International Journal of Information Management 47 (2019) 168–182

Contents lists available at ScienceDirect

International Journal of Information Management

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

Information system capabilities and firm performance: Opening the black box through decision-making performance and business-process performance☆

Arafat Salih Aydiner[a], Ekrem Tatoglu[b,*], Erkan Bayraktar[c], Selim Zaim[d]

[a] Faculty of Political Sciences, Istanbul Medeniyet University, Kadikoy, Istanbul, 34000, Turkey
[b] School of Business, Ibn Haldun University, Basaksehir, Istanbul, 34494, Turkey
[c] College of Engineering and Technology, American University of the Middle East, Kuwait
[d] College of Engineering and Natural Sciences, Istanbul Sehir University, Kartal, Istanbul, 34865, Turkey

ARTICLE INFO

Keywords:
Information system capabilities
Resource-based view
Decision-making performance
Business-process performance
Firm performance
Emerging countries

ABSTRACT

This study contributes to the extant literature on information management by investigating the interrelationships between information systems (IS)-related capabilities and their effects on firm performance. Using the resource-based view (RBV), a set of hypotheses is formulated to examine these links, considering the role that may be played by decision-making performance and business-process performance as mediating variables. Structural equation modeling (SEM) has been applied to a sample of 204 firms in Turkey. The test results obtained confirm the proposed serially mediating model according to which decision-making performance and business-process performance play a critical mediating role in the human resource and administrative-related IS capabilities, and firm-performance relationships. No support, however, has been found concerning the serial mediation effect between infrastructure-related IS capabilities and firm performance.

1. Introduction

For the survival and growth of many firms in today's businesses environment, creative use of information technology (IT)/information systems (IS) is essential. IT and IS together provide new opportunities to businesses to redesign their business processes and work practices, while enabling organizational change (Dedrick, Gurbaxani, & Kraemer, 2003). However, a recent survey by McKinsey & Company reveals that nearly half of the IT/IS projects exceed their budgets (Bloch, Blumberg, & Laartz, 2012). Large IT/IS projects overrun their budgets by 45 percent, exceed their allotted time by 7 percent and provide 56 percent less value than predicted. Moreover, 17 percent of IT/IS projects are managed so poorly that they may jeopardize the existence of the company (Bloch et al., 2012). In the absence of proper governance of business processes, IS/IT-enabled process-management practices may also fail (Rahimi, Møller, & Hvam, 2016). Furthermore, according to McKinsey's research on digital revenue growth, only a small number of firms are doing better in the digital era, while three quarters of them encounter the negative effects of digital competition on a company's growth in earnings (Bughin, Catlin, Hirt, & Willmott, 2018).

Considering the amount of money and effort invested in IS projects, as well as the expectations raised for better firm performance, there is a significant concern about whether or not the anticipated value is being realized from IT/IS investments (Carr, 2003; Henderson & Venkatraman, 1993). Therefore, a substantial number of studies has been conducted to investigate the impact of IT/IS on firm performance. To exemplify, Table 1 provides a summary of selected past studies reporting both direct and indirect associations on the relationship between IT/IS capabilities and firm performance using various theoretical perspectives. Some of these studies have captured a direct positive relationship between IT capabilities and firm performance (Bharadwaj, 2000; Devece, Palacios, & Martinez-Simarro, 2017; Devece, Palacios-Marqués, Galindo-Martín, & Llopis-Albert, 2017; Santhanam & Hartono, 2003). Various authors, such as Chae, Koh, and Prybutok, (2014), have pointed out that IT capabilities have no positive direct impact on firm performance anymore, since more standardized and homogeneous IS are being implemented through enterprise resource planning (ERP) and web technologies since the 2000s. Many

☆ We are indebted to the invaluable comments and feedback of Editor Professor Yogesh Dwivedi and two anonymous reviewers.
* Corresponding author.
E-mail addresses: arafat.aydiner@medeniyet.edu.tr (A.S. Aydiner), ekrem.tatoglu@ihu.edu.tr (E. Tatoglu), Erkan.Bayraktar@aum.edu.kw (E. Bayraktar), selimzaim@sehir.edu.tr (S. Zaim).

https://doi.org/10.1016/j.ijinfomgt.2018.12.015
Received 9 July 2018; Received in revised form 4 December 2018; Accepted 24 December 2018

Table 1
Summary of studies between IT/IS capabilities and firm performance.

Related studies on IT/IS capabilities-firm performance	Theoretical perspective used	Types of IT/IS capabilities and performance measures	Nature of relationship between IT/IS capabilities and firm performance
Bharadwaj (2000)	Resource-based view	IT capability and firm performance	Direct relationship
Tippins and Sohi (2003)	Resource-based view	IT competency, organizational learning and firm performance	Indirect relationship
Santhanam and Hartono (2003)	Resource-based view	IT capability and firm performance	Direct relationship
Ravichandran and Lertwongsatien (2005)	Resource-based view	IS resources and capabilities, IT support and firm performance	Indirect relationship
Stoel and Muhanna (2009)	Resource-based view	Internal IT capability, external IT capability and firm performance	Direct relationship
Mithas et al. (2011)	Resource-based view	IT-enabled information management capability, organizational capabilities (customer management capability, process management capability, performance management capability) and firm performance	Indirect relationship
Chen (2012)	Resource-based view	IT/IS resources (technological, human and complementary organizational resource), organizational capabilities and financial performance	Indirect relationship
Kim et al. (2009)	Resource-based view	IS management capability, IS infrastructure capability, IS personnel capability and firm performance	Direct relationship
Pérez-López and Alegre (2012)	Dynamic capabilities	IT-competency, knowledge management process, market performance and firm performance	Indirect relationship
Gu and Jung (2013)	Resource-based view and the information systems success model	IS resources, complementary organizational resources, IS capabilities, business process performance and organizational performance	Direct relationship
Chen et al. (2015)	Corporate entrepreneurship perspective	IT capability, corporate entrepreneurship, competitive intensity, innovation performance	Indirect relationship
Wang et al. (2015)	Resource-based view and systems theory	IT assets, IT management, environmental dynamism and firm performance	Indirect relationship
Peng et al. (2016)	Process-based view	IT, process management capability, supply chain management capability and firm performance	Indirect relationship
Chae et al. (2018)	Industry-based view	IT capability, industry categories and firm performance	Indirect relationship

