empirical evidence for positive operational and strategic implications of IT (Fernández-Portillo et al., 2022; Gellweiler and Krishnamurthi, 2021; Yu et al., 2021a; Felipe et al., 2020; Hensen and Dong, 2020; Ashrafi and Mueller, 2015; Schryen, 2013; Kohli and Grover, 2008). It is even considered a fact that IT can deliver value to organizations (Gandelman et al., 2017). However, the terms, definitions, and construction of IS business value are diverse in the literature (Gellweiler and Krishnamurthi, 2021; Ashrafi and Mueller, 2015; Schryen, 2013). Moreover, the term “IS business value” (e.g., Eikebrokk and Olsen, 2020; Schryen, 2013)—the value of IT for business—has been described in the literature using terms such as IT business value (e.g., Seufert et al., 2021; Popović et al., 2018), IS value (e.g., Ågerfalk et al., 2020), IT value (e.g., Gellweiler and Krishnamurthi, 2021; Chan, 2000), business value of IT (e.g., Pathak et al., 2019; Nevo and Wade, 2010), IS success (e.g., Rai et al., 2002), IT success (e.g., Sugumaran and Arogyaswamy, 2004), IS performance (e.g., Ragu-Nathan et al., 2004), IT performance (e.g., Mitra et al., 2011), and IT productivity (e.g., Oz, 2005). In this study, the term IS business value was chosen to emphasize the business context as well as the definition of IS, according to which IS includes, in addition to IT assets, other organizational resources. These IT-complementing resources have long been recognized as necessary for IS business value creation (e.g., Seufert et al. 2021; Powell and Dent-Micallef, 1997), due in part to the organizational changes required to successfully leverage new IT (Eikebrokk and Olsen, 2020; Zhu et al., 2020; Liu et al., 2016; Gregor et al., 2006; Zhuang and Lederer, 2006).

There is no consensus on the definitions of business performance (synonyms: performance, company / firm performance, and so on (Gellweiler and Krishnamurthi, 2021)), dimensions, measurements (Santos and Brito, 2012; Richard et al., 2009), or value (Ong and Chen, 2014). However, in general, business performance refers to

understanding how a company can conduct its operations in a way that leads to success (Chatterjee et al., 2021; Mithas et al., 2011; Tangen, 2005). It is measured by the efficiency and effectiveness of business structures, units, processes, and workflows (Franco-Santos et al., 2007; Tangen, 2005) using indicators that vary in their level of specificity, meaningfulness, and impact (Mitra et al., 2011). According to the framework of Fitzgerald et al. (1991), these performance indicators can be divided into two main categories: the actual results (competitiveness, financial performance), and the determinants of results (quality, flexibility, resource utilization, and innovation) (Neely et al., 2000), reflecting the business performance dichotomy to financial and operational performance (Saunila, 2014). These indicators are also referred to as lagging and leading indicators to highlight the fact that financial results are derived from operational results (Suoniemi et al., 2021; Neely et al., 2000), and there is typically a time lag between the two (Gellweiler and Krishnamurthi, 2021; Seufert et al., 2021; Ågerfalk et al., 2020; Ji-fan et al., 2017; Schryen, 2013; Kohli and Grover, 2008). Ong and Chen (2014) also used a similar division when aiming to specify a distinction between business performance and business value, ending up defining the first as retrospective (Kohli et al., 2012), backward-looking (Tanriverdi, 2006) indicators, and the latter as potential (Kohli et al., 2012), forward-looking (Tanriverdi, 2006) indicators. This definition of business value refers to anticipating the future economic value of a company. This study, instead, uses the term business value to refer to both financial and operational performances that are meaningful for the goals set for the business (Galankashi and Rafiei, 2021; Mitra et al., 2011; Franco-Santos et al., 2007). Although business performance has been found to affect business value (Chatterjee et al., 2021), and even vice versa (Hameed et al., 2021; Ji-fan et al., 2017), it cannot always be determined whether individual performance indicators deliver value for the business (Mitra et al., 2011). This is because where performance is measurable, value is often inextricably linked to context and must be agreed upon (Ågerfalk et al., 2020; Mitra et al., 2011). In this approach, value is outlined by stakeholder perceptions that evolve through the evolution of the business environment, so the factors affecting value creation and / or their relative importance are likely to change over time (Tzempelikos, 2020). For example, an IT project with good financial performance may not add business value if the financial goals were met by abandoning features considered business-critical; conversely, an IT project with poor financial performance can bring value if the IT solution has all the essential features (Mitra et al., 2011), such as integration with other essential systems like CRM and ERP. Or, if more efficient IT-enabled workflows improve operational performance, no value is created if the time saved is not utilized for the benefit of the business (Schryen, 2013). In conclusion, although the concepts of value and performance are strongly intertwined and are often used interchangeably, they do not always go hand in hand (Gellweiler and Krishnamurthi, 2021; Ong and Chen, 2014; Mitra et al., 2011).

Despite numerous attempts, the concept of IS business value has also remained undefined in a generally accepted and consistent way (Gellweiler and Krishnamurthi, 2021; Ji-fan et al., 2017; Ashrafi and Mueller, 2015; Schryen, 2013; Fink and Sukenik, 2011; Oz, 2005). However, a quite commonly used definition states that IS business value refers to the impact of IT on business value (Gellweiler and Krishnamurthi, 2021; Seufert et al.,

2021; Pathak et al., 2019; Gandelman et al., 2017; Schryen, 2013; Fink and Sukenik, 2011; Cao, 2010; Nevo and Wade, 2010; Kohli and Grover, 2008; Gregor et al., 2006; Melville et al., 2004). Some researchers have extended the definition to cover different levels, such as process, company, and inter-organizational (Seufert et al., 2021; Fink and Sukenik, 2011; Cao, 2010; Nevo and Wade, 2010; Kohli and Grover, 2008; Gregor et al., 2006; Melville et al., 2004), and some to include different types, such as operational and financial (Nevo and Wade, 2010; Kohli and Grover, 2008; Gregor et al., 2006; Melville et al., 2004). Company-level performance indicators mirror the impact of IT on the entire organization, including inter-organizational functions, and they may appear, for example, in the form of revenue growth or improved supplier relationships, while process-level indicators reflect performance on a more specific level, and they may manifest, for example, as improved workflow efficiency or as the developed innovation processes (Gellweiler and Krishnamurthi, 2021; Seufert et al., 2021; Kohli and Grover, 2008). As for the types of performance indicators, they can be thought of as referring to the economic results that are considered to occur after a delay, and the determinants of those results that may occur directly after the deployment of IT. Financial performance indicators track the use of IT to reduce costs, increase revenue, or both (Mithas and Rust, 2016; Oh and Pinsonneault, 2007). However, it is generally accepted that IS business value cannot be measured solely from financial perspectives (Priambodo et al., 2021; Gandelman et al., 2017; Mitra et al., 2011; Oz, 2005), as the impacts of IT usually appear as determinants of economic results (Ågerfalk et al., 2020; Schryen, 2013; Kohli and Grover, 2008), such as operational efficiency (e.g., Chatterjee et al., 2021). Thus, in addition to financial performance indicators, IS business value should also include operational performance indicators, both of which can manifest themselves in both internal and inter-organizational performance. Based on the above, this study follows numerous other researchers (e.g., Gellweiler and Krishnamurthi, 2021) and defines IS business value as the impacts of IT on business value but complements the definition to include a bundle of different types of performance indicators that are manifested at different levels and are considered relevant by stakeholders at any given time (Mitra et al., 2011; Nevo and Wade, 2010; Kohli and Grover, 2008; Gregor et al., 2006; Melville et al., 2004).

The concepts of IS business value and performance are strongly interrelated, as IS business value is described by several performance indicators (Gellweiler and Krishnamurthi, 2021). However, there is no unambiguous view in the literature as to which performance indicators best describe IS business value (Gellweiler and Krishnamurthi, 2021; Gandelman et al., 2017). In IS business value research, the division between financial and operational performances is often reflected in the examination of tangible/intangible (e.g., Seufert et al., 2021), direct/indirect (e.g., Teng and Tsinopoulos, 2021), immediate/anticipated (e.g., Seufert et al., 2021), or short-term/long-term (Saeed et al., 2005) impacts on business performance. Even though the focus of the research has been on the relationship between IT and financial performance (Gellweiler and Krishnamurthi, 2021; Ong and Chen, 2014; Kuiper et al., 2011; Kohli and Grover, 2008), leaving non-financial impacts with less attention (Gellweiler and Krishnamurthi, 2021; Chan, 2000), the researchers have found both direct and indirect impacts of IT on business

value (Gellweiler and Krishnamurthi, 2021). The impacts manifest themselves in both internal and inter-organizational performance (Kohli and Grover, 2008) and different types, such as in both financial performance (e.g., Fernández-Portillo et al., 2022) and operational performance (e.g., Pathak et al., 2019), as well as more specifically in sales performance (e.g., Eller et al., 2020), innovation performance (e.g., Hameed et al., 2021), and relationship value (e.g., Prasetya et al., 2021). In this study, financial and sales performances related to economic results were considered as direct value indicators, and relationship value and operational and innovation performances as indirect value indicators.

Financial performance

Regarding IS business value, financial performance indicators aim to evaluate the use of IT to reduce costs, increase revenue, or both (Mithas and Rust, 2016; Oh and Pinsonneault, 2007). Numerous indicators of financial performance are used in business (Galankashi and Rafiei, 2021), such as profitability, which can be defined as the ratio of revenue to cost (Tangen, 2005), as well as various sales performance indicators, such as sales revenues and sales growth (Dieste et al., 2021; Galankashi and Rafiei, 2021; Dossi and Patelli, 2010; Richard et al., 2009). Because several studies have found a direct impact of IT on a company's financial performance (e.g., Fernández-Portillo et al., 2022; Ong and Chen, 2014), and also specifically on sales performance (e.g., Eller et al., 2020), they were considered part of the IS business value performance indicators in this study. Although many financial performance indicators are traditionally based on objective accounting (Ong and Chen, 2014; Venanzi, 2011; Dossi and Patelli, 2010; Richard et al., 2009; Jiménez-Zarco et al., 2006), subjective measures are also used (Richard et al., 2009). In this study, both financial performance and sales performance were formulated as subjective indicators to reflect the respondents' perceptions regarding the achieved outcomes (e.g., Eller et al., 2020).

Operational performance

Operational performance can be understood as a combination of company functions performed to achieve business objectives (Princewill and Needorn, 2022). It is thus typically measured with non-financial performance indicators (Ukko, 2009). Operational performance indicators encompass a range of measures that relate to different aspects of a company's operations, including productivity, efficiency, quality, delivery, time/speed, flexibility, dependability, innovation, and relationships (e.g., Princewill and Needorn, 2022; Prasetya et al., 2021; Sharma and Modgil, 2019; Trattner et al., 2019; Belekoukias et al., 2014; Kaplinsky and Morris, 2014; Wu et al., 2015; Prajogo et al., 2012; Devaraj et al., 2007; McAfee, 2002). Several IS business value studies have shown that IT positively impacts operational performance, such as improving process efficiency or customer experience (e.g., Khin and Ho, 2019; Gandelman et al., 2017; Ong and Chen, 2014; Kohli and Grover, 2008), and that operational performance ultimately impacts financial performance (Chatterjee et al., 2021; Suoniemi et al., 2021; Pathak et al., 2019; Wu et al., 2015; Kim et al., 2011; Kohli and Grover, 2008; Sambamurthy et al., 2003). In

fact, operational performance has been found to play a critical role in creating IS business value (Zhu et al., 2020; Liu et al., 2016). Thus, in this study, operational performance was considered an integral part of the IS business value performance indicators. Researchers have used a variety of objective measures for operational performance, such as labor productivity (e.g., Park et al., 2006; Guest et al., 2003), but often subjective measures are also used, for example, due to their better suitability for the research context (Richard et al., 2009; Wall et al., 2004), which was also the case in this study.

Innovation performance

Both innovation and innovation performance have various definitions in the literature (Yu et al., 2021a; Saunila, 2014; Crossan and Apaydin, 2010). Innovation can refer to the viable inventions that are new to the adopting company, such as new products or business models, as well as the company's ability to produce them (Yiu et al., 2020; Tarafdar and Gordon, 2007). These two aspects of innovation reflect innovation as a process and as an outcome. Although the distinction between the two is sometimes blurred, the former contains dimensions that seek to answer the question 'how' and the latter the question 'what.' (Crossan and Apaydin, 2010.) In this study, innovation refers to the innovation process, namely the ability of a company to produce new viable inventions (Carayannis and Provan, 2008; Hansen and Birkinshaw, 2007), and similarly, innovation performance refers to the extent to which a company succeeds in such production (Yu et al., 2021a; Yiu et al., 2020).

Today, there are numerous indicators of innovation performance (Nappi and Kelly, 2021; Yu et al., 2021a; Dziallas and Blind, 2019; Edison et al., 2013; Crossan and Apaydin, 2010), which are more related to the process than the outcome, with an emphasis on non-financial indicators (Dziallas and Blind, 2019). They are associated with, for example, speed/time, quality, cost, satisfaction, cooperation, and resources (Nappi and Kelly, 2021; Dziallas and Blind, 2019; Dewangan and Godse, 2014; Mascarenhas Hornos da Costa et al., 2014; Saunila, 2014; Andrew and Sirkin, 2008; Jiménez-Zarco et al., 2006) that are measured both objectively and subjectively (Saunila, 2014; Edison et al., 2013). The innovation process involves several stages and perspectives (Nappi and Kelly, 2021; Hansen and Birkinshaw, 2007; Jiménez-Zarco et al., 2006), so to succeed in managing innovations, a comprehensive range of indicators must be included in the measurement (Yu et al., 2021a; Dewangan and Godse, 2014; Saunila, 2014; Andrew and Sirkin, 2008; Carayannis and Provan, 2008), including both operational and financial indicators (Nappi and Kelly, 2021). However, there is no set of indicators that is suitable for all companies (Saunila, 2014; Neely, 2000). Because the purpose of this study is not to examine the indicators to support the management of a single company but to analyze the relationships between the IS capabilities and the innovation performance of an IT-consuming company, the measure used must be comparable between different companies. Objective measures do not always meet this condition (Katsikeas et al., 2006), so subjective measures are recommended to reduce the effects of contextual factors (Singh et al., 2016). Furthermore, some researchers (e.g., Yiu et al., 2020) have relied on a single measure of innovation performance, which Hagedoorn and Cloudt (2003) deem

acceptable. Consequently, according to the proposal of Saunila (2014), innovation performance was measured in this study using a single subjective metric designed to be closely linked to innovation capability.

IT's impact on innovation is ambiguous (Usai et al., 2021), though researchers in IS and innovation agree that IT positively impacts many business innovation aspects (Trantopoulos et al., 2017; Tambe et al., 2012). In addition, several researchers have found that IT has a significant impact on organizational transformation, not only by increasing operational efficiency (Urbinati et al., 2020; Khin and Ho, 2019; Verhoef et al., 2019; Fitzgerald et al., 2014) and enabling better customer experience (Ziaie et al., 2021; Khin and Ho, 2019; Verhoef et al., 2019; Fitzgerald et al., 2014) but also by creating innovative business models (Khin and Ho, 2019; Fitzgerald et al., 2014; Gregor et al., 2006). IT is particularly useful in innovation processes related to knowledge management (Urbinati et al., 2020; Trantopoulos et al., 2017; Gómez et al., 2017; Roberts et al. 2012), as IT facilitates external knowledge acquisition, and companies that consciously seek external knowledge seem to achieve a higher level of innovation performance than their industry peers (Trantopoulos et al., 2017; Raymond et al., 2016; Moilanen et al., 2014; Garriga et al. 2013). In addition, it has been found that the more a company invests in IT, the greater its tendency to innovate (Silva et al., 2012), and Ardito et al. (2021) found that digital orientation has a direct positive effect on innovation performance. E-commerce is one of the most significant innovations enabled by IT (Andonov et al., 2021; Lin, 2008), and companies are constantly striving to improve their end-customer experience by updating their online stores by adding new features to them (Tsai et al., 2013). IT-producing companies play an important role in this innovation, especially for SMEs with limited in-house resources (Zhu et al., 2015; Prajogo and McDermott, 2014). Based on the above, IT can be expected to play a considerable role in innovation performance. In addition, since innovation performance is considered one of the key determinants of organizational performance (Fernández-Portillo et al., 2022; Yiu et al., 2020; Prajogo and Sohal, 2006), it can be considered a significant element in IS business value.

Relationship value

Previously, Kohli and Grover (2008) noted that the traditional boundaries of companies are blurring, and that companies tend to cooperate. The question is not whether there should be cooperation but what kind of cooperation is appropriate (Bititci et al., 2012; Pisano and Verganti, 2008). The primary objective of B2B relationships is to create value (Skarmas et al., 2018; Xu et al., 2014; Palmatier, 2008; Gil-Saura et al., 2009) while ensuring survival amidst an uncertain and competitive business environment (Casidy and Nyadzayo, 2019). In recent years, interest in B2B relationships has increased among researchers, and topics such as business benefits and factors affecting the functioning of such relationships have been studied in several contexts (Gu et al., 2021; Zhang and Zhu, 2019; Li et al., 2012; Carr and Kaynak, 2007; Sánchez-Rodríguez et al., 2005). Meanwhile, B2B relationships have been found to shift from transaction-centric to joint value creation efforts in longer-term, deeper, and more complicated relationships (Prasetya et al., 2021; Tzempelikos, 2020; Ku et al., 2016; Dey et al., 2015; Sarker et al.,

2012), which can lead to relationship success that creates value for both parties (Skarmeas et al., 2018). Some researchers consider a B2B relationship to perform well if the parties are satisfied with the relationship's efficiency and effectiveness (Selnes and Sallis, 2003) or cooperation and conflict (Palmatier et al., 2007) and define relationship performance as the extent to which the partners consider the relationship worthwhile, equitable, productive, satisfying, and rewarding (Skarmeas et al., 2018; Selnes and Sallis, 2003). However, many scholars (e.g., Prasetya et al., 2021; Tzempelikos, 2020; Casidy and Nyadzayo, 2019; Luu et al., 2018; Skarmeas et al., 2018; Cheung et al., 2010; Baxter, 2009; Gil-Saura et al., 2009; Ulaga and Eggert, 2006), as well as this study, use the term relationship value because the construct is subjective, context-specific, and time-changing (Blocker et al., 2011; Gil-Saura et al., 2009; Ulaga and Eggert, 2006). Although the literature does not provide a consensus on the definition of relationship value (Tzempelikos, 2020; Baxter, 2009), a widely accepted view supports the conception that it can be defined as the parties' perception of compromise between the benefits and cost/sacrifices of a relationship (Tzempelikos, 2020; Skarmeas et al., 2018; Blocker et al., 2011; Cheung et al., 2010; Ulaga and Eggert, 2006). Because "relationship value reflects a comprehensive evaluation of a relationship" (Skarmeas et al., 2018, p. 281) and because it is a subjective construct (Gil-Saura et al., 2009), it was measured in this study using a comprehensive one-item subjective measure when determining the IT-consuming company's view. The IT-producing company's view of the value creation of customer relationships was examined through interviews.

Several studies have shown that long-term B2B relationships as a whole and/or their sub-dimensions have either direct or indirect positive effects on the performance of a customer, a supplier, or both (e.g., Prasetya et al., 2021; Rahmati et al., 2021; Zou et al., 2021; Yang et al., 2020; Yiu et al., 2020; Sharma and Modig, 2019; Kohtamäki and Partanen, 2016; Liu et al., 2016; Bititci et al., 2012; Prajogo and Olhager, 2012; Cao and Zhang, 2011; Chen et al., 2011; Smirnova et al., 2011; Srinivasan et al., 2011; Gil-Saura et al., 2009; Palmatier, 2008; Carr and Kaynak, 2007; Palmatier et al., 2007; Selnes and Sallis, 2003), even though some empirical studies have failed to prove such connections (Gu et al., 2021). Although IS business value is generated primarily in a company's own operations, external factors, such as partners, have been found to play a significant role in the extent to which IS business value is created (Melville et al., 2004). IS business value has also been found to be increasingly realized through the cooperation of several parties (Eikebrokk and Olsen, 2020; Kohli and Grover, 2008), and relationship value is considered a determinant of business value (Prasetya et al., 2021). Cooperation between companies enables knowledge-sharing (Yiu et al., 2020; Bititci et al., 2012; Selnes and Sallis, 2003), which has been found to improve not only the relationship value (Selnes and Sallis, 2003) but also the innovation performance (Hameed et al., 2021; Yiu et al., 2020; Ferraris et al., 2017; Bititci et al., 2012; Tarafdar and Gordon, 2007). External knowledge plays a key role (Hameed et al., 2021) and can even be considered a necessity (Ferraris et al., 2017) in innovation, as an innovator must typically combine external knowledge with his developmental ideas to succeed (Tarafdar and Gordon, 2007). Not only knowledge-sharing through B2B relationships but also relationship quality has been found to positively affect innovation performance (Yang et al., 2020; Kim et al., 2019).

In addition, supplier–buyer cooperation has been shown to improve operational performance (Yang et al., 2020; Sharma and Modig, 2019; Truong et al., 2017) as well as the profitability (Yang et al., 2020) and competitiveness (Gil-Saura et al., 2009) of both parties. However, research has shown that creating IS business value is challenging for SMEs, who, due to the limited availability of resources, are dependent on collaboration with other companies (Eikebrokk and Olsen, 2020; Prajogo and McDermott, 2014; Zach et al. 2014). Indeed, a good supplier relationship has been found to affect the business performance of an IT-consuming company (Zhu et al., 2015). Eikebrokk and Olsen (2020) state that co-creation can be an important way for SMEs to realize IS business value. Co-creation represents the idea that IS business value stems from a cooperative relationship between companies and that the resulting value is shared equally (Kohli and Grover, 2008), whereby interfirm relationships create value for both parties (Skarmeas et al., 2018). IT-producing companies have been found to invest in building customer relationships, as they expect these efforts to increase their sales, profits, and total customer value (Palmatier, 2008). Indeed, the positive impact of strong customer relationships on a supplier’s financial performance has been widely accepted (Palmatier, 2008), and studies suggest that, when a company creates value for a customer, it ultimately creates business value for itself (Gellweiler and Krishnamurthi, 2021; Teng and Tsinopoulos, 2021; Ainin et al., 2015).

In today’s economy, with increasing competition, specialization, knowledge intensity, and technological complexity in many sectors (Rahmati et al., 2021; Xu et al., 2014; Aarikka-Stenroos and Jaakkola, 2012), IT-producing and IT-consuming companies are increasingly interdependent to create business value (Rahmati et al., 2021; Hudnurkar et al., 2014; Xu et al., 2014; Aarikka-Stenroos and Jaakkola, 2012; Li et al., 2012; Nordin and Kowalkowski, 2010; Tuli et al., 2007; Möller, 2006), and thus both parties seek close relationships with each other (Xu et al., 2014). Indeed, many scholars have adopted the capability to engage with external relations as part of the typology of IS-related capabilities (e.g., Suoniemi et al., 2021; Felipe et al., 2020; Tan et al., 2015; Gu and Jung, 2013; Liang et al., 2010; Doherty and Terry, 2009; Wade and Hulland, 2004; Powell and Dent-Micallef, 1997). Based on the above, the relationship value generated through cooperation between IT-producing and IT-consuming companies is seen in this study as an integral part of IS business value.

2.2 IS capabilities

It is widely accepted that IT does not create business value on its own; other organizational resources are needed to complement it (e.g., Seufert et al., 2021; Mikalef and Pateli, 2017; Chuang and Lin, 2015; Cao, 2010; Liang et al., 2010; Kohli and Grover, 2008; Melville et al., 2004; Wade and Hulland, 2004; Santhanam and Hartono, 2003; Bharadwaj, 2000; Powell and Dent-Micallef, 1997). This has been explained by considering IT as a commodity, one that is widely available, imitable, and relatively easy to acquire (Mikalef and Pateli, 2017; Karimi et al., 2007; Melville et al., 2004; Wade and Hulland, 2004). The difference in business value creation thus lies in how this commodity

is deployed and used in an organization (Felipe et al., 2020; Muhanna and Stoel, 2010; Doherty and Terry, 2009; Bharadwaj et al., 1999). This is to say that, to take full advantage of a company's IT and thus create IS business value, various organizational capabilities are needed (Aydiner et al., 2019; Mikalef and Pateli, 2017; Ashrafi and Mueller, 2015; Chuang and Lin, 2015; Kohli and Grover, 2008). Weaknesses in such capabilities, it has been found, has both direct and indirect impacts on business operations that affect business performance (Peppard and Ward, 2004). Ong and Chen (2014) even found that the effects of IT are more often indirect than direct, indicating a delay in the impact of IS capabilities on business value, which, in turn, makes monitoring their effects challenging.

A subset of organizational capabilities that aim to leverage IT with the help of other organizational resources to achieve desired business outcomes has been intensively studied over the past three decades (Teng and Tsinopoulos, 2021; Aydiner et al., 2019; Ashrafi and Mueller, 2015; Breznik, 2012; Wade and Hulland, 2004). During this time, several different approaches were used, the key constructs and their interrelationships were conceptualized in diverse ways, and several different terms were invented. However, all this has led to ambiguous results. (Teng and Tsinopoulos, 2021; Ashrafi and Mueller, 2015; Chae et al., 2014; Breznik, 2012; Oh and Pinsonneault, 2007.) The terms used for such organizational capabilities include IT assets (e.g., Ross et al., 1996), IT competence (e.g., Sambamurthy et al., 2003), IT resources (e.g., Karimi et al. 2007), IT capabilities (e.g., Suoniemi et al. 2021), IS capabilities (e.g., Tan et al., 2015), digital capabilities (e.g., Khin and Ho, 2019), and IT infrastructure capabilities (e.g., Benitez et al., 2018). In this study, the term IS capabilities is used to emphasize the wide scope of such capabilities, which include the capabilities of both the IT-producing company and the IT-consuming company concerning their in-house operations as well as the capabilities associated with the production process of an IT solution and the relationship between the parties.

Conceptual pluralism also appears in the variety of categorizations used in the literature. Some researchers have categorized IS capabilities according to character, such as technology (infrastructure, assets), human (knowledge, skills), and intangibles (operations, partnerships, customer orientation) (e.g., Erkmen et al., 2020; Aydiner et al., 2019; Chae et al., 2018; Chae et al., 2014; Chen, 2012; Pérez-López and Alegre, 2012; Karimi et al., 2007; Ravichandran and Lertwongsatien, 2005; Tippins and Sohi, 2003; Bharadwaj, 2000; Powell and Dent-Micallef 1997; Ross et al., 1996), while others have used a categorization based on orientation, such as external (relationships, market anticipation), internal (skills, operations, development), and spanning (IT-business partnerships, management) (e.g., Felipe et al., 2020; Baloch et al., 2018; Tan et al., 2015; Lu and Ramamurthy, 2011; Doherty and Terry, 2009; Stoel and Mulhanna, 2009; Wade and Hulland, 2004). There is also categorization by level, such as strategic (firm, IT deployment, IT-business partnerships), operational (group, project, process, shared knowledge), and resources (individual, knowledge, skills) (e.g., Suoniemi et al., 2021; Kohli and Grover, 2008; Duhan, 2007; Ray et al., 2005; Peppard and Ward, 2004). Several other categorizations are also used (see e.g., Benitez et al., 2018; Ravichandran,

2018; Peng et al., 2016; Gu and Jung, 2013; Kim et al., 2011; Masli et al., 2011; Mithas et al., 2011; Aral and Weill, 2007; Pavlou and El Sawy, 2006; Sambamurthy et al., 2003; Zhu and Kraemer, 2002; Feeny and Willcocks, 1998). Most of the mentioned studies introduced a single company's perspective on its performance. However, some studies crossed these boundaries and examined the IT value creation, for example, within B2B alliances (e.g., Rahmati et al., 2021; Tan et al., 2015; Grover and Kohli, 2012; Sarker et al., 2012) or between supplier and customer companies (e.g., Blocker et al., 2011; Soto-Acosta and Meroño-Cerdan, 2008; Lapierre, 2000). Both Lapierre (2000) and Blocker et al. (2011) examined the impact of a supplier company's capabilities on the customer company's value creation and divided the capabilities into product, service, and relationship. These capabilities and their variants have been found to be key value drivers by both customer value and customer satisfaction literature (Blocker et al., 2011). The same categorization was used in this study to examine the impact of an IT-producing company's IS capabilities on value creation for its customers, due to the framework's relevance and applicability to the research scope and objectives. However, since the B2B relationship is bilateral, both parties influence value creation, and, following the example of Aarikka-Stenroos and Jaakkola (2012), relationship capability was examined in this study not only as a capability of the IT-producing company but also as a capability of the IT-consuming company.

In addition, several studies from an individual company's perspective on IT use have shown that company operations play an important role in business value creation (e.g., Suoniemi et al., 2021). Therefore, in this study, in addition to the other three IS capabilities mentioned above—IT solution quality, service quality, and relationship—the capabilities related to the use of an IT solution were considered. Indeed, such capabilities have been found to positively impact business processes (Karimi et al., 2007), which, in turn, ultimately affect a company's competitive advantage, especially if the IT solution is linked to customer-oriented processes (Suoniemi et al., 2021). Since an online store represented a company's IT solution in this study, the operational capabilities were e-commerce-related and defined as e-commerce capabilities.

Furthermore, it has been found that not all value-generating IS capabilities are at the strategic level (Karimi et al., 2007), and IS capability research has increasingly identified the importance of operational-level capabilities for business performance (e.g., Suoniemi et al., 2021; Mikalef et al., 2020; Putra and Santoso, 2020; Kim et al., 2011; Kohli and Grover, 2008; Karimi et al., 2007; Pavlou and El Sawy, 2006; Devaraj and Kohli, 2003; Sambamurthy et al., 2003). Yet, operational-level IS capabilities have remained poorly understood (Suoniemi et al., 2021). To reinforce the understanding of IS capabilities holistically, this study considered operational-level capabilities alongside strategic-level capabilities. This study thus examined the IS capabilities of both IT-producing and IT-consuming companies in terms of the production and use of an IT solution and the long-term relationship between the companies (Figure 2.1). The four types of IS capabilities—IT solution quality, service quality, e-commerce, and relationship—are discussed in more detail in the following chapters.

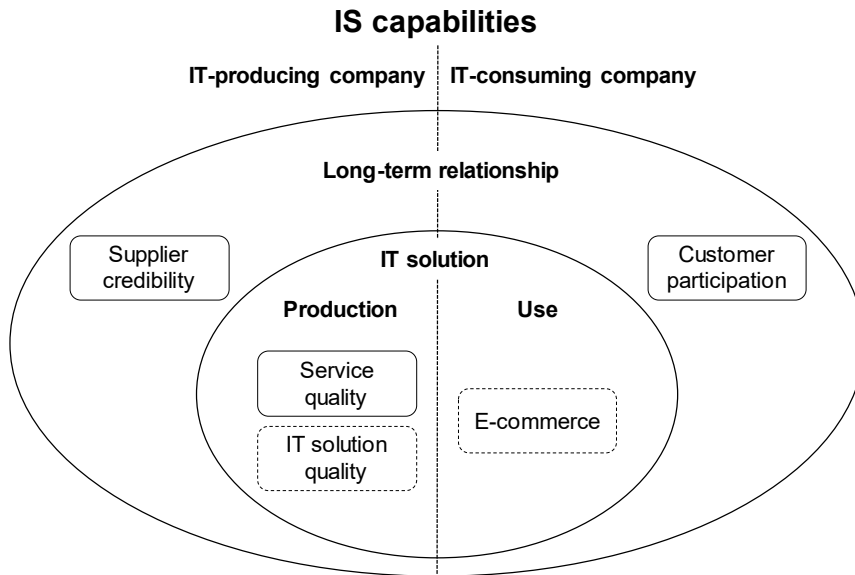


Figure 2.1: Scope, duration¹, and level² of IS capabilities

- 1: Inner circle: capabilities are in use during the production and use of a particular IT solution
 Outer circle: capabilities are in use a long time
- 2: ———: strategic and operational level capabilities
 -----: operational level capabilities

2.2.1 IT solution quality capabilities

In this study, IT solution quality capabilities refer to the capability of an IT-producing company to produce high-quality, fit-for-purpose IT solutions. Extensive research has examined the quality of IT solutions, leading to the identification of various dimensions, which are categorized in this study as performance (e.g., Gotzamani and Tzavlopoulos, 2009), content (e.g., Huang et al., 2015), and reliability (e.g., Xu et al., 2013), synthesizing insights from previous research. Performance refers to the quality dimension that determines how easily appropriate tasks can be performed. Design, on the other hand, denotes the visual appearance and structure of an IT solution; and reliability, in turn, refers to the correct, secure, and fluent technical functioning of an IT solution. All these quality dimensions require specific capabilities at the operational level during the production of an IT solution. Table 2.1 presents a synthesis of the dimensions of IT solution quality capabilities and the terms relevant to them.

Table 2.1: IT solution quality capabilities dimensions and relevant terms

Dimension, description, and relevant terms in the existing literature
Performance – operational <i>Capability to produce an IT solution that makes it easy to perform the appropriate tasks</i> Performance (Gotzamani and Tzavlopoulos, 2009; Janda et al., 2002; Zhang and von Dran, 2001) Functional fit-to-task / usefulness (Wagner et al., 2020; Xu et al., 2013; Chiu et al., 2009; Ahn et al., 2007) User-friendliness / usability (Tzavlopoulos et al., 2019; Wang, 2008; Lee and Lin, 2005; DeLone and McLean, 2003; Barnes and Vidgen, 2002) Easy/simple/effortless/convenience use / simplicity / intuitive operations (Zhang et al., 2021; McLean et al., 2018; Blut, 2016; Blut et al., 2015; Jiang et al., 2016; Kim et al., 2015; Oliveira and Roth, 2012; Holloway and Beatty, 2008; Su et al., 2008; Wang, 2008; Ahn et al., 2007; Loiacono et al., 2007; Wang and Liao, 2007; Collier and Bienstock, 2006; Boyer and Hult, 2005a; Boyer and Hult, 2005b; Parasuraman et al., 2005; Evanschitzky et al., 2004; DeLone and McLean, 2003; Zeithaml et al., 2002; Yoo and Donthu, 2001) Ease of navigation/navigability (Dai and Salam, 2019; Tan et al., 2013; Oliveira and Roth, 2012; Rose et al., 2012; Chiu et al., 2009; Gotzamani and Tzavlopoulos, 2009; Holloway and Beatty, 2008; Mahmood et al., 2008; Boyer and Hult, 2005a; Boyer and Hult, 2005b)
Design – operational <i>Capability to produce an IT solution with high-quality design</i> Design / user interface (Rita et al., 2019; Tzavlopoulos et al., 2019; Blut, 2016; Blut et al., 2015; Ariff et al., 2013; Lu et al., 2009; Holloway and Beatty, 2008; Su et al., 2008; Collier and Bienstock, 2006; Lee and Lin, 2005; Evanschitzky et al., 2004; Gummerus et al., 2004; Wolfenbarger and Gilly, 2003) Visual appearance/appeal/attractiveness / vividness / aesthetics (design) (Zhang et al., 2021; Ziaie et al., 2021; Patel et al., 2020; Wagner et al., 2020; Dai and Salam, 2019; Rita et al., 2019; Blut, 2016; Rose et al., 2012; Gotzamani and Tzavlopoulos, 2009; Mahmood et al., 2008; Wang and Liao, 2007; Loiacono et al., 2007; Otim and Grover, 2006; Zeithaml et al., 2002; Yoo and Donthu, 2001) Structure / website organization / navigation patterns (Gotzamani and Tzavlopoulos, 2009; Holloway and Beatty, 2008; DeLone and McLean, 2003)
Reliability – operational <i>Capability to produce an IT solution that functions correctly, securely, and fluently</i> Reliability (Dai and Salam, 2019; Xu et al., 2013; Yu, 2013; Akter et al., 2010; Gotzamani and Tzavlopoulos, 2009; DeLone and McLean, 2003; Wolfenbarger and Gilly, 2003; Zeithaml et al., 2002) System availability/quality (Wagner et al., 2020; Rita et al., 2019; Blut, 2016; Blut et al., 2015; Gao et al., 2015; Huang et al., 2015; Akter et al., 2010; Chiu et al., 2009; Ahn et al., 2007; Parasuraman et al., 2005; DeLone and McLean, 2003) Accessibility / functionality (Tan et al., 2013; Gotzamani and Tzavlopoulos, 2009; Collier and Bienstock, 2006) Efficiency / (processing) speed / quick loading / response time (Omar et al., 2021; Wagner et al., 2020; Huang et al., 2015; Akter et al., 2010; Gotzamani and Tzavlopoulos, 2009; Mahmood et al., 2008; Loiacono et al., 2007; Boyer and Hult, 2005a; Boyer and Hult, 2005b; Parasuraman et al., 2005; DeLone and McLean, 2003; Zeithaml et al., 2002; Yoo and Donthu, 2001) Security / trust / trustworthiness / privacy (Wagner et al., 2020; Rita et al., 2019; Blut, 2016; Gao et al., 2015; Huang et al., 2015; Jiang et al., 2016; Ariff et al., 2013; Tan et al., 2013; Abdul-Muhmin, 2011; Akter et al., 2010; Gotzamani and Tzavlopoulos, 2009; Holloway and Beatty, 2008; Mahmood et al., 2008; Loiacono et al., 2007; Parasuraman et al., 2005; Evanschitzky et al., 2004; Gummerus et al., 2004; Wolfenbarger and Gilly, 2003; Zeithaml et al., 2002; Yoo and Donthu, 2001) Expertise / technical competence (Gansser et al., 2021; Gao et al., 2021; Makhoulfi et al., 2021; DeLone and McLean, 2016; Aarikka-Stenroos and Jaakkola, 2012; Chen et al., 2011; Lapierre, 2000) System integrity / integration of applications / interconnection of assets / back-end integration (Makhoulfi et al., 2021; Lenka et al., 2017; Gotzamani and Tzavlopoulos, 2009; Zhu, 2004)

Although it is widely accepted that IT solutions do not alone add business value (e.g., Seufert et al., 2021; Mikalef and Pateli, 2017; Chuang and Lin, 2015; Liang et al., 2010; Kohli and Grover, 2008; Melville et al., 2004; Wade and Hulland, 2004; Santhanam and Hartono, 2003; Bharadwaj, 2000; Powell and Dent-Micallef, 1997), they are nevertheless considered an essential part of a company's structure (Aydiner et al., 2019) and a necessity for several company functions (Pérez-López and Alegre, 2012) as well as for business development (Aydiner et al., 2019). The quality of an IT solution is of great importance to its use and, thus, to the achieved impacts (e.g., DeLone and McLean, 2003). Several studies support the positive impact of IT solution quality on an IT-consuming company's value (Blocker et al., 2011; Mahmood et al., 2008; Wang, 2008; Ulaga and Eggert 2006; Zhu, 2004; DeLone and McLean, 2003; Zhu and Kraemer, 2002). In addition, the performance, design, and reliability of an online store have all been shown to affect—directly or indirectly—the business value of an online store operator (Patel et al., 2020; Rita et al., 2019; Tzavlopoulos et al., 2019; Blut et al., 2015; Thirumalai and Sinha, 2011; Lee and Lin, 2005). IT solution quality is also considered important for an IT-producing company that seeks to achieve and maintain a key supplier position in an IT-consuming company (Ulaga and Eggert, 2006). Considering these factors, the IT solution quality capabilities of an IT-producing company are of great importance for both parties. The IT solution quality capabilities are discussed in more detail in the publications.

2.2.2 Service quality capabilities

In this study, service quality capabilities refer to an IT-producing company's capability to meet its customers' needs during the IT solution production process. Service quality and its effects on business have been studied in a variety of service settings for a long time (Ladhari, 2009), and several categorizations for the concept exist in the literature. In this study, the categorization utilized is based on the framework employed by Roth and Menor (2003) and Ponsignon et al. (2011), as it aligns with the research objectives. A service is defined within this framework as being comprised of a service concept and service delivery, allowing for the consideration of both strategic- and operational-level capabilities. The first concerns what is to be produced, the second how the offering is delivered. Service concept is defined in the literature in many ways; the generally accepted view is that it contains both tangible and intangible elements and a perspective on their value to the customer (Ponsignon et al., 2011; Karwan and Markland, 2006; Roth and Menor, 2003). In this study, service concept refers to the IT-producing company's capability to implement a comprehensive offering and customize it to the needs of the IT-consuming company. This capability necessitates expertise at both the strategic and operational levels, which becomes evident throughout the production of the IT solution. Service delivery, in turn, is described in the literature as how (e.g., people, technology, processes, and customer contact points) an organization delivers a service concept to its customers (Ponsignon et al., 2011; Karwan and Markland, 2006; Roth and Menor, 2003). In this study, service delivery refers to an IT-producing company's capability to offer flexible and helpful services and conduct the IT solution production process in a

customer-oriented and reliable manner. This capability is related to the operational-level skills during the IT solution production. Table 2.2 presents a synthesis of the dimensions of service quality capabilities and the terms relevant to them.

Table 2.2: Service quality capabilities dimensions and relevant terms

Dimension, description, and relevant terms in the existing literature
Service concept – strategic / operational <i>Capability to conduct a comprehensive offering and customize it to customer's needs</i> Service concept (Ponsignon et al., 2011; Roth and Menor, 2003) Service portfolio comprehensiveness (Oliveira and Roth, 2012) Service differentiation (Gotzamani and Tzavlopoulos, 2009) Customization (Ziaie et al., 2021; Oliveira and Roth, 2012; Gotzamani and Tzavlopoulos, 2009; Zeithaml et al., 2002) Fulfillment (Blut et al., 2015; Huang et al., 2015; Holloway and Beatty, 2008; Parasuraman et al., 2005) Customer satisfaction (Zou et al., 2021; Huang et al., 2019; Blut et al., 2015)
Service delivery – operational <i>Capability to provide flexible and helpful services and conduct the IT solution production process in a customer-oriented and reliable manner</i> Service delivery (Sousa and da Silveira, 2017; Ponsignon et al., 2011; Roth and Menor, 2003) Timeliness / efficient / accurate / reliable delivery (Dai and Salam, 2019; Blut et al., 2015; Holloway and Beatty, 2008; Devaraj et al., 2007; Parasuraman et al., 2005; Möller and Törrönen, 2003) Process excellence (Möller and Törrönen, 2003) Order accuracy (Blut et al., 2015; Holloway and Beatty, 2008) Customer orientation / centricity (Lenka et al., 2017; Setia et al., 2013; Gotzamani and Tzavlopoulos, 2009) Customer / front office service (Valtakoski and Witell, 2018; Setia et al., 2013; Kuo et al., 2009; Holloway and Beatty, 2008) Service quality / level / excellence / impeccability (Gansser et al., 2021; Gao et al., 2021; Zou et al., 2021; DeLone and McLean, 2016; Blut et al., 2015; Ngo and O'Cass, 2013; Holloway and Beatty, 2008; DeLone and McLean, 2003) Serviceability (Gotzamani and Tzavlopoulos, 2009) Helpfulness / support (Holloway and Beatty, 2008; Lee and Lin, 2005) Responsiveness (Huang et al., 2019; Lee et al., 2019; Tzavlopoulos et al., 2019; Lenka et al., 2017; DeLone and McLean, 2016; Huang et al., 2015; Setia et al., 2013; Yu, 2013; Gotzamani and Tzavlopoulos, 2009; Lee and Lin, 2005; Parasuraman et al., 2005; DeLone and McLean, 2003; Roberts et al., 2003; Lapierre, 2000) Flexibility (Gansser et al., 2021; Möller and Törrönen, 2003; Lapierre, 2000)

To achieve their desired outcomes, IT-consuming companies tend to purchase solutions instead of just buying products or services (Boehm and Thomas, 2013; Nordin and Kowalkowski, 2010). The capability of an IT-producing company to provide excellent service quality is thus fundamental to delivering value to its customers (Sousa and da Silveira, 2017; Yang, 2016; Visnjic Kastalli and Van Looy, 2013; Kuo et al., 2009; Yang et al., 2009; Soto-Acosta and Meroño-Cerdan, 2008; Ulaga and Eggert, 2006; Roth and Menor, 2003; Boyer et al., 2002). Moreover, researchers have found a direct positive effect of service quality on supplier business performance (e.g., Valakoski and Witell, 2018) as well as of the extent of services provided on profitability (Visnjic Kastalli and

Van Looy, 2013). Thus, as competition in the global economy increases and products and prices become less important differentiators, many manufacturing companies are looking for new ways to differentiate themselves in the B2B market by adding services to their products (Visnjic Kastalli and Van Looy, 2013; Ulaga and Eggert, 2006). To provide a superior level of added value to IT-consuming companies, IT-producing companies must be able to solve their customers' problems (Chumpitaz and Paparoidamis, 2020) and address not only the customers' expressed needs but also their latent and future needs (Blocker et al., 2011; Möller, 2006). This can be achieved through collaborative processes with customers, which, indeed, are already an integral part of the operations of many IT-producing companies during the IT solution production process. In addition to benefiting an IT-consuming company, such cooperation has also been found to benefit an IT-producing company in several ways, including the gaining of valuable specialized expertise that cannot be easily imitated by competitors (Rahmati et al., 2021). The capability of an IT-producing company to meet its customers' needs during an IT solution production process is thus of great importance to both parties. Service quality capabilities are discussed in more detail in the publications.

2.2.3 E-commerce capabilities

In this study, e-commerce capabilities refer to the capability of an IT-consuming company to exploit an online store technically and operate it in a customer-oriented manner. The quality of online stores and related IS capabilities have been studied for more than two decades, and various scales have been developed to analyze them (e.g., Fuller et al., 2022; Omar et al., 2021; Zhang et al., 2021; Ziaie et al., 2021; Blut et al., 2015; Huang et al., 2015; Gotzamani and Tzavlopoulos, 2009; Soto-Acosta and Meroño-Cerdan, 2008; Su et al., 2008; Lee and Lin, 2005; Parasuraman et al., 2005; Zhu, 2004; Wolfinbarger and Gilly, 2003; Barnes and Vidgen, 2002). While the indicated scales encompass interrelated factors that mutually influence one another (Gotzamani and Tzavlopoulos, 2009), they highlight aspects that can be synthesized from the literature into dimensions associated with the use of online store solutions, customer service, and consideration of individual customer needs. In this study, these three dimensions of service quality capability are termed e-commerce practices, customer orientation, and personalization, providing a more precise description of the phenomena under investigation. The first denotes an IT-consuming company's capability to operate reliably and to keep the online store content accurate; the second the capability to operate in a customer-oriented manner both in the customer interface and in the e-commerce processes; and the third the capability to make the online store meet individual preferences. All these capabilities are manifested at the operational level during the use of the online store. Table 2.3 presents a synthesis of the dimensions of e-commerce capabilities and the terms relevant to them.

Table 2.3: E-commerce capabilities dimensions and relevant terms

Dimension, description, and relevant terms in the existing literature
E-commerce practices – operational <i>Capability to operate reliably and to keep the online store content accurate</i> <p>Information availability / quality / accuracy / relevance / appropriateness / richness / completeness / informativeness / informational fit-to-task (Ziaie et al., 2021; Patel et al., 2020; Wagner et al., 2020; Rita et al., 2019; Dai and Salam, 2019; Blut, 2016; Cho, 2015; Blut et al., 2015; Gao et al., 2015; Huang et al., 2015; Oliveira and Roth, 2012; Gotzamani and Tzavlopoulos, 2009; Lu et al., 2009; Holloway and Beatty, 2008; Su et al., 2008; Ahn et al., 2007; Loiacono et al., 2007; Collier and Bienstock, 2006; Zhu, 2004; DeLone and McLean, 2003; Wolfinbarger and Gilly, 2003; Barnes and Vidgen, 2002; Zeithaml et al., 2002; Zhu and Kramer, 2002)</p> <p>Ease of understanding (Wagner et al., 2020; Loiacono et al., 2007; DeLone and McLean, 2003)</p> <p>Content (quality) (Omar et al., 2021; Dai and Salam, 2019; Huang et al., 2015; Gotzamani and Tzavlopoulos, 2009; Kuo et al., 2009; Wang and Liao, 2007; Agarwal and Venkatesh, 2002; Zeithaml et al., 2002)</p> <p>Product selection / assortment / portfolio / offer / service portfolio comprehensiveness (Rita et al., 2019; Nguyen et al., 2018; Blut, 2016; Jiang et al., 2016; Blut et al., 2015; Oliveira and Roth, 2012; Dennis et al., 2009; Holloway and Beatty, 2008; Melián-Alzola and Padrón-Robaina, 2007; Boyer and Hult, 2005a; Boyer and Hult, 2005b)</p> <p>(Timely / timeliness / on-time) delivery (arrangements / time / quality) (Dai and Salam, 2019; Rita et al., 2019; McLean et al., 2018; Nguyen et al., 2018; Blut, 2016; Blut et al., 2015; Abdul-Muhmin, 2011; Cho, 2015; Ramanathan, 2011; Gotzamani and Tzavlopoulos, 2009; Holloway and Beatty, 2008; Collier and Bienstock, 2006; Otim and Grover, 2006; Barnes and Vidgen, 2002)</p> <p>Order accuracy (Rita et al., 2019; Blut, 2016; Blut et al., 2015; Holloway and Beatty, 2008; Collier and Bienstock, 2006)</p> <p>Reliability / fulfillment / outcome quality / fairness (Omar et al., 2021; Rita et al., 2019; Blut, 2016; Huang et al., 2015; Jiang et al., 2016; Ariff et al., 2013; Lin, 2012; Akter et al., 2010; Chiu et al., 2009; Dennis et al., 2009; Lu et al., 2009; Holloway and Beatty, 2008; Su et al., 2008; Melián-Alzola and Padrón-Robaina, 2007; Collier and Bienstock, 2006; Otim and Grover, 2006; Lee and Lin, 2005; Parasuraman et al., 2005; Wolfinbarger and Gilly, 2003)</p> <p>Privacy (experience) / security / (e-)trust / assurance (Zhang et al., 2021; Rita et al., 2019; Tran and Vu, 2019; Tzavlopoulos et al., 2019; Blut, 2016; Blut et al., 2015; Gao et al., 2015; Huang et al., 2015; Lin, 2012; Rose et al., 2012; Ramanathan, 2011; Akter et al., 2010; Chiu et al., 2009; Dennis et al., 2009; Gotzamani and Tzavlopoulos, 2009; Holloway and Beatty, 2008; Loiacono et al., 2007; Collier and Bienstock, 2006; Otim and Grover, 2006; Lee and Lin, 2005; Parasuraman et al., 2005; DeLone and McLean, 2003; Barnes and Vidgen, 2002)</p>
Customer orientation – operational <i>Capability to operate in a customer-oriented manner both on the customer interface and during the e-commerce processes</i> <p>Customer orientation / customer-oriented policies (Bi et al., 2017; Tsironis et al., 2017; Gotzamani and Tzavlopoulos, 2009; Eng, 2008)</p> <p>Contact (Omar et al., 2021; Huang et al., 2015; Chiu et al., 2009; Parasuraman et al., 2005)</p> <p>Customer / consumer service / (e-)service quality (Rita et al., 2019; Tran and Vu, 2019; Tzavlopoulos et al., 2019; Blut, 2016; Blut et al., 2015; Gao et al., 2015; Ariff et al., 2013; Abdul-Muhmin 2011; Denga et al., 2010; Santouridis and Trivellas, 2010; Dennis et al., 2009; Kuo et al., 2009; Lu et al., 2009; Holloway and Beatty, 2008; Kumar and Lim, 2008; Su et al., 2008; Ahn et al., 2007; Wang and Liao, 2007; Boyer and Hult, 2006; Boyer and Hult, 2005a; Boyer and Hult, 2005b; DeLone and McLean, 2003; Wolfinbarger and Gilly, 2003)</p> <p>Responsiveness / timeliness / interaction (quality) / interactive fairness / interactivity / communication (with customers) / customer support (Omar et al., 2021; Zhang et al., 2021; Ziaie et al., 2021; Dai and Salam, 2019; Bi et al., 2017; Cho, 2015; Huang et al., 2015; Lin, 2012; Akter et al., 2010; Chiu et al., 2009; Gotzamani and Tzavlopoulos, 2009; Lu et al., 2009; Collier and Bienstock, 2006; Otim and Grover, 2006; Lee and Lin, 2005; Parasuraman et al., 2005; DeLone and McLean, 2003; Barnes and Vidgen, 2002; Zhu and Kramer, 2002)</p>

Empathy / care (Jiang et al., 2016; Lin, 2012; Akter et al., 2010; DeLone and McLean, 2003; Barnes and Vidgen, 2002; Parasuraman et al., 1988)

Purchase process / process controllability / transaction / online completeness (Wagner et al., 2020; Rita et al., 2019; Blut, 2016; Blut et al., 2015; Holloway and Beatty, 2008; Su et al., 2008; Loiacono et al., 2007; Zhu, 2004; Zhu and Kramer, 2002)

Order taking (Bi et al., 2017; Wu et al., 2003)

Billing / payment system / service / accuracy / mechanism/process/methods (Huang et al., 2015; Abdul-Muhmin, 2011; Ramanathan, 2011; Santouridis and Trivellas, 2010; Holloway and Beatty, 2008; Kumar and Lim, 2008; Otim and Grover, 2006)

Return management / handling / policies / guarantee / ease of returns / refunds (Rita et al., 2019; Nguyen et al., 2018; Blut, 2016; Ramanathan, 2011; Holloway and Beatty, 2008; Melián-Alzola and Padrón-Robaina, 2007)

Flexibility in policies / problem-solving (Gotzamani and Tzavlopoulos, 2009; Lu et al., 2009)

Personalization – operational

Capability to make the online store meet individual preferences

(Website) personalization / (e-)customization / personalized logons / tailored information / content flexibility (Fuller et al., 2022; Zhang et al., 2021; Ziaie et al., 2021; Wagner et al., 2020; Dai and Salam, 2019; Rita et al., 2019; McLean et al., 2018; Blut, 2016; Blut et al., 2015; Kim et al., 2015; Oliveira and Roth, 2012; Rose et al., 2012; Mahmood et al., 2008; Loiacono et al., 2007; Lee and Lin, 2005; Zhu and Kraemer, 2005; Zhu, 2004; DeLone and McLean, 2003; Wolfenbarger and Gilly, 2003; Barnes and Vidgen, 2002)

Retail has changed dramatically along with digitalization (Ziaie et al., 2021; Huré et al., 2017), making e-commerce one of the fastest growing and most important new business models in the contemporary environment (Attia, 2022; Andonov et al., 2021; Kabrilyants et al., 2021). Thus, to survive competition, companies must adopt the use of IT in trading (Khin and Ho, 2019; Fitzgerald et al., 2014). Implementing e-commerce is complex, and companies need to learn to adopt new technologies effectively and redefine their business models and internal processes (Attia, 2022; Kabrilyants et al., 2021; Lin, 2008; Zhuang and Lederer, 2006). Successful e-commerce has been shown to positively impact a company's business performance and its ability to compete in the ever-changing business environment (Attia, 2022; Ziaie et al., 2021; Aydiner et al., 2019; Tzavlopoulos et al., 2019; Eng, 2008; Zhuang and Lederer, 2006). Although previous empirical studies show conflicting findings regarding the impact of e-commerce capabilities on both e-commerce and business performance (Kabrilyants et al., 2021), these capabilities rooted in company-specific processes and business routines have also been shown to play a crucial role in the success of e-commerce (Zhu et al., 2020; Soto-Acosta et al., 2016; Soto-Acosta and Meroño-Cerdan, 2008). For example, the ability to develop customer interface service activities and the ability to exploit an online store technically have been shown to have a direct positive impact on business performance (Attia, 2022; Valtakoski and Witel, 2018; Zhu, 2004; Zhu and Kraemer, 2002). In addition to the direct impact on business performance, e-commerce capabilities have been found to impact business indirectly by influencing customers, such as their satisfaction, loyalty, perceived overall service quality, purchase intentions, and trust (Omar et al., 2021; Zhang et al., 2021; Patel et al., 2020; Dai and Salam, 2019; Rita et al., 2019; Tzavlopoulos et al., 2019; Blut et al., 2015; Thirumalai and Sinha, 2011; Zhuang and Lederer, 2006; Lee and Lin, 2005). Weaknesses in e-commerce capabilities, in turn, have been found to harm business operations and,

ultimately, business performance (Ross et al., 2017; Peppard and Ward, 2004). Considering these factors, the e-commerce capabilities of an IT-consuming company are crucial for gaining business value. E-commerce capabilities are discussed in more detail in the publications.

2.2.4 Relationship capabilities

In this study, relationship capabilities refer to the capability of both IT-producing and IT-consuming companies to cooperate in a way that creates business value in the long run. Although relationship and service quality capabilities have common characteristics, their nature differs in terms of the duration and scope of the collaboration (Roberts et al., 2003). The B2B relationship value is a multidimensional concept, the key dimensions of which have not been agreed upon in the literature (Tzempelikos, 2020; Ulaga and Eggert, 2006). However, in relationships with upstream and downstream partners, some bilateral capabilities that affect value, such as trust, commitment, cooperation, and communication, have been quite widely accepted (e.g., Prasetya et al., 2021; Zou et al., 2021; Yang et al., 2020; Skarmeas et al., 2018; Kohtamäki and Partanen, 2016; Hudnurkar et al., 2014; Chen, 2011; Redondo and Fierro, 2007). The present study employed Aarikka-Stenroos and Jaakkola's (2012) division to categorize the relationship capabilities of the supplier and the customer into separate dimensions. They recognized this division as vital for value creation in knowledge-intensive services, aligning with the current study's context. The dimensions of supplier credibility and customer participation describe the roles of IT-producing and IT-consuming companies in the phenomenon under study. The former refers to the IT-producing company's capability to create a credible image and build long-term customer relationships, whereas the latter refers to the IT-consuming company's capability to contribute to co-production and commit to a long-term supplier relationship. Competence at both strategic and operational levels is required by both parties in order to establish capabilities that extend beyond the production of an IT solution and facilitate long-term cooperation. Table 2.4 presents a synthesis of the dimensions of relationship capabilities and the terms relevant to them.

Table 2.4: Relationship capabilities dimensions and relevant terms

Dimension, description, and relevant terms in the existing literature
Supplier credibility – strategic / operational <i>Capability to create a credible image and build long-term customer relationships</i> Relational / relationship capability / orientation (Zhang and Zhu, 2019; Krathu et al., 2015; Cheng and Sheu, 2012; Smirnova et al. 2011; Redondo and Fierro, 2007; Möller and Törrönen; 2003) (External) relationship / partnership management / development / strength / quality (Gao et al., 2021; Suoniemi et al., 2021; Felipe et al., 2020; Tan et al., 2015; Gu and Jung, 2013; Guo and Ng, 2011; Srinivasan et al., 2011; Liang et al., 2010; Wade and Hulland, 2004; Roberts et al., 2003) Supply chain / supplier / relationship cooperation / collaboration / integration (Yu et al., 2021b; Ku et al., 2016; Liu et al., 2016; Krathu et al., 2015; Hudnurkar et al., 2014; Ranjan and Read, 2014; Xu et al., 2014; Cao and Zhang, 2011; Fawcett et al., 2011; Zacharia, 2009) Relationship / collective / joint learning / knowledge creation (Zhang and Zhu, 2019; Kohtamäki and Partanen, 2016; Krathu et al., 2015; Hudnurkar, 2014; Cao and Zhang, 2011; Selnes and Sallis, 2003)

Long-term orientation / continuity / (relationship / collaborative) commitment (Zou et al., 2021; Xu et al., 2014; Li et al., 2012; Salam, 2011; Zhao et al., 2011; Vijayasathay, 2010; Paulraj et al., 2008; Redondo and Fierro, 2007; Selnes and Sallis, 2003; Ganesan, 1994)

Credibility (Krathu et al., 2015; Moon, 2011; Sternquis et al., 2008; Lapierre, 2000; Ganesan, 1994; Parasuraman et al., 1988)

Trust / confidence / assurance (Gansser et al., 2021; Zou et al., 2021; Mungra and Yadav, 2020; Huang et al., 2015; Krathu et al., 2015; Hudnurkar et al., 2014; Xu et al., 2014; Zhang and Huo, 2013; Aarikka-Stenroos and Jaakkola, 2012; Li et al., 2012; Salam, 2011; Nyaga et al., 2010; Vijayasathay, 2010; Gotzamani and Tzavlopoulos, 2009; Poppo et al., 2008; Redondo and Fierro, 2007; Fynes et al., 2005; Lee and Lin, 2005; Kwon and Suh, 2004; Roberts et al., 2003; Selnes and Sallis, 2003; Zeithaml et al., 2002; Lapierre, 2000; Doney and Cannon, 1997; Kumar et al., 1995; Morgan and Hunt, 1994)

(Customer) understanding / empathy / solidarity / (proactive) attitude/customer orientation / predictive customer insights / opportunity recognition (Lenka et al., 2017; Yu, 2013; Aarikka-Stenroos and Jaakkola, 2012; Coviello and Joseph, 2012; Blocker et al., 2011; Smirnova et al., 2011; Gotzamani and Tzavlopoulos, 2009; Doney et al., 2007; Möller and Törönen, 2003; Lapierre, 2000; Parasuraman et al., 1988)

Cooperative attitude (Zou et al., 2021)

(Inter)personal interaction (Blocker et al., 2011; Ulaga and Eggert, 2006; Ranjan and Read, 2014; Yi and Gong, 2013; Chen et al., 2011)

Reputation / (corporate) image / past experiences (Gansser et al., 2021; Dey et al., 2015; Gotzamani and Tzavlopoulos, 2009; Lu et al., 2009; Parasuraman et al., 2005; Kwon and Suh, 2004; Zeithaml et al., 2002; Lapierre, 2000; Doney and Cannon, 1997; Ganesan, 1994)

Customer participation – strategic / operational

Capability to contribute to co-production and commit to a long-term supplier relationship

Customer participation / attendance / cooperation / collaboration / integration (Yu et al., 2021b; Zou et al., 2021; Zhang and Zhu, 2019; Dong and Sivakumar, 2017; Ku et al., 2016; Hudnurkar et al., 2014; Ranjan and Read, 2014; Lin and Huang, 2013; Ngo and O'Cass, 2013; Yi and Gong, 2013; Coviello and Joseph, 2012; Chen et al., 2011; Fang, 2008; Redondo and Fierro, 2007; Fynes et al., 2005)

Co-production / co-development / co-invention (Rahmati et al., 2021; Mende and van Doorn, 2015; Ranjan and Read, 2014; Lin and Huang, 2013; Aarikka-Stenroos and Jaakkola, 2012; Chen et al., 2011; Fang, 2008)

Customer engagement / commitment / loyalty (Zou et al., 2021; Huang et al., 2019; Dong and Sivakumar, 2017; Krathu et al., 2015; Hudnurkar et al., 2014; Ranjan and Read, 2014; Chen et al., 2011; Zhao et al., 2011; Nyaga et al., 2010; Vijayasathay, 2010; Redondo and Fierro, 2007; Fynes et al., 2005; Kwon and Suh, 2004; Roberts et al., 2003; Kumar et al., 1995; Morgan and Hunt, 1994)

Responsible behavior (Zhang and Zhu, 2019; Yi and Gong, 2013; Chen et al., 2011)

Communication / information sharing / provision / knowledge-sharing / information quality (Zou et al., 2021; Zhang and Zhu, 2019; Bi and Smyrniotis, 2017; Kohtamäki and Partanen, 2016; Liu et al., 2016; Krathu et al., 2015; Hudnurkar et al., 2014; Lin and Huang, 2013; Yi and Gong, 2013; Aarikka-Stenroos and Jaakkola, 2012; Li et al., 2012; Cao and Zhang, 2011; Chen et al., 2011; Fawcett et al., 2011; Salam, 2011; Nyaga et al., 2010; Holloway and Beatty, 2008; Paulraj et al., 2008; Doney et al., 2007; Redondo and Fierro, 2007; Kwon and Suh, 2004; Selnes and Sallis, 2003; Parasuraman et al., 1988)

The IT industry has long recognized the necessity of supplier–customer co-production in developing successful IT solutions (Rahmati et al., 2021; Zhang and Zhu, 2019), and it requires the contribution and close cooperation of both parties (Zou et al., 2021; Aarikka-Stenroos and Jaakkola, 2012; Vargo and Lusch, 2011). The customer may need to share delicate business information, such as strategic plans or financial information, with the supplier, and, the supplier should leverage their accumulated hard-to-imitate customer- and industry-specific expertise to anticipate the customer's changing needs in the long

term and offer solutions for potential business opportunities and problems the customer does not have the expertise to recognize (Rahmati et al., 2021; Xu et al., 2014; Aarikka-Stenroos and Jaakkola, 2012). When suppliers apply their expert knowledge to the proactive development of a customer's business, they can amplify the value created for customers (Aarikka-Stenroos and Jaakkola, 2012; Blocker et al., 2011). In doing so, they have a good chance of achieving a key supplier status, to which the customer commits in the long term, in which case the supplier typically acquires a significantly larger share of the customer's business than other suppliers (Ulaga and Eggert, 2006). Moreover, Ulaga and Eggert (2006) state that relationship capabilities affect a company's ability to retain its position as a key supplier. As far as finding a suitable supplier to deliver a complex solution, Zou et al. (2021) suggest that companies evaluate suppliers based on their image. Based on the above discussion, the relationship capabilities of an IT-producing and an IT-consuming company are of great importance for both parties. Relationship capabilities are discussed in more detail in the publications.

2.3 Conceptual framework of the study

As the previous chapters show, IS capabilities and their business value creation effects have been significantly studied (e.g., Baird and Maruping, 2021; ZareRavasan and Krčál, 2021; Teng and Tsinopoulos, 2021; Aydiner et al., 2019). Much of this research has been conducted in the field of IS management, and little attention has been paid to the topic in performance management research (Nasiri, 2021; Nudurupati et al., 2016; Melnyk et al., 2014). Despite the large amount of attention overall, even the key concepts, such as IS capabilities and IS business value, still lack consensus (Teng and Tsinopoulos, 2021; Ashrafi and Mueller, 2015). The many different definitions of the key concepts have led to ambiguity, due to which there exists no consensus in the literature regarding which IS capabilities or which mechanisms are essential for business value creation (Teng and Tsinopoulos, 2021; ZareRavasan and Krčál, 2021; Schryen, 2013). Further research is thus needed regardless of the research field.

Although the impact of IT on business value has recently been shown to be more indirect than direct (Ong and Chen, 2014), occurring at an operational rather than a strategic level (Karimi et al., 2007), the focus of research on IS business value has been on direct financial performance (Jiménez-Zarco et al., 2006). This has led to the situation that operational-level IS capabilities have remained poorly understood (Suoniemi et al., 2021), and the indirect impact on business value has constantly been called for further research (e.g., Teng and Tsinopoulos, 2021).

Since most of the IS business value literature presents the impact of an individual company's IS capabilities on its own value creation, less is known about IS value creation through B2B relationships (Skarmeas et al., 2018; Grover and Kohli, 2012; Sarker et al., 2012). In particular, there is little research on the effects of the IS capabilities of IT-producing companies on their customers' business value creation.

This study built its conceptual framework by considering the aforementioned research gaps. First, to grasp all the essential aspects of IS capabilities and IS value creation, this study relied on different research fields rather than a single field. Second, the study examined the IS capabilities that are either directly related to the IT solution or to the long-term relationship between the companies producing and consuming IT and that occur at both strategic and operational levels. Third, this study focused not only at direct IS business value indicators but also at indirect value indicators. Fourth, this study looked beyond a single company to examine value creation between two companies, particularly considering the impact of the IS capabilities of IT-producing companies on the value creation of IT-consuming companies. Therefore, to comprehensively understand the capabilities related to IS business value creation, and thus support IS performance management, a conceptual framework, as shown in Figure 2.2, was composed in this study.

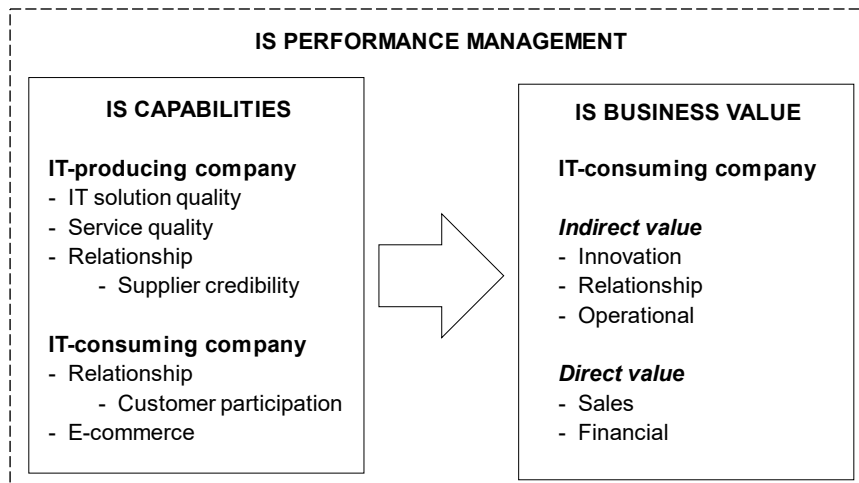


Figure 2.2: Conceptual framework of the study

3 Research methodology

This chapter presents the research methodology and the methods used to achieve the research objectives. First, the research approach is introduced, including the philosophical foundation of the research, the approach to theory development, and the research design. Second, the implementation of the study is presented, covering data collection, analysis methods, and progress.

3.1 Research approach

Nayak and Singh (2021, p. 1) define research “as a scientific and systematic search for pertinent information on a specific topic.” Every research is affected by several choices made regarding its different methodological dimensions, such as research philosophy, approach to theory development, methodological choice, research strategy, time horizon as well as techniques and procedures, as illustrated in Figure 3.1 (Saunders et al., 2015).

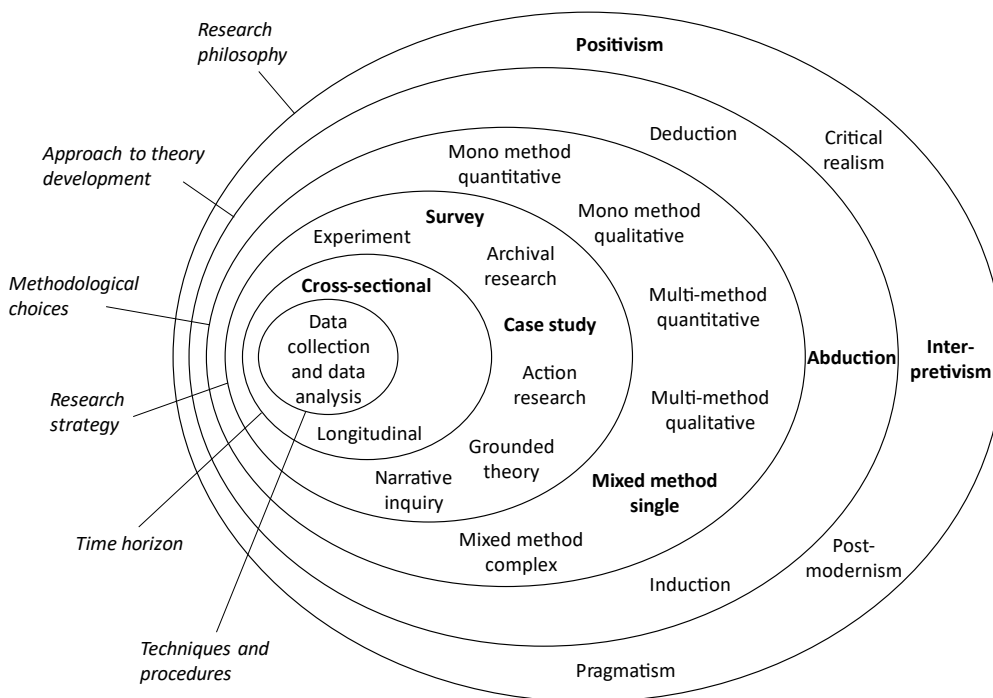


Figure 3.1: The research ‘onion’ (according to Saunders et al., 2015, p. 124)

The methodological choices made in this study are presented in bold in the figure and further discussed in the text.

Research philosophy

The research philosophy that underpins a study determines the nature of reality, knowledge, and values, thus defining the ways the world is seen, and how knowledge is developed (Saunders et al., 2015). The assumptions about these ontological, epistemological, and axiological dimensions determine the philosophical position of the research, which, in turn, affects the choice of a suitable research methodology.

In the literature, ontology is referred as the science of being (Crotty, 1998), which deals with the issues of existence and the nature and structure of reality (Nayak and Singh, 2021; Guarino et al., 2009). In social science research, this refers to the assumptions made about the research objects, such as organization, artifacts, organizational events, and management (Saunders et al., 2015). The two most distinguished ontological positions are realism and nominalism (Easterby-Smith et al., 2021; Burrell and Morgan, 1994). Realists argue for objective existence, which means that social entities exist external to and independent of social actors. They see the social world as concrete as the natural world, being relatively immutable, and having a reality of its own. Nominalists, for their part, believe that social entities are constructions created through language, conceptual categories, perceptions, and the actions of social actors. They do not accept an underlying independent reality as true; instead, the social world is seen as an artificial construct, one created based on the interpretations of different social actors—instead of a single reality, multiple realities exist. (Saunders et al., 2015; Burrell and Morgan, 1994.) Hence, the key difference between these ontological positions lies in the continuum of objectivism and subjectivism. In social research, this could mean, for example, whether an organization is seen as a fixed and structured organized system (realism) or as a floating system of organization and management (nominalism).

Epistemology considers the assumptions about knowledge, what and how we can know about things, and what kind of knowledge is real knowledge (Nayak and Singh, 2021; Saunders et al., 2015; Crotty, 1998). The existing literature presents quite a range of epistemological stances, of which Crotty (1998) introduces a tripartite division: objectivism, constructionism, subjectivism. Objectivism is linked to realist ontology, which holds that there is one reality apart from social actors. Accordingly, objectivists assert that knowledge simply exists, and objective truth can be discovered through observation and measurement (Saunders et al., 2015; Bryman, 2008; Crotty, 1998). Constructivism, in contrast, considers that no single pre-existing knowledge exists, and that truth and meaning result from social actors' interplay with realities (Crotty, 1998). Thus, according to constructivism, knowledge is continually being constructed by social actors' interactions with social entities (Saunders et al., 2015; Bryman, 2008; Crotty, 1998). Subjectivism is linked to nominalist ontology, which asserts that social entities are a convention of social actors. Truth and meaning exist in the subjects (social actors), and the objects (social entities) do not contribute to the generation of meaning. Thus, subjectivists gain knowledge from social actors via narratives, opinions, interpretations, and perceptions. This leads to the creation of multiple realities. (Saunders et al., 2015; Crotty, 1998.) In research, the two extreme epistemological positions may mean, for

example, whether the researcher collects measurable facts from large samples to generalize knowledge (objectivism) or narratives from a small number of individuals to search for new in-depth understandings (subjectivism).

Alongside ontology and epistemology, axiology has its place in the philosophical commitments that underlie research. It considers the role of values in research. A researcher's values affect the choices made throughout the research and influence the research results. It determines, among others, how personally a researcher becomes involved in the research. Objectivists strive for value-free research and try to detach from their values. In contrast, subjectivists believe that they cannot detach themselves from their values, and they openly need to consider the role of their values during research. (Saunders et al., 2015; Bryman, 2008.)

Assumptions made in the above-discussed philosophical dimensions determine different research philosophies. In business and management research, five major research philosophies are commonly used: positivism, critical realism, interpretivism, postmodernism, and pragmatism (Saunders et al., 2015). Positivism holds that the social world is external and objective, and that knowledge about its phenomena is observable through scientific methods (Easterby-Smith et al., 2021). Critical realism, on the other hand, asserts that the social world is mostly objective (Sousa, 2010). However, unlike positivism, critical realism views observations as manifestations of the real world that, as such, do not offer a complete understanding of reality. Interpretivism asserts that the social world is not objective; rather, reality is manifested through subjective interpretations of social structures and actions. Thus, instead of a singular objective reality, there are several worlds. Interpretivists study these human interpretations of the social world to enrich understanding rather than seek to create generalizations as positivists do. (Saunders et al., 2015.) According to postmodernism, the social world is created through discourse, power relations, and human conventions (Easterby-Smith, 2021; Sousa, 2010). Absolute truth is considered both insignificant and unattainable (Sousa, 2010). Instead, 'truth' is only the perspective of a particular group of people at a particular point in time, and other perspectives are considered equally valuable (Saunders et al., 2015). Pragmatism emphasizes practical orientation, denoting that knowledge and understanding are made up of the direct experiences of individuals. Since people interpret the world differently, no single perspective can ever offer an overall picture, and thus multiple realities exist (Saunders et al., 2015). Pragmatists aim to figure out 'what works,' so the research problem is at the center, and all the available research strategies can be used to understand the problem (Saunders et al., 2015; Creswell, 2014; Buchanan and Bryman, 2011).

Approach to theory development

In addition to reflecting on philosophical perspectives, the starting points of research include a reflection on the approaches to theory development and reasoning (Gummesson, 2000). The literature recognizes three approaches to reasoning: inductive, deductive, and abductive (Easterby-Smith et al., 2021; Saunders et al., 2015). Deduction is based on the

existing theories and concepts that are tested using data (i.e., moving from theory to data). In induction, on the other hand, the starting point is data, and the goal is to form concepts and models from it and, eventually, a new theory (i.e., moving from data to theory). Abduction is not a separate approach, but it combines deductive and inductive reasoning by moving back and forth between them. (Gummesson, 2000; Saunders et al., 2015.) Instead of trying to keep them separated, Bryman (2008) emphasizes, it is better to think of deductive and inductive approaches as tendencies.

Methodology

The chosen philosophical perspective and approach to theory development influence research methodology, the strategy by which the research is conducted (Nayak and Singh, 2021; De Loo and Lowe, 2011; Crotty, 1998). The first methodological choice, according to Saunders et al. (2015), is the selection between quantitative, qualitative, and mixed methods. Quantitative research employs a variety of statistical methods to analyze numerical data collected in a structured form to achieve generalizations (Saunders et al., 2015; Bryman, 2008). The typical quantitative strategies are surveys and experiments (Creswell, 2014; Crotty, 1998). Using a survey, a common method in business and management research, the researcher aims to answer the ‘what,’ ‘how much,’ and ‘how many’ questions (Saunders et al., 2015; Ghauri and Grønhaug, 2010); it is often used to discover opinions, attitudes, and the nature of relationships between variables (Easterby-Smith et al., 2021; Ghauri and Grønhaug, 2010; Bryman, 2008). This research strategy usually targets a fairly large sample (Easterby-Smith et al., 2021), with the aim of generalizing the results to the entire population (Saunders et al., 2015).

Using a wide range of different methods of data collection and analysis, qualitative research aims to gain an in-depth understanding of a phenomenon by examining the meanings and relationships between them (Saunders et al., 2015; Bryman, 2008). The typical qualitative strategies are case study, ethnography, grounded theory, and narrative research (Saunders et al., 2015; Creswell, 2014). A case study is suitable to answer the ‘how’ and ‘why’ questions (Yin, 2018; Ghauri and Grønhaug, 2010), and it is a commonly used strategy in many academic fields as well as in practicing professions, such as business and management (Yin, 2018; Ghauri and Grønhaug, 2010; Bryman, 2008). This strategy focuses on a contemporary phenomenon in its real-world context by delving into one or a few cases to gain a thorough understanding of it (Yin, 2018; Saunders et al., 2015; Creswell, 2013).

Creswell and Plano Clark (2011) define mixed methods research as a methodological approach that mixes both quantitative and qualitative methods in a single study. They highlight that mixing can take place not only on a methods level but also on a philosophical level, and that “mixed methods designs may be fixed and/or emergent” (p. 54), meaning that the use of mixed methods is pre-planned, arises during the research process, or is something in between. The aim of using mixed methods is to “obtain a more comprehensive view and more data about a problem” (Creswell, 2015, p. 15), allowing for a better understanding and validity of the problems and complex phenomena under

study than when using a mono method design (Easterby-Smith et al., 2021; Molina-Azorin et al., 2017; Molina-Azorin, 2012). The major mixed methods strategies include simple designs, such as convergent, exploratory sequential, and explanatory sequential designs, and complex designs, such as transformative, embedded, and multiphase designs (Creswell, 2014). The complex designs incorporate the simple ones, which, in turn, differ with the timing (concurrently or sequentially) of quantitative and qualitative data collection and analysis (Creswell, 2015). For example, the explanatory sequential design comprises two consecutive phases. First, the quantitative data are collected and analyzed, and the results are used to design a second qualitative phase, which, in turn, is intended to help explain the original quantitative results in more detail (Creswell, 2014).

Methods

Methodology offers a useful higher-level plan for conducting research; methods, on the other hand, inform the research work at a more detailed level by defining the techniques and procedures used for data collection and analysis (Johannesson and Perjons, 2014; Crotty, 1998). In the survey strategy, data are most commonly collected through questionnaires but also through structured interviews, structured observation, and real-time data (Easterby-Smith et al., 2021; Saunders et al., 2015). A questionnaire can be defined as a collection of questions presented to respondents in a structured, predetermined order (Saunders et al., 2015; Bryman, 2008); it can be completed either interviewer-administered or self-administered (Saunders et al., 2015). It can be used to produce both numerical and non-numerical data, the latter of which must be quantified for statistical analysis. Statistical methods are used to analyze the data, which vary depending on their type, with the goal of describing the data, exploring variable relationships, and testing significance. (Saunders et al., 2015.) The methods include graphs, dispersion measures, correlation, principal component analysis, and linear regression analysis (Saunders et al., 2015; Bryman, 2008).