other studies also highlight the indirect effect of IT/IS capabilities on firm performance that should be investigated further (Dedrick et al., 2003; Gu & Jung, 2013; Huber, 1990; Ravichandran & Lertwongsatien, 2005). Among these studies, Stoel and Muhanna (2009) investigate the role of environmental conditions in the relationship between IT capability and firm performance, while Pérez-López and Alegre (2012) and Garrison, Wakefield, and Kim (2015) consider knowledge management and cloud success, respectively. Many intermediary links, such as customer value (Ainin, Mohd, Salleh, Bahri, & Mohd Faziharudean, 2015; Gu & Jung, 2013), quality of implementation processes (Yeh, Lee, & Pai, 2012), and business-process performances (Gu & Jung, 2013; Mithas, Ramasubbu, & Sambamurthy, 2011), were noted to significantly influence the relationship between IS capabilities and firm performance. While testing the moderating effect of IT implementation levels, Céspedes-Lorente, Magán-Díaz, and Martínez-Ros (2018) find that IT mitigates the negative impact of downsizing on firm performance. As a moderator, strategic emphasis of IT plays a significant role in the relationship between IT investments and firm performance, though its effect varies significantly (Mithas & Rust, 2016). In their study to investigate the impact of IT capabilities on firm performance, Chae, Koh, and Park, (2018) show that the strategic role of IT varies from industry to industry and IT is really a differentiating factor in the industries where IT fundamentally changes business and industry processes. Consequently, these studies show inconsistent findings about the possible ways that IT/IS capabilities may impact on firm performance (Gable, Sede, ra, & Chan, 2008) and deviate in the selection of variables and the levels at which those variables are collected (Devaraj & Kohli, 2003).

Many of the previous studies focus on either IT investment or IT capability, which was described by both computer and telecommunications technologies and associated hardware, software, and services (Bassellier, Reich, & Benbasat, 2001; Bharadwaj, Sambamurthy, & Zmud, 1999; Bharadwaj, 2000; Dedrick et al., 2003; Tippins & Sohi, 2003; Santhanam & Hartono, 2003; Stoel & Muhanna, 2009; Pérez-López & Alegre, 2012; Chen, Wang, Nevo, Benitez-Amado, & Kou, 2015). However, IS are not concerned with IT only, but also deal with business systems, processes and people to manage the information effectively (Checkland & Holwell, 1998). According to Devaraj and Kohli (2003), the actual usage of such systems is important, and it is the missing link between IT/IS and firm performance. Two of the most critical areas indicating the effective usage of IS and its impact on firm performance are the decision-making processes and business processes. Therefore, to explore the strategic role of IS capabilities, this study investigates the relationship between IS capabilities and firm performance through the mediation of business-process performance and decision-making performance. IS capabilities under consideration include infrastructure (Mithas et al., 2011; Pérez-López & Alegre, 2012; Ravichandran & Lertwongsatien, 2005), human resources (Tippins & Sohi, 2003; Bharadwaj, 2000; Cepeda-Carrion, Cegarra-Navarro, & Jimenez-Jimenez, 2012; Ravichandran & Lertwongsatien, 2005) and administrative capabilities (Pérez-López & Alegre, 2012; Ravichandran & Lertwongsatien, 2005; Yeh et al., 2012). These IS capabilities, which are value-added strategic combinations of resources and competencies, are the complex routines that dynamically define the effective transformation of the inputs into outputs in a firm (Ravichandran & Lertwongsatien, 2005). Thus, IS capabilities create a broader view of a firm by combining the resources and competencies in order to achieve superior performance.

This study contributes to information management (IM) literature in a number of ways. First, specifying IS capabilities with resources and competencies enables the use of the resource-based view (RBV) to better explore the strategic value of IS. Second, a new serial multiple mediator model is designed to consider the influence of decision-making performance and business-process performance on the relationship between IS-related capabilities (i.e., infrastructure, human resources and administrative) and firm performance. It is envisaged that the adoption of this approach creates a distinct epistemology for organizations to have a strategic IS perspective. Third, there is a clear paucity of empirical research about IM within emerging country settings (Aydiner, Tatoglu, Bayraktar, Zaim, &

Delen, 2019; Dedrick et al., 2003). Moreover, even a relatively smaller portion of the studies investigates firm-level competitiveness and emphasizes the strategic importance of IT/IS to achieve long-term gains (Avgerou, 2008). Thus, this study contributes to the IM research in emerging countries through examining the case of Turkey, which is undoubtedly a key emerging country that exhibits comparable features with other sizable emerging countries, such as Brazil, Mexico, Russia, and Poland (Gölgeci, Gligor, Tatoglu, & Arda, 2019).

The remainder of the study is organized as follows. In the next section, we provide background literature and set out the study's hypotheses. Then, the research methodology is presented in Section 3. Section 4 provides the data analyses and results, followed by the discussion of findings. The conclusion is set out in the final section.

2. Theoretical background and hypotheses

The RBV argues that firms possess resources to create a competitive advantage in order to attain a superior performance while examining the link between the internal characteristics of a firm and its performance (Barney, 1991; Wernerfelt, 1984). The IT/IS resources of a firm are composed of tangible assets such as hardware and software namely IS infrastructure, human assets such as IT/IS employees, their skills and commitment to their jobs, and intangible assets such as corporate culture, IT/IS administrative skills, competencies, and experience (Wheelen, Hunger, Hoffman, & Bamford, 2017). In line with the classification of Barney (1991), IS infrastructure, IS human resources, and IS administration are defined as main IS resources, referring to physical, human, and organizational capital resources, respectively. If a firm has an ability to exploit these resources (Wheelen et al., 2017), and carries them out to a level of capacity to achieve its tasks and activities (Ravichandran & Lertwongsatien, 2005), a capability can be built up on a certain function. Capabilities are repeatable patterns of actions for the utilization of assets to create, produce, and/or offer products to the necessary environment. Thus, these capabilities involve infrastructure, human capital, processes, managerial abilities and skills (Wade & Hulland, 2004). In this study, drawing on the RBV, IS capabilities are composed of infrastructure, human, and administrative capabilities, so that they develop an ability to exploit IS resources to create a competitive advantage. These heterogeneously distributed, immobile resources and capabilities are considered as the sources of the performance differences among the competing firms according to RBV (Barney, 2001). There is a vast literature that adopts RBV to explain the source of competitive advantage in IM field. Initial discussions about the adaptation of RBV to IS mainly focused on IT and IT investments (Bharadwaj, 2000; Santhanam & Hartono, 2003; Tippins & Sohi, 2003; Melville, Kraemer, & Gurbaxani, 2004; Wade & Hulland, 2004). There is also a growing literature using RBV to explain the impact of different IT/IS capabilities on firm performance (Duhan, 2007; Gu & Jung, 2013; Luo, Fan, & Zhang, 2012; Ordanini & Rubera, 2010; Ravichandran & Lertwongsatien, 2005; Stoel & Muhanna, 2009; Wang, Shi, Nevo, Li, & Chen, 2015).