Since a case study strategy aims to gain a thorough understanding of a case, its data collection often includes qualitative methods, such as interviews, observations, and documentation (Yin, 2018; Creswell, 2013; Ghauri and Grønhaug, 2010). According to Yin (2018), interviews are “one of the most important sources of case study evidence”. In the literature, interviews are divided into several different typologies (see Yin, 2018; Saunders et al., 2015; Creswell, 2013), and one of them is based on the formal–informal continuum, which forms a categorization of structured, semi-structured, and unstructured interviews (Saunders et al., 2015; Ghauri and Grønhaug, 2010). A structured interview is the most formal form of an interview that corresponds to completing a questionnaire under the interviewer’s guidance. An unstructured interview, on the other hand, is only loosely structured based on one or more topics and can proceed very freely in discussion (Yin, 2018; Saunders et al., 2015; Ghauri and Grønhaug, 2010). The formality of a semi-structured interview is between the two types of interviews presented above. The interview questions are designed in advance and use the same wording. As there are no ready-made answer options, the respondents are free to answer as they wish, and the interviewee can ask new clarifying questions and change the order of the pre-planned

questions (Saunders et al., 2015; Bryman, 2008). Qualitative data can be analyzed using various methods, such as grounded theory, discourse analysis, and content analysis (Renz et al., 2018; Saunders et al., 2015; Hsieh and Shannon, 2005). Content analysis can be performed as a search for ‘truth’ using quantitative methods; however, increasingly, it is performed using qualitative methods, emphasizing the meaning and subjective interpretation of the content (Graneheim et al., 2017). The term “content analysis” is used in the literature to mean either one or the other of these approaches, or is considered to include both (Camprubí and Coromina, 2016). Qualitative content analysis can be considered a subjective interpretation of textual data, as it codes and identifies themes or categories through a systematic classification process (Schreier, 2014; Hsieh and Shannon, 2005). Data coding can be approached by deriving the coding categories directly from the data or by creating them based on theory (Hsieh and Shannon, 2005; Weber, 1990). However, Lune and Berg (2017) emphasize that, when conducting research, neither approach is completely mutually exclusive.

Research approach in this study

This study aimed to comprehensively understand the IS capabilities that enable an IT-consuming company’s business value creation. According to Crotty (1998), the research purpose should determine whether qualitative, quantitative, or mixed methodologies are employed. Moreover, Fetter and Freshwater (2015), as well as Creswell and Plano Clark (2011), found that combining quantitative and qualitative methodologies provides a better understanding of the research problem compared to using either methodology in isolation. Rather than choosing between the two, researchers should strive to integrate the strengths of both methodologies in the same study (Molina-Azorin et al., 2017). Hence, this research was conducted using a mixed-methods approach, specifically an explanatory sequential design. The research was initially designed to be conducted in two phases, beginning with a quantitative phase and followed by a qualitative phase. However, the details of the second phase emerged through the interpretation of the initial quantitative phase results. As a result, the mixed-methods design incorporated both fixed and emergent elements, as Creswell and Plano Clark (2011) have noted as possible.

In addition to changing the methodology during research, its philosophical view may also change when using mixed methods (Creswell and Plano Clark, 2011). This was also the case in this study. In the first phase of the study, the philosophical stance of positivism was adopted, as the aim was to objectively test the causal relationships between IS capabilities and various dimensions of business value. Consequently, the phenomenon under research was quantified, and survey research was conducted among IT-consuming companies. The quantitative data were gathered using a self-administered questionnaire and analyzed using various statistical methods (publications I–IV). In the second phase of the study, the philosophical stance of interpretivism was adopted, as the aim was to create a richer understanding of IS capabilities in creating business value by gaining in-depth insights into the individuals’ perspectives. Therefore, a multi-case study was implemented among IT-producing companies. The data were obtained through semi-structured interviews and analyzed using qualitative content analysis with the original

coding categories based on the literature (publication V). Since the data analyzed was collected at a single point in time in both phases, this is a cross-sectional study. As Gummeson (2000) notes, all types of research ultimately involve iterations of deduction and induction, as was the case in this study. The analysis used a theoretical framework to examine the data (deductive approach), while also remaining open to the emergence of unexpected findings (inductive approach), resulting in an abductive approach to theory development.

3.2 Implementation of the study

This study aimed to gain a comprehensive understanding of IT-producing and IT-consuming companies' IS capabilities on the business value creation of an IT-consuming company. To this end, data were collected from both these target groups in sequence, allowing the results obtained in the first phase to be exploited in the second phase. To understand the IS capabilities that IT-consuming companies consider to be impacting their business value, the first phase of the study was conducted as a quantitative survey study (presented in the publications I-IV). To gain a richer understanding of the role of IS capabilities in business value creation, the second phase of the study focused on the perspective of IT-producing companies and was conducted as a qualitative multi-case study (presented in publication V).

3.2.1 Quantitative phase

Operationalization

To comprehensively investigate the IS capabilities of IT-producing and IT-consuming companies and their impact on value creation for the latter, it was essential to employ a measurement instrument that embraced multiple dimensions. These dimensions encompassed the IS capabilities utilized during the production and usage phases of a given IT solution while also considering those that extended beyond these phases. Additionally, the measurement instrument needed to account for IS capabilities at both the strategic and operational levels. Since the existing literature did not offer a measurement instrument that would consider all these aspects, a specific instrument was developed for this study. To ensure its comprehensiveness and relevance, the instrument drew on pertinent literature from diverse fields.

The unit of analysis in the study is the individual respondent's perception of the organizational-level capabilities related to IS in use as well as the achieved business value. The independent variables measuring organizational-level IS capabilities were measured using multiple-item scales, all assessed on a five-point Likert-type scale, alternating from strictly disagree (1) to strictly agree (5). The capability scales included IT solution quality capabilities to assess the technical functionalities that affect the desired operation of the IT solution, service quality capabilities to discover the IT solution procurement process, e-commerce capabilities to focus on the actions that the IT-

consuming company takes to serve its customers through their online store, and relationship capabilities to explore the long-term relationship between the IT-producing and IT-consuming companies. The dependent variables measuring IS business value were measured using single-item scales, all assessed on a four-point Likert-type scale, alternating from weak (1) to excellent (4). The IS business value scales included financial and sales performances to assess the economic success of the online store, operational performance to assess the non-economic success of the online store, innovation performance to consider the contribution of the online store on the organization's ability to innovate, and relationship value to explain the business value obtained through cooperation with the IT-producing company. In addition, three control variables (company size, online store age, and online store sales) were included to enhance internal validity. The scales and their construction are discussed in more detail in publications I–IV, and the scale items are presented in Appendix A.

Self-reported subjective measures were chosen for several reasons. First, although it has been argued that objective measurements are more valid than subjective ones, the literature has shown that there is a high correlation and concurrent validity between the two (Song et al., 2005; Wall et al., 2004). Indeed, researchers have found empirical support for the reliability and validity of subjective performance measures (Katsikeas et al., 2006; Venkatraman and Ramanujam, 1987). Second, the IS business value indicator in this study included measures, such as relationship value and innovation performance, that are difficult or impossible to objectively observe. Third, some objective business value indicators may not be comparable, for example, between different industries or different types of companies (Katsikeas et al., 2006). Instead, subjective measures are proposed to reduce the impact of such contextual factors (Singh et al., 2016). Fourth, responding to objective metrics can be challenging for respondents, as they may not have accurate information at their disposal (Song et al., 2005) and, in addition, finding numerical values requires extra effort. Moreover, it has been stated that respondents may be more reluctant to offer exact objective information about their company compared to subjective perception (Singh et al., 2016).

The use of single-item measures in surveys has been the subject of major concern in the literature. First, some researchers claim that validity suffers, as it is considered unlikely that a single item could soundly represent a complex construct (Diamantopoulos et al., 2012; Sarstedt and Wilczynski, 2009; McIver and Carmine, 1981). Second, single-item measures have been alleged to be inaccurate because their ability to provide discrimination is limited (McIver and Carmine, 1981). Third, the reliability of single-item measures has been considered lower than that of multi-item measures (Sarstedt and Wilczynski, 2009; McIver and Carmine, 1981). However, single-item measures have been found to perform as well or even better than multi-item measures or are at least a reasonable substitute for multi-item measures (Bergkvist and Rossiter, 2007; Drolet and Morrison, 2001; Ittner and Larcker, 1998). Even researchers who have questioned the use of single-item measures support them under certain circumstances. The construct to be measured should be sufficiently simple (Sarstedt and Wilczynski, 2009), narrow (Freed, 2013), homogeneous (Diamantopoulos et al., 2012; Loo, 2002), and unambiguous to the

respondent (Freed, 2013; Sackett and Larson Jr., 1990). As the single-item measures used in this study met the above criteria, their use was justified.

Sample and data collection

The data were collected through a structured online questionnaire from Finnish small-and medium-sized online store operators. An online store was considered a suitable choice to represent an IT solution, as it is a versatile system connected to several company processes and systems, offering a wide range of possibilities, and is used not only by the company's operators but also by customers, which also allowed to consider the end-user perspective. In addition, the total number of online store operators in Finland was reasonable, which allowed a sufficiently large proportion of the entire population to be reached. All the industries were included in the study, as it focused on IS capabilities, and a company's industry was not considered a significant issue in this research setting. The questionnaire was sent to the employees who worked with the company's online store and occupied digital business management positions. These employees were understood to possess the relevant information to answer questions about their online store supplier's capabilities, their e-commerce operations, and the related business value dimensions. The original sample of 2541 Finnish online store operators was randomly selected from the total population of 7500. After 229 false contacts (invalid email addresses) were excluded, the questionnaire was emailed to 2312 e-commerce representatives. Twelve days later, a first reminder email was sent to those who had not yet responded, and three weeks later, another follow-up email was sent. A total of 109 responses were received from 107 companies.

The responses were examined for the following two criteria: first, if most values were missing; second, if it was evident that the responses were intentionally incorrect throughout the questionnaire (e.g., the worst option was chosen for all response items). None of the responses had to be removed based on these criteria, so all 109 responses were included in the study. The number corresponds to a response rate of about 4.7%. Glaser (2008) highlights that it is important to take response rate into account when measuring the accuracy of survey research results; however, its significance should be assessed in the context of the research, for example, by considering the variables of interest as well as the population of interest and sample. Since the initial sample in this study included about 31% of the total population, which was randomly selected from a target group of individuals with optimal backgrounds and expertise to respond to the questionnaire, the obtained responses can be considered highly representative of the target population. In addition, the number of responses exceeded the smallest sample size for a certain population size (see Barlett et al., 2001). Consequently, the sample size can be perceived as appropriate.

Respondent demographics

The demographics were analyzed based on the following three characteristics: the number of employees, the online store sales as a share of total sales, and the age of the online

store (Table 3.1). The data on the number of employees were obtained from the business information service provider (Suomen Asiakastieto Oy), while the data on the other two were requested from respondents. Just over 73% of the respondents represented micro-companies with fewer than 10 employees and about 9% small companies (10 to 249 employees). For a little less than 18% of the respondents, the information on the number of employees in the represented company was not available. Roughly 58% of the respondents reported that the company they represented receives less than 25% of their total sales through the online store, almost 24% sold 25%–75% online, and only less than 16% stated that online store sales account for more than 75% of total sales. About 3% of the respondents did not answer this question. Around 48% of the respondents represented companies that had had an online store for less than five years, while about half had had one for longer. Just under 2% of the respondents did not answer this question.

Table 3.1: Company-level characteristics

Characteristic	Category	Frequency	Percent
Number of employees	< 10	80	73.4
	10–249	10	9.2
	No info available	19	17.4
Online store sales as a share of total sales (%)	< 25	63	57.8
	25–75	26	23.9
	> 75	17	15.6
	No response	3	2.8
Age of the online store	≤ 5 years	52	47.7
	> 5 years	55	50.5
	No response	2	1.8

Data analysis

The questionnaire data were analyzed in all the publications by multiple linear regressions. In addition, in publications I, II, and IV, a moderator analysis was performed to determine whether a third variable moderated the relation between the independent and dependent variables. All the publications assessed the effects of company size and online store age on dependent variables; additionally, publication II assessed online store sales as a determining factor. Moreover, whenever it was deemed necessary based on the correlations of independent variables, multicollinearity—i.e. one independent variable explains another (Hair et al., 2010)—was checked by calculating the variance inflation factors (VIF). As the VIF values were lower (less than 2.0) than the recommended limit of 5–10, multicollinearity was not presumed to be a problem in this study (Kleinbaum and Kupper, 1988).

Publication I used multiple regressions to examine the effect of the IT-producing company's IS capabilities on the IT-consuming company's innovation performance. Additionally, the effect of the IT-consuming company's e-commerce capabilities on the

relation between the IT-producing company's capabilities and the IT-consuming company's innovation performance was studied using moderator analysis. Publication II, in turn, applied multiple regressions to estimate the effect of the producing company's IT solution quality and service quality capabilities as well as the IT-consuming company's e-commerce capabilities on the relationship value; moreover, moderator analysis was employed to examine the effect of relationship capabilities on that relation. In publication III, multiple regressions were used to investigate the impact of different dimensions of the IT-producing company's IS capabilities on the IT-consuming company's IS performance. Finally, publication IV applied multiple regressions to study the effect of the different dimensions of the IT-consuming company's e-commerce capabilities on the IS performance; further, the moderative effect of the IT-consuming company's relationship participation capabilities on the relation was investigated by the moderator analysis. A summary of the variables and hypothesis analyses used in the quantitative publications and their counterparts in this study is presented in Table 3.2.

Table 3.2: Summary of the variables and hypothesis analyses used in the publications. The terms used in this study are in parentheses.

Publication	Independent variables	Dependent variables	Moderator variables	Control variables	Hypothesis analyses
I	Product (<i>IT solution quality capabilities</i>) Service delivery (<i>Service quality capabilities</i>) Buyer-supplier relationship (<i>Relationship capabilities</i>)	Buyer innovation performance (<i>Innovation performance</i>)	Buyer operations (<i>E-commerce capabilities</i>)	Number of employees (<i>Company size</i>) Age of online store (<i>Online store age</i>)	Linear regression analysis Moderator analysis
II	Product characteristics (<i>IT solution quality capabilities</i>) Service delivery characteristics (<i>Service quality capabilities</i>) Buyer operations (<i>E-commerce capabilities</i>)	Supplier relationship value (<i>Relationship value</i>)	Buyer-supplier relationship intensity (<i>Relationship capabilities</i>)	Number of employees (<i>Company size</i>) Age of e-shop in use (<i>Online store age</i>) Portion of sales via e-shop (<i>Online store sales</i>)	Linear regression analysis Moderator analysis
III	Product capabilities (<i>IT solution quality capabilities</i>) Service capabilities (<i>Service quality capabilities</i>) Relationship capabilities (<i>Relationship capabilities</i>)	Financial performance (<i>Financial performance</i>) Operational performance (<i>Operational performance</i>) Sales performance (<i>Sales performance</i>)	-	Number of employees (<i>Company size</i>) Online shop age (<i>Online store age</i>)	Linear regression analysis
IV	E-business operations (<i>E-commerce capabilities</i>)	Financial performance (<i>Financial performance</i>) Operational performance (<i>Operational performance</i>)	Responsiveness to the supplier (<i>Customer participation</i>)	Number of employees (<i>Company size</i>) Web shop age (<i>Online store age</i>)	Linear regression analysis Moderator analysis

3.2.2 Qualitative phase

Methodological choices

In addition to the quantitative phase, the study included a complementary qualitative phase following the mixed methods explanatory sequential design (Creswell, 2014). The quantitative phase explored the IT-consuming company's perspective regarding the IS capabilities of both the IT-producing and IT-consuming companies in creating business value. To gain a deeper understanding of the impact of IS capabilities on business value creation, the research examined the value creation of IS capabilities as perceived by IT-producing companies. B2B companies were chosen, as they are known to be more aware of their customers' requirements and value creation mechanisms than B2C companies; in addition, they tend to build long-term customer relationships rather than settling for individual deliveries. These features give B2B companies a good understanding of the value creation processes and the factors that create business value.

Since the case study strategy is suitable for gaining an in-depth understanding of a contemporary phenomenon in its real-world context (Yin, 2018; Saunders et al., 2015; Creswell, 2013), a case study among IT-producing companies was chosen. A multi-case study was chosen, as Eisenhardt and Graebner (2007) argue that the power of analysis increases in proportion to the number of cases added to a single-case study, giving a multi-case study typically a stronger basis for theory building than a single-case study.

Case selection and data collection

The cases were selected through a purposive sampling approach, considering their suitability for shedding light on the phenomenon under study (Campbell et al., 2020). Five selection criteria were used. First, the companies had to have extensive experience as an IT-producing company. Second, the companies' offerings had to include an online store. Third, the companies needed to have concrete initiatives to co-create value with their customers. Fourth, the companies had to be of different sizes to reduce the impact of contextual factors. Fifth, the companies had to be able to provide access to a sufficient amount of relevant information. These criteria were met by one Finnish 20-person company and a very large international company. In addition to their size and internationality, the companies differed in terms of maturity, operating logic, and customer strategies, providing a rich premise for studying the IS capabilities in business value creation. The selected cases are described in more detail in publication V.

The data were collected through semi-structured interviews. The interview questions were designed based on the results of the quantitative phase, focusing on digitalization, the digital operating environment, value creation, value co-creation, and customer participation (see Appendix B for the interview protocol). Although the interview questions were defined in advance, the researchers' support questions and comments imparted a conversational nature to the interviews, allowing an in-depth understanding of the phenomenon under study. To minimize bias and gain a comprehensive picture of the

IS capabilities and value creation from different perspectives, and since the unit of analysis was the company and its relationships with its customers, five informants from different hierarchical levels and job descriptions were selected from the two companies participating in the study. The interviews were recorded and transcribed to conduct an in-depth analysis. The interviews are described in more detail in publication V.

Data analysis

This study followed the suggestion of Eisenhardt and Graebner (2007) that data from a multi-case study can be combined rather than organized into cases. As a result, no within-case or cross-case analysis was performed, and the data were analyzed as one unit. The analysis was performed as a qualitative content analysis (e.g., Renz et al., 2018; Saunders et al., 2015; Hsieh and Shannon, 2005) by three researchers to find out the essential IS capabilities and how they enable value creation. The original coding categories were based on the existing literature (e.g., Suoniemi et al., 2021; Blocker et al., 2011; Karimi et al., 2007; Lapierre, 2000), but themes were also allowed to emerge from the data. The analysis followed an iterative process, including the following three stages: (1) reading the transcriptions, interpreting the contents, and writing notes; (2) coding and classifying the data into themes; and (3) combining the themes into categories. The researchers discussed any differing interpretations between the stages. When no new information was found in the data, a comprehensive interpretation was developed. By having several researchers interpret the data and by replicating the the aforementioned three stages, the validity of the study was confirmed. The data analysis is described in more detail in publication V.

3.2.3 Summary of the implementation of the study

The study followed the explanatory sequential design of mixed methods. First, a quantitative survey study was conducted by collecting data with a structured online questionnaire and analyzing them using different statistical methods. Second, a complementary qualitative phase as a multi-case study was conducted by collecting data with semi-structured interviews and analyzing them using qualitative content analysis. Finally, the results of the two phases were interpreted to find answers to the research questions.

Because mixed methods research contains many components, the value of providing a visual presentation of the study has been emphasized in the literature (Harrison et al., 2020; Creswell, 2015; Ivankova et al., 2006). Thus, this study presents a diagram of its progress (Figure 3.2), the style of which follows the guidelines of Ivanka et al. (2006) and Creswell (2015).

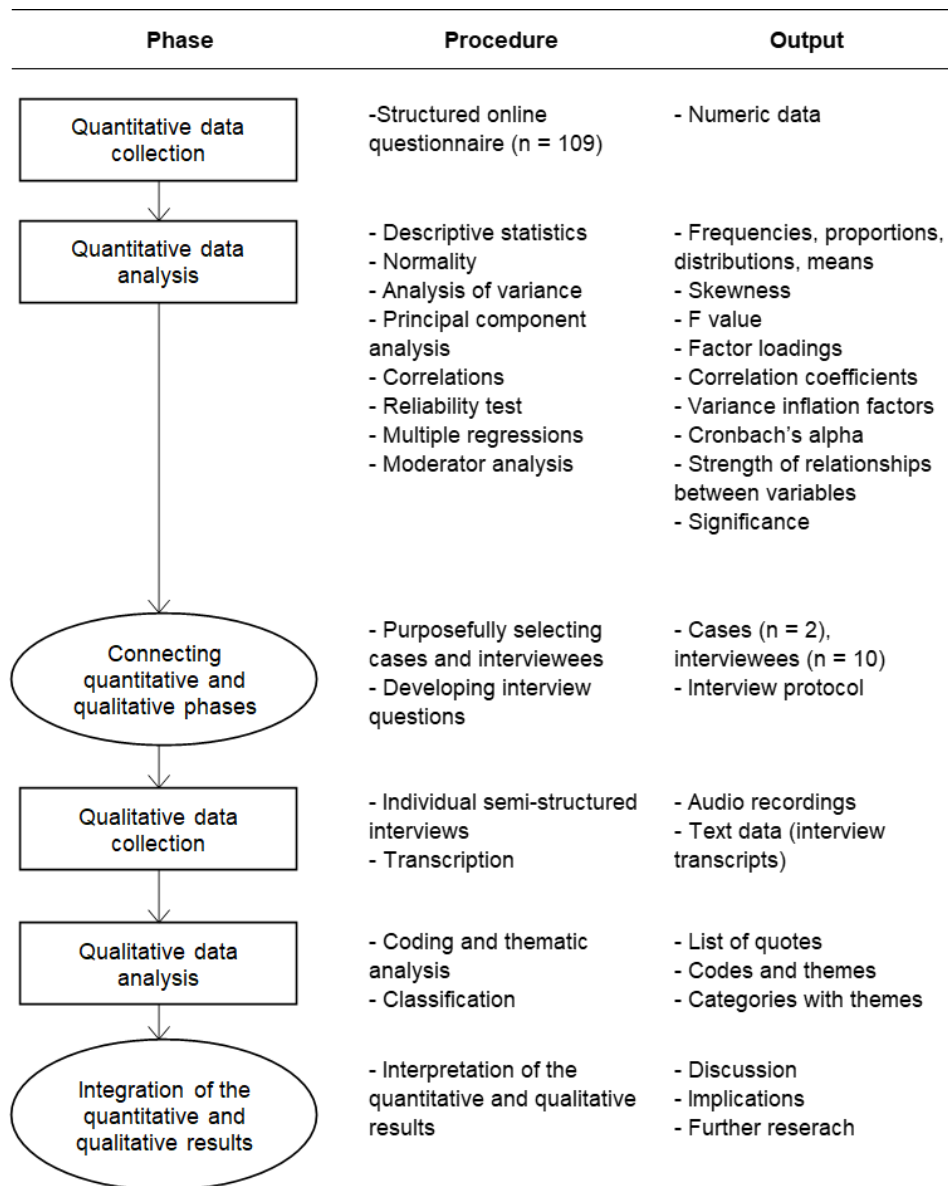


Figure 3.2: The progress of the mixed methods explanatory sequential design

4 Results

This chapter presents the five publications forming the second part of the thesis and answers the research questions. First, a summary of the results of the publications is presented. Second, IS capabilities in business value creation are discussed, and the research questions are answered by presenting a summary of the objectives and findings of each publication.

4.1 Summary of the publications

Each publication has its role in this thesis. Collectively, they form the understanding necessary to arrive at the conclusions. Publications I, II, III, and IV examine from different aspects how IT-consuming companies consider IS capabilities affecting their business value, thus addressing research question 1: *According to IT-consuming companies, which are the IS capabilities that impact their business value?* More specifically, publications I, II and III examine the impact of both IT-producing and IT-consuming companies' IS capabilities on the latter's business value, thus seeking an answer to sub-questions 1a: *Which are the IS capabilities of the IT-producing company that impact the business value of IT-consuming companies?* and 1b: *Which are the IS capabilities of IT-consuming companies that impact their business value?* While publication I considers IS business value in terms of innovation performance, publication II focuses on relationship value. Publication III, in turn, examines the impact of an IT-producing company's IS capabilities on an IT-consuming company's financial, operational, and sales performance; moreover, it considers the role of an IT-consuming company in the relationship between the two parties. Thus, this publication mainly seeks an answer to the first sub-question. Publication IV, on the other hand, considers only the IS capabilities of an IT-consuming company and examines their effects on its financial and operational performance, thus seeking an answer to the second sub-question. Publication V, in turn, examines the IT-producing companies' view on the IS capabilities that are essential in the business value creation of both parties, seeking an answer to research question 2: *How do IT-producing companies consider achieving excellent IS capabilities that enable the creation of IS business value?* Table 4.1 gives an overall view of the publications by presenting a summary of their titles, objectives, their research questions, their main findings, and their main contribution to this thesis.

Table 4.1: Summary of the publications

	Publication I	Publication II	Publication III	Publication IV	Publication V
Title	Managing supplier capabilities for buyer innovation performance in e-business	Managing buyer-supplier relationships in e-commerce projects: Implications for relationship value	The view of IT-consuming firms on the key digital service capabilities of IT-producing firms	Turning e-business operations for business value	Digital service capabilities in B2B value creation
Main objective	To examine which IT-producing company's IS capabilities affect an IT-consuming company's innovation performance and whether an IT-consuming company's e-commerce capabilities moderate the relationship.	To investigate which IS capabilities contribute to IT-consuming companies' relationship value, and whether such contributions are moderated by the intensity of the relationship between an IT-producing and an IT-consuming company.	To explore which IS capabilities IT-consuming companies consider as determinants of their business value creation.	To examine which IT-consuming company's e-commerce capabilities contribute to their IS business value and whether such contributions are moderated by their relationship capabilities.	To find out which IS capabilities IT-producing companies consider essential for value creation with their business customers.
RQ	1a, 1b	1a, 1b	1a, 1b	1b	2
Main findings	The relationship capabilities of an IT-producing company can directly transform into the innovation performance of an IT-consuming company, while the IT solution quality and service quality capabilities do not. The IT-consuming company's e-commerce capabilities positively affect the relationship between service quality capabilities and innovation performance, while the relationship between IT solution quality capabilities and innovation performance is negatively affected.	The service quality capabilities of an IT-producing company can be considered as direct value drivers for the relationship value of an IT-consuming company, while the IT-producing company's IT solution quality capabilities and the IT-consuming company's e-commerce capabilities do not. The more intensive the relationship between an IT-producing company and an IT-consuming company, the less the IT solution quality capabilities and the more the e-commerce capabilities affect the relationship value.	The relationship capabilities do not affect the financial, sales, or operational performance of an IT-consuming company, while the IT solution quality and the service quality capabilities of an IT-producing company do.	Customer orientation has a direct effect on an IT-consuming company's financial and operational performance, while e-commerce practices and personalization do not. Customer participation capability has a positive moderating effect on the relationship of the customer orientation to the financial performance.	In the business between IT-producing and IT-consuming companies, the most business value comes from relationship and service quality capabilities. IT solution quality capabilities are not considered a priority in IS business value creation.
Main contribution to the thesis	The IT-producing company's IS capabilities that contribute to an IT-consuming company's innovation performance, and the role of the IT-consuming company's e-commerce capabilities as a moderator on that relationship.	The IS capabilities that contribute to an IT-consuming company's relationship value, and the role of the relationship capabilities as a moderator on that connection.	The IT-producing company's IS capabilities the IT-consuming companies consider as determinants of their IS business value.	The IT-consuming company's IS capabilities that contribute to its IS business value.	The IS capabilities IT-producing companies consider essential in IS business value creation.

4.2 Impact of IS capabilities on business value

4.2.1 Aspects of IT-consuming companies

Publication I

The aim of publication I—*Managing IT-producing company capabilities for buyer innovation performance in e-business*—was to examine the impacts of an IT-producing company's IS capabilities on an IT-consuming company's innovation performance, and whether the latter's e-commerce capabilities moderate this relationship. The IT-producing company's IS capabilities were considered through three dimensions: IT solution quality, service quality, and relationship capabilities.

The relationship capabilities, the results show, are positively related to the IT-consuming company's innovation performance; however, the IT solution quality and service quality capabilities do not. Further, the moderating effect of e-commerce capabilities on the relationship between IT solution quality capabilities and innovation performance was found to be negative, while it was positive on the relationship between service quality capabilities and innovation performance. Establishing close relationships with IT-producing companies thus seems to be a successful way for IT-consuming companies to attain innovation performance, and vice versa, IT-producing companies should invest in the relationship to support their customers in innovation. On the other hand, IT-consuming companies should not expect IT-producing companies' IT solution quality and service quality capabilities alone to improve their innovation performance. Moreover, IT-consuming companies can, through their e-commerce-related activities, benefit from the IT-producing company's service quality capabilities in terms of innovation performance. However, one should not put too much effort into these activities, as they have side effects. For example, when an IT-producing company has superior technological expertise related to producing an IT solution, the IT-consuming company's e-commerce activities may have a diminishing effect on innovation performance.

Publication II

Publication II—*Managing buyer-supplier relationships in e-commerce projects: Implications for relationship value*—aimed to investigate the links between IS capabilities and an IT-consuming company's relationship value, and whether such links are moderated by the relationship capabilities of the two parties. The IS capabilities were considered through three dimensions: the IT-producing company's IT solution quality and service quality capabilities, and the IT-consuming company's e-commerce capabilities.

The findings suggest that service quality capabilities, unlike the other two dimensions, positively contribute to the relationship value. In addition, the more intense the relationship between the parties, the less the IT solution quality capabilities and the more the e-commerce capabilities affect the relationship value. IT-consuming companies can

thus consider an IT-producing company's outstanding service quality to improve the value gained through the relationship between the parties, and IT-producing companies should therefore invest in service quality to generate value from the relationship for the customer. However, neither a high-quality IT solution nor an IT-consuming company's exploitation of the solution seems to improve the value of the relationship. Nonetheless, IT-consuming companies can amplify the impact of e-commerce operations on the value derived from the relationship by maintaining an excellent relationship with the IT-producing company. Unfortunately, having an excellent relationship has also adverse effects, as it can undermine the impact of an excellently produced IT solution on the relationship value.

Publication III

Publication III—*The view of IT-consuming firms on the key digital service capabilities of IT-producing firms*—aimed to explore the links between IS capabilities and IS business value in terms of financial, operational, and sales performance. The IS capabilities were considered through three dimensions, each of which was examined through sub-dimensions: (1) IT solution quality capabilities (performance, design, and reliability); (2) service quality capabilities (service concept and service delivery); and (3) relationship capabilities (supplier credibility and customer participation). The first six sub-dimensions are the capabilities of an IT-producing company, and the last is the capability of an IT-consuming company. Thus, the publication mainly focused on the effects of an IT-producing company's IS capabilities on an IT-consuming company's IS business value.

The results show that a sub-dimension of IT solution quality capability, namely performance—the capability to produce an IT solution that makes it easy to perform the appropriate tasks—affects all the three aspects of an IT-consuming company's IS business value—that is, its financial, operational, and sales performance. Operational performance is also impacted by another IT solution quality capability, namely reliability—the capability to produce an IT solution that functions correctly, securely, and fluently. In addition, the second sub-dimension of service quality capability, service concept—the capability to conduct a comprehensive offering and customize it to customer needs—affects the IT-consuming company's financial (negative effect) and operational (positive effect) performance. However, relationship capabilities do not appear to have a statistically significant impact on any of the three examined IT-consuming company's IS business value dimensions. Consequently, the study results suggest that IT-producing companies should seek to balance their service concept, because while it affects the customer's operational performance positively, it negatively impacts the customer's financial performance. Thus, when an IT-consuming company is looking for an IT-producing company, it is worth noting that a best value-generating supplier considers a balance between the functional and financial aspects of its services. In addition, it appears that the design-related issues of an IT solution are taken for granted; however, functional features, such as performance and reliability, seem to provide added value for the IT-consuming company.

Publication IV

Publication IV—*Turning e-business operations for business value*—aimed to examine the links between an IT-consuming company's e-commerce capabilities and their financial and operational performance and whether they were moderated by their relationship capabilities. The e-commerce capabilities were considered through three sub-dimensions—e-commerce practices, customer orientation, and personalization—and the relationship capability was viewed as customer participation. The publication thus focused on the effects of an IT-consuming company's IS capabilities on its own IS business value.

According to the results, one sub-dimension of e-commerce capabilities—customer orientation—significantly impacts both the IT-consuming company's financial and operational performance, while e-commerce practices and personalization do not. In addition, customer participation was found to have a statistically significant positive moderating effect on the link between the IT-consuming company's customer orientation capability and financial performance. Thus, as the findings suggest, to achieve better IS business value in terms of financial and operational performance, IT-consuming companies should pay close attention to their capability to operate customer-oriented through their online store. In addition, the impact on financial performance can be further improved by taking good care of one's own part in the relationship with the IT-producing company.

Answer to research question 1

The research question 1—*According to IT-consuming companies, which are the IS capabilities that impact their business value?*—is answered below through two sub-questions, the first looking for an answer about the impact of an IT-producing company's IS capabilities, and the second the impact of an IT-consuming company's IS capabilities on the business value of an IT-consuming company. Figure 4.1 shows an overview of the effects of IS capabilities on the business value of IT-consuming companies based on the above-discussed publications.

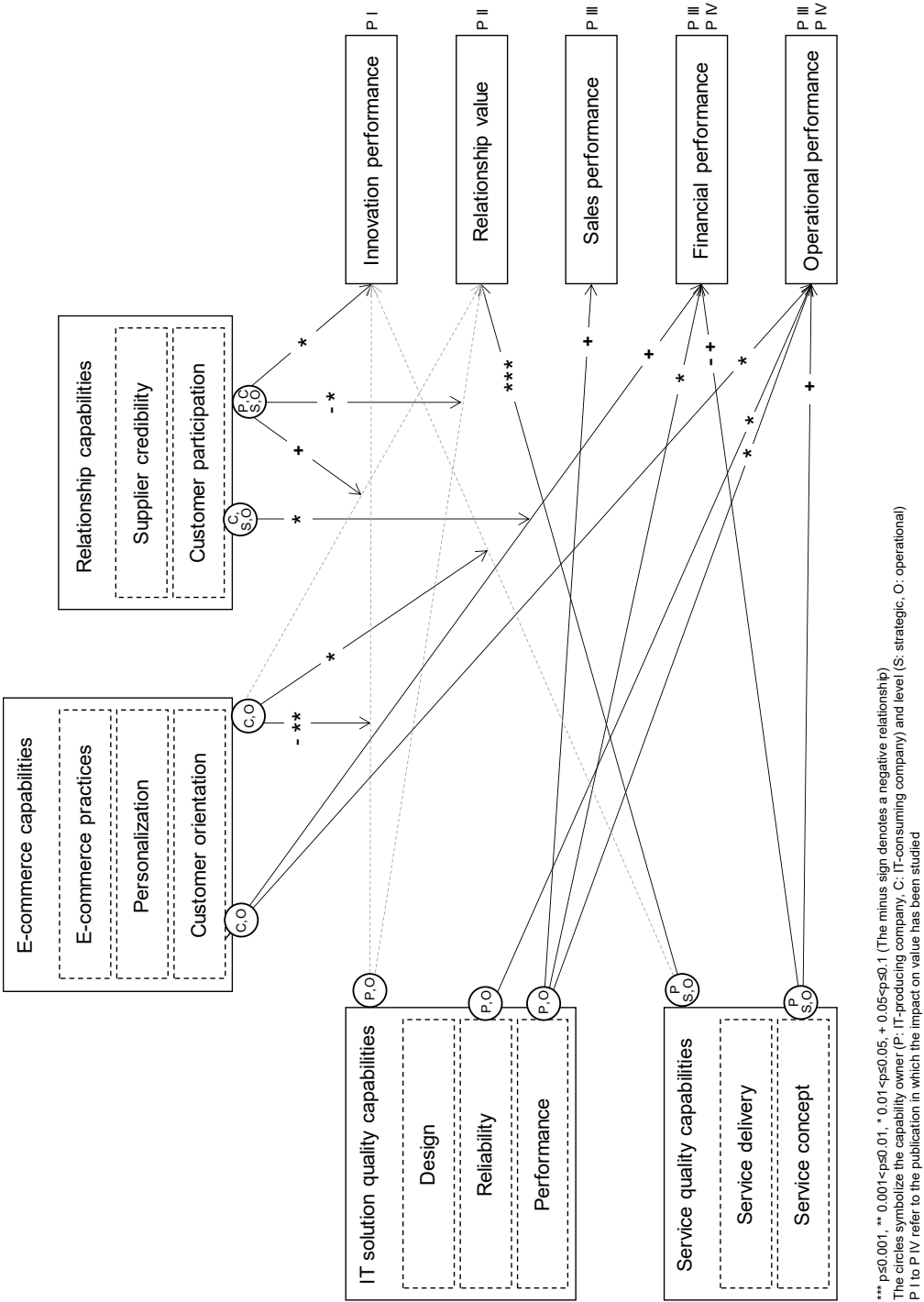


Figure 4.1: Effects of IS capabilities on the business value of an IT-consuming company

The answer to sub-question 1a—*Which are the IS capabilities of the IT-producing company that impact the business value of IT-consuming companies?*—is compiled from the results of publications I, II, and III relating to the IT-producing company's IT solution quality, services quality, and relationship capabilities and the IT-consuming company's e-commerce and relationship capabilities. First, the results reveal an interesting shift of focus in IT solution quality capabilities, i.e., in the IT-producing company's capability to produce high-quality, fit-for-purpose IT solutions. It seems that IT-consuming companies take the design-related issues of an IT solution for granted; however, the functional features—such as correct, secure, and fluent functioning as well as making it easier for the customer to perform appropriate tasks—appear to bring business value for the IT-consuming company. Second, in terms of service quality capabilities, IT-consuming companies seem to highly value IT-producing companies' capability to meet their needs during an IT solution production process. However, there seems to be a two-kind effect to be considered. While the IT-producing company's capability to conduct a comprehensive offering and customize it to the customer's needs positively affects the customer's operational performance, it negatively affects the customer's financial performance. Third, regarding relationship capabilities, the capability of an IT-producing company to build long-term relationships with its B2B customers is crucial, as a strong long-term relationship between the parties appears to have a direct positive impact on the business value of an IT-consuming company in terms of its ability to innovate. In addition, it appears to have a positive moderating effect on the connection between the IT-consuming company's operations with the IT solution and the business value derived from the relationship. However, an outstanding relationship also has its downside, as it seems to weaken the impact of an excellently produced IT solution on the relationship value.

Answer to sub-question 1b—*Which are the IS capabilities of IT-consuming companies that impact their business value?*—is compiled from the results of publications I, II, III, and IV relating to the e-commerce and relationship capabilities of an IT-consuming company. First, the results reveal a clear emphasis on the dimensions of e-commerce capabilities. Although more technical capabilities—such as the capability to make an online store meet individual preferences, as well as the capability to operate reliably and to keep the online store content accurate—are commonly seen as important characteristics of online stores, they do not appear to directly affect the business value of an IT-consuming company. However, a company can improve its financial and operational performance by having the capability to operate in a customer-oriented manner both in the customer interface and in the e-commerce processes; further, it can strengthen the impact on the financial performance by investing in its relationship with the supplier, such as contributing to co-production and committing to a long-term supplier relationship. Second, the capability of an IT-consuming company to exploit its online store technically and operate it in a customer-oriented manner seems to be a double-edged sword, as it alters the impact of the IT-producing company's two IS capabilities on its innovation performance, reinforcing one while weakening the other. More precisely, in terms of innovation performance, an IT-consuming company can, with their e-commerce capabilities, benefit from their supplier's capability to meet their needs during the IT

solution production process. At the same time, however, these IT-consuming company's capabilities appear to undermine the impact that the IT-producing company's capability to produce a high-quality, fit-for-purpose IT solution has on their innovation performance.

4.2.2 Aspects of IT-producing companies

Publication V

Publication V—*Digital service capabilities in B2B value creation*—aimed to investigate how IT-producing companies consider achieving excellent IS capabilities that enable the creation of IS business value when offering IT solutions to IT-consuming companies. The IS capabilities were mainly examined as the capabilities of IT-producing companies (1) to produce high-quality, fit-for-purpose IT solutions, (2) to meet customers' needs during an IT solution production process, and (3) to build long-term relationships with customers. IS business value, in turn, was considered to cover all the value dimensions that the IT-producing company perceives the IT-consuming company to receive directly or indirectly through IS capabilities. It also covers the value elements that the IT-producing company themselves perceive to gain from the relationship.

The results show that, in the business between IT-producing and IT-consuming companies, the most value for both parties is created through relationship capabilities. IT-producing companies also consider service quality capabilities an important means of creating value for the customer, while they consider IT solution quality capabilities a necessary requirement that does not generate added value. Thus, the findings suggest that, to gain the best possible IS business value for both parties, IT-producing companies should pay particular attention to their capability to build long-term customer relationships and create a credible image. The results are discussed in more detail in publication V.

Answer to research question 2

The answer to research question 2—*How do IT-producing companies consider achieving excellent IS capabilities that enable the creation of IS business value?*—is derived from the results of publication V. First, since the most significant IS capabilities of an IT-producing company in business value creation are relationship capabilities, an IT-producing company should take special notice of them. A long-term partnership with a customer requires credibility from the IT-producing company—that it can be trusted and that its technical expertise can be believed in. Although technical expertise is not perceived to bring added value to the customer, a customer must be able to trust that the supplier has the necessary technical expertise to implement the best possible solution. Moreover, the ability to operate confidentially is of utmost importance, as it is a crucial element that convinces the customer to offer business-critical information to the supplier needed for the supplier to better understand the customer's business needs. In addition, an IT-producing company must be able to acquire market knowledge. Then, by

combining the knowledge acquired from the customer with its own technical and market expertise, an IT-producing company can contribute to the customer's future business development. This is seen to create the most significant possible business value for the customer, which manifests itself, for example, in the IT-consuming company's improved ability to innovate. Moreover, IT-producing companies feel that they also benefit from such knowledge-creating cooperation, as it augments their knowledge capital. However, a long-term strong partnership requires mutual commitment, and the supplier must therefore have different means of engaging customers in continuous cooperation. A good long-term relationship gives the IT-producing company a special position, and it is presumably harnessed to develop a large part of the customer's IT solutions. Such a special position not only increases the market position of the supplier but also allows the supplier to experiment with emerging technologies with the customer. However, such a relationship is important for the supplier also in terms of creating a credible image. In other words, IT-producing companies feel that establishing new customer relationships requires a reputation as credible experts, and an ability to build such a reputation oneself cannot be compared with customer recommendations. Figure 4.2 summarizes the abilities considered by IT-producing companies to achieve excellent relationship capabilities, enabling the creation of IS business value for the business parties.

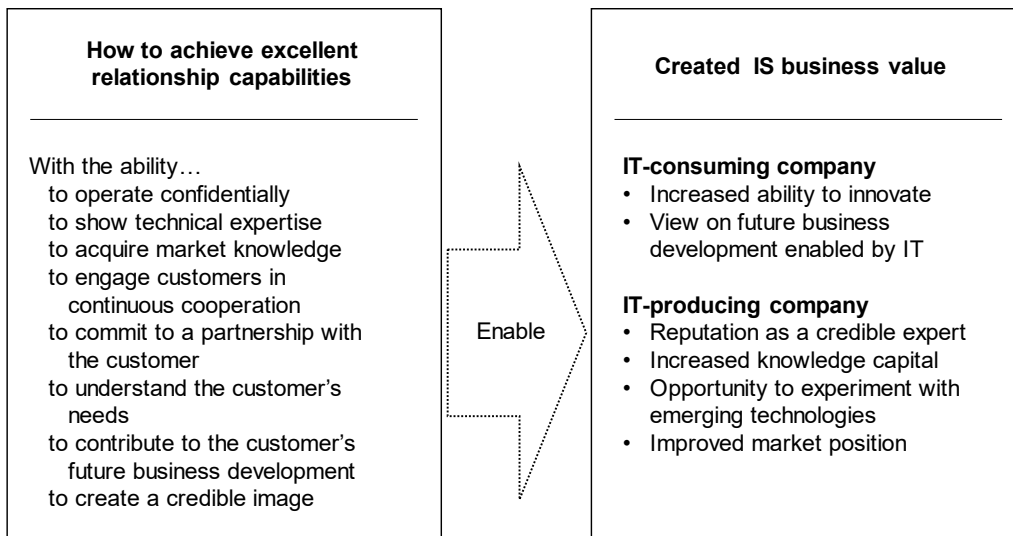


Figure 4.2: Abilities using which IT-producing companies think they can achieve excellent relationship capabilities that enable IS business value creation for the business parties

Second, a long-term relationship cannot be built without the capability to meet the customers' needs during an IT solution production process. According to IT-producing companies, it seems that customers get the most added value from their services when the

supplier not only meets the customers' needs but exceeds their expectations. High service quality is considered to include a comprehensive range of services and IT solutions that IT-producing companies must be able to customize according to customer needs. Understanding the real needs is best achieved when the customer participates in the co-development of the IT solution. Today, since the focus has shifted beyond mere technological development, optimal business benefits can be achieved when non-IT representatives from the customer side also participate in the development process. In such co-production projects, IT-producing companies feel that IT-consuming companies learn to understand their business processes and value creation mechanisms, and they themselves increase both their technological skills and business expertise. In addition, seamless interactive communication between the parties, but also within each company, is considered an important part of the success of an IT solution development process. While in certain situations face-to-face encounters are perceived to enable the best communication, various digital channels are considered to support successful communication at several stages of the process. By succeeding well in both the service concept and service delivery, the IT-producing company can achieve a reputation as a house of quality service, one endorsed by its customers. Figure 4.3 summarizes the abilities considered by IT-producing companies to achieve excellent service quality capabilities, enabling the creation of IS business value for the business parties.

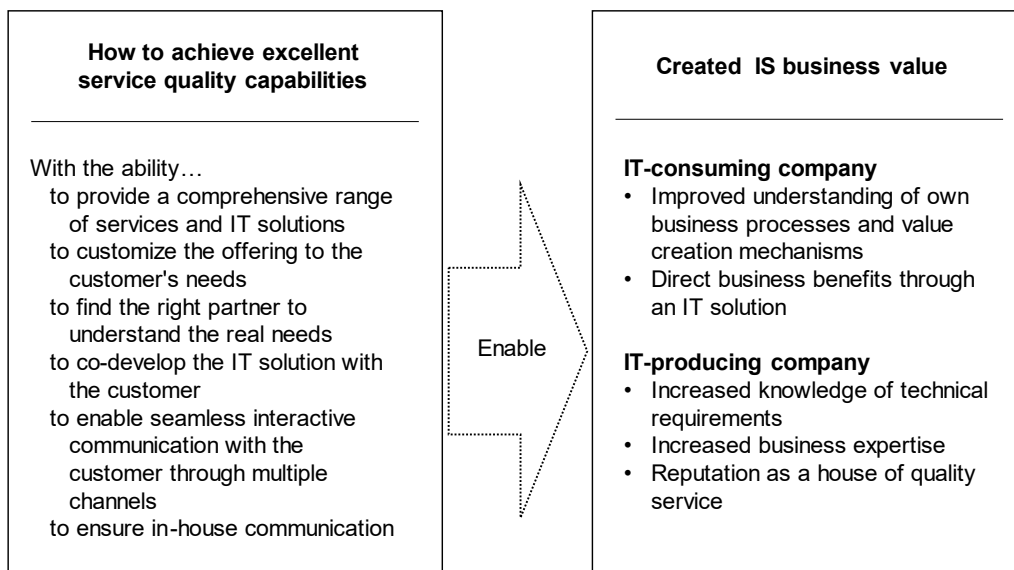


Figure 4.3: Abilities using which IT-producing companies think they can achieve excellent service quality capabilities that enable IS business value creation for the business parties

Third, even if IT-producing companies think they need to find a competitive advantage beyond technical expertise, they still need to ensure that they are technically up to date. They can test new technologies in the projects with their long-term customers, and if necessary, they can buy special expertise outside their own house. To bring value to the customer, technology must be harnessed to create an excellent user experience—that is, an IT-producing company requires capabilities to produce high-quality IT solutions that enable seamless, secure, and efficient task performance for its customers. Figure 4.4 summarizes the abilities considered by IT-producing companies to achieve excellent IT solution quality capabilities, enabling the creation of IS business value for the business parties.

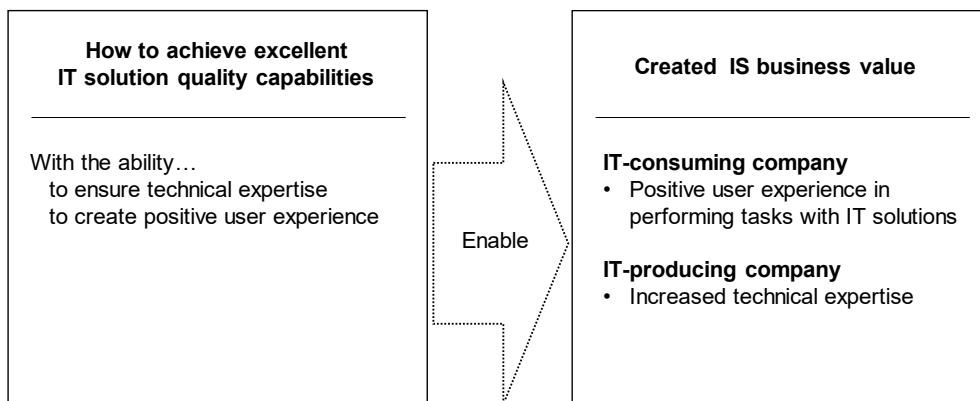


Figure 4.4: Abilities using which IT-producing companies think they can achieve excellent IT solution quality capabilities that enable IS business value creation for the business parties

5 Discussion

Today, business development with IT has become indispensable, and companies are striving at an accelerating pace to utilize the opportunities ushered in by IT in their business. However, an SME's technological know-how to effectively realize these opportunities is rarely sufficient, and therefore they need the expertise of an IT-producing company. This means that the IT-producing company's capabilities must expand from traditional technological IT expertise and adapt to the new situation as digital business developers for their customers. The results of this study bring some new insights into the capabilities needed and the value created in the business between IT-producing and IT-consuming companies.

Regarding operational IT solution quality capabilities, it was found that IT-producing companies no longer believe that these technological capabilities offer the most significant value for customers; instead, being foundational for the entire IT business, they are a necessity. The result is entirely consistent with that of Yu (2013), which states that meeting basic customer requirements is a necessity and is taken for granted, albeit it is not sufficient to generate customer satisfaction. However, IT-consuming companies feel that an excellently functioning IT solution affects their value creation both directly (financial and sales) and indirectly (operational). IT solutions have, indeed, been found to be an essential prerequisite for many everyday business activities (Aydiner et al., 2019; Pérez-López and Alegre, 2012) and, specifically, several studies emphasize the importance of the IT solution quality as a business value driver (e.g., Tzavlopoulos et al., 2019; Blocker et al., 2011; Mahmood et al., 2008). Moreover, the present study found that, according to IT-producing companies, technological expertise should be harnessed to ensure the high quality of an IT solution, which can be achieved through the customization and realization of a positive user experience.

In turn, IT-consuming companies seem to experience considerable differences in the impact of different dimensions of the IT solution quality capabilities. They perceive gaining the most significant business value, both direct and indirect, through an IT solution that makes it easy to perform the appropriate tasks. This is in line with previous studies, which have shown that performance is a key feature of a high-quality IT solution (Wagner et al., 2020; Huang et al., 2015; Xu et al., 2013; Gotzamani and Tzavlopoulos, 2009; Mahmood et al., 2008; Parasuraman et al., 2005). However, unlike previous studies which found design to be an integral part of value-generating IT solutions (Zhang et al., 2021; Tzavlopoulos et al., 2019; Blut, 2016; Gotzamani and Tzavlopoulos, 2009; Lee and Lin, 2005), this study found that IT-consuming companies do not perceive high-quality design impacting their business value. Thus, the results highlight a new situation in the value-creating factors of an IT solution. This may be because design-related issues primarily affect the use of an IT solution, such as pleasantness and learnability, and actual business value is considered to arise from the functional features of the solution.

In addition, the results highlight an interesting perspective on the impact of IT-consuming companies' own capabilities on the business value derived from the high quality of the

IT solution. First, the capability of an IT-consuming company to operate excellently with its online store seems to undermine the relationship between IT solution quality and innovation performance. This is somewhat unexpected, as previous research has shown that the skillful use of an IT solution contributes to the development of the associated business and reinforces innovation performance (see Zhu et al., 2015). This result is probably because once an IT-consuming company has the capability to make full use of a high-quality online store, the IT solution no longer has a business renewal effect and is therefore not perceived to increase innovation performance. Second, the results suggest that an ideal relationship between IT-producing and IT-consuming companies seems to weaken the link between the IT solution quality and relationship value. This may indicate that the better the relationship between the parties, more things other than the quality of the IT solution affect the value gained from the relationship.

Regarding relationship capabilities manifested at the strategic and operational levels, both IT-producing and IT-consuming companies perceive that they bring value in the long term. This is in line with the findings of Möller and Törrönen (2003) that the more complex and newer the technologies produced, the greater the need for partnering relationships in future value creation. The results of the present study revealed that IT-producing companies seek such relationships for two intertwined reasons. First, IT-producing companies feel that they can, in a trusting relationship, get business-critical information from the customer and thus understand the customer's business. This creates an opportunity not only to increase technological and market expertise but also to support the customer's business development with IT in the best way possible. This result supports the view of Lenka et al. (2017) who argue that understanding the customer's independent value creation is essential for joint value creation in business relationships. Furthermore, Zou et al. (2021) highlight the critical role of service experience in building inter-organizational relationships, where success requires understanding the customers. Second, a robust B2B relationship can support an IT-producing company to gain a large foothold as the customer's supplier and thus achieve an improved market position. The findings corroborate the existing literature, which supports the notion that a strong relationship between B2B parties can significantly enhance a producer's prospects of becoming a key supplier, as argued by Ulaga and Eggert (2006). Moreover, Palmatier (2008) stresses that it is widely accepted that a strong customer relationship positively impacts the supplier's financial performance in the B2B market.

Just as IT-producing companies feel that they can help customers with future business development and thus support their innovation activities through a strong cooperative relationship, IT-consuming companies also feel that such a relationship directly increases their ability to innovate. This result is consistent with that of previous research which concluded that sharing information in strong relationships between business parties offers opportunities to enhance innovation performance, which may manifest as new products and services (Raymond et al., 2016; Moilanen et al., 2014). While IT-producing companies perceive relationship capabilities to be the most important IS capabilities in business value creation, IT-consuming companies see them, in addition to the one direct effect mentioned above, as merely moderating the impact of some other IS capabilities

on different value dimensions. This result shows that the shift in focus from technological-related IS quality capabilities to relationship capabilities is not yet apparent among small- and medium-sized online store operators.

In a successful service production process, IT-producing companies find that their indirect business value increases in terms of technological and business expertise. They also feel that a successful production process delivers not only direct business benefits for their customers through customized IT solutions but also indirect value, such as an understanding of their own business processes and value creation mechanisms. These results are consistent with Brandl (2017), which showed that at the end of the production process between the service suppliers and their customers, direct value is created for both parties. Moreover, indirect value is also created during the process; for the customer, this involves understanding their own problems and operations, and for the supplier, this involves learning more about customers and problem-solving methods. The present study further reveals that IT-producing companies perceive the gained knowledge to be so valuable that, in certain situations, they are prepared to reduce the direct economic value they otherwise receive.

IT-consuming companies believe that the capability of an IT-producing company to meet their needs during an IT solution production process greatly affects the value they perceive to be getting from the business relationship. This is in line with Gansser et al. (2021), who stated that service quality impacts the perceived trust in the providing company, and trust, in turn, was identified as a crucial determinant for successful business relations (Prasetya et al., 2021; Zou et al., 2021; Doney et al., 2007). In particular for IT solutions, the production process has been found to play an important role in the success of the B2B relationship (Sombultawee and Pasunon, 2021). However, IT-consuming companies experience noteworthy differences in the dimensions of service quality capabilities. Contrary to previous studies (cf., Gao et al., 2021; Zou et al., 2021; Sousa and da Silveira, 2017; Setia et al., 2013; Yang et al., 2009), the present study shows that IT-consuming companies do not find that service delivery capabilities affect their financial, operational, or sales performance. This may be because these operational-level capabilities are related to how the IT solution is produced, and not the outcome; they are no longer seen to have value effects after the production process. Even though IT-consuming companies do not consider that an IT-producing company's capability to provide flexible and helpful services and conduct the IT solution production process in a customer-oriented and reliable manner generates business value, they feel that their own capability to work with their online store in a customer-oriented manner, both in the customer interface and in the e-commerce processes, positively impacts their operational and financial performance. The e-business literature agrees with this finding, as the high quality of online customer services has been found to positively impact a company's business value (Zhu et al., 2020; Eng, 2008). The difference in the experience regarding the impact of service on performance, depending on whether one is the target of the service or the service provider, may be because purchasing an IT solution is considered a temporary event, while serving one's own customers in an online store is a continuous business.

As for the other service quality capability dimension of the IT-producing company, namely the service concept, IT-consuming companies feel that their operational performance improves through the supplier's capability to conduct a comprehensive offering and customize it to their needs. It can be assumed that IT-consuming companies have experienced IT-producing companies' service concept capabilities as a reason for achieving their desired outcomes. This finding supports previous studies, according to which a suitable IT solution was found to positively affect a company's operations (e.g., Khin and Ho, 2019; Gandelman et al., 2017; Ong and Chen, 2014; Kohli and Grover, 2008). However, while IT-consuming companies perceive the impact of an IT-producing company's service concept capabilities as positive on their operations, they perceive them to be negative for their finances. This can be expected because an IT solution needs to be invested, which causes costs that can be attributed to the perceived negative financial performance. Similarly, as Mitra et al. (2011) argue, an IT project that produces an IT solution with all the essential features may well fail in its financial goals.

6 Conclusions

The main objective of this dissertation was to support performance management and IS management by understanding IT-consuming and IT-producing companies' IS capabilities that enable the former's business value creation. The results, derived from the individual publications and the synthesized understanding gained during the research process, suggest that IS capabilities play an essential role in the business value creation of cooperating IT-producing and IT-consuming companies. However, the views of the business parties on the importance of different capabilities seem to differ.

This study makes three main contributions to the literature. First, it presents an inter-organizational, multi-level (strategic/operational), and cooperation-duration acknowledging framework for IS capabilities in the context of IT-producing and IT-consuming companies. Second, it provides empirical evidence regarding the effects of IS capabilities on direct and indirect business value creation. Third, it clarifies the differences in views between IT-producing and IT-consuming companies regarding the significance of the different dimensions of IS capabilities in business value creation.

6.1 Theoretical implications

This dissertation combined IS management and performance management research and built its theoretical foundation on the literature related to IS capabilities and IS business value. It used a categorization of IS capabilities based on Lapierre (2000) and Blocker et al. (2011), who investigated the impact of a supplier company's capabilities on the customer company's value creation. Furthermore, relying on Karimi et al. (2007) and Suoniemi et al. (2021), the capabilities associated with the use of an IT solution were added as one dimension to the IS capabilities categorization, resulting in the four-dimensional IS capabilities categorization: (1) IT solution quality, (2) service quality, (3) relationship, and (4) e-commerce capabilities. This categorization is innovative from several viewpoints. First, it extends the perspective of IS business value creation from within a single company to value creation between IT-producing and IT-consuming companies, considering the impact of IS capabilities on the other party in addition to one's own value creation. Second, it considers operational-level IS capabilities alongside strategic-level IS capabilities. Third, it identifies not only the IS capabilities directly related to the IT solution but also those related to the long-term relationships between companies.

In addition, this dissertation identified the impact of the strategic and operational level IS capabilities needed at different times on creating direct and indirect business value. The impact was examined in the first phase of the study from the perspective of IT-consuming companies and in the second phase from the perspective of IT-producing companies. IT-consuming companies feel that the IT-producing company's service quality capabilities that are needed during the IT solution production and their own capabilities related to the use of the online store are the most relevant capabilities in creating business value for

themselves. On the other hand, IT-producing companies emphasize the importance of the capabilities needed to create and sustain a long-term business relationship in creating business value for themselves and their customers.

In terms of direct economic impacts, IT-consuming companies experience gaining positive value through the IT-producing company's capability to produce an IT solution that makes it easy to perform the appropriate tasks as well as their own capabilities to operate in a customer-oriented manner both in the customer interface and in the e-commerce processes. In addition, they feel that the IT-producing company's capability to carry out a comprehensive offering and customize it to their needs has a negative effect on their financial performance. However, IT-consuming companies consider that these capabilities provide them with indirect non-economic value. In addition, IT-consuming companies feel that they get indirect positive value through the IT-producing company's capability to produce an IT solution that functions correctly, securely, and fluently as well as the capability to meet their needs during an IT solution production process. IT-producing companies think that they can, using their operational- and strategic-level IS capabilities, generate direct and indirect business value for both parties. Despite acknowledging the necessity of various dimensions of operational-level IT solution quality capabilities for their business, they believe that these capabilities do not contribute to creating added value as such. Instead, they think the value from an IT solution derives from the suitability of the solution for business. This means that to create added value for the business, the IT-producing company must have abilities such as acquiring market knowledge, understanding customer needs, and customizing the IT solution according to them, as well as co-developing the solution with customers. IT-consuming and IT-producing companies agree that long-term relationship capabilities that demand strategic and operational expertise from both parties will generate indirect business value for IT-consuming companies, that will be realizable in the future. In addition, IT-producing companies believe that they themselves gain the most value for their own business through these IS capabilities.

6.2 Managerial implications

This dissertation provides new insights and guidance for managers of IT-producing and IT-consuming companies on how to leverage IS capabilities to create the best business value.

First, dividing IS capabilities into different sub-dimensions and dividing their effects into different value elements helps in managing modern IT-using businesses. This approach enables easier measurement and control of the leveraging of IT in business compared to managing the overall phenomenon.

Second, this study raises awareness on the less-researched value creation mechanisms in the interrelationship between IT-producing and IT-consuming companies, thus opening up new perspectives on the connections between the parties. More specifically, the study provides empirical evidence of the IT-producing companies' capabilities valued by IT-

consuming companies and thus offers a model for IT-producing companies in deciding future priorities. For example, IT-producing companies should strive to find a balance in the IT solution they customize to the customer. This is because, while a perfect IT solution impacts a customer's operational performance positively, it negatively impacts the customer's financial performance. Similarly, when an IT-consuming company considers a supplier for an IT solution, it is good to note that an IT-producing company that produces the best added value as a whole takes into account the balance between the functional and financial aspects of the solution. IT-producing and IT-consuming companies should also pay attention to the capabilities needed to maintain a robust long-term relationship, as such a relationship can offer significant added value for both parties, especially in the future.

Third, when estimating the business value gained through IS capabilities, managers should consider that it is not always realized directly as financial results. Instead, it is often realized first as an indirect non-economic value, which can be later realized as financial results. These include, for example, an IT-consuming company's increased operational performance and an IT-producing company's opportunity to acquire new expertise. In fact, the IT-producing companies that participated in this study seem to have identified these opportunities as value drivers—that is, in certain cases, they were willing to reduce the direct economic value to learn something new.

6.3 Quality of the study

The quality of the study was measured in terms of validity and reliability. Validity refers to the accuracy of a study—that is, whether it was able to measure exactly what was intended. Reliability, in turn, refers to the stability and consistency of a study—that is, whether the same results can be achieved with the same research design repeatedly. Since a mixed methods study contains both quantitative and qualitative elements, it is necessary to address the specific types of quality assessments for both separately but also consider the integration of the phases (Harrison et al. 2020; Gibson, 2017; Creswell and Plano Clark, 2011; Onwuegbuzie and Johnson, 2006).

Quantitative phase

The examination of validity in the quantitative phase was divided into three aspects: measurement validity, internal validity, and external validity (Saunders et al., 2015; Bryman, 2008). Measurement validity, which refers to the extent to which a measurement instrument reflects the intended concept (Bryman, 2008), was considered in this study through content validity, construct validity, and criterion validity. Content validity—the extent to which a measurement instrument meets all the aspects of the construct it is designed to measure (Field, 2018; Hair et al., 2010; Straub et al., 2004)—was ensured in several different ways. First, an exhaustive literature review was conducted to acquire the understanding needed to capture the essence of the constructs of interest. Second, the measurement instrument was constructed based on existing theories and previously

empirically tested measurements. However, whenever necessary, previous measures were modified to ensure harmony throughout the instrument. Third, the instrument was modified and tested by experienced subject matter researchers. Construct validity—whether a measurement instrument measures what it is intended to measure (Ghauri and Grønhaug, 2010; Hair et al., 2010)—was considered using discriminant and convergent validity, as proposed by Campbell and Fiske (1959). Due to the varying definitions of discriminant validity in the literature, it can be challenging to determine the most appropriate procedures for evaluating it (Rönkkö and Chu, 2020). In this study, the definition provided by Engelland et al. (2016) and Taherdoost (2016) was adopted, which conceptualizes discriminant validity in a commonly recognized manner as the degree to which different scales measuring distinct constructs are truly distinct from one another. As suggested by Campbell and Fiske (1959) and which has become common practice (Rönkkö and Chu, 2020), this study considered discriminant validity using more than one method. First, it was considered using principal component analysis with varimax rotation, which eliminates items that simultaneously present high loadings on multiple scales. Second, the correlations of the scales measuring different constructs proved to be low, confirming the discriminant validity of the measurement instrument. Convergent validity—the extent to which the different scales used to measure a construct are interrelated (Taherdoost, 2016; Saunders et al., 2015)—was met in this study, as the measurement instrument scale items loaded high for their particular constructs. Moreover, criterion validity—the extent to which a measurement instrument corresponds to an outcome to which it is assumed to correspond (Taherdoost, 2016)—was met, since regression analysis proved that all the used models were statistically significant. Therefore, the consideration of the above forms of measurement validity revealed that the measurement instrument accurately measured what was intended to be measured, indicating good measurement validity.

Internal validity refers to the degree to which the results and conclusions of a study are accurate (Easterby-Smith et al., 2021), such as the causal relationships between variables being sound (Ghauri and Grønhaug, 2010; Bryman, 2008). To ensure the internal validity of the study in the quantitative phase, various procedural and statistical remedies were used to minimize the risk of bias. Moreover, the variables that could influence the results (control variables) were examined in all the quantitative studies (publications I–IV).

The common method bias is believed to occur for several reasons, such as the respondent's answer affecting tendencies (e.g., social desirability and mood state), matters related to the questionnaire (e.g., structure, wording, items' formats), or measurement context (e.g., time, location, medium) (Jordan and Troth, 2020; Podsakoff et al., 2012; Podsakoff et al., 2003). Various procedural and statistical remedies can be used to control the probability of common method bias (Podsakoff et al., 2012). According to Podsakoff et al. (2003), the use of remedies is needed when using only one method, and especially when using only one respondent from a company. In this study, the aim was to reduce the method bias with a carefully and iteratively constructed questionnaire of the research group. Particular attention was paid to the order, wording,

and comprehensibility of the items, as well as to the impossibility of respondents to recognize any relationships between the independent and dependent variables. In addition, as Craighead et al. (2011) recommend, methodological separation was used, such as employing different variations of Likert-type scales for independent and dependent variables. Following Krosnick (1991), all the points of the response scales were labeled to reduce item ambiguity. Further, this study sought to reduce the tendency toward social desirability by allowing respondents to complete the questionnaire anonymously. In addition to the above-mentioned procedural remedies, Harman's single-factor test was used to statistically check the possibility of common method bias. All the items related to the dependent and independent variables were loaded into the principal component analysis, and the unrotated factor solution was examined. The analysis did not load all items onto a single factor, and none of the factors accounted for most of the covariance among the items. The common method bias thus did not appear to be a pervasive issue in this survey research (Podsacoff et al., 2003).

Selection bias, in terms of under-coverage bias and voluntary response bias, was sought to be eliminated by randomly selecting the cases used in the study. The sample obtained was thus ensured to be representative of the population to be analyzed. Non-response bias was checked by performing an analysis of variance (ANOVA). The suggestion of Armstrong and Overton (1977) for the similarity between non-respondents and late respondents was used, and the respondents were divided into two groups: early and late respondents. Early respondents were defined as those who completed the questionnaire after the first email, and late respondents as those who did not answer until after the reminders. The results of ANOVA did not show statistically significant differences between early and late respondents. Thus, the bias of non-response was not considered a problem in this study, and it could be assumed that the responses reflected the entire sample well.

External validity refers to the extent to which the findings of a particular study are generalizable outside its context (Easterby-Smith et al., 2021; Bryman, 2008; Ghauri and Grønhaug, 2010). In the quantitative phase of this study, the sample was selected randomly to ensure its representativeness. As a result, the findings from this study can be generalized to the entire population.

Reliability—the extent to which a measurement instrument can consistently produce the same results—was analyzed by computing Cronbach's alpha (Easterby-Smith et al., 2021; Field, 2018). All the values were higher than 0.7, indicating good internal consistency (Hair et al., 2010).

The positivist stance in this phase of the study enabled rigorous quantitative methods and statistical analyses, ensuring robust and objective investigation. It allowed for generalizability and drawing conclusions based on the empirical evidence. Emphasizing the control of the variables and objectivity throughout the research process enhanced the study's quality and credibility. Thus, this philosophical choice facilitated the reliable

identification of the impact of IS capabilities on business value creation. The quality of the quantitative phase is discussed in more detail in publications I–IV.

Qualitative phase

Although the quality of qualitative research is the subject of much debate (Onwuegbuzie and Johnson, 2006), the concepts of validity and reliability familiar from quantitative research are still widely used in the evaluation of qualitative research (Saunders et al., 2015; Creswell, 2014). Creswell (2014, p. 201) defines qualitative validity to mean that “the researcher checks for the accuracy of the findings by employing certain procedures” and encourages the use of one or more of these validation strategies in a study. To ensure validity in the qualitative phase of this study, five validation strategies presented in the literature (e.g., Saunders et al., 2015; Creswell, 2014; Silverman, 2014; Gibbs, 2007) were incorporated into this study at its different stages. First, data triangulation was applied by selecting five informants from two companies at different hierarchical levels and job descriptions to cover the widest possible range of perspectives about the phenomenon under study. Second, comprehensive data treatment was applied using an iterative analysis process until no new information was found in the data. Third, rigorous descriptions of the design and implementation of the study were provided. Fourth, the findings were grounded with different perspectives emerging from the data, and evidence was provided in the form of quotations. Fifth, peer review was used to improve the accuracy of the report.

Qualitative reliability—the extent of stability across different researchers (Creswell, 2013; Gibbs, 2007)—was ensured by an approach in which two researchers interviewed the participants, and three researchers coded and analyzed the transcription data and discussed the interpretations between repetitive stages in the data analysis process.

The adoption of interpretivism in this phase of the study enabled in-depth qualitative research and contextual analysis, enriching the study with individual perspectives. This philosophical choice enhanced the depth, quality, and credibility of the research, resulting in a richer understanding of IS capabilities in creating business value. The quality of the qualitative phase is discussed in more detail in publication V.

Mixed methods aspects

In addition to quantitative and qualitative quality assessment, a mixed methods research quality assessment includes the consideration of the integration of the phases from the perspectives of research design, data collection, analysis, and interpretation (Gibson, 2017; Creswell and Plano Clark, 2011; Onwuegbuzie and Johnson, 2006), with particular emphasis on the process of conducting and reporting the study (Harrison et al., 2020). The literature offers several frameworks that present the possible threats of the different stages of the process and remedies to avoid them (Harrison et al., 2020). To minimize threats to validity, this study used various remedies following the suggestions of Harrison

et al. (2020), Gibson (2017), and Creswell and Plano Clark (2011). First, to avoid the research design threats, a mixed methods design was selected that was suitable to provide a comprehensive understanding of the research problem under investigation. Furthermore, the study provides a diagram to clarify the progress of the selected mixed methods design. Second, to avoid the data collection validity threats, insights gained in the first phase informed the selection of relevant cases and informants for the second phase of the study. Third, to avoid the data analysis validity threats, the two data strands of the study were linked by building the data needs of the second phase of the study on the results of the first phase of the study. In addition, to expand the analytical options, both data strands and literature were reviewed during the analysis. Fourth, to avoid the interpretation validity threats, the research team discussed interpretations of the data in different stages. In addition, the combination of methods fortified the interpretations, as neither of the research phases alone would have led to such comprehensive results.

6.4 Limitations

The study has limitations that need to be acknowledged when interpreting the results and that serve as opportunities for further research. First, although the other IT-producing company is an international company, the data were collected from a single country, which may limit the generalizability of the results. Even if the results can be considered applicable to the online store context in other similar countries, country-specific characteristics should be taken into account when applied in practice or in further studies. To improve the generalizability of the results, data should be collected from other countries in the future.

Second, the first phase of the study was conducted in the context of SMEs, so the results cannot be generalized to large companies. Future studies should collect data from large companies to assess the effect of company size on the results.

Third, the findings of the second phase of the study are based on data from two IT-producing companies that have existing structures for value creation with customers. Although the aim of qualitative research is not generalizability, the in-depth information obtained tends to reveal significant factors of the phenomenon, which might recur on a more general level. Thus, the study results should be confirmed in a research conducted with a significantly larger sample to gain a generalizable understanding of IT-producing companies' views on the phenomenon.

Fourth, all types of IT solutions were recognized in the second phase of the study, but the target group of the first phase of the study was Finnish online store operators. Although an online store is an ideal IT solution for researching IS capabilities and their impacts on business value, it has special characteristics that do not apply to all IT solutions. Therefore, the results of the first phase of the study can hide some effects and highlight others that cannot be generalized to all IT solutions. Thus, to generalize the results of the first phase to various customized IT solutions, the impacts of IT solutions other than online stores on business value should be studied in the future.

Fifth, this study was based on cross-sectional data collected a few years ago. The data were based on the perceived situation at the time, which may hide the effects that would have emerged in the longer term, making it difficult to build a comprehensive understanding of the impact of IS capabilities on business value over time. To overcome this limitation, future research should be conducted using longitudinal data.

6.5 Directions for further research

The results of this dissertation offer interesting opportunities and starting points for further research. First, since the presented framework for IS capabilities in the context of IT-producing and IT-consuming companies was created for this study and was therefore used only in its publications, it should be tested with a larger amount of data and developed further. Furthermore, it would be very interesting to examine how the framework could be best utilized both at the strategic and operational levels of IT-producing and IT-consuming companies and determine what kind of organization and operating practices produce the best results. This information would lead to the emergence of a more valid and more practicable model for use by both types of companies.

Second, the differences in views between IT-producing and IT-consuming companies about the significance of the different dimensions of IS capabilities in direct and indirect business value creation offer interesting research avenues. For example, exploring the reasons that underlie these differences and understanding their impact on the operations of the business parties would be a valuable pursuit. This would help the parties better understand each other, which, in turn, would enable the creation of added value through the relationship.

Third, since the empirical evidence on IT-consuming companies' viewpoints of the impact of IS capabilities on business value is based on quantitative data, further qualitative studies are needed to understand these relationships in more depth. For example, there is a need to understand how a long-term relationship with an IT-producing company can best serve an IT-consuming company—in other words, what kind of relationship do IT-consuming companies feel that they need? Such an understanding would provide valuable information on the possibilities of relationships between the parties and thus support IT-producing companies in developing customer relationships.

Fourth, this study offers IT-producing companies' insights into the determinants of their IS capabilities. In future studies, it would be meaningful to find out the determinants of IT-consuming companies' IS capabilities. In addition, more research is needed on the measurement of IS capabilities through these determinants. These results would help IT-producing and IT-consuming companies develop their IS capabilities.

Fifth, this study found results that differ from the existing literature on how certain dimensions of IS capabilities affect business value, indicating a need for further research on the topic. For example, this study challenges the findings of previous literature that the

design of an IT solution and the quality of its delivery are value-creating factors, as it found no significant impact of these factors on business value. The results of further research may confirm a new situation regarding the subjects to be examined. More ideas for further research are presented in the publications.

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Appendix A: Survey items

Part 1: Background information

1. Years since the online store was established (under 1, 1-5, over 5)
2. Online store sales as a percentage of the company's total sales

Part 2: IS capabilities

1. IT solution quality
 - 1.1. Our online store is easy to learn to use
 - 1.2. Our online store functions can be found easily
 - 1.3. Our online store is pleasant to maintain
 - 1.4. With our online store, tasks can be completed quickly
 - 1.5. Our online store has good marketing features
 - 1.6. It is possible to include useful analytics in our online store
 - 1.7. It is possible to connect other tools we need to our online store
 - 1.8. In our online store, it is possible to personalize content on a customer-specific basis
 - 1.9. Our online store protects customers' online store behavior
 - 1.10. Our online store is constantly in operation
 - 1.11. Our online store works without delay
 - 1.12. The payment transactions have been protected in our online store
 - 1.13. Our customers can handle the entire purchase process on a mobile device
 - 1.14. Our online store always works properly
 - 1.15. Our online store is integrated with our other information systems
 - 1.16. Effortless payment procedures are connected to our online store
2. E-commerce
 - 2.1. We update the content of our online store regularly
 - 2.2. Our online store has up-to-date and correct information
 - 2.3. We offer our customers an easy way to return their purchases
 - 2.4. We have smooth practices in handling reclamations
 - 2.5. Our online store displays a telephone number using which our customers can reach a company representative
 - 2.6. We offer our customers real-time online customer service
 - 2.7. We deliver the ordered products to customers within the promised time
 - 2.8. The offering of our online store is truthful
 - 2.9. We offer our customers the opportunity to choose the delivery and payment method
 - 2.10. We enable our customers to find products in the online store in different ways
 - 2.11. We do not share information about our customers with others

- 2.12. We inform the customers in our online store about the purchasing behavior privacy and secure payment
- 2.13. We strive to personalize our customers' experience in the online store
- 2.14. We allow our customers to customize their online store appearance according to their preferences
- 3. Service quality
 - 3.1. The supplier had relevant information about the online store available to support our purchasing decision
 - 3.2. The supplier adequately informed us during the online store procurement and deployment process
 - 3.3. The supplier solved the problems related to our online store efficiently and quickly
 - 3.4. The online store supplier actively asks for customer feedback
 - 3.5. It is possible to get good quality customer service from our online store supplier
 - 3.6. It is possible to reach a customer service representative from the online store supplier whenever necessary
 - 3.7. The supplier delivered the online store within the promised time
 - 3.8. The offering of the online store supplier was truthful
 - 3.9. We were able to connect all the information systems we needed to the online store
 - 3.10. We had the opportunity to add the functionalities we wanted to the online store
 - 3.11. The price of the online store was reasonable
 - 3.12. We used our work contribution reasonably in the online store procurement process
- 4. Relationship
 - 4.1. Our online store supplier is actively seeking to establish a long-term partnership with us
 - 4.2. We actively participate with our own contribution in developing the services provided by our online store supplier
 - 4.3. Our previous experience of the online store supplier is good
 - 4.4. Our online store supplier has a good reputation in the market
 - 4.5. We share all requested / necessary information with the online store supplier
 - 4.6. We have implemented the operations requested by the online store supplier related to the online store

Part 3: IS business value

1. The online store has contributed to our ability to innovate
2. Cooperation with our online store supplier has been successful
3. The financial objectives we have set for the online store have been met
4. The operational objectives we have set for the online store have been met
5. The sales objectives we have set for the online store have been met

Appendix B: Interview protocol

Part 1: Background information

- Name
- Job description
- How do you see / experience digitalization in your own work?

Part 2: How can we be customer-wise in the digitalization of business?

- What opportunities does digitalization offer?
- What are the challenges of digitalization?
- What changes will digitalization bring?
- What kind of business and cooperation models does digitalization offer?
- What factors create customer's value / experience in your business?
- How is the customer's value / experience created when it is not possible to meet the customer face to face?

Part 3: How should customer value be measured and managed to generate customer wisdom in the digitalization of business?

Current state

- What kind of information do you collect about customers' experiences and value creation?
- What kind of information would you have needed about customers' experiences and value creation?
- How is the information collected and analyzed now?
- What kind of metrics are used to measure the customer / customer value now?
- How does the customer participate in the collection and utilization of the information?
- How can the customer be motivated to produce and share information about products and services?
- How is the information utilized in management and decision-making now?

Future

- What kind of information do you need / would like about customers' experiences and value creation?
- How should information be collected and analyzed so that the business could be developed for the benefit of the customer?
- How can different tools, platforms, and methods (e.g., gamification, social media, industrial internet) be utilized in the development of management processes?
- What kind of metrics should be used to measure the customer / customer value in the future?
- How should the customer participate in the collection and utilization of information in the future?
- How / where should the information be used (own organization / the customer)?

Publication I

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Managing
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Abstract

Purpose – The purpose of this paper is to analyze the connections between the capabilities of suppliers, buyer operations and the innovation performance of buyers in service-based supply chains. In particular, the authors use a construct of supplier capabilities comprising the capabilities needed to produce an online store and divided into capabilities related to the product, capabilities related to service delivery and capabilities related to the buyer-supplier relationship.

Design/methodology/approach – Data were collected with cross-sectional, random sampling from Finnish companies that have an active online store. A survey was used to collect data on managerial assessments of capabilities of a supplier, the operations of buyers and the innovation performance of buyers. Multiple regressions were used to test the hypotheses.