2.1. IS capabilities

IS capabilities are key indicators of a firm's capacity to implement and utilize IT systems effectively. IS capabilities involve the implementation of strategically aligned planning for swift delivery and cost-effective operations and support (Gu & Jung, 2013). Similarly, IS capabilities may be described as a means of classifying and providing access to knowledge that is learned and successfully applied. Cepeda-Carrion et al. (2012) argue that IS capabilities positively increase the knowledge capacity of organizations. Thus, rigorous IS capabilities are likely to produce value in an organization by quickly responding to changes in the business environment (Peppard & Ward, 2004; Wang et al., 2015).

IS capabilities are composed of complicated and multidimensional facets. The extant literature proposes various perspectives regarding IS capabilities. For instance, Feeny and Willcocks (1998) suggested three perspectives: the design of the IT architecture, the business and IT vision, and the provision of IS services. Amidst these perspectives, IS capabilities have been identified as relationship building, business system thinking, leadership, architecture planning, contract facilitation, contract monitoring, informed buying, and vendor development (Feeny & Willcocks, 1998). In addition, the pertinent IS capabilities by Mclaren, Head, Yufe, and Chan (2011) have been described as operational flexibility, operational efficiency, planning, and external and internal analysis. Furthermore, IS capabilities also comprise three interrelated attributes: business and IS knowledge, flexibility of IT infrastructure, and the effective usage of the processes. IS capabilities are associated with resources and competencies. Resources constitute the stocks of available factors held or controlled by the organization (Peppard & Ward, 2004:175), and tangible IS resources therefore denote the IT infrastructure that is possessed and controlled by an organization. The competencies represent the organization's cross-functional capacity to organize, exploit, and activate these resources. According to Peppard and Ward (2004), IS competencies include six distinct features: Formulating a strategy, defining the IT capability, defining the IS contribution, delivering solutions, exploitation, and supplying. Both resources and competencies describe the capabilities composed of these domains (Garrison et al., 2015). Hence, IS capabilities are built upon the IS resources and IS competencies and become the basis of a competitive paradigm that provides knowledge to organizations to generate superior performance (Peppard & Ward, 2004; Wang et al., 2015).

For sustained competitive advantage, this study adopts RBV to explain a superior performance for a firm using IS resources classified as physical, human, and organizational capital (Barney, 1991). Accordingly, based on the extant literature, three distinct but interrelated capabilities, rather than being hierarchically linked with each other, are explained in the ensuing subsections: IS infrastructure capability, IS human resource capability, and IS administrative capability.

2.1.1. IS infrastructure capability

Infrastructure mainly refers to IT. Therefore, IT and IS are the terms that are used together within the subject of technology. As one of the key firm-specific resources, IT infrastructure is a group of shared technologies necessary for the foundation of all the business applications. It is considered as an indispensable part of a firm's structure. It establishes the technical platform and the service resources needed to respond swiftly to a firm's needs and changes. In addition, the IT infrastructure includes the resources, artifacts, and tools that contribute to the acquisition, processing, storage, distribution, and use of information (Pérez-López & Alegre, 2012). Thus, these technical capabilities build up a capacity to affect the firm's performance by speeding up the necessary business initiatives.

The IT infrastructure provides easy and fast access to the necessary information and enables knowledge transfer. A strong infrastructure enhances the influence of IS capabilities over firm performance by standardizing and automating certain tasks and enabling transfer of tacit knowledge into explicit knowledge (Pérez-López & Alegre, 2012). A flexible IT infrastructure also positively supports IS capabilities by providing a platform ready to access the appropriate data and establishing a network system to communicate with other systems. All of the firm's units adapt and integrate the IT infrastructure to change the business's direction and needs. Therefore, the infrastructure becomes part of the IS capabilities to reach every point and cover the range of the firm's boundaries (Mithas et al., 2011).

Most of the time, it is easy for rival firms to imitate each other's IT infrastructure, where these physical resources are available to procure without any difficulty. When basic IT is transformed into IS infrastructure capability (IS-IC), which is the distinct capacity to support the IS capabilities, it then becomes a rent-yielding and

inimitable resource. This is in line with VRIO framework analysis drawn from the logic of RBV, which clearly posits that firm performance depends on the extent to which a firm simultaneously possesses valuable (V), rare (R), imperfectly imitable (I) resources or capabilities that are properly organized (O) (Barney, 1991; Rothaermel, 2015). Thus, IS-IC is considered as one of the key resources or capabilities for a firm to gain sustainable competitive advantage.

2.1.2. IS human resource capability

Technical operations require a technical skill set to achieve certain activities at certain performance levels (Tippins & Sohi, 2003). IS human resource capability (IS-HRC) is designed to disseminate technical capacity and make sure that this capacity works efficiently and effectively (Cepeda-Carrion et al., 2012). Thus, IS-HRC makes an important contribution to the development of IS capabilities. There are two distinct characteristics of IS-HRC (Ravichandran & Lertwongsatien, 2005): Skills and specificity. Whereas skills refer to the possession of IS personnel with the required technical and business skills, specificity defines the level of understanding of IS personnel the culture and the routine of the firm. The technical skills of IS-HRC also include programming, system analysis and design, and competencies in emerging technologies (Bharadwaj, 2000). These characteristics of IS-HRC enable IS staff to communicate quickly and easily and integrate their knowledge with that of the business staff by providing rapid troubleshooting when problems occur. Human capabilities also stem from an understanding of the fundamentals of IT. Thus, IS staff can work within a wide range of system environments based on their knowledge of different programming capacities (Feeny & Willcocks, 1998). Strong IS-HRC has the capability to integrate IS and business processes more effectively; develop more reliable and cost-effective applications; integrate and communicate with the business departments/units more efficiently; and perform proactively to create future business and innovative new technological infrastructures to develop the value of the business (Bharadwaj, 2000).

The ability of firms to provide empowerment and autonomy to teams, improve and share tasks, provide a collaborative work environment, and organize and integrate their work practices creates opportunities in which IS personnel can not only leverage their technical skills but also deliver the assets of the socio-technical networks effectively to the firms (Bharadwaj, 2000).