Findings – The results reveal that capabilities related to the buyer-supplier relationship are positively connected with the innovation performance of the buyer, but those related to the product and service delivery do not significantly influence the innovation performance of the buyer. The results show that the moderating influence of buyer operations on the relationship between capabilities related to the product and the innovation performance of the buyer is negative. The moderating influence of buyer operations on the relationship between capabilities related to service delivery and the innovation performance of the buyer is positive.

Research limitations/implications – Forming tight relationships with online store suppliers appears to be a successful way to attain innovation performance for online store operators. Online store operators should not expect supplier capabilities related to online store functionality and characteristics of online store delivery alone to improve their innovation performance.

Originality/value – Few studies use an e-business operations model to comprehend the role played by supplier capabilities in buyer innovation performance in service-based supply chains. Building on a resource-based view with inter-organizational management and e-business literature streams, the authors focus on three supplier capabilities and buyer operations to investigate their effects in terms of enhancing innovation performance.

Keywords Innovation, Service supply chain

Paper type Research paper



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1. Introduction

Increases in digitalization and service integration are among the largest transformations that have put supply chain management under a lot of strain recently (Lusch, 2011; Bag *et al.*, 2020). The distinctiveness of service-based supply chains is the role of buyers as both asset providers and receivers (Haque and Islam, 2018; Sampson and Froehle, 2006; Sampson and Spring, 2012; Sengupta *et al.*, 2006). In service-based supply chains, buyers engage in supplementary positions relative to traditional supply chains (Sampson and Spring, 2012), which makes them key players in the value creation process. Consideration will be given to how the relations between suppliers and buyers are enhanced, retained and controlled, especially in digitalized business environments. As a part of service-based supply chains, e-business processes are currently supporting collaboration activities and generating possibilities for economic payoffs by helping to overcome boundaries in supply chains through the use of organizational resources and capabilities (Xue *et al.*, 2013; Zhang *et al.*, 2016; Zhu *et al.*, 2020). This refers to the management of buyer-supplier relationships and is an important operative process for building tighter relations with central suppliers for the purpose of value creation (Andersen *et al.*, 2019; Autry and Golobic, 2010; Lambert and Schwieterman, 2012). The focus on these relationships is why the effectiveness of different information technologies and digital solutions for managing supply chains and value creation is receiving increasing interest from practitioners and academic researchers (Andersen *et al.*, 2019; Setia *et al.*, 2013; Xue *et al.*, 2013).

Thus, this study analyzes the connections among capabilities of suppliers, buyer operations and the innovation performance of buyers in service-based supply chains. Scholars have made significant contributions to the growing literature on service-based supply chains, also in the e-business context (Wang *et al.*, 2021; Zhu *et al.*, 2020). For example, Wang *et al.* (2021) explored the role of big data analytics in the coordination of electronic retail service supply chains and Zhu *et al.* (2020) examined process components and value creation mechanisms in e-business supply chain operations. However, studies on service-based supply chain innovation, especially in the e-business context, are limited. With an abundance of e-businesses, there is a need to comprehend how buyer-supplier relationships contribute to business value (Zhu *et al.*, 2015). While the focus of studies on supply chains has recently shifted from an operation-oriented to a strategy-oriented one, for example regarding capability leveraging (Shiau *et al.*, 2015; Zhu *et al.*, 2020), there is a need to further understand how organizations should focus and leverage their inter-firm resources and capabilities embedded in e-business processes to generate innovation performance (Zhu *et al.*, 2020). Without an understanding of how business value and innovations can be obtained from e-business processes in service-based supply chains, organizations have limited guidance when implementing e-business processes that promote digital supply chain innovation (Zhu *et al.*, 2020). To address this need, the study answers the following first research question:

RQ1. What is the role of supplier capabilities in terms of increasing the innovation performance of buyers in e-business-based, service-based supply chains?

Despite the recognized importance of understanding the factors supporting organizations' operations, studies that use an e-business operations model to comprehend the part that supplier capabilities play in buyer innovation performance in service-based supply chains do not exist. To address this need, the study answers the following second research question:

RQ2. Do buyer operations facilitate the link between supplier capabilities and innovation performance in e-business-based, service-based supply chains?

Building on the dynamic capabilities view with inter-organizational management and e-business literature streams, we focus on three supplier capabilities and buyer operations to investigate their effects in terms of enhancing innovation performance. In particular, we use a construct of supplier capabilities comprising the capabilities needed to produce an online store and divided into capabilities related to the product, capabilities related to service delivery and capabilities related to the buyer-supplier relationship. This construct is further used to build a theoretical framework to examine how the buyer (online store operator) leverages its supplier capabilities to create business value in terms of innovation performance. The theoretical model is tested with survey data from Finnish companies that have an active online store.

The remainder of the article is organized as follows: Section 2 discusses theoretical background and definitions of the key concepts are decomposed, and then the theoretical model and hypotheses development are discussed in Section 3. Next, the data collection, construct operationalization and data analysis processes are presented in Section 4, after which the research results are described in Section 5. Finally, theoretical and managerial contributions and the limitations and directions for further research are outlined in Sections 6 and 7.

2. Theoretical background

2.1 Theoretical underpinnings

The resource-based view builds on the premise that company competitiveness is dependent on firm-specific capabilities that contribute to firm effectiveness in general (Barney, 1991) and innovation performance in particular (Tarafdar and Gordon, 2007). According to Teece (2018), the resource-based view of firms is one piece of the process of bringing all such capabilities together for the achievement of competitive advantages. In addition to this, dynamic capabilities are necessary and complement the resource-based view in a way that tackles issues in dynamic environments. Thus, advocates of the resource-based view claim that it creates dynamic capabilities to handle issues in the current dynamic environment (Kim *et al.*, 2015; Lin and Wu, 2014; Teece, 2018). Companies with strong dynamic capabilities are more efficient with regard to forming, renewing and reconfiguring capabilities and resources to innovate and react to changes in the market environment (Teece, 2018). Innovation performance refers to a firm's capacity to renew via the application of novel knowledge acquired from both internal and external sources. Afterward, academia has focused on the knowledge gained outside a firm's boundaries and especially from suppliers, which have been proven to provide valuable competitive advantages through innovation (Cheng and Krumwiede, 2018; Johnsen, 2011; Kulangara *et al.*, 2016).

Innovation performance requires a prolonged orientation and the need to account for a variety of internal and external factors (Romijn and Albaladejo, 2002; Rosenbusch *et al.*, 2011). To generate this type of renewal, a firm must also pay attention to how it best contributes to the service process concerning its customers. The buyer's own operations can encourage this process. An important change in the buyer-supplier relationship has resulted from the rise of e-business (Randall *et al.*, 2011). However, within the context of e-business, these links have remained largely unexplored. Thus, this study focuses on the role of supplier capabilities in increasing the innovation performance of a buyer within the frame of e-business. In addition, the facilitation of buyer operations in the link between supplier

capabilities and innovation performance by the online store operator is considered. These terms are each defined, in turn.

2.2 Supplier capabilities

Little attention has been paid to the importance of supplier capabilities when studying online stores. In this article, we consider *supplier capabilities* as the ways in which suppliers engage with a buyer's operations by offering extensive input with regard to the procurement of a product or service. To benefit from supplier capabilities, elements such as the functionality of the supplied product/service, the attributes of the service delivery process and the fluency of the buyer-supplier collaboration must be considered (Blut *et al.*, 2015; Lee and Lin, 2005; Saunila *et al.*, 2017). Thus, while the product itself and its technology base are facilitators of value, the customer base should also be considered a priority for e-businesses (Oliveira and Roth, 2012a). This means considering the service process, for example, in terms of knowledge sharing, promise fulfillment and empathy (Saunila *et al.*, 2017; Haque and Islam, 2018) and examining relationships, for example, in terms of trust development (Corsten and Felde, 2005; Mitrega *et al.*, 2017).

2.3 Buyer operations

Buyer operations are also essential ingredients for enabling e-businesses to succeed with regard to their customers. These buyer operations enable the management of the digital process and information sharing (Zhu *et al.*, 2015). In this article, we consider buyer operations as the ways in which the online store operator serves its customers. This view of buyer operations highlights contact, responsiveness, flexibility, security and customization (Oliveira and Roth, 2012b) as important features for the buyer company to consider when operating the online store. This type of interaction permits customers to use the digital platform to order services and products online (Saunila *et al.*, 2019a). In this way, successful buyer operations are likely to result in a more efficient supply chain. Buyer operations are, thus an essential facilitator of supply chain effectiveness.

Next, we turn to the development of hypotheses that investigate how buyer innovation performance is driven by supplier capabilities and the moderating influence of buyer operations.

3. Hypotheses development

Figure 1 demonstrates the research framework directing the study. The framework suggests that supplier capabilities in terms of managing the online store production process offer the prospect of increasing buyer innovation performance. Supplier capabilities are reflected by the dimensions of product capabilities (constructing an online store), service

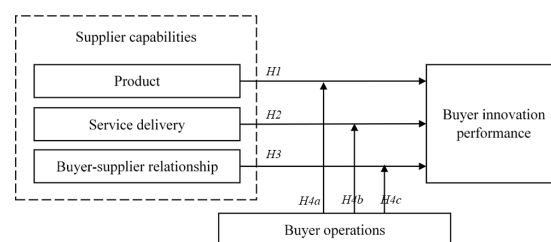


Figure 1.
Research framework

delivery capabilities (delivering an online store) and buyer-supplier relationship capabilities (maintaining a relationship with regard to the operation of the online store, i.e. the buyer company). Further, we argue that this perspective is encouraged by buyer operations (actions the online store operator takes to serve its customers). While supplier capabilities can help to increase buyer innovation performance, the buyer's own operations offer the fuel that enhances the supplier's influence on the buyer's way of obtaining renewal. Thus, an online store operator that lacks the appropriate mechanisms for dealing with its customers may not obtain increased innovation performance despite the supplier's capabilities in terms of producing the online store. Thus, it is argued that buyer operations offer a moderating mechanism that connects supplier capabilities and buyer innovation performance. Next, hypotheses are developed in the context of online store operations.

3.1 Supplier capabilities as antecedents of buyer innovation performance

Online platforms and sites have become fast-growing and important elements for reaching customers worldwide (Leung *et al.*, 2019). With the huge amount of data available from different operations conducted online (Leung *et al.*, 2019), suppliers are now more capable of supporting buyer operations regarding such platforms. From the infrastructure perspective, e-business platforms can be considered as products with certain characteristics that are necessary for the foundation of the platforms (e.g. online stores). According to Tsai *et al.* (2013), technology forms an inseparable part of these operator value chain activities. Online store functionalities provide buyers with easy and fast access to relevant and important information and enable knowledge transfer among suppliers, buyers and end customers (Aydiner *et al.*, 2019). Even though in most cases, it is easy for buyers to follow and imitate competitors' online operations (Aydiner *et al.*, 2019), there are elements related to the product/infrastructure side of online stores in which suppliers' capabilities play an important role in affecting online store operators' (i.e. buyers') performance (Najafi-Tavani *et al.*, 2018; Saunila *et al.*, 2019b).

As suppliers develop and provide online stores for different buyers and for different purposes, they gather knowledge and expertise related to online store functionalities, which were not previously available to buyers. This knowledge can be related, for example, to security issues, which have been shown to affect the appropriation of web-equipped business-to-business (B2B) e-commerce (Sila, 2013). Although sharing knowledge through platforms provides more benefits, there is also a risk of information linkage, which might result in unwanted results and for suppliers that are not prepared to tackle security issues, it is challenging to achieve competitive benefits (Ovuakporie *et al.*, 2021). In addition, supplier product capabilities can be related to a platform's usability, functionalities and system availability. Technological and product innovations, such as advanced business analytics, provide possibilities and methods that can offer buyers new processes and/or potential redesigns of existing methods (Ramirez *et al.*, 2010). As such, buyers incessantly look for means to renew and develop the end-user experience by updating their online platforms with novel features, for example, personalized imaging and interactive commerce (Tsai *et al.*, 2013). By using their product capabilities, suppliers can help buyers renew and update their online stores properly and boost buyer innovation performance (Zhu *et al.*, 2015). Based on the preceding elaboration, the following hypothesis is presented:

- H1.* Supplier capabilities regarding the product are positively connected with buyer innovation performance.

The benefits of e-business, when applied and integrated throughout supply chains (Bakker *et al.*, 2008; Choudhury *et al.*, 2021; Scuotto *et al.*, 2017) and the remarkable role of e-service in

effective customer service (Chuang and Lin, 2015) have been presented in the literature; the achievement of such benefits, value and innovations relies strongly on successful service delivery (Finne and Holmström, 2013). In other words, online platforms are not only about the delivery of technology but also about how service delivery processes are designed and adopted. Successful service delivery in e-business supply chains ensures that companies can realize the benefits of digitally enabled solutions, and thus support their renewal and innovation performance. As such, online platforms enable proper service delivery to develop collaboration among supply chain parties and to improve business performance (Zhu *et al.*, 2015).

According to Finne and Holmström (2013), providers of integrated solutions (buyers) are highly dependent on the specific expertise of their suppliers. In the frame of service-based supply chains in e-businesses, such buyers may have to rely on and use the different capabilities of their suppliers to fulfill service delivery and support the responsiveness of online platforms. These supplier capabilities can be described as learned means of delivering support for the implementation of planned e-customization for swift service delivery (cf. Aydiner *et al.*, 2019). Renewing companies' operations in terms of e-business needs supplier capabilities to provide value for customers through correct and updated information, high-quality and on-time delivery and different alternates in terms of the service process (Soto-Acosta and Meroño-Cerdan, 2008).

Because service delivery in e-business requires continuous platform updates and renewals, information updates and e-customization, a software supplier is required to develop the platforms and the required functionalities. To improve buyer innovation performance, suppliers need to understand the buyer's operations and possibilities regarding the developed platforms. On the other hand, the buyers need to be open to the possibilities provided by suppliers. Thus, platform suppliers also need to develop service delivery (Finne and Holmström, 2013; Galbraith, 2002) to successfully renew and update the platforms and support buyer innovation performance. Derived from the above discussion, the next hypothesis is presented as follows:

- H2.* Supplier capabilities regarding service delivery are positively connected with buyer innovation performance.

Owing to the complex nature of the digital market and the ability to create value with a single actor, creating innovation performance and renewing operations with effective relationships have gained significant attention from online store operators (Chuang and Lin, 2015; Pagani and Pardo, 2017). In e-business, absorptive capabilities, including knowledge sharing and strong relationships between business actors, can provide opportunities to transform external knowledge into innovation performance that creates new products and service offerings (Moilanen *et al.*, 2014; Raymond *et al.*, 2016). According to Najafi-Tavani *et al.* (2018), companies that are involved in collaborative networks, like those with e-businesses, can achieve innovation through the presence of absorptive capability. They also mentioned that companies with managers who know how to scan and acquire external knowledge can accelerate the pace of innovation in their companies. Active participation and interaction with buyers affect the creation and development of more complex and novel innovations (Chen *et al.*, 2011). Moreover, active participation and interaction between both suppliers and buyers enable strong buyer-supplier relationships, leading to effective collaboration built on user experiences and the information gathered on buyers' needs (Chuang and Lin, 2015; Saunila *et al.*, 2019b). According to Santamaria *et al.* (2012), effective relationships with external resources could be beneficial for growth in terms of the innovation performance of companies.

Digitalization changes the way business is conducted between firms, which causes a greater refocusing on the importance of relationships between firms, especially in B2B relationships among buyers and suppliers. For instance, B2B digital business enables Coca-Cola Enterprises to continuously monitor its customers and track its clients' preferences, leading to innovation creation through establishing efficient relationships (Niu *et al.*, 2020; Pagani and Pardo, 2017). According to Iansiti and Lakhani (2014), in e-business, relationships among firms within the process, product and service domains create a complex and dynamic environment for innovation and business development. Thus, suppliers' capabilities with regard to obtaining continued, strong relationships between their buyers can significantly contribute to buyer innovation performance. Therefore, based on the preceding discussion, the following hypothesis is formed:

- H3. Supplier capabilities regarding buyer-supplier relationships are positively connected with buyer innovation performance.

3.2 Buyer operations as a moderator

Firms' innovations increasingly rely on digital technologies to handle inter-firm processes (Zhu *et al.*, 2015) or to generate value for existing or prospective customers (Chuang and Lin, 2015). However, a number of companies fail to achieve the advantages of such technology changes as a consequence of a shortage in efficient e-business process design capabilities, operational capabilities and cooperation capabilities (Chuang and Lin, 2015; Zhu *et al.*, 2015). In this study, these capabilities refer to supplier capabilities related to the product, service delivery and the buyer-supplier relationship. As presented in the preceding hypotheses, these capabilities may affect buyer innovation performance.

Operations capabilities can be understood as buyer operations used for satisfying customer needs via an online store. Buyer operations, thus refer to a company's capability to solve customers' issues electronically, which is also called e-service recovery or responsiveness (Agag, 2019; Oliveira and Roth, 2012b). Communication in terms of the informal and formal distribution of revealing and topical information (e.g. on order handling) and adjusting expectations are also buyer operations that impact the success of an online store (Agag, 2019; Oliveira and Roth, 2012b). Other buyer operations that affect the success of online stores are order fulfillment (Agag, 2019; Parasuraman *et al.*, 2005; Rabinovich, 2007); the flexibility of payment methods, returns processing and customer support (Boyer *et al.*, 2002; Saunila *et al.*, 2019b); the security of customer information (Agag, 2019; Rabinovich, 2007; Zeithaml *et al.*, 2002); and e-customization in terms of the personalization and malleability of the online experience (Oliveira and Roth, 2012b; Zeithaml *et al.*, 2002). These buyer operations can be considered internal drivers, that is, proficiencies and processes that need to be managed to authorize firm innovation (Chuang and Lin, 2015; Romijn and Albaladejo, 2002; Schmiedeberg, 2008). Buyer operations are, thus considered in this research as intrinsic drivers that empower firms to comprehend their customers and respond to their needs (cf. Chuang and Lin, 2015). Further, buyer operations reduce conflict between business partners and improve connectedness through effective contact, responsiveness and flexibility and through caring about security and customization and thereby provide quick adaptation and innovative processes, which are critical for the success of e-business (Scuotto *et al.*, 2017). This understanding, together with the supplier's capabilities, is likely to influence buyer innovation performance.

Further, digital service and product suppliers are required to have experience concerning the buyer's change process, as well as the ability to explore new opportunities to achieve a successful outcome (Saunila *et al.*, 2019a). When supplying this type of digital service, such

as an online store, the buyer's readiness to enable the supplier entry to different systems and platforms and to provide relevant information connected to the service product are essential for the prosperity of production, as the buyer is not part of the factual generation of a service (Saunila *et al.*, 2017). Based on these considerations, it can be proposed that the actions the buyer takes into account when operating the online store (forming buyer operations) are interconnected with the relationship between capabilities related to supplier and buyer innovation performance. Thus, the fourth hypothesis is formed as follows:

- H4.* Buyer operations moderate the connection between supplier capabilities and buyer innovation performance.
- H4a.* Buyer operations moderate the connection between supplier capabilities regarding the product and buyer innovation performance.
- H4b.* Buyer operations moderate the connection between supplier capabilities regarding service delivery and buyer innovation performance.
- H4c.* Buyer operations moderate the connection between supplier capabilities regarding buyer-supplier relationships and buyer innovation performance.

4. Research methodology

4.1 Sample and data gathering

This study aims to understand how buyer companies (companies that purchased an online store) leverage the potential of supplier capabilities to attain innovation performance. To achieve this aim, data were collected with cross-sectional, random sampling from companies located in Finland. A survey was used to collect data on managerial assessments of the capabilities of a supplier, the operations of buyers and the innovation performance of buyers. The focal company (also called the buyer company) in this study is an online store operator. Thus, the survey was sent to companies that had purchased an online store. The buyer companies were asked to respond to items related to the supplier services provided in terms of the online store, their own operations connected to the online store and their innovation performance. The survey was sent to individuals in managerial positions with the background and work experience necessary to respond to a survey that investigated their supplier's capabilities, on the one hand, and their own operations relating to their online stores, on the other.

From an initial sample of 2,312 online store operators (approximately 31% of the total population), we received 109 responses. Most online stores (about 75%) were really small with five employees or less and the rest (about 25%) had more than five employees. Approximately 49% of the online stores had been in operation for 5 years or less and the remaining online shops were more mature (more than five years in operation). The online stores studied operate in a variety of markets as they sell, for example, fashion apparel, sports equipment, household goods, building material software and consulting services.

We used *t*-tests to check the non-response bias. As late-wave respondents can be used to represent non-respondents (Armstrong and Overton, 1977), the data were split into the following three entities: early-wave respondents, middle-wave respondents and late-wave respondents. From these data, 47 usable responses were obtained from the early wave and 24 were obtained from the late wave. The distinctions between the early wave and the late wave when considering the means of the study variables (capabilities of the supplier, operations of a buyer and the innovation performance of a buyer) were tested using *t*-tests.

As there were no remarkable distinctions (at the 0.05 significance level), there is no bias regarding non-respondents.

4.2 Construct operationalization

All scales were based on previous measures and amended for this survey through a pretest performed by researchers familiar with the subject. The complete items are presented in the appendix. The independent variable, supplier capabilities, consisted of the following three dimensions: capabilities related to the product, capabilities related to service delivery and capabilities related to the buyer-supplier relationship. The product capabilities dimension considers elements that are necessary for the product (i.e. an online store in this study) to function properly. Thus, 15 items were selected based on the previously used scales of [Gotzamani and Tzavlopoulos \(2009\)](#), [Huang et al. \(2015\)](#), [Oliveira and Roth \(2012b\)](#) and [Zeithaml et al. \(2002\)](#). The items dealt with the usability, functionalities, security and system availability of the online store that the buyer company had purchased.

In the service delivery capabilities construct, the service process assets required with regard to the supplier were assessed. The measures for this construct included 12 items inspired by [Gotzamani and Tzavlopoulos \(2009\)](#), [Huang et al. \(2015\)](#), [Oliveira and Roth \(2012b\)](#) and [Zeithaml et al. \(2002\)](#). These works were used as a reference to assess the aspects related to information richness, responsiveness, promise fulfillment and the customization of the service process of purchasing the online store.

The buyer-supplier relationship capabilities consider the elements required to form a long-lasting relationship between the supplier of the online store and the operator of an online store (i.e. the buyer company). This construct relies on the scales of [Oliveira and Roth \(2012b\)](#), [Gotzamani and Tzavlopoulos \(2009\)](#) and [Parasuraman et al. \(2005\)](#). It consists of six items that consider the two-way buyer-supplier relationship in relation to cooperation, trust development and responsiveness.

For the moderator construct, buyer operations, we focus on the actions that the online store operator performs to serve its customers. The works of [Oliveira and Roth \(2012b\)](#), [Zeithaml et al. \(2002\)](#) and [Parasuraman et al. \(2005\)](#) were used to form a typology that considers contact, responsiveness, flexibility, security and customization as important features for the buyer company to contemplate when operating its online store. We assessed each item of the independent and moderating variables using a five-point Likert-type scale that varied from strongly disagree (1) to strongly agree (5).

The dependent variable, innovation performance, was measured with a scale ranging from weak (1) to excellent (4). The respondents were asked to assess their company's capability to renew its e-business operation.

Control variables included firm age (number of years the online store had been in operation) and firm size (number of employees). Well-established online stores have experience in terms of how to renew and survive in markets, and such online stores are also presumably larger and older. Thus, it was necessary to control innovation performance in relation to these issues.

Multiple remedies were adopted to avoid common method variance. Although it was not possible to attain survey responses from distinct sources, we instead separated the measures of independent and dependent variables. In addition, distinct response formats were used to avoid common method bias. We also introduced a delay between measuring the independent and dependent variables. In the cover letter, we also made the respondents aware that their survey answers would remain anonymous to reduce the possibility of garnering only socially desirable responses. Another way of checking common method variance is using Harman's one-factor procedure ([Podsakoff et al., 2003](#)). Based on factor

analysis, a multiple-factor solution emerged and the percentage of variance explained by the main factor was below 50%. Thus, it was proven that common method variance is not a problem with regard to the data.

4.3 Data analysis, validity and reliability

We evaluated the validity and reliability before we tested the hypotheses. The reliability of the scales was tested using Cronbach's α , and the results suggested that all the measures have adequate levels of reliability (Hair *et al.*, 1998). The discriminant validity of the factor structure was tested by using principal component analysis with varimax rotation. This analysis eliminated items that simultaneously presented high loadings in multiple factors. Table 1 also shows that the individual items have strong loadings for their particular factors. The constructs have been proved to be distinct from one another, as the highest correlation is 0.532. The constructs and their correlations are given in Table 2. This exploratory analysis revealed the unidimensionality of the subdimensions of the capabilities of suppliers and buyer operations scales. These procedures validate the data in terms of discriminant validity.

5. Results

Multiple regression analyzes were conducted to test the hypotheses. Table 3 presents the results of the regression analyzes for buyer innovation performance, which includes three models. Model 1 was applied to test the direct impact of the number of employees and the age of the online store on buyer innovation performance. As shown in Table 3, the impacts of contextual characteristics, meaning the size and age of the online store operators, on buyer innovation performance were controlled. The results reveal that there is no significant effect between the control variables and buyer innovation performance. Model 2 was applied to test $H1-H3$, which includes the direct impact of supplier capabilities (i.e. product related, service delivery related and buyer-supplier relationship-related) on buyer innovation

Table 1.
Results of the
validity and
reliability tests

Constructs	No. of items	Factor loadings	Cronbach's α
<i>Supplier capabilities</i>			
Product	15	0.527–0.702	0.850
Service delivery	12	0.544–0.844	0.916
Buyer-supplier relationship	6	0.595–0.829	0.812
Buyer operations	14	0.493–0.787	0.850
Buyer innovation performance	1		

Table 2.
Correlation matrix

Variables	Mean/SD	1	2	3	4
<i>Supplier capabilities</i>					
1. Product	3.88/0.569	1.000			
2. Service delivery	3.45/0.775	0.503***	1.000		
3. Buyer-supplier relationships	3.58/0.718	0.486***	0.669***	1.000	
4. Buyer operations	3.86/0.567	0.532***	0.379***	0.337***	1.000
5. Buyer innovation performance	2.82/0.810	0.388***	0.348***	0.446***	0.320***

Note: *** $p \leq 0.001$

Variables	Model 1 β	Std. error	Model 2 β	Std. error	Model 3 β	Std. error
<i>Controls</i>						
No. of employees	2.54E-5	0.000	-8.50E-5	0.000	-7.01E-5	0.000
Age of online store	0.310	0.173	0.168	0.162	0.220	0.161
<i>Main effects</i>						
Product			0.139	0.209	4.271	1.485
Service delivery			-0.001	0.153	-4.131	1.928
Buyer-supplier relationship			0.375*	0.171	0.223	1.794
Buyer operations			0.205	0.189	0.449	0.385
<i>Interaction effects</i>						
Product* operations					-1.093**	0.385
Service delivery* operations					1.081*	0.496
Relationship* operations					0.014	0.446
<i>Model summary</i>						
F	1.632		4.664***		4.339***	
R	0.193		0.521		0.593	
R ²	0.037		0.272		0.352	
Adjusted R ²	0.014		0.213		0.271	

Notes: *** $p \leq 0.001$; ** $0.001 < p \leq 0.01$; * $0.01 < p \leq 0.05$

Table 3.
Results of regression
analyze for buyer
innovation
performance

performance. As shown previously in Table 2, capabilities related to the buyer-supplier relationship (i.e. one of the capabilities of suppliers) are positively connected with the innovation performance of the buyer ($\beta = 0.375$; $0.01 < p \leq 0.05$). Capabilities related to the product and capabilities related to service delivery (i.e. the other two capabilities) do not significantly influence the innovation performance of the buyer ($\beta = 0.139$; $p > 0.05$ and $\beta = -0.001$; $p > 0.05$, respectively). This means that concerning $H1-H3$, only $H3$ was supported. Thus, the results show that the supplier's buyer-supplier relationship capabilities affect buyer innovation performance. Model 3 was applied to test $H4$ (including $H4a$, $H4b$ and $H4c$), which studies the interaction effects of buyer operations. As shown in Table 3, the moderating influence of buyer operations on the relationship between capabilities related to the product and the innovation performance of the buyer ($\beta = -1.093$; $0.001 < p \leq 0.01$) is negative. The moderating influence of buyer operations on the relationship between capabilities related to service delivery and the innovation performance of the buyer ($\beta = 1.081$; $0.01 < p \leq 0.05$) is positive. In contrast, no moderating influence of buyer operations on the link between the buyer-supplier relationship and buyer innovation performance ($\beta = 0.014$; $p > 0.05$) was found. Therefore, referring to $H4$, $H4a$ and $H4b$ were supported, but $H4c$ was not supported. These results mean that buyer operations diminish the effect of the supplier's product capabilities on buyer innovation performance but foster the effect of the supplier's service delivery capabilities on buyer innovation performance.

6. Discussion

This study analyzed the connections between capabilities of suppliers, buyer operations and the innovation performance of buyers in service-based supply chains. Therefore, the research builds on prior studies on innovation generation via service-based supply chains (Sampson and Spring, 2012; Sengupta et al., 2006) by taking into account two interconnected perspectives as follows: the supply of services and the production of services in the e-business context (Wang et al., 2021; Zhu et al., 2020). The current research offers an

interesting contribution to the service-based supply chain literature as follows: we integrated the perspectives of the supplier's capabilities and the buyer's e-business operations with organizational factors under which the supplier's capabilities are most influential. The study's main findings are discussed in the following.

First, the results reveal the relation between supplier capabilities and buyer innovation performance in the context of e-business. We investigated the capabilities of a supplier using three dimensions as follows: capabilities related to the product, capabilities related to service delivery and capabilities related to the buyer-supplier relationship. The results show that capabilities related to the buyer-supplier relationship are positively connected with the innovation performance of the buyer, but the capabilities related to the product and service delivery do not significantly influence the innovation performance of the buyer. This result is in agreement with prior e-business research, concluding that absorptive capabilities, including knowledge sharing and strong relationships between business actors, can provide opportunities to transform external knowledge into innovation performance in a way that creates new products and service offerings (Haque and Islam, 2018; Moilanen *et al.*, 2014; Raymond *et al.*, 2016). Thus, suppliers can have e-business-related information that the buyer does not have and building tight relationships with a supplier (i.e. using this specific supplier capability) enhances buyer innovation performance. Thus, the results contribute to dynamic capabilities theory by increasing our understanding about forming, renewing and reconfiguring capabilities and resources to innovate in the market environment (Teece, 2018).

Second, this study reveals the role of buyer operations in the linkage between supplier capabilities and buyer innovation performance. The results show that the moderating influence of buyer operations on the relationship between capabilities related to the product and the innovation performance of the buyer is negative. The moderating influence of buyer operations on the relationship between capabilities related to service delivery and the innovation performance of the buyer is positive. The negative moderation is somewhat surprising as previous research showed that supplier information regarding the product can help buyers renew and update their online stores properly and boost buyer innovation performance (cf. Zhu *et al.*, 2015). As suppliers develop and provide online stores for different buyers and for different purposes, they gather specialized knowledge related to online store functionalities that buyers do not have. Thus, buyer participation in the online store production process is rarely needed; in fact, participation can become a problem as buyers without the necessary expertise and knowledge can create a negative effect. On the other hand, buyer operations were found to foster the relationship between the supplier's service delivery capabilities and buyer innovation performance, which may be due to the buyers having different needs and requiring different service delivery. The needs of the buyer must be heard to renew buyer operations. Recognizing each buyer's knowledge of its customers together with the service delivery process enhances buyer innovation performance. Previous research touched on this by concluding that when supplying this type of digital service (i.e. an online store), the buyer's readiness to allow the supplier access to different systems and platforms and to provide relevant information connected to the service product is essential for the prosperity of production, as the buyer is not part of the factual generation of a service (Saunila *et al.*, 2017).

Third, no moderating influence of buyer operations was found on the relationship between capabilities related to the buyer-supplier relationship and the innovation performance of the buyer, which might be because a good buyer-supplier relationship improves buyer innovation performance regardless. The buyer's own operations and

actions regarding its end customers do not cause much of an effect because renewal originates so strongly from the supplier relationship.

7. Conclusions

7.1 *Contribution to the theory*

The study contributes to supply and operations management literature by examining the connection between supplier capabilities, buyer operations and the innovation performance of buyers in e-business. The study concludes that capabilities related to the buyer-supplier relationship are positively connected with the innovation performance of a buyer with regard to e-business. Contrary to this, the capabilities related to the product and service delivery do not significantly influence the innovation performance of the buyer in relation to e-business. The study also highlights the positive moderating influence of buyer operations on the relationship between capabilities related to service delivery and the innovation performance of the buyer. In contrast, the moderating influence of buyer operations on the relationship between capabilities related to the product and the innovation performance of the buyer is negative.

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7.2 *Contribution to managerial practice*

This study provides instructions to managers on how an online store operator (the buyer) can leverage its supplier's capabilities to gain business value regarding innovation performance. Forming tight relationships with online store suppliers appears to be a successful way to attain innovation performance for online store operators. On the other hand, online store operators should not expect supplier capabilities related to online store functionality and characteristics of online store delivery alone to improve their innovation performance. Knowing that buyer operations embrace a moderating role in the connection between the supplier's capabilities in terms of product and service delivery, managers should take this into account when operating with their suppliers with the goal of improving innovation performance. Through their own operations related to their online stores, online store operators can benefit from their suppliers' service delivery capabilities and improve their innovation performance. However, online store operators should be careful in terms of putting too much weight on these operations as they can also have a hampering effect, for example, when the supplier has specific expertise related to the functionalities and technical execution of the online store. In this case, the actions the buyer takes when operating the online store can diminish the effect of the supplier's capabilities on buyer innovation performance.

7.3 *Limitations and future scope of the research*

First, because the study builds on data from one country, the demography needs to be considered when generalizing the results. Second, the dependent variable was innovation performance and effects on other types of performance need further research. Third, the study was conducted among online store operators and the applicability of the results should be studied in other contexts as well. Finally, due to the cross-sectionality of the research, longitudinal studies may offer valuable insight into the interplay between supplier capabilities and buyer operations. For example, trust's role in the relation between a supplier and an online store operator requires further research. It would be useful to examine what is required to build trust in the e-business context, as it differs from that between a goods supplier and an online store operator.

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Publication II

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Managing buyer–supplier relationships in e-commerce projects: Implications for relationship value

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Managing buyer-supplier relationships in e-commerce projects:

Implications for relationship value

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Abstract

This study investigates which e-commerce characteristics contribute to supplier relationship value in e-commerce projects. Further, it is examined if such contributions are moderated by the intensity of the buyer-supplier relationship. The hypotheses were developed based on previous research on e-commerce characteristics and buyer-supplier relationship intensity to test the links between e-commerce characteristics, buyer-supplier relationship intensity, and supplier relationship value. Using a structured online survey questionnaire, the data were collected from Finnish e-commerce companies, which had supplied an e-shop, and they were asked to evaluate the purchasing process of the shop as an example of an e-commerce project. The results suggest that one of the dimensions of e-commerce characteristics (service delivery characteristics) positively contributes to the supplier relationship value, whereas the other two dimensions (product characteristics and buyer operations) do not. Further, as the intensity of the buyer-supplier relationship increases, the strength of the connections between product characteristics and supplier relationship value and between buyer operations and supplier relationship value increases. This study could provide useful insights for supply chain managers by informing suppliers about which e-commerce characteristics are likely to influence supplier relationship value.

Keywords: Relationship value; Relationship intensity; E-commerce; Supply Chain; Buyer-Supplier Relationships; Digital supply chain; Digital service

1 Introduction

Supply chain management is under significant pressure to increase its contribution in changing business environments (Hammervoll, 2011; Weele and Raaij, 2014; Fedi et al., 2019; Ukko and Saunila, 2019). The traditional focus of the buyer-supplier relationships domain has mostly been on cost savings, quality, and technology development, and the research in the field has largely been concerned with determining how to run supply chain operations efficiently (i.e., doing things right) rather than effectively (i.e., doing the right things; Weele and Raaij, 2014). Among the biggest categorical changes that create pressure on buyer-supplier relationships management in the 21st century are service integration and digitalization (e.g., Fedi et al., 2019; Mora-Monge et al., 2019; Saunila et al., 2019). Brito and Nogueira (2009) argue that the fact that digitalization is transforming the ways organizations act is no longer a novelty and that the significance of appreciating the implications of the introduction of e-commerce is demonstrated by a number of studies devoted to the topic of buyer-supplier relationships. An example of an e-commerce project is the acquisition of an e-shop, where the purchasing process of the shop, the shop itself, and the deliverance of the service to the end customer mainly take place in digital form. In e-commerce projects, it is crucial to consider how relationships with suppliers are enhanced and preserved. This is also known as buyer-supplier relationships management, which is a crucial business process for developing closer collaboration with pivotal suppliers to create value (Ronchi et al., 2007; Autry and Golobic, 2010).

The motivation of this research builds on the importance of e-commerce characteristics as part of e-commerce projects. For example, the sharing of information can enhance unification with suppliers (So and Sun, 2010; Haensel and Hofmann, 2017). However, while better management of supplier relationships enhances company performance (Lambert and Schwieterman, 2012),

few studies aim to understand the role of key characteristics in influencing supplier relationship value in SME e-commerce. In addition, the moderating influence of buyer-supplier relationship intensity requires further investigation. Thus, we aim to contribute to this research gap by studying the links between e-commerce characteristics, buyer-supplier relationship intensity, and supplier relationship value in e-commerce projects.

2 Buyer-supplier relationships in e-commerce projects

Two of the biggest changes that buyer-supplier relationship management has faced and must operate with in the near future are related to digitalization and the increase of services. In response to the increase in digitalization of business environments, several studies have been conducted on the relationships between client and digital service suppliers, which include client-consultant relationships (cf. Dawes et al., 2007), IT outsourcing collaboration (cf. Gonzalez et al., 2006; Goo et al., 2007; Fedi et al., 2019), and collaboration between buyers and digital service suppliers (Kishore et al., 2003; Brito and Nogueira, 2009). Although previous studies on e-commerce supplier relationships seem to have focused on outsourcing, these presented studies highlight the significance of relationship management with suppliers to gain advantages from the adoption of digitalization. Brito and Nogueira's (2009) study provides further evidence that in the relationships between buyers and digital service suppliers, IT resources from both parties are switched and compounded, thus increasing their related capabilities. Although the research emphasizes the importance of managing relationships, the right rate of supplier integration will be dependent on the collaboration, and endeavors should be made to recognize strategies for different types of relationships (cf. Lambert and Schwiterman, 2012; Haensel and Hofmann, 2017).

While previous studies have shown that better management of supplier relationships increases companies' performance, in continuously changing business environments companies need knowledge and information to guide them in these actions (Lambert and Schwiterman, 2012) when managing e-commerce projects. This is because it is necessary to integrate multiple e-commerce characteristics as a comprehensive solution that is appropriate for buyer values in e-commerce projects. Therefore, managers highlight the relational perspective for value creation in different studies. Studies on relationship value have revealed that the deeper the relationship, the better the performance of a company's supply chain (Autry and Golicic, 2010). Supplier relationship value can be defined as the obtained benefits perceived by suppliers and buyers in terms of their promises of a business relationship (i.e., their wants and needs; e.g., Cheung et al., 2010). The benefits can be divided into functional benefits and relational benefits. Functional benefits are benefits that pertain to products and services, and exist in buyer value hierarchies that center on delivery service quality, product quality, and pricing by suppliers (Cheung et al., 2010). Relational benefits, in turn, consist of companies' perceptions of the quality of the interplay and connection with their partners; these perceptions contain interpersonal dimensions, such as having a pleasant and thriving relationship with a business partner and feeling that their needs or problems are met (Woodruff, 1997).

3 Hypothesis development

3.1 E-commerce characteristics as antecedents of relationship value

In this study, we define product characteristics as the means by which suppliers contribute to the characteristics of a buyer's e-shop. Researchers have developed various quality models (since the model of Garvin, 1987) that identify what is important for value creation in e-

commerce. In the context of e-commerce, Su and his colleagues (2008) classified quality factors into six different dimensions, including information quality, ease of use, output quality, consumer service, process controllability, and online design. Parasuraman et al. (2005) consider that the product characteristics that contribute to the perceived quality of the service include fulfillment, efficiency, privacy, and system availability. Similarly, Huang et al. (2015) refer to the product characteristics relating to mobile service quality as efficiency, functionalities of the content, and system availability. According to Gotzamani and Tzavlopoulos (2009), e-commerce quality constitutes a variety of factors that are co-related and interact with each other. Currently, e-commerce companies constantly seek new ways to enhance the buyer experience by renewing their online stores with new properties and capacities, such as social networking, dynamic imaging, mobile commerce, and customization (Tsai et al., 2013). As a variety of product characteristics have been found to provide value to the buyer, these characteristics are likely to enhance the perceived supplier value. Consequently, the following hypothesis was developed regarding e-commerce:

H1: Product characteristics positively affect supplier relationship value.

In this study, we define service delivery characteristics as the means by which suppliers contribute to a buyer's e-shop by providing comprehensive value during the supply of an e-shop. Within the e-commerce context, different models have been proposed, and some relevant characteristics for value creation have been measured. Therefore, characteristics such as richness of information sharing, integrated cooperation and processes, and trust among the companies are important for e-commerce, while delays in information sharing, out-of-date information about products and services, and poor data translations are among the activities that lead to huge costs, missed revenue, and dissatisfaction (Ovalle and Marques, 2003; Saunila et

al., 2019). Parasuraman and his colleagues (2005) have proposed the SERVQUAL model and measured assurance, responsiveness, reliability, empathy, and tangibles as factors in service quality. Additionally, satisfying delivery in terms of time and quality, contact with customer service, tracking of the status of the orders from the time of ordering until delivery, and high-quality websites are among the crucial operation components that can make or break satisfaction for buyers (Boyer et al., 2002). A variety of service delivery characteristics were found to provide value to the buyer. These characteristics are likely to enhance the perceived supplier value in e-commerce. Therefore, we hypothesize the following:

H2: Service delivery characteristics positively affect supplier relationship value.

In e-commerce, it is necessary to satisfy the needs of e-shoppers (cf. Zeithaml et al., 2002; Gotzamani and Tzavlopoulos, 2009). In this study, we define buyer operations as the means by which the e-retailer (i.e., the buyer) serves its customers. As quality is one element that contributes to business growth, several studies have considered the quality of websites and customer services as the elements that boost profitability in business (cf. Gotzamani and Tzavlopoulos, 2009). Different quality models have been defined for value creation in the e-commerce context. Proposed by Loiacono (2002), the TM model refers to the quality of the website and identified information trust, interactivity, fit-to-task, flow/emotional appeal, visual appeal, design appeal, intuitiveness, integrated communication, innovativeness, response time, business process, and a viable surrogate as the 12 factors that must be considered in e-commerce. Gotzamani and Tzavlopoulos (2009) refer to the website characteristics that have replaced the value provided by a physical store, for example, system quality and information quality, as well as the aesthetics, structure, and properties of the website. Based on the studies conducted by Lee and Lin (2005), responsiveness, reliability, website design, personalization,

and trust are among the elements in the e-service process. Based on Yoo and Donthu's (2001) studies, different characteristics, including esthetic design, ease of use, ease of ordering, competitive value, processing speed, security, corporate and brand equity, product uniqueness, and product quality assurance have been mentioned in the SITEQUAL model as elements that are related to the experience of online purchasing. Additionally, different studies have mentioned user interface quality, information quality, and security as three crucial factors for buyers during online shopping (Park and Kim, 2003; Oliveira and Roth, 2012). A variety of buyer operations related to e-shops have been considered to provide value to the customer. These operations are likely to enhance the value that the supplier has produced when supplying the e-shop. Based on previous research, the following hypothesis was formed:

H3: Buyer operations positively affect supplier relationship value.

3.2 Buyer-supplier relationship intensity as a moderator

One way to understand the changes in the development of buyer value propositions is the recognition that it gets easier for companies to look further down their supply chains to identify changes that are arising many partners away, thus conveying extra lead time for strategic and operational planning and amendments (Cheung et al., 2010). Prior research in supply chain and operations management has presented a variety of factors contributing to *buyer-supplier relationship intensity*, whose existence can be associated with relationship performance (e.g., Prahinski and Benton, 2004; Liu et al., 2009; Cheung et al., 2010; Li et al., 2010). Cocreation between e-retailers and suppliers is an important part of service delivery processes through which e-retailers have direct input in the development of e-services (Ngo and O'Cass, 2009). The joint sensemaking, exchange of information, and knowledge integration have been

documented as important factors for buyer-supplier cooperation (Cheung et al., 2010). These factors are also connected to the *responsiveness towards the supplier* in terms of the effectiveness with which problems are handled, the willingness to help the supplier, and the speed with which a response to a problem or question is given (Gotzamani and Tzavlopoulos, 2009; Huang et al., 2015). Prior literature often presents the duration of collaboration as representative of the strength of relationships among parties (Li et al., 2010). Lengthy collaboration also equips parties to distribute confidential knowledge, reduce knowledge asymmetries, and enhance *trust development* (Poppo et al., 2008). Trust can be understood as one partner's reliance on the fact that the other partner in the relationship will not take advantage of its vulnerabilities (e.g., Li et al., 2010). It is documented that when behavioral norms and trust are enhanced, parties are more efficient in developing knowledge sharing, information flow, solidarity, and communication (Hult et al., 2004), and if the company merely intends to enhance relationship performance, inter-company trust and relational norms turn into even more crucial ways for achieving this end (Liu et al., 2009). Based on the current understanding, we believe that the intensity of the relationship between the buyer and the supplier enhances the connection between product characteristics and supplier relationship value, service delivery characteristics and supplier relationship value, and buyer operations and supplier relationship value. In line with this, the following hypotheses were developed:

H4: Relationship intensity moderates the connection between e-commerce characteristics and supplier relationship value.

H4a Relationship intensity moderates the connection between product characteristics and supplier relationship value.

H4b Relationship intensity moderates the connection between service delivery characteristics and supplier relationship value.

H4c Relationship intensity moderates the connection between buyer operations and supplier relationship value.

3.3 Research model

The literature review presented in the above sections resulted in the development of the research model, which is illustrated in Figure 1. The research model indicates e-commerce characteristics as a three-dimensional construct with the dimensions of product characteristics, service delivery characteristics, and buyer operations as relevant for improving supplier relationship value. We define product characteristics as the means by which suppliers contribute to the characteristics of a buyer's e-shop. Service delivery characteristics are defined as the means by which suppliers contribute to a buyer's e-shop by providing comprehensive value during the supply of an e-shop. Finally, we define buyer operations as the means by which the e-retailer (the buyer) serves its customers. Further, it is argued that e-commerce characteristics and buyer-supplier relationship intensity interact with each other to maximize supplier relationship value. Thus, an e-commerce company missing the appropriate relationship intensity with its suppliers may not achieve enhanced relationship value, despite the e-commerce characteristics realized during the e-commerce project.

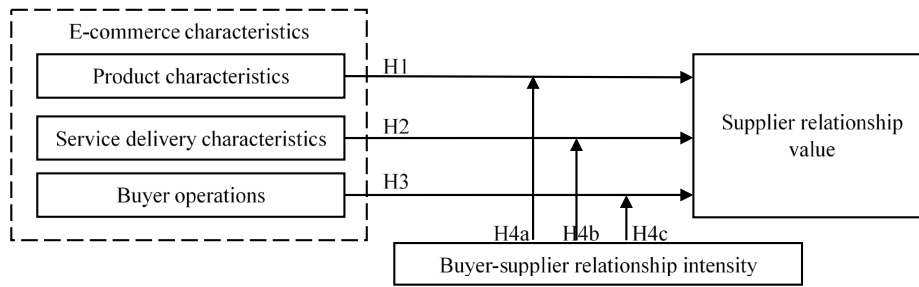


Figure 1: Research model and hypotheses.

4 Methodology

4.1 Construct operationalization

A survey-based method was utilized to test the hypotheses. A literature review assisted in recognizing relevant constructs and previously operationalized scale items. Measurement items related to e-commerce characteristics and buyer-supplier relationship intensity were adapted from the literature, but they were modified in order to ensure contextual consistency. The measure of supplier relationship value was generated especially for this study. To ensure validity, the measure was developed based on existing research. All the scales were processed in cooperation with multiple researchers, and the scales underwent formal pretests to assure content validity. Table 1 presents the measurement items.

Table 1: Measurement scales

Items	No	References
E-commerce characteristics		
Product characteristics (<i>'Strongly disagree' [1] to 'strongly agree' [5]</i>)		Zeithaml. et al., 2002; $\alpha = 0.850$ Gotzamani and
Usability/efficiency	3	Tzavlopoulos, 2009;
Functionalities	4	Oliveira and Roth, 2012;
Security	2	Huang et al., 2015
Continuous operation/System availability	6	
Service delivery characteristics (<i>'Strongly disagree' [1] to 'strongly agree' [5]</i>)		Zeithaml. et al., 2002; $\alpha = 0.916$ Gotzamani and
Information/contact	4	Tzavlopoulos, 2009;
Responsiveness	2	Oliveira and Roth, 2012;
Fulfillment	2	Huang et al., 2015
E-customization	2	
Sacrifice	2	
Buyer operations (<i>'Strongly disagree' [1] to 'strongly agree' [5]</i>)		Zeithaml. et al., 2002; $\alpha = 0.850$ Parasuraman et al., 2005;
Information/contact	4	Oliveira and Roth, 2012
Responsiveness	2	
Fulfillment/flexibility	4	
Security	2	
E-customization	2	
Buyer-supplier relationship intensity (<i>'Strongly disagree' [1] to 'strongly agree' [5]</i>)		Parasuraman et al., 2005; $\alpha = 0.812$ Gotzamani and
Cooperation	2	Tzavlopoulos, 2009;
Trust development	2	Oliveira and Roth, 2012
Responsiveness towards the supplier	2	
Supplier relationship value (<i>'Weak [1] to 'excellent' [4]</i>)		
Value gained from the relationship	1	

The independent variables of the survey were the e-commerce characteristics. The e-commerce characteristics were operationalized as a three-dimensional construct, with the dimensions of product characteristics, service delivery characteristics, and buyer operations. All these dimensions were measured by 12 to 15 items. Product characteristics reflect those of the e-shop that the supplier produced for the e-commerce company. Service delivery characteristics reflect those that the supplier offered during the e-shop delivery project. Finally, buyer operations reflect the means by which the e-retailer (the buyer) serves its customers.

The moderator variable was the buyer-supplier relationship intensity. The six items of this variable estimate the strength of the buyer-supplier relationship in the context of the e-commerce projects.

The dependent variable was the supplier relationship value. It was measured with a one-item measure. Although a few researchers argue against the utilization of one-item measures due to concerns regarding their validity and reliability (Sarstedt and Wilczynski, 2009; Diamantopoulos et al., 2012), they are acceptable with some restrictions. Drolet and Morrison (2001) argued that the awareness obtained from every extra item is very modest. They also suggested that researchers ought to weigh the factor of item information in addition to that of reliability. One-item measures are applicable when the empirical research environment contains singular concrete attributes (Bergkvist and Rossiter, 2007), which are homogenous (Loo, 2002) and unequivocal to the study participants (Sackett and Larson, 1990). This is the case in this study.

The survey also included controls for contextual factors that may have potentially altered the results. Controls included company size (measured by the number of employees), sales (measured by the portion of sales through the e-shop), and the age of the e-shop (measured by the number of years the shop had existed).

4.2 Sample and data gathering

The survey was conducted in Finnish e-commerce companies. The companies had supplied an e-shop, and they were asked to evaluate the purchasing process of the shop as an example of an e-commerce project. Respondents were responsible for business and customer service tasks

related to e-commerce and digital business. The respondents were also managerial-level employees, as managers were considered to have the required information to answer the items reflecting their company's supply chain operations. Thus, the study participants had the capability to respond to a questionnaire that mapped the current state of their companies' e-commerce projects. The study's unit of analysis was the individual perceptions of the respondent regarding the e-commerce characteristics and buyer-supplier relationship intensity as well as the value of his/her company's buyer-supplier relationship. Thus, the respondents offered their personal judgment of the constructs in their company. Overall, based on a European Commission report, Finland has been ranked as the global leader in the digitalization of businesses (Microsoft, 2017). Therefore, the results can be generalized to apply to countries where digitization is already well advanced.

Initially, 2541 respondents were asked to take part in the study. Of these, 229 contacts were invalid, so the survey reached 2312 respondents. After eliminating incomplete surveys, our final sample consisted of 109 (response rate about 4.7%) responses from 107 e-commerce companies. The response rate is not always the best measure for assessing the accuracy of the results, as it ignores the compounding effect of sampling and coverage errors. The target population of this study was e-commerce companies operating in Finland that had an e-shop in operation. Because the study focused on the purchasing process of the e-shop, the company's industry was not expected to be a major issue in this research setting. For this reason, all the industries were included in the study. The directive number of such companies was 7500. Besides the response rate, the accuracy of the survey results should be assessed by the representativeness of the respondents. The initial sample was randomly selected from these companies and contained about 30% of the total amount of Finnish companies that had an e-shop. Overall, the sample was representative of a large amount of the entire target population.

Further, the number of responses exceeded the minimum sample size for a certain population size (Barlett et al., 2001). The sample size is considered appropriate.

Table 2: Respondent demographics

		n	%
No of employees (buyer company)	Less than 10	80	73.4
	10 or more	10	9.1
	No response	19	17.4
Portion of sales via e-shop	Under 25%	63	57.8
	25-75%	26	23.9
	Over 75%	17	15.6
	No response	3	2.8
Age of e-shop in use	0-5 years	52	47.7
	Over 5 years	55	50.5
	No response	2	1.8

Demographics were analyzed based on the number of employees in the organization that the respondent worked for. Roughly 73% of the respondents were from micro companies employing fewer than 10 persons, while about 9% of respondents were from small companies. About 17% of the respondents did not want to reveal how many employees their company had. As far as the portion of digital sales compared to all sales was concerned, around 58% of the companies obtained less than 25% of their sales through digital channels. About 24% sold a 25–75% portion of their sales online, and only 15% sold more than that through their websites. About 3% of the respondents did not answer this question. About 48% of the sample represented companies that had had an e-shop for less than 5 years, while about 50% had had an e-shop for more than 5 years. Of all the respondents, 2% did not respond to this question.

4.3 Non-response bias

To determine whether there was non-response bias, we performed an analysis of the variance. Early respondents were compared to late respondents regarding the key variables: product

characteristics, service delivery characteristics, buyer operations, buyer-supplier relationship intensity, and supplier relationship value. Early respondents were those respondents who filled out the survey within the time limit after obtaining the first e-mail. Respondents who corresponded with the subsequent e-mails were classified as late respondents. Respondents who were among the last to correspond were most precisely reminded non-respondents (e.g., Armstrong and Overton, 1977). If no distinctions are found between early respondents and late respondents, it is likely that no differences exist between respondents and non-respondents. The analysis results did not indicate significant differences between the early respondents and late respondents regarding the key variables. Thus, it was established that non-response bias did not pose a problem, and that the received responses were an accurate portrayal of the entire sample.

5 Results

5.1 Measurement model

Before testing the hypotheses, the level of validity and reliability was assessed. As Table 1 shows, Cronbach's α values are greater than 0.8, indicating that the measurements are reliable. High Cronbach's α values also support internal consistency, which was further investigated by performing factor analysis with principal components (no rotation) separately for each construct. All the items of one variable loaded on one factor, which supports internal consistency. Next, correlation analyses (Table 3) were conducted in order to investigate if the constructs behave in a credible manner. In some cases, the correlations were high, which may mean that multicollinearity can cause problems. For multicollinearity, the variance inflation factors (VIFs) were computed for every predictor by conducting a linear regression of that predictor on all the other predictors. All the VIFs were considerably lower (less than 2.0) than

the advised limit of 5–10, proposing that multicollinearity was not a problem (Kleinbaum and Kupper, 1988). The normal distribution of each variable was assessed via a measure of skewness. Each variable appeared to have an approximately normal distribution.

Table 3: Descriptive statistics and correlations of the variables

	Mean	St.Dev.	1	2	3	4
1 Product characteristics	3.88	0.569	1.000			
2 Service delivery characteristics	3.45	0.775	0.503***	1.000		
3 Buyer operations	3.86	0.567	0.532***	0.379***	1.000	
4 Buyer-supplier relationship intensity	3.58	0.718	0.486***	0.669***	0.337**	1.000
5 Supplier relationship value	2.93	0.799	0.400***	0.707***	0.234*	0.568***

Sign. *** ≤ 0.001 , ** $0.001 < p \leq 0.01$, * $0.01 < p \leq 0.05$

The possibility of common method bias was checked, as only one respondent from an organization was used. During the data gathering process, multiple procedures were used to decrease the possibility of such bias (see Podsakoff et al., 2003 for further reference). The study participants were asked to respond to the items as veraciously as possible and were permitted to respond anonymously. These actions decreased the likelihood of respondents editing their answers to make them more socially desirable. Common method biases were also reduced by careful construction of the items. Further, methodological separation was used to decrease the risk of common method bias (Craighead et al., 2011). Thus, different variations of Likert-type scales were employed, such as “weak/excellent” and “strongly disagree/strongly agree.” In addition, Harman’s one-factor test (Podsakoff et al., 2003) was performed. Exploratory factor analysis was performed with all the variables included, and the unrotated factor solution was analyzed. If one generic factor that accounts for the mass of the variance of the measures exists, common method variance exists. In this case, the main factor explained 30.3% of the variance, and no remarkable common method variance existed (Podsakoff et al., 2003).

5.2 Hypothesis testing

The regression results are summarized in Table 4. Step 1 includes controls only (the control model), and step 2 (the main effects model) includes the direct effects of product characteristics, service delivery characteristics, buyer operations, and the moderator variable of buyer-supplier relationship intensity. Step 3 (the full model) includes the interaction effect of buyer-supplier relationship intensity. Prior to hypothesis testing, the effects of contextual factors, including company size, the portion of sales through the e-shop, and the age of the e-shop, on supplier relationship value were controlled. The results of this control model showed no significant effect.

Next, a main effects model was used to test hypotheses 1–3. Table 4 shows that the direct effects of product characteristics on supplier relationship value ($\beta = 0.156$; $p = 0.189$), buyer operations on supplier relationship value ($\beta = -0.145$; $p = 0.155$), and buyer-supplier relationship intensity on supplier relationship value ($\beta = 0.045$; $p = 0.708$) were not significant. However, the direct effect of service delivery characteristics on supplier relationship value ($\beta = 0.697$; $p = 0.000$) was significant. Thus, the results provided support for hypothesis 2.

The full model, which is shown in Table 4, was used to test hypotheses 4a–4c. The full model included the interaction terms, and a comparison with the previous model allowed for estimating the effect caused by the interaction terms. The results suggest that buyer-supplier relationship intensity has a significant interaction effect on the path from buyer operations to supplier relationship value ($\beta = 1.261$; $p = 0.097$). Hence, we can interpret from these observations that the influence of buyer operations on supplier relationship value rises with an

Table 4. Regression results for supplier relationship value

Variables	Control model			Main effects model			Full model		
	β	St. β	t	β	St. β	t	β	St. β	t
Controls									
No. of employees	-0.001 (0.001)	-0.084	-0.736	0.000 (0.001)	-0.039	-0.509	-0.001 (0.001)	-0.053	-0.694
Age	0.001 (0.190)	0.000	0.004	0.066 (0.128)	0.040	0.512	0.033 (0.130)	0.020	0.253
Portion of sales	0.004 (0.003)	0.144	1.233	0.001 (0.002)	0.043	0.525	0.001 (0.002)	0.041	0.495
Main effects									
Product characteristics				0.222 (0.167)	0.156	1.326	1.534 (0.660)	1.081	2.323*
Service delivery characteristics				0.741 (0.122)	0.697	6.086***	0.327 (0.445)	0.308	0.736
Buyer operations				-0.211 (0.147)	-0.145	-1.437	-1.132 (0.536)	-0.778	-2.110*
Buyer-supplier relationship intensity				0.050 (0.134)	0.045	0.376	0.137 (0.392)	0.122	0.350
Interaction effects									
Product characteristics* Buyer-supplier relationship intensity							-0.399 (0.197)	-1.994	-2.025*
Service delivery characteristics* Buyer-supplier relationship intensity							0.121 (0.128)	0.696	0.950
Buyer operations* Buyer-supplier relationship intensity							0.270 (0.161)	1.261	1.684*
Model summary									
F			0.809			15.754***			11.694***
R ²			0.031			0.615			0.639
Adjusted R ²			-0.007			0.576			0.585
F Change						14.945			10.885
R ² Change						0.584			0.608

Sign. *** ≤ 0.001 , ** $0.001 < p \leq 0.01$, * $0.01 < p \leq 0.05$, + $0.05 < p \leq 0.1$ (Standard errors in parentheses)

increase in the depth of the buyer-supplier relationship. However, the interaction influence of buyer-supplier relationship intensity on the path from product characteristics to supplier relationship value was significant, but the impact of product characteristics on supplier relationship value decreased when the depth of the buyer-supplier relationship was greater ($\beta = -1.994$; $p = 0.047$). The interaction effect of buyer-supplier relationship intensity on the path from service delivery characteristics to supplier relationship value was not significant ($\beta = 0.696$; $p = 0.346$).

Table 5: Summary of the results

Hypotheses	Support	Implication
H1: Product characteristics positively affect supplier relationship value.	Not supported	Characteristics of the e-commerce platform do not directly contribute to supplier relationship value.
H2: Service delivery characteristics positively affect supplier relationship value.	Supported	The provided service during the creation of the e-commerce platform contributes to supplier relationship value.
H3: Buyer operations positively affect supplier relationship value.	Not supported	Buyer operations related to the e-commerce platform do not directly contribute to supplier relationship value.
H4a Relationship intensity moderates the connection between product characteristics and supplier relationship value.	Supported	The more intense the relationship between the buyer and the supplier is, the less impact the characteristics of the e-commerce platform have on supplier relationship value.
H4b Relationship intensity moderates the connection between service delivery characteristics and supplier relationship value.	Not supported	The intensity of supplier relationships does not increase or decrease the contribution of the service delivery process to supplier relationship value.
H4c Relationship intensity moderates the connection between buyer operations and supplier relationship value.	Supported	The more intense the relationship between the buyer and the supplier is, the more the buyer's operations affect supplier relationship value.

6 Discussion

This study investigated the direct effects of e-commerce characteristics, namely product characteristics, service delivery characteristics, and buyer operations, on supplier relationship

value, and examined the moderation impact of buyer-supplier relationship intensity on that connection. Thus, our research contributes to prior studies on the effect of e-commerce characteristics on supplier relationship value (e.g., Ovalle and Marques, 2003; Brito and Nogueira, 2009; Autry and Golicic, 2010) in e-commerce projects. Considering the direct effects of the main effect model (Table 4), the relationship between service delivery characteristics and supplier relationship value was highly significant, while no other direct and significant effects could be found. Regarding value creation in the e-commerce projects, it seems that the influence of the characteristics of service delivery outcome overrides that of the product characteristics and the buyers' own operations. This highlights that different characteristics of service delivery, such as sharing accurate, updated, and timely information during the service delivery process (Ovalle and Marques, 2003), together with different characteristics of quality elements, such as assurance, responsiveness, empathy, reliability, and tangibles (Parasuraman et al., 2005), can be considered value drivers for the buyer-supplier relationship. However, there may be a need to integrate these service delivery characteristics as a comprehensive solution to facilitate the relational perspective for value creation. Whereas Lambert and Schwiterman (2012) present the management of supplier relationships as a process that offers the framework for how these collaborations with suppliers can be enhanced and preserved, the current study suggests that these procedures can be targeted to the service delivery characteristics in value creation in e-commerce projects.

Another contribution relates to the prior research on buyer-supplier relationship intensity (e.g., Liu et al., 2009; Cheung et al., 2010; Li et al., 2010). Considering the interaction effects in the full model (Table 4), the results indicate that the buyer-supplier relationship positively moderates the relationship between buyer operations and supplier relationship value. This means that a high intensity in the buyer-supplier relationship, for example, in terms of buyer-

supplier cooperation and the development of trust, is connected to buyer operations within the delivered service in a way that affects the value of the supplier relationship. This may indicate that considering the “supplier as a customer,” together with relationship learning in terms of joint sensemaking, exchange of information, and knowledge integration (Cheung et al., 2010), is associated with buyers’ operations within the delivered digital service (Yoo and Donthu, 2001; Park and Kim, 2003), and generates a higher supplier relationship value. Cooperation that is based on relationship learning provides better knowledge and skills for the buyers to address the issues described above. Thus, the study strongly supports the importance of relationship learning in creating relationship value, as presented by Cheung et al. (2010). Responsiveness towards the supplier in terms of the effectiveness with which problems are handled, willingness to help the supplier, and providing a quick response to a problem (Parasuraman et al., 2005; Huang et al., 2015) are also connected to relationship learning and considering the “supplier as a customer,” thus improving the knowledge and skills that buyers need in their operations. Further, relationship learning, together with the willingness to have a long-term relationship, are characteristics that facilitate the development of trust and positively affect the relationship between buyer operations and supplier relationship value. The study thus highlights the development of trust as an integral portion of the buyer-supplier relationship and an essential element in supply chain value creation, as presented by Poppo et al. (2008). The findings also suggest that the buyer-supplier relationship negatively moderates the relationship between product characteristics and supplier relationship value. This may indicate that the more intensive the buyer-supplier relationship is, the more irrelevant the product characteristics themselves are. In an intensive buyer-supplier relationship, supplier relationship value is created through the buyer’s own actions regarding the e-shop.

7 Conclusions

The results contribute to our understanding of the links between e-commerce characteristics, buyer-supplier relationship intensity, and supplier relationship value. Specifically, we examined the impacts of e-commerce characteristics on supplier relationship value by identifying the moderating impacts of buyer-supplier relationship intensity. Three dimensions of e-commerce characteristics were assessed: product characteristics, service delivery characteristics, and buyer operations.

The current study enriches research on buyer-supplier relationships in e-commerce projects by lending support to the interaction effect of the buyer-supplier relationship intensity on supplier relationship value. Our study argues that one dimension of e-commerce characteristics, service delivery characteristics, is positively related to supplier relationship value. Also, buyer-supplier relationship intensity enhances the connection between buyer operations and supplier relationship value. As a practical implication, the study provides empirically proven guidance for understanding the role of buyer-supplier relationships on the connection between e-commerce characteristics and supplier relationship value. The findings of our study could provide useful insights for managerial decision-making by informing suppliers about which e-commerce characteristics are likely to influence supplier relationship value so that suppliers can improve these characteristics.

The study has limitations that serve as eventualities for further studies. First, the data are cross-sectional in nature. Longitudinal data would assist in providing an in-depth understanding of how buyer-supplier relationships affect value creation. Second, the demographics may limit the generalizability of our findings, as the data were gathered from Finland. Also, a common

method bias can cause a problem when the key informant approach is utilized. Fourth, supplier relationship value was the only dependent variable and, thus, the only performance measure. Therefore, the theoretical model of this study can be further studied using other performance measures, such as financial performance and market performance, as dependent variables. Further research could address these limitations and build on the findings of this study.

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Publication III

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The view of IT-consuming firms on the key digital service capabilities of IT-producing firms

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**THE VIEW OF IT-CONSUMING FIRMS
ON THE KEY DIGITAL SERVICE CAPABILITIES
OF IT-PRODUCING FIRMS**

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ABSTRACT

Aim/Purpose	This study focuses on the connection between IT-producing firms' digital service capabilities and the digital service performance of IT-consuming firms, especially online shop operators.
Background	The acquisition and integration of knowledge regarding digital service capabilities and performance can increase the level at which employees assimilate information, organize with IT-consuming firms, and cooperate with them to develop the delivery of services and customize services to fill their needs. Exploring capabilities that may enable this process is a prerequisite for all businesses offering digital services and, thus, an engrossing and ongoing interest of practitioners and scholars. However, there is a lack of research on the relationship between IT-producing firms' digital service capabilities and the digital service performance of IT-consuming firms in the business-to-business (B2B) context.
Methodology	The study builds on a survey conducted among small firms that have an online shop in use and are located in Finland.
Contribution	The study offers empirical evidence for the capabilities valued by IT-consuming firms, providing a model for IT-producing firms to use when deciding on a future focus. The study was executed in a B2B setting from the viewpoint of online shop operators, presenting a novel understanding of influential digital service capabilities.
Findings	Adaptability, determined by capabilities related to utilizing information gained via the integration of a digital product into other digital tools (e.g., marketing,

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personalization, and analytics), statistically significantly affects all three aspects of an IT-consuming firm's digital service performance (financial, operational, and sales). Another product capability, availability, which includes aspects such as security, different aspects of functioning, and mobile adaptation, affects one aspect of digital performance, namely operational. The results also suggest that the role of service process-related capabilities in determining service comprehensiveness significantly influences two aspects of IT-consuming firms' digital service performance: financial (negative effect) and operational (positive effect). The results show that the capabilities associated with the relationship between the producing firm and the consuming firm do not affect IT-consuming firms' performance to the same extent.

Recommendations for Practitioners	The study results suggest that IT-producing firms should concentrate on leveraging service comprehensiveness, as there has been a shift in the B2B context from merely selling a digital product and associated services. It seems that usability-related issues are now taken for granted, and the emphasis is on features that support the use of information to create value.
Recommendations for Researchers	The results contribute to the capabilities literature by showing that the shift in focus from technical product-related capabilities to relationship-related capabilities is not yet evident among small online store operators.
Impact on Society	In addition to offering tools with different integration possibilities, supporting IT-consuming firms in making the most of the possibilities would be very helpful.
Future Research	The comprehension of the relationship between digital service capabilities and digital service performance would benefit from future research that takes into account additional control variables. The theoretical model of this study can be further studied by using other performance measures, such as market performance, as dependent variables.
Keywords	product capabilities, service capabilities, relationship capabilities, digital service, performance

INTRODUCTION

Digital transformation has changed the nature of services, compelling companies to revise their knowledge and skills in a digital context (Sjödin et al., 2020; Sore et al., 2022). In particular, using information to enhance customer value creation is critical to building digitalization capabilities (Parida et al., 2015). With the promise of meeting consumers' increasing expectations, IT-producing firms are increasingly committing themselves to building capabilities related to digital services (Hinings et al., 2018; Ngo & O'Cass, 2013; Oliveira & Roth, 2012; Sore et al., 2017). The main idea of the digital era is that it is transforming the current business world in a holistic and customer-driven manner by modifying operations, for example, by digitizing processes and generating e-services. This requires digital service capabilities that refer to "operations-based service proficiencies that are necessary for enhancing the value of digital service delivery" (Sore et al., 2017, p. 573). Thus, IT-producing firms' digital service capabilities refer to the proficiencies necessary to deliver digital services to IT-consuming firms. The capabilities are divided into capabilities related to product-service combination, the service delivery process, and the corresponding relationships. These capabilities are deployed by IT-producing firms throughout the service delivery process and are deeply integrated with IT-consuming firms' cooperative processes, thus advocating higher rates of collaboration (e.g., Chuang & Lin, 2015). Further, IT-producing firms using new information technology-based services have access to

more customer data through IT-consuming-firm–IT-producing-firm cooperation and interactive actions on the web (Chuang & Lin, 2015). Entry into and unification of this knowledge can increase the level to which employees assimilate information, organize with IT-consuming firms, and cooperate with them to develop the delivery of services and customize services to fill their needs (Chuang & Lin, 2015). Exploring the capabilities that may assist in enabling this process is a prerequisite for all businesses offering digital services, and thus, an engrossing and ongoing topic for practitioners and scholars. However, there is a lack of research on the relationship between IT-producing firms' digital service capabilities and the digital service performance of IT-consuming firms in the business-to-business (B2B) context. This is an important topic to study, as value creation in a B2B context differs from that in a business-to-consumer (B2C) context (Saunila et al., 2019; Sore et al., 2022).

This study addresses this research gap by examining IT-producing firms' digital service capabilities, which may determine the digital service performance of IT-consuming firms. The results are based on a survey conducted on online shop operators (i.e., IT-consuming firms) located in Finland. The initial sample was randomly selected from among these small firms, and 109 valid responses were received. The analyses showed that all three types of capabilities were somewhat interrelated with digital service performance. The size of the IT-consuming firm did not influence digital service performance. Our investigation of the capabilities necessary for digital service delivery from the perspective of the online store operator is novel. We contribute to service capability and IT consumption research by offering a viable model of various determinants of digital service performance.

The remainder of the article is structured as follows. The next section deals with the theoretical framework that considers digital service capabilities. The third section concentrates on the development of the hypotheses and the presentation of the research model. In the fourth section, the research methodology is discussed, followed by a description of the data analysis of the validity tests and hypotheses. In the fifth section, the research findings are discussed. Lastly, the theoretical implications, managerial implications, limitations, and further research directions are presented.

DIGITAL SERVICE CAPABILITIES

We build our study on the resource-based view (RBV), which suggests that firms possess unique resources that assist them in attaining a sustainable competitive advantage (Barney, 1991; Melville et al., 2004). However, the increase in external partnerships has drawn attention to the importance of inter-organizational resources (Mathews, 2003). Resources (IT-producing firm resources in this study) beyond organizational boundaries benefit focal firm performance. Relying on the classification of resources into assets and capabilities (Piccoli & Ives, 2005; Wade & Hulland, 2004), we define capabilities as proficiencies of actions deploying assets to reach desired outcomes (Amit & Schoemaker, 1993; Wade & Hulland, 2004). In the context of this study, IT-producing firm capabilities refer to capabilities related to products, services, and relationships. These three subcategories are based on the original work of Lapierre (2000) and have been used by several previous studies (e.g., Saunila et al., 2017). Table 1 shows the contents of the subcategories based on several studies on the quality of products, services, and relationships (Blut et al., 2015; Gao et al., 2021; Gotzamani & Tzavlopoulos, 2009; E. Y. Huang et al., 2015; Oliveira & Roth, 2012; Parasuraman et al., 2005; Tzavlopoulos et al., 2019; Wagner et al., 2020; Zeithaml et al., 2002; R. Zhang et al., 2021; Ziaie et al., 2021; Zou et al., 2021). This categorization is used as a framework for the study. These three capabilities are introduced next.

PRODUCT CAPABILITIES

Product capabilities can be defined as proficiencies in exploiting the features of a digital product to create value for users. In the previous literature, features defining the quality of a digital product have been categorized in several different ways and explored, for example, in the context of mobile commerce and e-commerce (e.g., DeLone & McLean, 2003; Gotzamani & Tzavlopoulos, 2009; E. Y. Huang et al., 2015; Mahmood et al., 2008; Oliveira & Roth, 2012; Omar et al., 2021; Parasuraman et

al., 2005; Rita et al., 2019; Tzavlopoulos et al., 2019; Wagner et al., 2020; Zeithaml et al., 2002; R. Zhang et al., 2021). Furthermore, the features have also been studied in a general context, such as using information technology for specific purposes, such as postal services and mobile banking, to create value for a firm or its current or potential customers (Benaroch & Appari, 2011; Chuang & Lin, 2015, 2017; Hinings et al., 2018; Ziaie et al., 2021). However, the distinct uses of the concept of product capabilities related to the features of a digital product are combined in this study into three categories: usability, availability, and adaptability. These categories are introduced next.

The first category, usability, is considered a fundamental feature of a digital product by DeLone and McLean (2003), who introduced e-commerce success metrics. Ease of use through the design of a digital product (McLean et al., 2018), efficiency (Parasuraman et al., 2005), attractiveness (R. Zhang et al., 2021), navigation patterns (Mahmood et al., 2008), esthetics (Rita et al., 2019), structure, and ancillary features (Gotzamani & Tzavlopoulos, 2009) have been discovered to be essential for the perceived value of a digital product.

The second category, availability, including features such as accessibility, response time, and error-freeness, has also been found to be a crucial feature of a successful digital product (DeLone & McLean, 2003; Gotzamani & Tzavlopoulos, 2009; Huang et al., 2015; Mahmood et al., 2008; Omar et al., 2021; Parasuraman et al., 2005). Gotzamani and Tzavlopoulos (2009) and Rita et al. (2019) also considered features connected to the use of a digital product crucial, such as security and privacy, along with payment and transaction functionalities. Parasuraman et al. (2005) and E. Y. Huang et al. (2015) further highlighted the importance of the privacy features of a digital product, whereas DeLone and McLean (2003) and Mahmood et al. (2008) emphasized security features. Privacy is considered to be the degree to which IT-consuming firms' information and behavior are protected, whereas security represents features that keep a digital product safe from attacks (Mahmood et al., 2008; Parasuraman et al., 2005; Rita et al., 2019; Zhu & Kraemer, 2002).

The third category, adaptability, is also considered an important feature of a digital product (DeLone & McLean, 2003). Zhu and Kraemer (2002) and Zhu (2004) emphasized the importance of integrating a digital front-end product with corporate back-end systems. Integrating and analyzing data from different sources provides relevant knowledge to firms to improve the quality of their e-service systems in many different ways, such as enhancing operational efficiency and effectively meeting customers' requirements (Benaroch & Appari, 2011; Chuang & Lin, 2017; Ulaga & Eggert, 2006).

SERVICE CAPABILITIES

This study follows Sousa and da Silva's (2017) definition of service capabilities as functions that support the delivery of relevant and interactive service processes for IT-consuming firms. Bundled together, service capabilities constitute a set of tightly connected inner activities that comprise the IT-producing firm's proficiencies related to service delivery. These proficiencies determine the IT-producing firm's capability to deliver value-added services to IT-consuming firms. Service capabilities are important when the production and consumption of a service are interrelated (X. Zhang & Chen, 2008). Thus, IT-producing firms need to resettle service-specific capabilities to provide product-service combinations. These investments include operational capabilities related to service delivery (Kastalli & Van Looy, 2013), which has been described as the means of "how" the service is provided to the consuming firms (Ponsignon et al., 2011). Thus, service capabilities comprise a set of functions that are united with the delivery of products and services (Setia et al., 2013). In this study, the capabilities related to service delivery were mapped into two categories: service ability and service comprehensiveness (cf. Roth & Menor, 2003; Setia et al., 2013; C. C. Yang et al., 2009). These two categories are introduced next.

The first category, service ability, represents the overall grade of the service within the service delivery process by considering the ability to monitor IT-consuming firm needs and to meet those needs effectively. For example, the role of the individuals conducting the service, as well as the role of

technology and equipment (Ponsignon et al., 2011), has been highlighted as crucial in-service delivery. C. C. Yang et al. (2009) studied service capability in logistics and concluded that the courtesy of sales representatives, as well as reliability and accuracy, are considered important attributes of logistics service capability. C. S. Yang (2016) considered that consuming firms value reliability, flexibility, and efficiency as the service capabilities of producing companies, and Gao et al. (2021) further emphasized overall service excellence.

The second category, service comprehensiveness, refers to meeting IT-consuming firms' direct and indirect affections and providing unique replies to IT-consuming firms' requisitions based on those affections (Oliveira & Roth, 2012). Following Roth and Menor (2003), we consider service comprehensiveness to include dimensions of the core and peripheral services. Capabilities linked to core services can be considered related to meeting the expressed needs of consuming firms, while peripheral services are complementary and include capabilities to provide customers with solutions to their latent and future needs, thus generating added value (Blocker et al., 2011; Möller, 2006; Roth & Menor, 2003). Regarding digital products, the focus is on customizing the core product; that is, modifying the digital product according to the customer's individual needs (Ziaie et al., 2021).

RELATIONSHIP CAPABILITIES

In this study, relationship capabilities are defined as a firm's capacity to change information beyond different forums and to compound information from different origins (Chuang & Lin, 2015). Participation in different relationship forums with different parties (Capaldo, 2007; Hertwig, 2012) highlights the significance of a firm's learning processes and experiences, through which it can obtain and generate knowledge on how to optimally control its relationships (Kale & Singh, 2007). This capability, thus, is closely connected to relationship learning, which is defined as a process for improving forthcoming manners in a connection or a shared, cooperative operation in which two firms strain to generate more value in conjunction than they would generate separately or with other parties. This construct is multidimensional, with multiple aspects, including information exchange and knowledge unification (Cheung et al., 2010; Selnes & Sallis, 2003), as well as trust and commitment (Gansser et al., 2021; Zou et al., 2021).

In this study, the participation capability related to the IT-consuming and IT-producing firm's relationship (i.e., relationship capability) was mapped into two categories: responsiveness to the IT producer, and IT producer credibility (c.f. Cheung et al., 2010; Gotzamani & Tzavlopoulos, 2009; E. Y. Huang et al., 2015; Parasuraman et al., 2005; Selnes & Sallis, 2003). Credibility relates to the IT-consuming firm's previous experiences with the IT-producing firm, the producer's reputation, and their willingness to conduct a long-term partnership. Willingness to develop trust has been presented as an essential element of relationship capability (Gansser et al., 2021; Poppo et al., 2008; Zou et al., 2021), referring to the reliance that the collaborator occupies on the integrity and complaisance of other collaborators (Kumar et al., 1995). The length of cooperation has been presented as a trust-enhancing factor (Poppo et al., 2008). The producer's corporate image and reputation are unified with the development of trust (Gotzamani & Tzavlopoulos, 2009; E. Y. Huang et al., 2015; Lapierre, 2000; Parasuraman et al., 2005). Moreover, it has been shown that when behavioral norms and trust are generated, collaborators are more efficient in enhancing information flow, communication, solidarity, and knowledge sharing (Hult et al., 2004; Leonardi & Treem, 2012). Responsiveness refers to an IT-consuming firm's willingness to participate in the service process, share information, and respond to producer requests. In the production of digital services, customer participation is of paramount importance for achieving the best results (Rahmati et al., 2021; J. Zhang & Zhu, 2019). Successful co-development requires close cooperation and input from both parties (Zou et al., 2021); thus, the customer must share firm-specific and tacit information with the IT-producing firm (Rahmati et al., 2021).