2.1.3. IS administrative capability

The IS administrative capability (IS-AC) is the main driver of the identification and development of the IS capabilities that are the most directly associated with a firm's needs and values (Feeny & Willcocks, 1998; Wang et al., 2015). The idea of administration within IS introduces the factors that explain the quality of IS practices and the ability to develop the proper processes needed to sense, gather, organize and disseminate information and to instill the anticipated information behaviors and values in workers (Mithas et al., 2011). The administrative approach is mainly related to IM, performance monitoring, human resource management, planning, asset management and resource allocation (Zwass, 1997). To accomplish these administrative duties, leadership is necessary for the performance of these activities. The IS-AC sets the goals and the direction for each of the IS resources and competencies. The way in which work is carried out in the IS is determined by the IS-AC. The policies and rules of engagement, the strategic perspective and security are parts of the IS-AC (Feeny & Willcocks, 1998). IS planning is the main stream of management activity that ensures that the IS goals and initiatives are aligned with the business strategies and plans. This convergence enables IS capabilities to be implemented strategically and the value of a business to be improved (Ravichandran & Lertwongsatien, 2005). The administrative capability should be able to organize the best emerging technologies, assess the need for technologies and coordinate with external entities when necessary (Chen & Wu, 2011). An effective IS-AC ensures that there is consistency in the IS policies throughout an organization and decreases the duplication and redundancy in a system and organization (Bharadwaj et al., 1999). This capability creates an enterprise architecture perspective, which acts as a planning and piloting instrument that translates strategies into programs and projects (Land, Proper, Waage, Cloo, & Steghuis, 2009).

2.2. IS capabilities and decision-making performance

IS capabilities have a central role in decision-making. Managers and executives face highly unstructured tasks and need to make decisions despite a high degree of uncertainty (Islei, Lockett, Cox, Gisbourne, & Stratford, 1991). Nevertheless, some scholars claim that IS capabilities do not have an important impact on decision-making. To exemplify, Wildavsky (1983) argues that computer systems are only a way of collecting, retrieving, and storing data that concentrates on IS-IC. Thus, formal information systems provide structured data, but decision makers also need to have intangible, unstructured information to make decisions (Molloy, 1990). However, other scholars have supported the positive impact of IS capabilities. For instance, Huber (1984) stated that technology reduces the amount of time that is spent on reviewing information. Without having adequate IS capabilities, firms fall behind in their competitiveness compared with their rivals by not making the necessary decisions in a timely manner. Using technological infrastructure and related systems, the time and effort required to make decisions may be reduced. Thus, IS capabilities increase the effectiveness of managers in decision making to achieve their organizational goals (Huber, 1990). In addition, a large variety of people can participate in the decision-making processes. IS capabilities also reduce the level of hierarchy in an organization during decision-making processes and lead to faster and more accurate identification of problems and/or opportunities. Accurate forecasting critically improves the transparency and ability to make decisions; therefore, managers can concentrate on more critical factors (Islei et al., 1991).

The extant literature posits that a firm's IS capabilities, including IS-IC, IS-HRC, and IS-AC, are composed of an alignment between business and decision-making processes. Business is a goal-seeking activity that resolves problems through decision-making. Thus, it is evident that the alignment of business with decision making through IS capabilities, namely IS-IC, IS-HRC, and IS-AC, has a positive effect on decision-making performance. This discussion leads to the following multi-part hypotheses.

H1a. IS infrastructure capability (IS-IC) is positively associated with decision-making performance.

H1b. IS human resource capability (IS-HRC) is positively associated with decision-making performance.

H1c. IS administrative capability (IS-AC) is positively associated with decision-making performance.

2.3. Decision-making performance and business-process performance

Decision-making performance affects managerial choices when identifying the viable courses of action for a firm (James & Mark, 1996), whereas business processes describe the way in which a firm manages its products and services. Therefore, good decision-making performance directs business processes toward the adoption of successful new products and services, and helps to integrate them with new technologies (Baum & Wally, 2003), which lead to better business-process performance. Business-process performance measures the financial and non-financial flexibility, reliability, responsiveness and costs/assets of organizational and operational capabilities (Bernhard, Peter, Zoltan, & Maria-Luise, 2006). Likewise, business processes examine operational performance to make improvements. It improves business models so that firms can better compete against their rivals.

Effective decision-making performance enables economies of scale and knowledge synergies in different organizational combinations, and facilitates the exploitation of opportunities in both dynamic and non-dynamic environments. For instance, the prediction of market behavior may ignite organizational learning of business processes and may change performance behaviors (Baum & Wally, 2003). Since business processes involve multidisciplinary and complex situations, they draw knowledge from different resources, such as information systems and their capabilities, decision-making performance and operations management (Bisogno, Calabrese, Gastaldi, & Ghiron, 2016). Thus, we expect a positive relationship between decision-making performance and business-process performance, which leads to the following hypothesis:

H2. Decision-making performance is positively associated with business-process performance.

2.4. Mediating effect of decision-making performance

The impact of IS capabilities on business-process performance has been studied a lot in the literature. Many IS studies have indicated that successful IT infrastructure investments generate substantial changes within business processes leading to superior performance. These substantial changes occur in terms of direct and indirect effects between IS capabilities (IS-IC, IS-HRC, and IS-AC) and business-process performance. Earlier research by Elbashir, Collier, and Davern (2008) reveals that IS help firms to create business value since they have a direct impact on business processes. The impact of IS capabilities may be visible in the improvement of the efficiency and effectiveness measures of business processes (Peng, Quan, Zhang, & Dubinsky, 2016; Rahimi et al., 2016). Gu and Jung (2013) identify six areas of the value chain that IS capabilities support and improve a firm's core business activities: Production and operations, supplier relations, process planning and support, sales and marketing support, product and service enhancement, and customer relations. Operational efficiency, order fulfillment rates, satisfied consumer expectations, and customer intimacy are essential indicators of the business-process performance. Despite these claims about the direct effect of IS capabilities on business-process performance, these effects may not be possible to realize without a strong and effective decision-making process. Some of the previous literature state that IS capabilities support superior business-process performance indirectly by applying and leveraging the other resources and capabilities of a firm (Aringhieri, Carello, & Morale, 2016; Luo et al., 2012; Rahimi et al., 2016; Ravichandran & Lertwongsatien, 2005). Superior business-process performance includes not only individual but also operational efficiency, customer service efficiency and product/service development. Operational efficiency aims at developing and delivering efficient and effective products/services across all channels. At this point, IS-IC, IS-HRC, and IS-AC together create opportunities to reach these channels by using different methodologies, such as websites, enterprise software, or communication utilities, providing and/or developing necessary skill sets, and setting visionary sights. Customer intimacy posits the creation of customer value, which integrates the possession of distinctive market knowledge and sense, and customer relationship within the internal processes of a firm. For the creation of customer value, business intelligence and customer relationship management systems are the main resources. Firms with these IS capabilities are more conscious of emerging market opportunities and are able to offer new products/services according to their customers' needs. Meanwhile, identification of new markets and entry into them are decision-making activities, and such decisions may affect the business processes and their performance (Ravichandran & Lertwongsatien, 2005). By improving the existing business processes, practical research results report that IS capabilities help to assess the current business-process performance and improve the decision-making performance (Aringhieri et al., 2016). These two different perspectives in the literature conclude that IS capabilities are both directly and indirectly related to business-process performance attributes (Luo et al., 2012). Nevertheless, decision-making performance depicts a capacity to decide on a feasible course of action in a firm (James & Mark, 1996). Thus, in this study, we adhere to the indirect notion and argue that decision-making performance creates an indirect link between IS-IC, IS-HRC, and IS-AC, and business-process performance. This is stated more formally in the following set of hypotheses:

H3a. Decision-making performance mediates the relationship between IS-IC and business-process performance.

H3b. Decision-making performance mediates the relationship between IS-HRC and business-process performance.

H3c. Decision-making performance mediates the relationship between IS-AC and business-process performance.

Through IS capabilities, providing accurate and more reliable data, forecasting ability and decision models will increase the effectiveness of the decision makers to make faster comprehensive decisions effectively, then achieve the objective of the organization (Huber, 1990). Therefore, the integration of IS capabilities into decision-making processes helps organizations to improve their performance (Baum & Wally, 2003). IS-IC, IS-HRC, and IS-AC provide the necessary infrastructure, know-hows, skill sets, and organizational abilities to make comprehensive decisions. Therefore, better decision-making performance enhances the relationship between each of the underlying dimensions of IS capabilities and firm performance, and thus leads to the following multi-part hypotheses:

H4a. Decision-making performance mediates the relationship between IS-IC and firm performance.

H4b. Decision-making performance mediates the relationship between IS-HRC and firm performance.

H4c. Decision-making performance mediates the relationship between IS-AC and firm performance.

2.5. Serial mediating effect of decision-making performance and business-process performance

IS capabilities, in terms of IS-IC, IS-HRC, and IS-AC, can influence business value, and they build the relationship between departments and functions in today's business world. When they create a link with other firm resources, IS capabilities as a whole provide strategic benefits (Wade & Hulland, 2004). According to Powell and Dent-Micallef (1997), IS capabilities eventually lead to higher firm performance, but they may not contribute directly to the sustaining firm performance. IS capabilities should interact with other firm resources to achieve a sustainable firm performance.

Based on the preceding discussion and confirming evidence reported earlier, the relationship between the facets of IS capabilities (IS-IC, IS-HRC, and IS-AC) and firm performance may be indirectly linked. However, most of the studies have focused on only a single mediation effect at a time or a parallel one (Hu, Chang, & Hsu, 2017; Peng et al., 2016). We posit that there should be more than one mediation impact on firm performance to ensure sustained and improved firm performance, and that these multiple mediators may have association with each other as well (Hayes, 2013). Thus, the serial multiple mediator model of decision-making performance and business-process performance may lead IS-IC, IS-HRC, and IS-AC to have a positive effect on firm performance. This is stated more formally in the following multi-part hypotheses.

H5a. Decision-making performance and business-process performance serially mediate the relationship between IS-IC and firm performance.

H5b. Decision-making performance and business-process performance

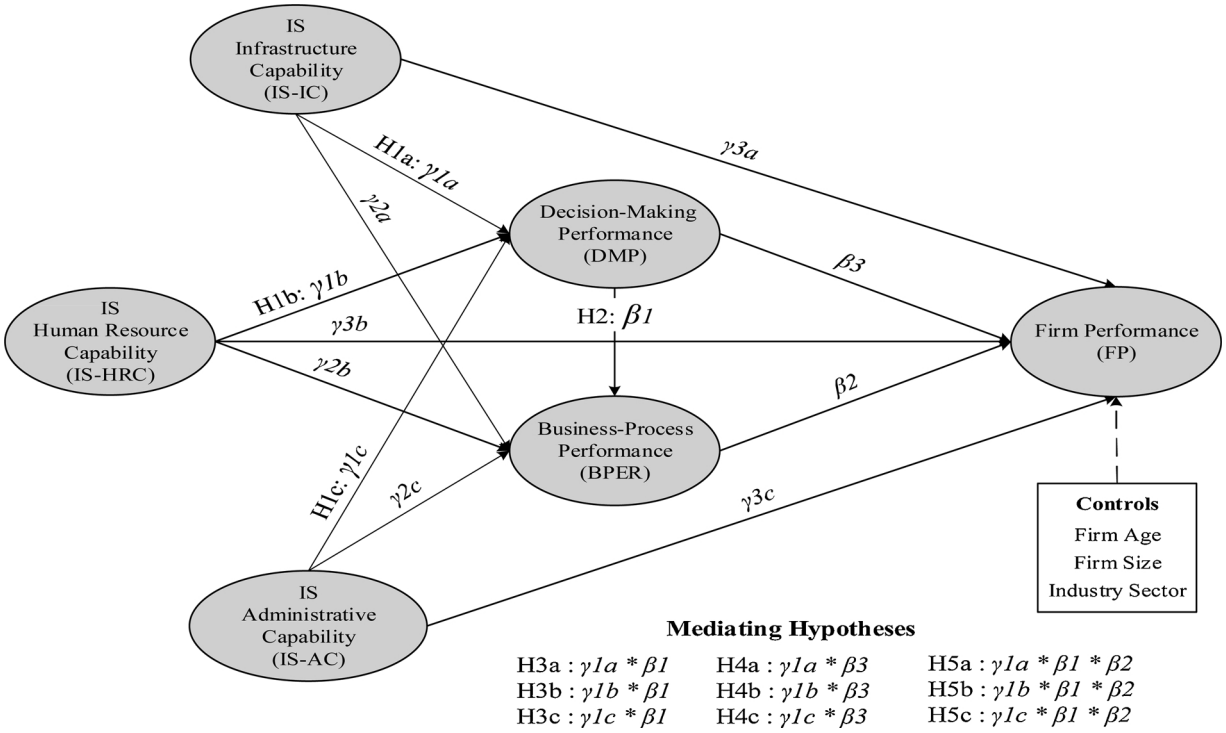

Fig. 1. Conceptual framework.

serially mediate the relationship between IS-HRC and firm performance.

H5c. Decision-making performance and business-process performance serially mediate the relationship between IS-AC and firm performance.

Fig. 1 shows the conceptual framework that depicts the nexus of the relationships between the main constructs discussed above.

3. Research methodology

3.1. Survey setting and data collection

The data for this study was collected through a mail survey using a questionnaire. The design, the development of the measurement items, and the questionnaire were constructed in line with the guidelines that have commonly been mentioned in prior research (Dillman, 2007; Hinkin, 1998). Based on a comprehensive review of the relevant literature, the survey instrument was prepared to measure the following three dimensions of IS capabilities: Infrastructure capability, human resource capability, and administrative capability. Again, relying on the existing literature, the following constructs were developed: Decision-making performance, business-process performance, and firm performance.

To establish the content validity of the measures used in this study, the procedure suggested by Hair, Money, Samouel, and Page (2007) was employed. First, in-depth interviews were conducted with three chief technology officers (CTOs) in Turkey, who provided us their views of the issues on IS applications and capabilities based on their actual knowledge and experience. Second, an initial version of the survey questionnaire was revised based on discussions with several expert academics. Finally, a pre-test was conducted with six business professionals that provided eventual fine-tuning opportunities to develop an informative, clear, and well-structured survey questionnaire.

We sampled a range of firms from several product-intensive industries located in Turkey to achieve a high level of external validity and generalizability of the survey findings. The respondent firms were selected among medium-size and large-size firms. Thus, small firms of fewer than 50 employees were excluded from this sample frame, as the small-size firms largely lack the required resources to invest in IS systems and applications.

The targeted respondents who would fulfill the surveys were asked to be senior and executive managers or medium-level managers with relevant knowledge of IS capabilities as well as knowledge of the entire company. A cover letter of the survey clearly indicated the required profile for an acceptable respondent. The respondents who did not meet these criteria were eliminated during the data evaluation process.

The sampling frame was constructed from the members of the TOBB (Union of Chambers and Commodity Exchanges of Turkey). The TOBB database consists of 365 local chambers of commerce, maritime commerce, and commodity exchange with over one million firms. Following the elimination of firms that did not meet the selection criteria, we randomly sampled 800 firms from this database. Following two waves of data collection and one reminder, a total of 236 questionnaires were returned; of which 204 were usable, representing an effective response rate of 25.5 percent. The remaining 32 questionnaires were eliminated due to missing values, improper respondents/firms and double respondents. A summary of the characteristics of the sample is shown in Table 2.

Non-response bias was tested using Armstrong and Overton (1977) method. The early respondents to the surveys were compared with the late respondents. We first compared the responses from early and late respondents to the survey and found no statistically significant differences ($p > 0.05$). Second, a comparison of a randomly selected group of 100 non-respondent firms with 204 respondent firms revealed no significant differences for any organizational level indicators (e.g., number of employees, years of operation, and annual sales). In addition, a relatively high response rate (25.5 percent) meant that the respondent firms were likely to provide a reasonable representation of the total sample, which is another solution to non-response bias (Rose, Sidle, Griffith, Rose, & Griffith, 2007). Therefore, no evidence was found for non-response bias. An additional check was undertaken to verify whether there was any significant variation in the responses stemming from the nature of the respondent manager's functional area of responsibility (i.e., IT/IS-related vs. non-IT/IS-related) that are likely

Table 2
Characteristics of the sample.

Characteristics		Number	%
Respondent's position	Senior/executive manager	106	52
	Middle/first line manager	98	48
Respondent's functional area of responsibility	IT/IS related	73	35.8
	Non-IT/IS related	131	64.2
Firm size (number of employees)	Medium-size (less than 250)	87	42
	Large-size (equal or more than 250)	117	58
Firm age (years of operation)	Young firms (equal or less than 15)	61	30
	Middle age firms (16-30)	80	39
	Mature firms (more than 30)	63	31
Annual revenue (Turkish Lira)	Less than 25 million	34	17
	25 million-99 million	44	22
	100 million-249 million	26	13
	250 million-499 million	19	9.3
	Equal or more than 500 million	81	40
Industry sectors	Food and beverages	16	7.8
	Durables, consumer electronics and machinery	22	11
	Chemicals, pharmaceutical and plastics	15	7.4
	Textile, leather and clothing	26	13
	Other manufacturing	8	3.9
	Investment, banking and finance	22	11
	Transportation, telecommunication and media	15	7.4
	Information systems and technology services	23	11
	Construction and real estate	11	5.4
	Health and social services	12	5.9
	Wholesale and retail	22	11
	Other services	12	5.9

to bias the survey findings. The test results revealed no significant differences in the responses between IT/IS-related and non-IT/IS-related managers ($p < 0.05$) for the following measures used in the study: IS infrastructure capability (t-value = 1.35, $p = 0.17$), IS human resource capability (t-value = 1.85, $p = 0.07$), IS administrative capability (t-value = 1.90, $p = 0.06$), decision-making performance (t-value = 0.27, $p = 0.78$), business-process performance (t-value = 0.35, $p = 0.72$) and firm performance (t-value = 0.38, $p = 0.70$).

3.2. Measurement of the variables

The following are brief descriptions of the main constructs and control variables used in the study. The main constructs are measured through five-point Likert type scales ranging from 1 = "strongly disagree" to 5 = "strongly agree." While it has been claimed that the ideal number of item alternatives appeared to be centered on seven with some situations calling for as few as five or as many as nine (Cox, 1980), the literature suggests that a five-point scale appears to be less confusing and to increase response rate and response quality along with reducing respondents' "frustration level" (Babakus & Mangold, 1992; Devlin, Dong, & Brown, 1993). It should also be noted that five-point scale has been widely used in IM literature (e.g., Kim, Oh, Shin, & Chae, 2009; Dwivedi, Kapoor, Williams, & Williams, 2013; Kapoor, Dwivedi, Piercy, Lal, & Weerakkody, 2014; Shareef, Kumar, Dwivedi, & Kumar, 2016).

3.2.1. Main constructs

IS capabilities were measured with three constructs in the model. In line with the current IS literature, these were identified as *IS infrastructure capability* (IS-IC), *IS human resource capability* (IS-HRC) and *IS administrative capability* (IS-AC).