DIGITAL SERVICE PERFORMANCE

Performance is an umbrella term that encompasses all factors associated with the success of a company and its operations, thus covering both financial and operational aspects (Tangen, 2005). Performance, therefore, relates to an understanding of how an organization is able to conduct its operations such that it leads to success (Chatterjee et al., 2021; Mithas et al., 2011). It has long been accepted in the literature that digital services combined with other organizational resources have a positive impact on company performance (e.g., Bharadwaj, 2000; Chuang & Lin, 2015; Powell & Dent-Micallef, 1997; Seufert et al., 2021; Wade & Hulland, 2004), but there is no consensus as to which performance indicators best describe that performance (Gellweiler & Krishnamurthi, 2021). Although the focus of research has long been on financial performance (Gellweiler & Krishnamurthi, 2021; Kohli & Grover, 2008; Ong & Chen, 2014), it is generally accepted that the performance of digital services cannot be measured from financial perspectives alone (Priambodo et al., 2021). This is because the impacts of digital services have often been found to appear as determinants of financial performance (Ågerfalk et al., 2020), such as operational efficiency (e.g., Chatterjee et al., 2021). Thus, digital services have been found to have economic impacts on, for example, financial performance (e.g., Fernández-Portillo et al., 2022) and sales performance (e.g., Eller et al., 2020), as well as on a company's operational performance (e.g., Pathak et al., 2019). Given that the impact of digital services on performance is manifold, we define digital service performance as a multidimensional construct that encompasses financial, sales, and operations performance.

RESEARCH MODEL AND HYPOTHESES

PRODUCT CAPABILITIES AS ANTECEDENTS OF DIGITAL SERVICE PERFORMANCE

Product capabilities may be determined as the proficiencies for harnessing a digital product to create value for its users. For this purpose, a digital product should be of great quality; that is, contain all necessary features to make it possible to achieve set goals. Numerous studies have shown that excellent digital product quality leads to higher perceived value and satisfaction, and consequently results in higher organizational performance (DeLone & McLean, 2003; Mahmood et al., 2008; Wang, 2008; Zhu, 2004; Zhu & Kraemer, 2002). DeLone and McLean (2003) introduced a renewed D&M IS success model for assessing the prosperity of an e-commerce system, which was a slight modification of their original model (published in 1992) for measuring the success of information systems. They argued that system quality, referring to features of an e-commerce system (such as reliability, usability, response time, adaptability, and availability), plays a considerable role in making an e-commerce system successful (DeLone & McLean, 2003). Wang (2008) respecified the D&M success model based on the information systems success and marketing literature but stuck to the conclusion that e-commerce system quality, measured by user-friendliness and ease of use, has an implicit impact on benefit metrics (e.g., grown sales per customer, net profit, and market share). Mahmood et al. (2008) investigated e-commerce success drivers, and their results emphasized the importance of online system quality (e.g., visual attractiveness, availability, security, and access time) and effectiveness in achieving e-commerce business success. Zhu and Kraemer (2002) established a positive relationship between e-commerce capability and inventory turnover. The developed e-commerce capability measures are formed into four categories: information (e.g., search capability), transaction (e.g., security), customization (e.g., content personalization), and producer connection (e.g., integration to back-end IS; Zhu & Kraemer, 2002). Zhu (2004, p. 195) emphasized the importance of “the integration between front-end e-commerce capability and back-end IT infrastructure in order to reap the benefits of e-commerce investments.”

In summary, superior product capabilities are crucial in making digital products successful. This study proposes that firms are expected to gain higher digital service performance when the product is characterized by usability, availability, and adaptability. The producer, who pays attention to product

quality, puts emphasis on the firm's operations to manage customer needs. In this sense, we believe that product features reflect the demands of the customer and are thus considered the driver of digital service performance. Consequently, the theoretical discussion above led us to believe that product capabilities related to product features explain the various dimensions of digital service performance. Thus, we advance the following hypotheses:

H1: Product capabilities positively affect digital service performance.

H1a: Usability positively affects digital service performance.

H1b: Availability positively affects digital service performance.

H1c: Adaptability positively affects digital service performance.

SERVICE CAPABILITIES AS ANTECEDENTS OF DIGITAL SERVICE PERFORMANCE

Service capabilities can be viewed as capabilities that support the delivery of consuming firm-centered and interactive service processes. Service delivery is the practice through which an IT-producing firm customizes its products or services to better meet IT-consuming firms' needs. Thus, IT-producing firms' capability to manage service delivery based on the consuming firm's requirements is an essential delivery action (Ngo & O'Cass, 2013). As indicated previously, service capabilities are used to meet consuming firm needs by ensuring higher-quality products or services (Y. F. Yang, 2012). For example, customizing a B2B platform can significantly increase the consuming firms' experience and the efficacy of the trade (Oliveira & Roth, 2012). Oliveira and Roth (2012) highlighted customization as a producer behavior for tracking consuming firm preferences and providing customized responses to them. Silvestro and Silvestro (2003) found that it is important to have the service strategically aligned in terms of its delivery systems because it has critical effects on the IT-producing firm's capability to convey service promises and reach operations objectives.

In addition to the contribution of service capabilities to enhancing the quality of products or services, scholars have argued that service capabilities affect business performance (Lai, 2004; Sousa & da Silveira, 2017; C. C. Yang et al., 2009; C. S. Yang, 2016). Chen et al. (2009) used the term service delivery innovation to characterize the process of utilizing specialized expertise and knowledge to deliver services for the customer. They found that renewed service delivery results in enhanced non-financial and financial performance, where financial performance refers to a firm's use of assets to gain revenues, and non-financial performance is a measure of operational success reflecting, for example, increased customer loyalty and a firm's enhanced reputation and image. Service capabilities are also found to be crucial in developing and managing advanced services (Sousa & da Silveira, 2017). Firms' financial performance improves when they develop advanced services which, in turn, require adequate levels of service capabilities (Sousa & da Silveira, 2017). Kastalli and Van Looy (2013) found that viable growth seems useful only to the extent that investments in service capability are transformed into economies of scale. Service capabilities have also been examined in the context of logistics services. Lai (2004) used the term logistics service capability to capture the capacity to generate and deploy resources to satisfy consuming firms' logistics demands, concluding that service capability affects the level of service performance. C. C. Yang et al. (2009) studied container shipping services and found that service capabilities increase the likelihood of achieving superior performance. Sinkovics and Roath (2004) used the term customer orientation to describe a firm's focus on offering prime service quality to customers. The authors found that this orientation improved logistics performance, which reflected the firm's internal efficiency.

Based on the preceding findings, this study proposes that firms are expected to gain higher digital service performance when the producer possesses superior service ability and comprehensiveness. A producer who focuses on the service process emphasizes the firm's operations to manage customer needs. In this sense, we believe that the service process reflects the demands of the customer and is

thus considered the driver of digital service performance. Consequently, service capabilities enhance performance in terms of finances, operations, and sales. Digital service performance is thus enhanced by service capabilities, that is, capabilities related to service delivery. Based on the literature and arguments discussed above, we propose the following hypotheses:

H2: Service capabilities positively affect digital service performance.

H2a: Service ability positively affects digital service performance.

H2b: Service comprehensiveness positively affects digital service performance.

RELATIONSHIP CAPABILITIES AS ANTECEDENTS OF DIGITAL SERVICE PERFORMANCE

Relationship capabilities refer to the ability to build long-term relationships between the parties to provide the best possible value for them. To comprehend the changes in the development of value propositions, Cheung et al. (2010) pointed out recognizing the fact that it becomes simpler for customers to examine their supply chains to spot interchanges occurring several times away, thus offering supplementary lead time for strategic and operational planning and arrangements. This can also be considered handling the “producer as a customer” (Cheung et al., 2010). Producer credibility can be considered a relationship capability, in which the duration of collaboration is presented as a warrant for the closeness of social relationships between collaborators (Dyer & Chu, 2000; Li et al., 2010). Dyer and Chu (2000) suggested that prolonged interplay between parties would be useful for obtaining a profound comprehension of one another. Lengthy collaboration also permits parties to reduce information asymmetries, distribute private knowledge, and facilitate trust development (Poppo et al., 2008). Trust can be defined as one partner’s reliance that the other partner in the interchange collaboration will not abuse the first party’s vulnerabilities (e.g., Li et al., 2010). Trust can also be defined as the reliance that the collaboration partner holds on the integrity and complaisance of other collaborators (Kumar et al., 1995). Producers’ corporate images and reputations are also unified with trust development (E. Y. Huang et al., 2015; Parasuraman et al., 2005). When behavioral norms and trust are generated, parties are more efficient in developing information flow, communication, solidarity, and knowledge sharing (Hult et al., 2004; Leonardi & Treem, 2012). If the firm focuses on enhancing cooperative performance alone, inter-firm relational norms and trust become even more significant assets for this end (Liu et al., 2009).

Responsiveness to the producer can be considered a relationship capability in terms of the effectiveness with which problems are handled, the willingness to help the producer, and the speed with which a response to a problem or question is made (Gotzamani & Tzavlopoulos, 2009; E. Y. Huang et al., 2015; Parasuraman et al., 2005). Further, joint sense-making, information exchange, and knowledge unification have been shown to be important factors for the consuming firm—providing firm relationship, especially from a learning perspective (Cheung et al., 2010; Selnes & Sallis, 2003), and are connected to responsiveness to the producer.

Against this background, this study proposes that firms are expected to gain higher digital service performance when the relationship is characterized by producer credibility and the consuming firm’s responsiveness to the producer. The parties who nurture long-term relationships tend to build the best possible solution in line with customer needs. In this sense, we believe that the relationship’s goal is to serve the demands of the customer and is thus considered the driver of digital service performance. Consequently, these relationship capabilities can enhance performance in terms of finances, operations, and sales. Based on the literature and arguments aforesaid, we propose the following hypotheses:

H3: Relationship capabilities positively affect digital service performance.

H3a: Producer credibility positively affects digital service performance.

H3b: Responsiveness to the producer positively affects digital service performance.

RESEARCH MODEL

There are two important reasons why this study proposes that the relationships between digital service capabilities, in terms of product capabilities, service capabilities, relationship capabilities, and performance are important, and they were empirically examined in the context of digital B2B services. First, from a theoretical point of view, earlier research has suggested that capability has a direct impact on performance. However, the presumption is that small firms, in particular, should have different types of interrelated capabilities to increase different areas of performance. In this study, performance is further split into three components: financial performance, operational performance, and sales performance. As we consider online store-producing services conducted in a digital context, we use the term digital service performance, which refers to a service that only functions through the web. Second, from a practical perspective, trade is being digitalized, and a larger number of products and services are sold through digital channels. Further, B2B is different from business-to-consumer (B2C) when it comes to digital services, and this context requires a different approach. What works in the consumer world does not always translate into a B2B context. Thus, it is crucial to understand the types of capabilities needed to maintain high performance in a digitalized B2B environment. The research model is shown in Figure 1. In this study, an IT-producing firm refers to the firm that sold the digital service (i.e., an online shop) to an online shop operator (IT-consuming firm). The IT-consuming firm supplies an online shop and uses it to sell goods and/or services to customers. The customer can be either a consumer or a firm that buys goods and/or services online. This study focuses on the relationship between the IT-producing firm and the IT-consuming firm – the IT-producing firm's digital service capabilities and the digital service performance of the online shop operator (IT-consuming firm).

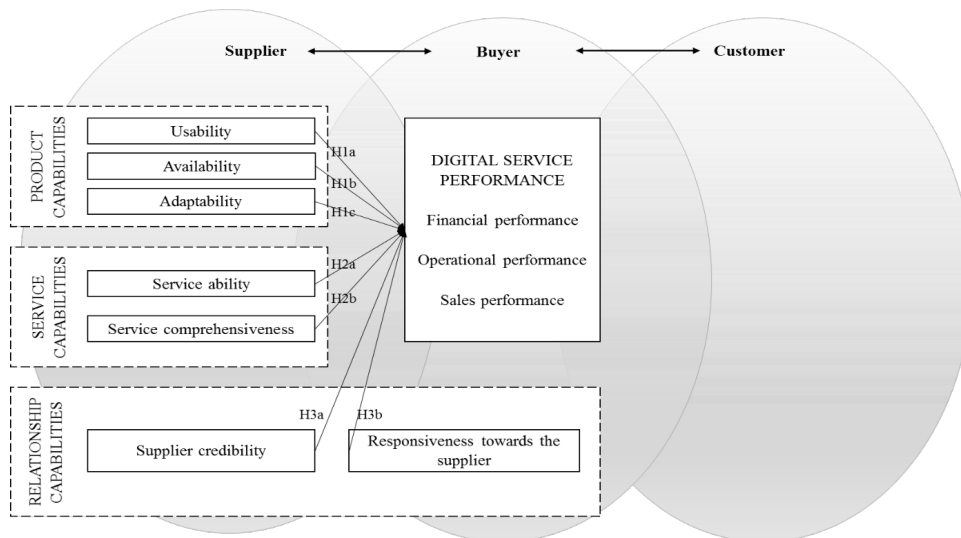


Figure 1. Research model and hypotheses

METHODOLOGY

SCALE DEVELOPMENT

A survey was utilized to gather data on managerial assessments of digital service capabilities (product, service, and relationship capabilities) and digital service performance (including financial, operational, and sales performance). The scales of the independent variables utilized were adopted from former research (see Table 1) and were shaped for this study via a pre-test in collaboration with experienced researchers. All items used were assessed on five-point Likert-type scales, ranging from strictly disagree (1) to strictly agree (5). The dependent variable was digital service performance (formed in the shape of financial, operational, and sales performance), which was assessed on a four-point scale, alternating from weak (1) to excellent (4). Thus, digital service performance was measured subjectively, as reliable objective performance data are rarely available and are often not directly comparable across different firms or industries. Scholars have also found that subjective measures correlate significantly with objective measures (e.g., Venkatraman & Ramanujan, 1987). Thus, IT-consuming firms were asked to evaluate the quality of their online stores, their experience with the service during the procurement process, their cooperation with the IT-producing firm, and their financial, operational, and sales performance. The aim was to gain an understanding of which factors related to digital services that IT-consuming firms perceived affected their performance, informing IT-producing firms of capabilities to invest in delivering the best value to their customers.

Two control variables were used in the study. One was firm size (surveyed by the number of employees in a firm that had supplied an online shop), as there is likely to be a favorable relationship between firm size and digital service performance. The second control variable was online shop age (surveyed by the number of years the shop had been in existence). A firm that is more experienced in e-commerce is also assumed to perform better in e-commerce.

Table 1. Variables used in the study

	Variables and items	References	Loadings	α
Product capabilities	Usability	Blut et al. (2015); DeLone and McLean (2003); Gotzamani and Tzavlopoulos (2009); E. Y. Huang et al. (2015); Mahmood et al. (2008); Oliveira and Roth (2012); Parasuraman et al. (2005); McLean et al. (2018); Rita et al., 2019; Tzavlopoulos et al. (2019); Wagner et al. (2020); Zeithaml et al. (2002); R. Zhang et al. (2021)	0.857–0.866	0.877
	Our online store is easy to learn and use. Our online store's features are easy to find.			
	Availability	Blut et al. (2015); DeLone and McLean (2003); Gansser et al. (2021); Gao et al. (2021); Gotzamani and Tzavlopoulos (2009); E. Y. Huang et al. (2015); Mahmood et al. (2008); Oliveira and Roth (2012); Omar et al. (2021);	0.436–0.777	0.810
	Our online store protects customers' e-commerce behaviors. Our online store has taken care of the protection of payment transactions. Our online store is running constantly.			

	Variables and items	References	Loadings	α
	Our online store operates without delay. Our customers can handle the entire purchase process on a mobile device. Our online store always works correctly. Effortless payment procedures are connected to our online store.	Parasuraman et al. (2005); Rita et al., 2019; Tzavlopoulos et al. (2019); Wagner et al. (2020); Zeithaml et al. (2002); Zhu (2004); Zhu and Kraemer (2002); Ziaie et al. (2021)		
	Adaptability With our online store, you can complete tasks quickly. Our online store has good marketing functions. It is possible to include useful analytics in our online store. We can connect other tools we need to our online store. In our online store, it is possible to personalize content on a customer-specific basis. Our online store is integrated with our other information systems.	Blut et al. (2015); DeLone and McLean (2003); Gotzamani and Tzavlopoulos (2009); Mahmood et al. (2008); Oliveira and Roth (2012); Tzavlopoulos et al. (2019); Wagner et al. (2020); Zeithaml et al. (2002); Zhu (2004); Zhu and Kraemer (2002)	0.763– 0.539	0.769
Service capabilities	Service ability We were adequately informed by the online store producer during our online store acquisition and deployment process. The online store producer solved the problems related to our online store efficiently and quickly. The online store producer actively solicits customer feedback. You can get high-quality customer service from the online store producer. You can reach the customer service representative of the online store producer whenever necessary. The online store producer delivered the online store within the promised timeframe. The online store producer's offer was truthful.	Blut et al. (2015); Gansser et al. (2021); Gao et al. (2021); P. L. Huang et al. (2019); Oliveira and Roth (2012); Parasuraman et al. (2005); Ponsignon et al. (2011); Tzavlopoulos et al. (2019); Zou et al. (2021)	0.480– 0.855	0.915

	Variables and items	References	Loadings	α
	The price of the online store was reasonable. We used our input reasonably in the online store procurement process.			
	Service comprehensiveness Relevant information about the online store was available from the online store producer to support our purchasing decisions. All the information systems we needed were connected to the online store. We were able to add the functionalities we wanted to the online store.	Blut et al. (2015); P. L. Huang et al. (2019); Oliveira and Roth (2012); Ponsignon et al. (2011); Roth and Menor (2003); Ziaie et al. (2021); Zou et al. (2021)	0.568–0.907	0.782
Relation-ship capabilities	Producer credibility The online store producer actively seeks to build a long-term partnership with us. Our previous experience working with an online store producer was good. The online store producer has a good reputation in the market.	Felipe et al. (2020); Gansser et al. (2021); Gao et al. (2021); Gotzamani and Tzavlopoulos (2009); Oliveira and Roth (2012); Parasuraman et al. (2005); Poppo et al. (2008); Suoniemi et al. (2021); Yu et al. (2021); J. Zhang and Zhu (2019); Zou et al. (2021)	0.832–0.869	.837
	Responsiveness to the producer We actively participate in the production of services provided by online store producers. We share all requested/required information with the online store producer. We have taken the actions requested by the online store producer that relate to the online store.	Cheung et al. (2010); E. Y. Huang et al. (2015); P. L. Huang et al. (2019); Selnes and Sallis (2003); Rahmati et al. (2021); Yu et al. (2021); J. Zhang and Zhu (2019); Zou et al. (2021)	0.731–0.850	0.753

SAMPLE AND DATA COLLECTION

The study followed a deductive approach; thus, data were gathered using a survey. Random sampling was used to select the respondents, and the relevant respondents were acquired from a database of company information service providers. The target population of this study was Finnish firms that had an online shop in use (referred to as IT-consuming firms in this paper). The directive number of such firms was 7,500, from which 2,541 firms were selected as the initial sample. The survey reached 2,312 respondents, as 229 addresses were invalid (either because the e-mail address was wrong, or the

person no longer worked in the company). From 107 firms, 109 valid responses (two of the companies each had two respondents) were received, which equals a response rate of about 4.7%. This was considered sufficient with respect to the response rate (Saunders et al., 2007) and sample size (Krejcie & Morgan, 1970) in a study such as this. The response rate does not account for the effect of sampling and coverage bias and thus is not the best way to estimate the accuracy of the results. Further, in the case of this study, the accuracy of the survey results should be assessed by the representativeness of the respondents. As the initial sample contained about 30% of the target population, the sample was representative of a large number of the entire target population. In addition, a non-response test performed among early and late respondents (Armstrong & Overton, 1977) exposed no specific bias. The questionnaire was sent to individuals in managerial positions who were responsible for digital business and customer service tasks. Thus, the respondents had the appropriate background and expertise to respond to a survey that investigated firms' digital businesses. Thus, it is likely that the responses represent the target population well.

Using a single respondent from one organization (Ketokivi, 2019) can cause problems in terms of common method variance (Podsakoff et al., 2003). However, if the studied organizations are small and the level of analysis is a single function within a firm (a digital business, in this study), a single-respondent design is applicable (Flynn et al., 2018). Despite this, we used several remedies to avoid common method variance. In terms of procedural remedies, we separated the measures of independent and dependent variables because it was not possible to gather responses from distinct sources. The confidentiality and anonymity of the survey responses were ensured, and the questionnaire was designed in such a way that the respondents could not establish cause-effect links between the dependent and independent variables. In addition, different response formats were used to avoid common method bias. We also introduced a delay between measuring the independent and dependent variables. In the cover letter, we made the respondents aware that their survey answers would remain anonymous to reduce the possibility of garnering only socially desirable responses. Statistically, the possibility of common method bias was examined via Harman's single-factor test. In the unrotated factor solution on items connected to the dependent and independent variables, more than one factor emerged, and the highest portion of variance explained by one factor was 34.57%. Thus, common method variance did not cause problems.

The demographics of the respondents are as follows. Roughly 73% of the respondents represented micro-firms employing fewer than 10 persons, while about 9% represented small firms. About 17% did not answer the question. About 48% of the sample represented firms that had had an online shop for less than 5 years, while about 50% of the sample represented firms that had had an online shop for more than 5 years. Two percent of the respondents did not answer.

RESULTS

RELIABILITY AND VALIDITY TESTING

The calculated correlations between the variables are shown in Table 2. Digital service performance (in the shape of operational, financial, and sales performance) had statistically significant and positive correlations with product, service, and relationship capabilities. The data were also used to estimate reliability and validity. This evaluation was executed by assessing single-factor item loadings and scale reliabilities (Table 1). Convergent validity was satisfied, as every item loaded greatly on its indicated variables. Discriminant validity was also apparent, as the cross-loading between the items and the variables was small. The reliability of the scales was tested utilizing Cronbach's α . All values were higher than 0.7 (see Table 1), suggesting that all measures had adequate rates of reliability (Hair et al., 1998).

Table 2. Correlation analyses

	1	2	3	4	5	6	7	8	9
Product capabilities									
1 Usability	1.000								
2 Availability	0.276**	1.000							
3 Adaptability	0.312***	0.440***	1.000						
Service capabilities									
4 Service ability	0.274**	0.420***	0.360***	1.000					
5 Service compr.	0.280**	0.382***	0.572***	0.582***	1.000				
Relationship capabilities									
6 Producer credib.	0.207*	0.422***	0.352***	0.730***	0.590***	1.000			
7 Responsiveness	0.054	0.406***	0.341***	0.351***	0.436***	0.454***	1.000		
Digital service performance									
8 Financial	0.276**	0.433***	0.410***	0.347***	0.233*	0.342***	0.287**	1.000	
9 Operational	0.331***	0.528***	0.544***	0.411***	0.522***	0.416***	0.314***	0.546***	1.000
10 Sales	0.225*	0.366***	0.356***	0.291**	0.207*	0.306**	0.316***	0.829***	0.504***

*** $p \leq 0.001$, ** $0.001 < p \leq 0.01$, * $0.01 < p \leq 0.05$, + $0.05 < p \leq 0.1$

TESTING THE EFFECTS

Hypotheses H1–H3 were tested using linear regression analyses. Linear regression is a way to study the relationship between dependent and independent variables with practical applications (Yan & Su, 2009). Table 3 presents the results of the regression analyses for the hypothesized links between digital service capabilities and digital service performance. Regarding H1 (H1a, H1b, and H1c), which hypothesized a connection between product capabilities (usability, availability, and adaptability) and digital service performance, H1b was partially supported, and H1c was supported. Hypothesis H1a was not supported. Regarding H1b, availability was found to influence operational performance ($\beta = 0.293$, $p \leq 0.05$). H1c was also supported: adaptability was found to affect financial performance ($\beta = 0.470$, $p \leq 0.05$), operational performance ($\beta = 0.345$, $p \leq 0.05$), and sales performance ($\beta = 0.320$, $p \leq 0.1$).

Regarding H2 (H2a and H2b), which hypothesized a connection between service capabilities (service ability and service comprehensiveness) and digital service performance, H2a was not supported, and H2b was partially supported. Regarding H2b, service comprehensiveness was found to influence financial performance ($\beta = -0.243$, $p \leq 0.1$) and operational performance ($\beta = 0.186$, $p \leq 0.1$) but not sales performance ($\beta = -0.165$, $p > 0.1$).

Regarding H3 (H3a and H3b), which hypothesized a connection between relationship capabilities (producer credibility and responsiveness to the producer) and digital service performance, neither H3a nor H3b was supported. The control variable number of employees did not have a statistically significant influence on digital service performance in the models. However, online shop age had a statistically significant influence on the model of sales performance. We interpret these observations to mean that the influence of digital service capabilities on digital service performance is not influenced by firm size. However, the online shop age may help the firm translate digital service capabilities into sales performance. The hypothesis testing results are summarized in Table 4.

Table 3. Regression analyses results

Dependent variables	Digital service performance					
	Financial		Operational		Sales	
	β	Std. error	β	Std. error	β	Std. error
Controls						
No. of employees	-9.039E-5	0.000	0.000	0.000	-4.414E-5	0.000
Online shop age	0.192	0.164	0.171	0.130	0.279 ⁺	0.167
Main effects						
Usability	0.014	0.115	0.140	0.091	0.059	0.116
Availability	0.224	0.156	0.293 [*]	0.124	0.206	0.158
Adaptability	0.470 [*]	0.183	0.345 [*]	0.145	0.320 ⁺	0.185
Service ability	0.071	0.164	-0.039	0.130	0.006	0.165
Service compr.	-0.243 ⁺	0.134	0.186 ⁺	0.106	-0.165	0.135
Producer credibility	0.181	0.159	0.026	0.126	0.119	0.161
Responsiveness	0.075	0.124	-0.089	0.098	0.207	0.125
Model summary						
F	4.449 ^{***}		8.559 ^{***}		3.808 ^{***}	
R ²	0.351		0.510		0.320	
Adjusted R ²	0.272		0.450		0.236	

*** $p \leq 0.001$, ** $0.001 < p \leq 0.01$, * $0.01 < p \leq 0.05$, + $0.05 < p \leq 0.1$

Table 4. Summary of hypothesis test results

Hypotheses	Hypothesis support	Interpretation
H1: Product capabilities positively affect digital service performance		
H1a: Usability positively affects digital service performance	Not supported	Usability does not affect financial, operational, sales performance.
H1b: Availability positively affects digital service performance	Partially supported	Availability affects operational performance but not financial or sales performance.
H1c: Adaptability positively affects digital service performance	Supported	Adaptability affects financial, operational, and sales performance.
H2: Service capabilities positively affect digital service performance		
H2a: Service ability positively affects digital service performance	Not supported	Service ability does not affect financial, operational, or sales performance.
H2b: Service comprehensiveness positively affects digital service performance	Partially supported	Service comprehensiveness negatively affects financial performance but positively influences operational performance. Service comprehensiveness does not affect sales performance.

Hypotheses	Hypothesis support	Interpretation
H3: Relationship capabilities positively affect digital service performance		
H3a: Producer credibility positively affects digital service performance	Not supported	Producer credibility does not affect financial, operational, or sales performance.
H3b: Responsiveness to the producer positively affects digital service performance	Not supported	Responsiveness to the producer does not affect financial, operational, or sales performance.

DISCUSSION

THEORETICAL IMPLICATIONS

By building on the RBV, this study contributes to the research on which IT-producing firms' digital service capabilities determine the digital service performance of IT-consuming firms. This study provides novel insights into the increasing research on utilizing capabilities outside organizational boundaries (Parida et al., 2015; Sjödin et al., 2020; Sore et al., 2022). Additionally, this study opens up a new perspective by focusing on the connections between online store producers and small operators. The main contributions are discussed below.

First, the study reveals some effects of IT-producing firms' product capabilities on IT-consuming firms' digital service performance. However, the results show that there are noteworthy differences in the influence of different categories of capability. Adaptability (H1c), determined by capabilities related to utilizing information gained via the integration of the digital product into other digital tools (e.g., marketing, personalization, and analytics), statistically significantly affects all three aspects of IT-consuming firms' digital service performance (financial, operational, and sales). This result (H1c) highlights the importance of integrating a digital front-end product with a back-end IT infrastructure (Zhu, 2004; Zhu & Kraemer, 2002), as well as integrating and analyzing data from different sources (Blut et al., 2015; Tzavlopoulos et al., 2019), which enables, for example, customer-specific personalization (Wagner et al., 2020) and ultimately leads to higher digital service performance. Another product capability, availability (H1b), for example, of security, different aspects of functioning, and mobile adaptation, has an effect on one aspect of digital performance, namely operational. Given that availability mainly refers to the functionality of e-commerce investments (Gansser et al., 2021; Gao et al., 2021; Rita et al., 2019; Wagner et al., 2020) and the understanding of how an organization is able to better conduct its operations (Chatterjee et al., 2021; Mithas et al., 2011), it is reasonable that availability directly affects only operational performance. In this case, the impact on financial and sales performance may arise indirectly and later through operational performance. The findings above are in line with previous research indicating that adaptability and availability capabilities are crucial features of a successful digital product (DeLone & McLean, 2003; Gansser et al., 2021; Gotzamani & Tzavlopoulos, 2009; E. Y. Huang et al., 2015; Mahmood et al., 2008; Omar et al., 2021; Parasuraman et al., 2005; Rita et al., 2019; Tzavlopoulos et al., 2019; Wagner et al., 2020; Ziaie et al., 2021). Contrary to previous studies that highlighted usability (H1a) as essential for the perceived value of a digital product (Gotzamani & Tzavlopoulos, 2009; Mahmood et al., 2008; Parasuraman et al., 2005), this study reveals that usability does not influence any aspects of the IT-consuming firm's performance. Thus, the results highlight the new situation of digital B2B services: usability is now taken for granted, and value is created through harnessing information from different sources to create superior service delivery (cf. Blut et al., 2015; Tzavlopoulos et al., 2019; Wagner et al., 2020).

Second, the results also suggest that the role of service process-related capabilities in determining service comprehensiveness (H2b) significantly influences two aspects of IT-consuming firms' digital service performance, namely financial (negative effect) and operational (positive effect). Since service comprehensiveness has been perceived as affecting performance, firms must invest in it. This, in turn, causes costs that may be the source of the negative influence on perceived financial performance. The positive effect of service comprehensiveness on operational performance may indicate that IT-consuming firms have been able to add all the functionalities they want to the online store (P. L. Huang et al., 2019; Ziaie et al., 2021; Zou et al., 2021), and the impact on sales performance may arise indirectly and later through operational performance. We also interpreted the outcome to indicate that finding a balance in service comprehensiveness is considered a highly significant determinant of digital service performance creation. Further, service ability (H2a) was not considered equally remarkable, which challenges the results of previous studies (cf. Blut et al., 2015; Gao et al., 2021; P. L. Huang et al., 2019; Roth & Menor, 2003; Setia et al., 2013; Sousa & da Silveira, 2017; C. C. Yang et al., 2009; Zou et al., 2021). The service abilities focus on how the service is produced rather than what is produced, and therefore can be considered necessary to the online shop production process; thus, they did not appear to have a particular impact on digital service performance.

Third, referring to H3a and H3b, the results show that the capabilities associated with the relationship between the producing firm and the consuming firm do not affect IT-consuming firms' performance to the same extent. These results contribute to the capabilities literature by showing that the shift in focus from technical product-related capabilities to relationship-related capabilities is not yet evident among small online store operators.

Furthermore, this study revealed that the size of an IT-consuming firm, in terms of the number of employees, does not have an effect on any of the aspects of the IT-consuming firm's digital service performance. However, online shop age had a statistically significant influence on sales performance, indicating that age may help firms process all digital service capabilities to sales performance. We interpreted the result as the longer an online shop has existed, the more the operators are able to use the different features of the digital product in terms of sales performance.

MANAGERIAL IMPLICATIONS

The findings of this article have significant implications for IT-producing firms. Most notably, the study offers empirical evidence of the capabilities valued by IT-consuming firms, providing a model for IT-producing firms to use when deciding on a future focus. The study results suggest that IT-producing firms should concentrate on leveraging service comprehensiveness, as there has been a shift in the B2B context from merely selling a digital product and the services related to it.

Another interesting issue revealed by the study is the shift in the weighting of digital product features. It seems that usability-related issues are now taken for granted, and the emphasis is on features that support the use of information to create value. These features include possibilities of integrating the digital product into other digital tools, combining data from different sources, and enabling the analysis of data for marketing purposes, for example. In addition to offering tools with different integration possibilities, supporting IT-consuming firms in making the most of the possibilities would be very helpful.

LIMITATIONS AND FURTHER RESEARCH

This study has various limitations that can be addressed in future studies. First, the sampling may restrict the generalization of the implications, as the data were collected from online shop operators from a single country. Prudence should be practiced when applying the results to other cultural environments. Second, the control variables were limited to two: the size of the IT-consuming firm and the online shop age. The comprehension of the relationship between digital service capabilities and digital service performances would benefit from future research that takes into account additional

control variables. Third, the dependent variables included only financial, operational, and sales performance. Thus, the theoretical model of this study can be further studied by using other performance measures, such as market performance, as dependent variables. Finally, the data were collected from one country, Finland, which may limit the generalizability of the results. However, we believe that the results are applicable to the online store context in other similar countries as well – at least, in developed countries. Further research could address these limitations and build on the findings of this study.

CONCLUSIONS

This study focused on the connection between an IT-producing firm's digital service capabilities and the digital service performance of an IT-consuming firm, an online shop operator. Numerous studies in the literature, particularly in the areas of marketing and information systems, have explored the success factors of digitally offered services. This article contributes to current studies in two main areas. First, this study offers a model that determines the digital service capabilities (i.e., product, service, and relationship capabilities) that have an impact on IT-consuming firms' digital service performance. The study was executed in a B2B setting from the viewpoint of IT-consuming firms, presenting a novel understanding of influential digital service capabilities. Second, the examination of digital service capabilities was extended to cover the long-term relationship between IT-producing firms and IT-consuming firms, instead of holding back and examining the relationship that lasts only the length of the procurement period of a digital product. This focus revealed new insights into the digital service capabilities that affect IT-consuming firms' digital service performances, as discussed below.

A digital product's adaptability significantly affects all three aspects of an IT-consuming firm's digital service performance (financial, operational, and sales). Another product capability – availability – has an effect on one aspect of digital performance, namely operational. The results also suggest that the role of service process-related capabilities in determining service comprehensiveness significantly influences two aspects of IT-consuming firms' digital service performance, namely financial (negative effect) and operational (positive effect). The results show that the capabilities associated with the relationship between the producing firm and the consuming firm do not affect IT-consuming firms' performance to the same extent.

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Publication IV

Ukko, J., Saunila, M., Sore, S., Rantala, T., and Nasiri, M.

Turning e-business operations for business value

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Turning e-Business Operations for Business Value

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Abstract

This paper examines the links between e-business operations, responsiveness to the supplier, and e-business performance. Specifically, the paper investigates which e-business operations contribute to e-business performance and whether such contributions are moderated by the e-retailer's responsiveness to the supplier. The results are based on a survey of 109 respondents, gathered from Finnish e-retailers. Building on a conceptualization of e-business operations that consists of service maintenance, customer orientation, and customization, the results show that customer orientation significantly affects e-retailers' financial and operational performance. Further, a statistically significant positive moderating effect of responsiveness to the supplier was found between the e-retailer's customer orientation and financial performance.

Keywords: E-business, Operations, Performance, Business value

1. Introduction

Continuous changes in technology and globalization of products and services have resulted in more dynamic markets and greater uncertainty in customer demand (Cheung et al., 2010). Cheung et al. (2010) further argued that because of the rapid development of technologies and digital services and solutions, customers today are better informed, have greater access to a wider choice of goods and services, and have access to new products that are emerging at a faster pace. That is why the effectiveness of different information technologies (ITs) and digital solutions for customer service and value creation are receiving increasing interest from practitioners and academic research (Setia et al., 2013; Xue et al., 2013). According to Xue et al. (2013), companies operating in different industries are investing in IT solutions and tools, such as for improving their performance in cross-selling, customizing products and services, and reducing customer service costs. Rao et al. (2011) and Griffis et al. (2012) showed that as the use of the Internet as a channel for distributing and selling solutions and goods from businesses to consumers (as well as businesses to businesses) has expanded, so has interest among different scholars, such as those in supply chain management, logistics, and operations. Rao et al. (2011) and Tsai et al. (2013) further argued that the e-retail industry has grown rapidly during the last five years and the growth trend would continue in the future. Griffis et al. (2012) stated two reasons for the rapid growth: People's access to the Internet has increased substantially during the last decade, and the percent of Internet users who make purchases online has grown considerably.

From the business point of view, Tsai et al. (2013) presented in a study of e-retailers' technology sourcing strategies that a well-designed IT infrastructure is an essential part of generating a tightly integrated value chain and delivering high-quality service. Thus, it can be argued that digital services have become increasingly important for companies in their drive to meet their business goals. This is due to the rapid developments in technologies and customer demands, which have brought substantial changes in the manner in which value is created through the delivery of goods and services. Because of the intangible nature of digital services, value creation differs from traditional goods and services offerings. Regarding value creation in digital services, McCormick (2013) noted that the role of digital services has

become critical in how companies position their value proposition. In this sense, new digital services can deliver embedded value to the whole supply chain, with e-retailers that own e-business operations representing a key value component. Building on previous research, the e-business operations investigated in this study are divided into three categories: service maintenance, customer orientation, and customization.

Although the amount of research regarding companies' e-business operations and their effects has increased, empirically tested conceptualizations of e-business operations and its effects on e-business performance are lacking. Current research also demonstrates the importance of cooperation throughout the supply chain. For example, sharing information can promote integration with suppliers (So and Sun, 2010). However, although better management of supplier relationships improves company performance (Lambert and Schwieterman, 2012), few studies have aimed to understand the role of supply chain cooperation in the e-retail setting. Thus, the moderating influence of e-retailers' responsiveness to their suppliers requires further investigation. In this study, supplier refers to the company that has supplied the web shop to the e-retailer.

This study contributes to this research gap by investigating the links between e-retailers' e-business operations, responsiveness to the supplier, and e-business performance. The empirical results are based on a survey conducted among e-retailer companies located in Finland. The initial sample was 109 Finnish e-retailer companies. The study contributes to the current literature by presenting e-retailer companies' operations related to service maintenance, customer orientation, and customization that explain e-business performance. Further, the role of responsiveness to the supplier in the connection between e-business operations and e-business performance is presented.

2. Hypothesis development

2.1. E-business operations as an antecedent of e-business performance. Successful e-business requires maintenance of the e-service in use. For example, suppliers' infrastructures (technologies and knowledge) have a positive influence on flexibility, which, in turn, has a positive impact on customer satisfaction (Jie et al., 2015). Providing accurate and timely information is also crucial in successful e-business. Oliveira and Roth (2012) identified attributes that make a company successful in e-business. One attribute is information richness which refers to the quality of information provided on the Internet portal, including the completeness, currency, interactivity, scope, and relevance (Oliveira and Roth, 2012). Xu et al. (2017b) found that posting product condition information and e-retailer information influences customers' willingness to pay. Subramanian et al. (2014) found similar results in a study of Chinese e-retailers. The authors confirmed that reliability (e.g., in records accuracy and goods provided) is important and increases the e-retailer's competitiveness. They also found that the e-retailer's responsiveness, meaning satisfying customer requirements and solving errors that occur, considerably influences customer satisfaction (Subramanian et al., 2014).

Rao et al. (2014) studied the effects of delivery reliability in e-retail. They found that the more consistency between the promises regarding the delivery of orders and the actual delivery performance of the orders the less likely the orders are returned (Rao et al., 2014). Thus, the likelihood of returns (as a sign of customer dissatisfaction) is dependent on the accuracy of the information provided. For complaint handling, Xu et al. (2017a) found that customer support increases a seller's customer cumulative ratings. Customer support refers to the customer's right to receive support in the case of a faulty transaction or a failed delivery

promise. Further, customer cumulative ratings were found to have a considerable influence on demand (Xu et al., 2017a).

Various factors related to service maintenance in the e-business context have been found to affect different areas of business success. Therefore, we hypothesized that service maintenance has a direct and positive impact on e-business performance. Consequently, we developed the following hypothesis:

H1: Service maintenance positively influences e-business performance.

According to Oliveira and Roth (2012), companies that are more customer-oriented are more successful in e-business. For example, Zhang (2010) found that providing the best customer service possible and putting the customers' interest first are positively associated with financial performance in terms of sales growth, market share, and profitability. Yee et al. (2010) used five dimensions of perceived service quality (tangibles, reliability, responsiveness, assurance, and empathy) and found that they impact customer satisfaction and customer loyalty, ultimately leading to company profitability in high-contact service industries.