IS-IC was adapted from earlier studies (Gable et al., 2008; Mithas et al., 2011; Pérez-López & Alegre, 2012; Ravichandran & Lertwongsatien, 2005). The items comprising IS-IC included: "developing customized applications," "reliability of solutions and products," "readiness of IS infrastructure," "response pace for requests," "network infrastructure competency," "infrastructure security," "data sharing," and "fast and flexible Internet-based operations."

The items constituting the IS-HRC were drawn from earlier studies (Bharadwaj, 2000; Cepeda-Carrion et al., 2012; Pérez-López & Alegre, 2012; Ravichandran & Lertwongsatien, 2005; Tippins & Sohi, 2003) and are as follows: "knowledge of IS," "expertise in IS,' "ability to learn and apply new technologies," "skills and knowledge capacity," "capability of implementing," "capability of discovering problems," and "capability of maintaining."

The items measuring the IS-AC were adapted from the extant literature (Pérez-López & Alegre, 2012; Ravichandran & Lertwongsatien, 2005; Yeh et al., 2012). The items comprising the IS-AC include: "IS strategy," "IS management authority," "IS planning capacity," "IS adaptation to the development process," "guideline for service requests," and "IS service quality."

Decision-making performance (DMP) evaluates the efficiency and effectiveness of the decision-making in a company. The scale for this construct was drawn from the previous literature (Gable et al., 2008; Huber, 1990; Mclaren et al., 2011; Mithas et al., 2011; Tippins & Sohi, 2003). The DMP includes the following items: "organizational communication for effective decision making," "culture of long-term planning," "effective decision making," "speed in analyzing information," "time management for decision making," "reaching accurate and comprehensive information," "rapid and accurate identification of problems and opportunities," and "delegation of decision making."

It is not easy to select a single measure of *business-process performance* (BPER). The extant literature has listed several quantitative and qualitative objectives that have been set to guide BPER (Bayraktar, Demirbag, Koh, Tatoglu, & Zaim, 2009; Elbashir et al., 2008; Luo et al., 2012; Mahmood & Soon, 1991; Mclaren et al., 2011; Mithas et al., 2011). Based on this literature, a subjective approach for the measurement of the BPER construct was used, and the following items are included: "customer relationship," "supplier relationship," "internal and external coordination," "purchasing cost," "delivery time," "inventory level," "economies of scale," "utilization of tools and equipment," "productivity of labor," "customer request," "accessing distribution channels and new markets," "identifying market trends," and "differentiated products and services."

Prior studies have adopted either an objective or a subjective approach to measuring *firm performance* (FP). The subjective approach based on executives' perceptions of performance has been widely used in empirical studies, having been justified by several researchers (e.g., Dess & Robinson, 1984; Venkatraman & Ramanujam, 1986; Geringer & Hebert, 1991; Collings, Demirbag, Mellahi, & Tatoglu, 2010). It should also be noted that the use of objective or quantitative performance measures might be subject to some limitations. To exemplify, Fisher and McGowan (1983) claim that objective measures in company statements are flawed and are not appropriate for research purposes, while Day and Wensley (1988) suggest an absence of suitable objective measures. Moreover, Turkish firms are not willing to disclose financial data unless they are listed on the stock exchange, hence making access to quantitative and objective measures of FP highly difficult. Due to such complexities involved, the use of perceptual measures of FP was adopted and the FP adapted here was derived from previous studies (Bharadwaj, 2000; Glaister, Dincer, Tatoglu, Demirbag, & Zaim, 2008; Mahmood & Soon, 1991; Mithas et al., 2011; Ordanini & Rubera, 2010; Pérez-López & Alegre, 2012; Santhanam & Hartono, 2003; Stoel & Muhanna, 2009). This performance dimension includes the following criteria: "return on sales," "distribution cost," "market share," "return on investment," "administrative expense," "inventory level," "staff cost," and "customer loyalty."

3.2.2. Control variables

The effects of firm-specific characteristics on FP were captured by the following three control variables.

Firm age (AGE) was measured by the number of years since the establishment of the firm. Young firms comprise those whose ages are equal or less than 15 years. Middle-age firms include of those whose ages vary between 16 and 30. Mature firms are the ones whose ages are more than 30 years. Regarding the number of firms in these three age groups, the young firms group consists of 61 firms, while middle-age and mature groups include 80 and 63 firms, respectively.

Firm size (SIZE) was measured by the number of employees. Firms are broadly classified into two categories: Medium-size and large-size firms. The firms with equal or more than 50 and less than 250 employees are defined as medium-size, while those with 250 employees and more are labeled as large-size firms. This definition is consistent with that of the Turkish Statistical Institute (TUIK, http://www.turkstat.gov.tr/) and the Turkish Small Business Administration (KOSGEB, https://www.kosgeb.gov.tr/). Regarding the number of firms in these two groups, the medium-size group includes 87 firms, while large-size group consists of 117 firms.

To control for the effect of *industry sector* (IND), two broad industry categories were created: Manufacturing and service industries. In terms of the number of firms in these two groups, the manufacturing group includes 87 firms, while the service group includes 117 firms.

4. Data analysis and results

Measurement model validation is performed through confirmatory factor analysis (CFA). Cronbach's alpha and composite reliability values, convergent and discrete validities are also checked further for the reliability and validity of the model constructs. The potential for common method variance (CMV) is investigated to validate the constructed model. Finally, hypotheses of the proposed model are examined. Details of these data analyses stages are discussed in more detail in the ensuing subsections.

4.1. Measurement model validation

The measurement model considers the relationship between the constructs and their items. To test the measurement model validity in Fig. 1, confirmatory factor analysis (CFA) was applied to the data. The goodness-of-fit indices for the measurement model were found to be satisfactory ($\chi 2$/df. = 1.38, the goodness-of-fit index [GFI] = 0.83, the adjusted goodness-of-fit index [AGFI] = 0.80, the Tucker–Lewis coefficient [TLI] = 0.92 and the comparative fit index [CFI] = 0.93, RMSEA = 0.043) and confirmed the proposed model. Furthermore, factor loadings were also calculated to specify the degree of correspondence between the variables. The factor loadings for each of the constructs were found to be significant ($p < 0.01$). This validation also approves the presence of IS-IC, IS-HRC, and IS-AC as the constructs to represent a multidimensional measure of IS capabilities. Thus, they are distinct in terms of their unique content but interrelated because of their total effect on IS capabilities. Relying on RBV, they are also critical drivers for FP under the serial multiple mediators model.