One perspective for studying customer orientation is the notion of service quality capabilities (Cruz-Ros and Gonzalez-Cruz, 2015) which relate to the set of processes that enable rapid, reliable, secure service provision (Ponsignon et al., 2011). Cruz-Ros and Gonzalez-Cruz (2015) found that these service quality capabilities affect company performance, where performance includes financial performance, as well as other aspects (such as sales, wealth creation, and competitive positioning). In addition, the effect of service quality capabilities on performance is stronger in low-customer-contact services than in high-customer-contact services. This could be because service specifications are often established before customer contact, and customers build expectations that act as a reference for evaluating service quality. In these cases, process reliability and responsiveness are the most important (Cruz-Ros and Gonzalez-Cruz, 2015).

Xu et al. (2017a) used the term purchase security to describe the truthfulness of seller communication. They found that purchase security enhances e-retailers' customer cumulative ratings. The authors also found that fast shipping enhances e-retailers' customer cumulative ratings by decreasing the ordering lead time and by making online shopping more attractive. Customer cumulative ratings also have a considerable influence on demand (Xu et al., 2017a). Similarly, Subramanian et al. (2014) found that logistics selection (e.g., pre-sale and after-sale service, as well as the delivery process) influences an e-retailer's competitiveness. The returns management process is also important in e-business (Griffis et al., 2012; Ramanathan et al., 2017). Faster returns processing is connected to customer retention, increased purchase frequency, and purchase amount (Griffis et al., 2012). Similarly, Ramanathan et al. (2017) found a relationship between customer service (in terms of ease of returns and customer support) and customer behavior of visiting again and recommending a retail shop. They also observed that customer behavior influenced retail sales.

In sum, authors have found that customer orientation enhances different areas of e-business. Thus, customer orientation is likely to have a direct and positive impact on e-business performance. Therefore, we hypothesized the following:

H2: Customer orientation positively influences e-business performance.

Oliveira and Roth (2012) stated that the level of customization increases customers' online experience and the efficiency of the transaction. Further, they observed customization was one of the e-service capabilities that enhance customer impact in terms of customer satisfaction, sales, and new customer acquisition (Oliveira and Roth, 2012). Froehle and Roth (2004) stated that personalization increases the odds of customers returning to a website. In addition, Xu et al. (2017a) found that customized website design increases customer cumulative ratings for e-retailers which, in turn, influences demand. This is based on the perception that customization can ease the navigation and make the website more clear and easier for communication (Xu et al., 2017a). In addition, Thirumalai and Sinha (2011) revealed that transaction customization is connected to customer satisfaction with e-retailers' online purchase process. Customization assists in decreasing customer inconvenience by making the transaction process personal, convenient, and interactive (Thirumalai and Sinha, 2011). Finally, Skaggs and Youndt (2004) stated that the combination of high levels of customization and human capital (i.e., employees' skills, knowledge, and expertise) are related to increased performance. Performance measures included return on equity and return on investment (Skaggs and Youndt, 2004).

Customization in the e-business context affects different areas of business success. Customization is likely to enhance business success by having a direct and positive impact on e-business performance. Based on previous research, we formed the following hypothesis:

H3: Customization positively influences e-business performance.

2.2. *The moderating effect of responsiveness to the supplier.* As discussed in section 2.2, an e-retailer's responsiveness to the supplier means considering the supplier as a customer in terms of willingness to support the supplier with problem solving, information needs, knowledge integration, joint sense making, etc. (Gotzamani and Tzavlopoulos, 2009; Huang et al., 2015; Parasuraman et al., 2005; Selnes and Sallis, 2003). Additionally, previous research in operations and supply chain management presented various factors for supplier cooperation, whose existence can be associated with relationship performance (Carr and Pearson, 1999; Cheung et al., 2010; Claycomb and Frankwich, 2004; Cousins and Menguc, 2006; Li et al., 2010; Liu et al., 2009; Prahinski and Benton, 2004). Co-creation between e-retailers and suppliers represents a critical component of service delivery processes through which e-retailers have direct input in the development of e-services (Ngo & O'Cass, 2009). However, Gummesson (2007) indicated that a retailer has a value proposition, but value actualization takes place during the customer's usage and consumption process. It is presented that e-business requires various maintenance operations to be successful. Maintenance attributes include real-time and rich information about the products, the service offerings, and the e-retailer (Oliveira and Roth, 2012; Prahalad and Ramaswamy, 2004). In addition, delivery reliability in e-retail combined with e-service recovery are service maintenance attributes that affect e-business performance (Oliveira and Ruth, 2012; Subramanian et al., 2014; Xu et al., 2017a). Based on the current understanding, we believe that an e-retailer's responsiveness to a supplier enhances the connection between service maintenance and e-business performance. In line with this, we developed the following hypothesis:

H4: The higher the responsiveness to the supplier, the higher the influence of service maintenance on the e-business performance.

Regarding customer orientation, customer preferences for time, the correctness and quality of the order, and the delivery method (Setia et al., 2013) together with the level of convenience and user friendliness of the ease and flexibility of payment methods, returns processing, and

customer support have been documented to lead to higher perceived value for customers in e-business (Boyer et al., 2002; Ramanathan et al., 2017). Further, real-time access to all necessary information and online customer service are important attributes of customer orientation (Klein, 2007). According to Chuang and Lin (2015), companies that use information technology-based services have more access to customer information owing to the customer–retailer collaboration and interaction via the Internet. Access to and integration of this information allows companies and their employees to better absorb information, coordinate with customers, and collaborate with them to improve service delivery and tailor services to demands (Chuang and Lin, 2015). Thus, customer orientation is understanding and awareness of customer needs by continually monitoring customers’ needs. However, customer needs related to these dynamic issues change rapidly, and a more sophisticated analysis of customer information is needed (Setia et al., 2013). In this case, responsiveness to the supplier, considering willingness to cooperate with the supplier in a more sophisticated analysis of customer information (Huang et al., 2015; Gotzamani and Tzavlopoulos, 2009), and learning from this relationship in terms of the exchange of information, joint sense making, and knowledge integration, may have a crucial impact on performance (Cheung et al., 2010; Selnes and Sallis, 2003). Based on the current understanding, we believe that an e-retailer’s responsiveness to a supplier enhances the connection between customer orientation and e-business performance. In line with this notion, we developed the following hypothesis:

H5: The higher the responsiveness to the supplier, the higher the influence of customer orientation on e-business performance.

Through providing satisfactory service delivery and service customization, companies can charge premium prices to generate higher profits (Chen and Tsou, 2012). The customization approach means, for example, to enable changing a website based on customer preferences (Ansari and Mela, 2003), ease of navigation, and making the website more clear and easier for communication (Xu et al., 2017a). The level of customization increases customers’ online experience, the efficiency of the transaction (Oliveira and Roth, 2012), and the odds of customers returning to a website (Froehle and Roth, 2004). Customization also enables retailers to collect customers’ information and desires, which, in turn, aid in matching products and services with customers’ preferences (Thirumalai and Sinha, 2011). For employing these operations, customized tools and assets that meet customers’ requests are needed (Devaraj et al., 2012). Thus, whether the intensity in responsiveness to the supplier considering willingness to cooperate with the supplier in creating customized tools and assets (Gotzamani and Tzavlopoulos, 2009; Huang et al., 2015) and learning from this relationship affects performance must be studied (Cheung et al., 2010; Selnes and Sallis, 2003). Based on the current understanding, we believe that an e-retailer’s responsiveness to a supplier enhances the connection between customization and e-business performance. In line with this notion, we developed the following hypothesis:

H6: The higher the responsiveness to the supplier, the higher the influence of customization on e-business performance.

3. Methodology

3.1. Sample and data collection. Data were collected with a survey conducted with e-retailers located in Finland. The questionnaire was sent to individuals in managerial positions who were responsible for business and customer service tasks. Thus, the respondents had the background and work experience to respond to a survey that investigated the companies’ e-business operations. The target population of this study was Finnish e-retailers. Such companies total 7500. An initial sample of 2541 e-retailers was selected. Of these, 229

responses were invalid, and the total was reduced to 2312 respondents. One hundred nine valid responses from 107 e-retailers were received which equaled a response rate about 4.7%. The response rate is not always the best measure for assessing the accuracy of the results, as the rate ignores the compounding effect of sampling and coverage errors. In addition to the response rate, the accuracy of the survey results should be assessed by the representativeness of the respondents. As the initial sample contained about 30% of the total number of Finnish e-retailers, the sample was representative of a large number of the entire target population. Thus, the responses represent the target population well. Demographics were analyzed based on the size of the company and the age of the web shop. Roughly 73% of the respondents represented micro-companies employing fewer than 10 persons, while about 9% represented small companies. About 17% did not answer the question. About 48% of the sample represented companies that had had a web shop for less than 5 years, while about 50% had had a web shop for more than 5 years. Two percent of the respondents did not respond.

3.2. *Measures.* A survey-based approach was utilized to test the hypotheses. The survey was aimed at collecting data on managerial assessments of a company's e-business operations, responsiveness to the supplier, and e-business performance. All of the scales were modified for this study through a pre-test in collaboration with experienced researchers. The items used in this study are listed in Table 1. The survey included two controls: company size (measured by the number of employees) and the age of the web shop (measured by the number of years the shop had been in existence). Small companies are more resource constrained than large companies which may have affected the results. In addition, the age of the web shop may have affected results as companies with more experience in e-business can succeed more than companies with less experience.

Items	References	Loadings	α
E-business operations			
Service maintenance ('Strongly disagree' [1] to 'strongly agree' [5]) Updates, Accurate and timely information, Complaint handling, Service agent reachability, Fulfillment of delivery promise, Truthfulness of the offering, Privacy of customer information	Parasuraman et al., 2005; Oliveira and Roth, 2012; Huang et al., 2015	0.519–0.833	0.836
Customer orientation ('Strongly disagree' [1] to 'strongly agree' [5]) Ease of returns, Real-time customer service, Delivery and payment flexibility, Acknowledging online behavior preferences, Security announcements	Zeithaml. et al., 2002; Parasuraman et al., 2005; Huang et al., 2015	0.506–0.758	0.734
Customization ('Strongly disagree' [1] to 'strongly agree' [5]) Personalization of online experience, Malleability of online experience	Zeithaml. et al., 2002; Oliveira and Roth, 2012	0.771–0.883	0.750
Responsiveness to the supplier ('Strongly disagree' [1] to 'strongly agree' [5]) Participating in supplier service processes, Sharing information with the supplier, Taking action based on supplier requests	Selnes and Sallis, 2003; Cheung et al., 2010; Huang et al., 2015	0.731–0.850	0.753
E-business performance ('Weak' [1] to 'excellent' [4]) Financial performance Operational performance	Barua et al., 1995; Cheung et al., 2010; Chuang and Lin, 2015		

Table 1. Survey instrument.

3.3. *Bias.* Non-response bias was checked with an analysis of the variance test. Early respondents were compared to later respondents on several items: company size measured by number of employees, return on investment, and e-business performance (both financial and operational). Early respondents responded within a reasonable period of time after receiving the first e-mail. Later respondents were those who responded after several reminders. Later respondents most closely resemble non-respondents (Armstrong and Overton, 1977). The results indicated no statistically significant differences in the variables between the early and later respondents. Thus, non-response bias was not a problem.

Using only one respondent from one company may cause problems related to common method bias. This potential problem was controlled through procedural and statistical methods (Podsakoff et al., 2003). Confidentiality and anonymity were ensured. The questionnaire was designed in such a way that the respondents could not establish cause-effect links between the independent and dependent variables. The effect of common method bias were also checked statistically through Harman's one-factor test. Unrotated factor analysis on items related to the independent and dependent variables was used to examine whether a single factor emerged and whether one general factor accounted for most of the covariance in the variables. This revealed five distinct factors, and that the highest portion of variance explained by one single factor was 34.37%. No general factor emerged in the result. Thus, common method bias did not seem to be a problem in this research.

4. Results

4.1. *The measurement model.* We evaluated the validity and reliability before we tested the hypotheses. The reliability, validity, correlations, and factor loadings for the measurement model are shown in Tables 1 and 2. The reliability of the scales was tested using Cronbach's α (Table 1). All the values were higher than 0.7, suggesting that all measures have adequate levels of reliability (Hair et al., 1998). The discriminant validity of the factor structure was tested by using principal component analysis with varimax rotation. This analysis eliminated items that simultaneously presented high loadings in multiple factors. This exploratory analysis revealed the unidimensionality of the sub-dimensions of the e-business operations scale. As presented in Table 1, the loadings were at an acceptable level, and no significant cross-loadings occurred. Thus, discriminant validity was supported. The extent of multicollinearity was checked by calculating the variance inflation factors (VIFs) and the tolerance values. The VIFs were in the range of 1.019–1.911, which is lower than the suggested threshold of 5, and the tolerance values were greater than 0.2. Thus, multicollinearity was not a major problem in this study. The inter-correlations showed that all three sub-dimensions of e-business operations are positively and statistically significantly related to financial and operational performance. Responsiveness to the supplier was positively related to financial and operational performance. These results provided initial support for the hypotheses.

	Mean/St. dev.	1	2	3	4	5
1 Service maintenance	4.32/0.587	1.000				
2 Customer orientation	3.72/0.781	0.529***	1.000			
3 Customization	2.59/0.933	0.184	0.362***	1.000		
4 Responsiveness to the supplier	3.68/0.818	0.349***	0.260**	0.002	1.000	
5 Financial performance	2.56/0.871	0.454***	0.389***	0.164	0.287**	1.000
6 Operational performance	2.79/0.789	0.406***	0.383***	0.211*	0.314***	0.546***

Table 2. Correlation analyses.

4.2. *Statistical analyses and results.* We used multiple regressions to test the hypotheses. Table 3 summarizes the results of the regression analysis for testing hypotheses 1 through 3 (e-business operations are positively related to e-business performance) and hypotheses 4 through 6 (the moderating effect of responsiveness to the supplier on the link between e-business operations and e-business performance). We entered the control variables (company size and web shop age) in step 1, e-business operations (service maintenance, customer orientation, and customization) and responsiveness to the supplier in step 2, and the interaction terms between e-business operations and responsiveness to the supplier in step 3.

Dependent variables	Financial performance			Operational performance		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Controls						
No. of employees	6.371E-5 (0.000)	-7.919E-6 (0.000)	-5.028E-5 (0.000)	3.516E-5 (0.000)	-3.364E-5 (0.000)	-8.133E-5 (0.000)
Age	0.329 ⁺ (0.181)	0.065 (0.172)	0.052 (0.176)	0.265 (0.166)	0.045 (0.153)	0.055 (0.160)
Main effects						
Service maintenance		0.264 (0.179)	1,399* (0.694)		0.254 (0.160)	0.842 (0.633)
Customer orientation		0.301 ⁺ (0.151)	-1.342 ⁺ (0.741)		0.341* (0.135)	-0.188 (0.676)
Customization		-0.020 (0.105)	0.341 (0.400)		0.013 (0.094)	-0.307 (0.365)
Responsiveness		0.174 (0.112)	-0.135 (0.461)		0.084 (0.100)	-0.013 (0.421)
Interaction effects						
Service maintenance*			-0.297			-0.161
Responsiveness			(0.196)			(0.179)
Customer orientation*			0.472*			0.153
Responsiveness			(0.208)			(0.190)
Customization*			-0.100			0.089
Responsiveness			(0.107)			(0.098)
Model summary						
F	1.728	4.334***	3.597***	1.306	5.053***	3.524***
R ²	0.038	0.245	0.296	0.029	0.275	0.292
Adjusted R ²	0.016	0.189	0.214	0.007	0.220	0.209

N = 109; unstandardized coefficients and standard errors (in parentheses) are reported.

*** p≤0.001, ** 0.001< p≤0.01, * 0.01< p≤0.05, + 0.05< p≤0.1

Table 3. Regression analyses results.

Hypotheses 1 through 3 predicted that e-business operations (service maintenance, customer orientation, and customization) influence e-business performance. We studied the influence on financial performance and operational performance separately. The control models 1 and 4 show that the size of the company does not affect financial or operational performance. However, age of the web shop did not affect operational performance but did affect financial performance. The results of main effect models 2 and 5 showed a statistically significant main effect of customer orientation on financial performance (model 2) and on operational performance (model 5). Companies with high customer orientation were more likely to achieve high financial ($\beta = 0.301$, $p = 0.050$) and operational ($\beta = 0.341$, $p = 0.013$) performance. The effect was not statistically significant on the path from service maintenance,

or customization on financial performance and operational performance. Thus, hypothesis 2 was supported, and hypotheses 1 and 3 are rejected.

Hypotheses 4 through 6 predicted moderating effects of responsiveness to the supplier on the link between e-business operations and e-business performance. As the results for model 3 show, responsiveness to the supplier has a statistically significant interaction effect on the path from customer orientation to financial performance ($\beta = 0.472$, $p = 0.026$). Thus, we can interpret from these observations that the influence of customer orientation on financial performance increases with an increase in the e-retailer's responsiveness to the supplier. However, the interaction effect of the responsiveness to the supplier on the path from customer orientation to operational performance was not statistically significant. In addition, the interaction effect was not statistically significant on the path from service maintenance, or customization on financial performance and operational performance. Thus, hypothesis 5 was partly supported, and hypotheses 4 and 6 are rejected.

5. Conclusions

Due to current challenges e-retailers have to deal as a part of their businesses, mainly caused by the service-oriented nature of e-business, this study investigated which areas of e-retailers' e-business operations affect their e-business performance. In addition to direct effects of the e-business operations on e-business performance, we investigated the moderating effect of responsiveness to the web shop supplier. We examined e-business operations through three dimensions: service maintenance, customer orientation, and customization. The results show that customer orientation has a statistically significant effect on e-retailers' financial and operational performance. Further, we discovered that service maintenance and customization do not directly affect e-retailers' operational or financial performance. We also found a positive moderating effect of responsiveness to the web shop supplier between customer orientation and e-retailers' financial performance.

5.1. Theoretical implications. As the main theoretical contribution, this study increases awareness of the less studied role of web shop suppliers in e-retailers' performance. Although the connections in supply chains between suppliers and e-retailers has been studied widely, previous researchers mainly focused on connections between goods suppliers and e-retailers. Thus, this study opened up a new point of view by focusing on connections between web shop suppliers and e-retailers. The results revealed that web shop suppliers could be connected more actively to e-retailers' business operations to boost e-business performance. In addition to shedding light on e-retailers' responsiveness to web shop suppliers, this study revealed that e-retailers' customer orientation affects their financial and operational performance.

5.2. Managerial implications. As a managerial implication, the results suggest that to achieve higher performance, both financial and operational, e-retailers should pay careful attention to customer orientation. E-retailers, thus, should pay attention to ease of returns, real-time customer service, delivery and payment flexibility, acknowledged online behavior preferences, and security announcements. We used these items to measure customer orientation, and they seem to have a direct positive effect on e-retailers' performance. Although current digital solutions provide continuously growing possibilities for web shop customization, it does not seem to have a direct effect on e-retailers' performance. This is a result that e-retailers should be aware of. Customization is an important part of web shops, especially when the web shop is delivered by the supplier and implemented. However, in the long run, customization does not seem to have a direct effect on e-retailers' performance. In addition to customization, service maintenance of web shops creates an important part of e-retailers' e-business operations. However, similar to customization, service maintenance does

not seem to have a direct effect on e-retailers' performance. Service maintenance is an operation handled by e-retailers and web shop suppliers and is invisible to customers. Thus, customer orientation seems to reflect, and customers seem to appreciate, actions and elements that are visible and available to them while they spend time on web shops.

Further implications for e-retailers are provided through the results that reveal a positive moderating effect of responsiveness to the web shop supplier on the connection between customer orientation and e-retailers' financial performance. Web shop suppliers are usually operators that provide web shops to many different e-retailers. Thus, these suppliers have a better awareness of different elements and parts of web shops that are operated by different e-retailers. Thus, the suppliers probably have a better understanding of which elements of web shops and customer orientation practices work well. Even though customer orientation is traditionally considered the actions pursued by e-retailers, they should develop closer and more open relationships with web shop suppliers and let them support the e-retailers' attempts to be more customer oriented.

5.3. Limitations and further research. The study has limitations that provide opportunities for further studies. First, the data were gathered from one country, and the demographics may limit the generalizability of the findings. Second, the cross-sectional nature of data caused some limitations, and longitudinal data would assist in providing an in-depth understanding of how e-business operations affect different performances. Third, the dependent variables included only financial and operational performance. Thus, the theoretical model of this study can be further studied by using other performance measures, such as sales performance and market performance, as dependent variables. Further research could address these limitations and build on the findings of this study. For example, the role of trust in the relationship between a web shop supplier and an e-retailer requires further investigation. It would be beneficial to study what is required to build trust in the e-business setting, as it differs from that between a goods supplier and an e-retailer.

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DIGITAL SERVICE CAPABILITIES IN B2B VALUE CREATION

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ABSTRACT

This paper examines how customer value is created through digital service capabilities in the business-to-business (B2B) context. The paper identifies crucial service capabilities within digital services and how customer value is created through these digital service capabilities. Qualitative approach was selected. Two qualitative case studies were conducted in the field of digital B2B services. The results highlight the importance of relationships, as digital products do not necessarily foster competitive advantage. Moreover, contact, customization, comprehensiveness, service recovery, and fulfillment appear to be important capabilities in the digital service process.

Keywords: digital service, digital service capabilities, b2b, value creation, co-creation.

1. INTRODUCTION

Digital services have become increasingly important for companies in their drive to meet their business goals. This is due to the rapid developments in technologies and customer demands, which have brought substantial changes to the manner in which value is created through the delivery of goods and services. In this sense, a new digital service can deliver embedded value to firms through the co-creation of products and services, with customers representing a key value component. Chuang and Lin (2015) studied financial service firms and showed that the impact of new digital services on firm outcomes begins with digital service and co-operation capabilities and that the complementarity between these factors positively influences new digital services. Furthermore, they claim that new digital services exert a positive effect on value co-creation, thereby improving firm value. Digital service capability is deployed throughout an organization and is deeply integrated with customer collaborative processes, thus representing higher levels of co-operation and co-creation capability (e.g., Tsou and Chen, 2012; Chuang and Lin, 2015). Thus, co-creation between customers and suppliers represents a critical component of the service-delivery processes through which customers have direct input in the development of both services and new digital services (Ngo and O'Cass, 2009; Chuang and Lin, 2015).

Companies operating in digital services need new strategies and capabilities to ensure that they remain focused on their customers and not on their own internal processes. These digital service capabilities are defined as operations-based service proficiencies that are necessary for enhancing the value of digital service delivery. However, there is a lack of research on the digital service capabilities that enhance value creation in the B2B context. Building on prior research and insights from two case studies, we aim to address this research gap by investigating digital service capabilities in value creation. The research question is as follows: how is customer value created through digital service capabilities in the B2B context? Thus, this study aims to increase understanding of digital service capabilities in customer value creation in the B2B context. Specifically, the study contributes to the current literature by presenting 1) the service capabilities emphasized

in digital services and 2) how customer value is created through these digital service capabilities.

2. VALUE CREATION, VALUE CO-CREATION, AND CO-CREATION CAPABILITY

2.1 VALUE CREATION AND CO-CREATION

Traditionally, ‘value’ has referred to the value that the service generates for the customer (Uлага and Chacour, 2001), that is, the relationship between the benefits and the sacrifice derived from the service (Parka et al., 2013). According to Uлага and Chacour (2001) regarding the formation of value from an inter-organizational point of view, value is created through collaborative relationships and not just through the delivery of products and services. Moving the locus of value creation from exchange to use means transforming the understanding of value from one based on units of organizational output to one based on processes that integrate resources (Vargo et al., 2008), which makes service production crucial. According to Grönroos and Voima (2013), the role of the provider has traditionally been emphasized, which was natural when value was regarded as a function of activities controlled by the company (value embedded in producer outputs). However, the importance of the customer’s perspective has been recognized in recent years (e.g. Vargo and Lusch, 2004; Grönroos and Voima, 2013). Value co-creation can be defined as the provider’s opportunity to engage in the customer’s value creation process or the customer’s opportunity to engage in the provider’s processes as a co-creator (Grönroos, 2011; Grönroos and Voima, 2013).

Value creation can also be explored through direct and indirect value creation (Walter et al., 2001; Brandl, 2017). According to Brandl (2017), direct value is predominantly created in the execution stage when the service is delivered from service providers to clients. This delivery implies a solution to the client’s problem and creates value for the client. Monetary reimbursement and service delivery are the basis of the service trade and the value creation logic of services for satisfying a client’s needs. Regarding indirect value creation, Brandl (2017) suggests that in the early stages of the production process, especially in the problem finding and acquisition and problem-solving stages, the service provider and client work closely together to ensure that all participating actors understand the service requirements and the possible, as well as anticipated, service delivery. The information gained creates indirect value to the service provider as more and more insights on the client are gained. This information is used by the service provider to offer additional services to the client, which are tailored to the client’s unique characteristics (Brandl, 2017).

2.2 CO-CREATION CAPABILITY

In order to manage in value creation and co-creation, the proper capabilities are needed. Similar to co-operation capability, co-creation capability can be seen to represent a firm’s ability to cooperate with partners in accumulating and exchanging knowledge, formulating strategic decisions, or providing specific services (Chuang and Lin, 2015). Based on the studies of Tsou and Chen (2012) and Chuang and Lin (2015), it can be stated that co-creation capability is a multidimensional construct effecting various facets of distinct capabilities, including three subsets for co-creation capability: absorptive capacity, coordination capability, and relational capability.

According to Tokman and Beitelspacher (2011), a firm’s capacity to absorb the information transferred from network partners and its ability to learn to use this information for value co-creation (Powell, 1998) are critical (Cheung et al., 2010).

Chuang and Lin (2015) in turn define absorptive capacity as a firm's capacity to leverage absorbed knowledge from partners and to apply new knowledge. It is proposed that the density of linkage among firms requires trust and collaboration (Zahra and George, 2002). Jin et al. (2013) note that, overall, trust-based relations are perceived as more socially responsible than those found on the adversarial end of the relationship continuum (Hofer et al., 2009). They continue that given these social norms, managers are likely to view collaborative relationships favorably, reinforcing their intention to engage in integration.

3. DIGITAL SERVICE CAPABILITIES

The main idea of the digital business is that it is changing the existing business world in a holistic and customer-driven way by renewing processes, for example, by digitizing processes and developing electrical services. Williams et al. (2010) define digital services as services that are obtained and/or arranged through a digital transaction over the internet. Although these services may include digital elements, not all elements or interactions are digital. Digital services can also encompass the coordination of something physical. Digital systems can be linked with product-service bundles to build novel digitalized product-service systems (Lerch and Gotsch, 2015). Lerch and Gotsch (2015) define this type of digitalized product-service system as “an integrated bundle of physical products, intangible services, and digital architectures designed to fulfill individual customer needs via automated, independent operation, with the goal to significantly improve customer outcomes.” In this study, *digital service refers to products/services that are provided in digital format as well as the process and relationship, either digital or physical, of producing these products/services*. Based on the above description and the definition of service capabilities presented earlier, *digital service capabilities are defined as operations-based service proficiencies that are necessary for enhancing the value of digital service delivery*. Many categories of digital service capabilities have been presented in the previous literature (e.g., Zeithaml et al., 2002; Lee and Lin, 2005; Gotzamani and Tzavlopoulos, 2009; Oliveira et al., 2012). As a theoretical framework of the research, these digital service capabilities are combined from previous works and presented in Table 1.

Digital service	capabilities	Description	Reference
Product/service	Efficiency	The product/service is easy to use and effortless to customers	e.g., Oliveira et al. (2012); Huang et al. (2015); Nylén and Holmström (2015)
	Content	Appearance and information accuracy in product/service	e.g., Zeithaml et al. (2002); Lee and Lin (2005); Nylén and Holmström (2015)
	System availability	Technical functioning of the product/service	e.g., Lapierre (2000); Zeithaml et al. (2002); Huang et al. (2015)
Service process	Contact	Solutions and flexibility in dealing customer inquiries, conflicts and complaints	e.g., Zeithaml et al. (2002); Lee and Lin (2005); Parasuraman et al. (2005)
	Customization	Considering customer preferences and the perceived completeness of the offering	e.g., Gotzamani and Tzavlopoulos (2009); Oliveira et al. (2012); Yu (2013)

	Fulfillment	Fulfillment of promises made and quality of information provided to customers	e.g., Lapierre (2000); Oliveira et al. (2012); Yu (2013)
Relationship	Understanding	Individualized response to customer requests	e.g., Lapierre (2000); Gotzamani and Tzavlopoulos (2009); Yu (2013)
	Image	Past and perceived experiences	e.g., Lapierre (2000); Gotzamani and Tzavlopoulos (2009)
	Trust	The degree of confidence	e.g., Lapierre (2000); Lee and Lin (2005); Gotzamani and Tzavlopoulos (2009)

Table 1. Digital service capabilities

4. RESEARCH APPROACH

4.1 CASE DESCRIPTION

A multiple case study design was applied, and the two cases were selected through theoretical sampling. The cases are digital service providers comprising different functions that co-create value through comprehensive digital solutions. Case 1 (referred hereafter as Provider 1) is an IT company that employs 20 people. As a fast growing company, it offers a wide range of digital services, including customer relationship management and enterprise resource planning software, application development, e-commerce solutions, design services, and data center services. The digital services and solutions offered by this company are strongly based on customization and versatility because it aims to build long-term customer relationships instead of one-time deliveries. Case 2 (referred hereafter as Provider 2) is a large international company that produces a broad range of digital and IT services, such as system deliveries (e.g., ERP), software solutions, and data center services. Its solutions are not heavily customized according to customer preferences, but the value is to provide comprehensive solutions so that the customer gets all services in the same place.

4.2 DATA COLLECTION AND ANALYSIS

The primary data collection method utilized were semi-structured interviews. Although the interview questions were determined in advance, the discussions were informal and were facilitated with supporting questions and comments made by the researchers. This enabled an in-depth understanding of the phenomenon under investigation. The aim of the interviews was to achieve an overall view of the role of digital service capabilities in the value creation process. The key themes in these interviews were as follows: digitalization, digital operating environment, value creation, value co-creation, and customer participation. To acquire a comprehensive view about patterns of usage and behavior at each level, employees from different hierarchical levels and job descriptions were included in the research process. However, the unit of analysis was the organization, and the interviews were aimed at understanding value creation through digital service capabilities at the organizational level. All the interviews were recorded and transcribed to enable in-depth analysis. The data analysis was conducted in line with the content analysis method on the basis of findings from the previous literature. The data analysis aimed to identify crucial service capabilities within digital services and the means by

which value is created through these digital service capabilities. As our goal was not to achieve scientific generalization, theoretical concepts were used as templates with which to compare the empirical results (Yin, 2003).

5. FINDINGS

In this section, the value creating digital service capabilities, as emerged from the data, are presented according to the classification gleaned from the previous literature (see Table 1).

5.1 PRODUCT

In this study, product refers to the actual product or service that is provided in digital format. In this study, the features of digital product were combined into three categories: efficiency, content, and system availability. However, only two product-related features serving as value elements were raised by the interviewees in this study, namely, user experience and system availability. The first falls in the efficiency category as it includes usability issues; the second relates directly to system availability. Both providers highlighted **user experience** as one of the features of a digital product to which they pay special attention. However, Provider 1 does not collect data on user experience from its customers, whereas Provider 2 has created a concept for collecting such data by observing end users for a day. Moreover, Provider 2 thought that technology should be harnessed for pleasant experience creation:

“When a customer visits an online store, he should feel like visiting a village shop: he’s known in advance, and the range of services is controlled by this.”

In addition to user experience, Provider 1 mentioned **system availability** as one of the value creating factors for a customer, *“it’s [value] partly created due to how well the service stays alive.”* Instead of raising several product-related features, the interviewees discussed the nature of the changes in the IT systems market. They highlighted consumerization, networking, and internationalization as areas that have such an effect on the IT systems market that the product no longer has a competitive advantage.

5.2 SERVICE PROCESS

In this study, service process refers to the process of producing a digital service from recognition of its need to its usage. In this study, these features were combined into three categories: contact, fulfillment, and customization.

Contact with customers was considered an essential capability in value creation during the service process. Customers are offered several different channels, both digital and physical, for contacting the provider. From the point of view of Provider 1, interaction seems to work just as well digitally as it does face-to-face, and *“transition between channels is seamless.”* However, both providers believe that different channels work best for different purposes. Physical channels are more suitable for making contract and for brainstorming, whereas digital channels are appropriate for most other purposes, e.g., ticketing systems for error reporting. Provider 2 noted that the potentials of digital channels could be utilized more diversely, making contacting even more convenient and appropriate:

“All sorts of contacting through digital service channels in our direction should be ridiculously simple.”

Fulfillment of promises made to customers was deemed highly important in value creation. Both providers underlined capabilities such as going beyond customers’ wishes, e-service recovery, and serviceability. According to the interviews, both providers

perceived that response time to customers' requests directly affected customer satisfaction. Besides paying attention to time spent on a customer's request, both providers seek to go beyond customers' wishes when it comes to business needs. Providers also have their own needs, for example, learning a new technology. Provider 2 may allow customers to engage in their value creation as co-creators during a service process.

"We may take a cut in profitability if only we are able to learn a new thing with a customer."

Provider 1 underlined that each customer needs to be a profitable unit, *"business needs to be profitable, customer-specific."* Provider 2 determines the value of a customer as *"investments and potential investments made by the customer for us."* Furthermore, Provider 1 pointed out that customer value cannot always be counted in monetary alone; the value may also be in bringing new customers in the future: *"the customer may be small for us in euros, but the doors that it opens are big."*

The providers considered **customization** as the status quo in the digital services business today. They emphasized capabilities such as modification of a digital service to conform to customer needs and customer involvement as well as the comprehensiveness of services; customers desire that everything related to a digital service is as effortless as possible. Both providers stressed that customer involvement in a digital service development process is valuable. Provider 1 mentioned that *"The customer provides 'input feed' throughout the development process of the digital product."* Provider 2 pointed out that, in the future, there should be even more co-designing with customers, involving all the persons from a client company whose work is linked to the digital product, and particularly end users who, in some cases, are the customers of customers.

5.3 RELATIONSHIPS

In this study, relationships refer to factors relating to mutual business operations between the producer and the customer. In this study, these features were combined into three categories, that is, understanding, image, and trust.

In this study, the interviewees highlighted **understanding** in relation to capabilities such as mutual development, customer care, and in-house operations as particularly essential for business nowadays. Both providers stressed that the mutual development of a customer's business far into the future was needed to bring the most value. To understand the effects of a provider's operations on customers' business, the providers set and monitor the customer's business objectives in collaboration with the customer. Both providers stressed that mutual development requires commitment. However, they highlighted that customers could be motivated in different ways in committing to give input and in taking part in mutual development. According to both providers, factors that motivate customers relate to both the perceived benefits and the criticalness of the digital service. The benefits may be financial, but public recognition and experience of the opportunity of being able to influence are perceived as meaningful.

Both providers deemed customer care to be one of the fundamental capabilities related to understanding a customer. Getting feedback from customers about their experiences helps providers adjust their business to the demand. Provider 1 pointed out that the information obtained from customers is customer related, and thus, there is a lack of aggregate information on particular subjects. Both providers highlighted that being able to take good care of customers requires good in-house operations. Besides customer affairs, Provider 2 also drew attention to other information that is useful to be shared in-house.

Both providers considered reputation, specifically the digital **image** of a company, to be important in the digital era, as customers are increasingly seeking credibility and expertise.

According to Provider 1, it is essential to create a credible digital image of the business, as *“new customers don’t even contact the company if the digital image is forbidding.”* Moreover, Provider 1 underlined that existing customers play a key role in creating a company’s reputation. According to Provider 2, a company itself may also be a key player in creating its reputation.

“Nowadays, we need to brand our employees as experts. In some social media and other forums, we need to be visible and active and thus create the impression that there’s expertise here.”

Provider 2 alluded to factors that it believes have an effect on its reputation, including its size and internationality, market expertise such as cross-industry expertise and knowledge of the future of markets, the wide range of services offered, together with system expertise and mastery of several provider technologies. Both providers stressed that the customer wants to buy expertise, not just technology.

The interviewees discussed *trust* in the provider from two different perspectives. On one hand, they felt that the customer needs to be able to trust the provider’s expertise; on the other, they considered trust in the provider as a partner, which means trust in relation to secrecy. Both providers emphasized trust in the provider’s expertise to offer concrete benefits as one of the important value creation features. Trust in terms of secrecy, and thus openness, is a required capability for achieving the ideal situation. A service provider would need a customer to share his business information, information on his customers’ needs and experiences, as well as information on his information systems as a whole.

6. DISCUSSION

This study aimed to provide novel insights regarding value creation through digital service capabilities in the B2B context. The previous literature demonstrates that value creation by service providers for their customers can be analyzed through two overlapping value creation spheres, which in turn constitute three parts, namely, the provider sphere, the joint sphere, and the customer sphere (Grönroos, 2011; Grönroos and Voima, 2013). This study focused on the first two: the provider generating potential value for the customer and the joint aspect for real value creation emerging from interaction between the provider and the customer. The model illustrates the value creation process for the customer, in this case, a business customer, in direct and indirect interaction. The results of the current study embrace the view adopted by Brandl (2017) that the real value of digital services for a business customer must incorporate co-creation; thus, direct interaction between the producer and the customer is necessary in order to create real value through a digital service for the customer. According to the results, the joint sphere creates value for both parties, for the producer and the customer act as co-producers, providing insights for the development of a digital service, and for the customer, as he gets a digital service that suits his unique characteristics. Furthermore, the results reveal that co-creation makes a perfect platform for producers to gain specific value for themselves; they are able to develop their skills and services but also acquire entirely new competences.

Moreover, as the role of information systems providers is changing on demand, from a mere technical professional to a wide-ranging expert of digitalization, the variety of needed capabilities is expanding to extensive levels of business understanding. The results of this study show the shift in focus from product-related capabilities to service-process and relationship-related capabilities that require the co-creation capability to consist of the subsets of absorptive capacity, coordination capability, and relational capability, as presented by Tsou and Chen (2012) and Chuang and Lin (2015). The

demand for the capabilities of acquiring, relating, and providing knowledge and skills from outside the company is increasing, including the ability to leverage all the existing potentials the business environment offers. Furthermore, the outcome of this study proves that inter-firm coordination capabilities are of great importance in value creation and that information technology offers new integrative ways for different kinds of cooperation.

The results also support the view of Grönroos and Voima (2013) that understanding a customer's independent value creation outside the direct interaction with the provider is fundamental for customer value creation. In order to understand the customer and, as a result, to be able to help in developing a customer's business forward, a provider needs to get information from the customer. Zahra and George (2002) state that close cooperation between companies require trust, and according to our results, so does the opening of business critical information. The customer needs to trust the provider, in particular, the provider's capability regarding secrecy, but also the provider's expertise in leveraging the information provided for advancing the customer's business.

7. CONCLUSIONS

7.1 THEORETICAL IMPLICATIONS

This study has increased our understanding of digital service capabilities in customer value creation in the B2B context. Thus, it contributes to the current literature by presenting 1) service capabilities deemed to be crucial in digital services and 2) how customer value is created through these digital service capabilities. The results show that the features of a digital product do not bring competitive advantage as such; instead, services around the product play a significant role. In particular, contact, customization, comprehensiveness, service recovery, and fulfillment appear to be important capabilities during a service process. The primary results also indicate that the current digital era brings networks, partnerships, and expertise in the focus on B2B value creation. Therefore, the role of information systems suppliers has changed, now emphasizing relationship-related capabilities such as mutual development, customer care, and trust.

7.2 MANAGERIAL IMPLICATIONS

These findings present important implications for digital service providers because the division of digital service capabilities assists in managing the phenomenon as they are more easily measurable and manageable than the whole phenomenon. The main practical implications are as follows: first, it seems that investing in the relationship characteristics of the digital service process is one way of facilitating value co-creation. The co-creation process acts as an important possibility for service providers in developing their own expertise. The examples in this study highlight the importance of contact and information richness during the service process when communication has been achieved through digital channels. Second, by building customers' trust in both provider expertise and openness regarding the service process, it is possible to create long-lasting relationships. This requires individuals who have the ability as well as the practical experience to conduct customer processes.

7.3 LIMITATIONS AND FURTHER RESEARCH DIRECTIONS

Lastly, the study has some limitations that can be addressed in future research. The results are based on data from firms that have their own culture and existing structures in relation to value co-creation; thus, more research is needed to ensure the generalizability of the results. Also, as the unit of analysis was the organization, future research could examine

individual characteristics that facilitate the value creation process. As the study investigated value co-creation characteristics from one company's perspective, it would be beneficial to study how to form networks for the purpose of co-creating value outside the focal company and how these new forms of organizing create value beyond finances.

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