In order to address the possible *endogeneity bias*, a two-stage least squares (2SLS) regression was adopted (Bellamy, Ghosh, & Hora, 2014; Guide & Ketokivi, 2015). Endogenous variables were instrumented by both AGE and SIZE as instrumental variables, since these two variables were not significantly related to FP (Table 4). After performing the 2SLS method using STATA, we conducted the Durbin–Wu–Hausman post-estimation test of endogeneity for the validity of the instruments (Davidson & MacKinnon, 1993; Liu, Wei, Ke, Wei, & Hua, 2016). The test results confirm the validity of instruments, indicating that the results are unlikely to be influenced by endogeneity.

4.2. Reliability and validity of the constructs

A reliability and validity analysis were conducted to check the internal consistency of the constructs in Fig. 1. Unidimensionality of the constructs was measured with *Cronbach's alpha*. As shown in Appendix A, Cronbach's alpha values varied between 0.77 and 0.88, which are greater than the threshold value of 0.70 (Hair, Black, Babin, & Anderson, 2010; Nunnally & Bernstein, 1994).

Composite reliability (CR) estimates the extent to which a set of construct items share in their measurement of the construct (Hair et al., 2010). The threshold value of 0.70 for CR specifies sufficient reliability for a construct (Fornell & Larcker, 1981). As shown in Appendix A, the CR measurements are within the recommended thresholds, and each of the constructs in the study is sufficiently reliable.

In addition, average variance extracted (AVE) estimates were also calculated to confirm the *convergent validity*. The threshold value of 0.5 for AVE indicates adequate convergent validity for a construct (Fornell & Larcker, 1981; Yusoff, 2011). As shown in Appendix A, the AVE measurements satisfy the recommended thresholds, so each of the constructs in the study is sufficiently reliable and has adequate convergent validity.

Discriminant validity describes the degree to which the measures of the different dimensions of all the constructs are different from each other. In Table 3, the results of 15 pairwise tests are shown for discriminant validity. The findings strongly confirm the discriminant validity of each pair.

The descriptive statistics and inter-correlations among the variables are shown in Table 4. During data analysis, it was revealed that some of the variables were not distributed normally. To warrant adequate normality prior to data analysis, these variables were converted to a normal distribution using Templeton's two-step transformation approach (Templeton, 2011).

4.3. Common method variance

Potential for CMV was also investigated to check its influence on structural results. The CMV may lead to erroneous conclusions about the relationships between the variables by inflating or deflating the variance (Craighead, Ketchen, Dunn, & Hult, 2011). The Harman's single-factor test was used to investigate the CMV in this study. In this single-factor test, all of the items in this study are subjected to an exploratory factor analysis (EFA) (Malhotra, Kim, & Patil, 2006; Podsakoff & Organ, 1986). The number of factors extracted from the EFA is forced to one. The results reveal that the common method variance accounts for 30.41 percent of the total variance. Thus, the CMV is not considered to be statistically significant, since it is below the threshold value of 0.50.

Table 3
Discriminant validity of the measurement model.

Test #	Description	$\chi 2$ model	$\chi 2$ unconstrained model	Difference*
1	IS-IC→ IS-HRC	204.82	112.14	92.42
2	IS-IC → IS-AC	1070.73	1007.99	62.74
3	IS-AC → IS-HRC	157.16	93.33	63.83
4	IS-IC→DMP	175.96	64.71	111.25
5	IS-IC→BPER	242.32	88.30	154.02
6	IS-IC→FP	191.64	41.40	150.24
7	IS-HRC→DMP	203.07	93.60	109.47
8	IS-HRC→BPER	256.93	118.62	138.31
9	IS-HRC→FP	141.90	79.41	62.49
10	IS-AC→DMP	139.66	61.51	78.15
11	IS-AC→BPER	196.13	59.44	136.69
12	IS-AC→FP	140.98	38.24	102.74
13	DMP →BPER	193.96	77.99	115.97
14	DMP →FP	186.15	70.41	115.74
15	BPER →FP	236.45	95.83	140.62

* All values are significant at $p < 0.001$.

Table 4
Descriptive statistics and inter-correlations.

Variables		Definition	Mean	S.D.	1	2	3	4	5	6	7	8	9
1	IS-IC	IS infrastructure capability	4.10	0.60	1								
2	IS-HRC	IS human resource capability	4.11	0.61	0.73**	1							
3	IS-AC	IS administrative capability	3.86	0.68	0.71**	0.73**	1						
4	DMP	Decision-making performance	3.76	0.68	0.44**	0.54**	0.54**	1					
5	BPER	Business-process performance	4.12	0.47	0.35**	0.44**	0.42**	0.68**	1				
6	FP	Firm performance	3.76	0.55	0.21**	0.27**	0.34**	0.46**	0.56**	1`			
7	AGE	Firm age	2.00	0.78	0.02	0.06	0.07	0.05	0.06	−0.01	1		
8	SIZE	Firm size	0.57	0.49	0.24**	0.18**	0.26**	0.06	0.05	0.09	0.24**	1	
9	IND	Industry sector	0.42	0.49	−0.11	−0.16	−0.17*	−0.05	0.03	0.17*	0.14	0.00	1

* $p < 0.05$.
** $p < 0.01$.

4.4. Hypothesis testing

The study examines the structural relationships between the constructs through a path analysis by considering the multiple mediating effects. Path analyses with the AMOS software (Byrne, 2010) were used to test the hypotheses in the conceptual model. The maximum likelihood method was selected to calculate the model parameters, and the results of the analyses are depicted in Fig. 2. In addition to three constructs, comprising IS capabilities (i.e., IS-IC, IS-HRC, and IS-AC), two mediating variables (i.e., DMP and BPER) and three control variables (i.e., firm age, firm size and industry sector) are also included in the model. The goodness-of-fit index of the model is less than the threshold value of 3 ($\chi^2/df = 1.38, p < 0.01$). Moreover, the fit indices for the model are also within the acceptable levels (GFI = 0.83, AGFI = 0.80, TLI = 0.92, CFI = 0.93, RMSEA = 0.043) (Cheung & Rensvold, 2002; Hair et al., 2010; Hooper, Coughlan, & Mullen, 2008). These findings confirm that the model indicates a good fit to the data.

Fig. 2 shows that H1a (γ1a) was not supported, indicating that IS-IC has no association with DMP. However, strong support was found for both H1b ($\gamma 1b$) and H1c ($\gamma 1c$) that IS-HRC and IS-AC have positive associations with DMP ($\gamma 1b = 0.38$, $\gamma 1c = 0.56$, $p < 0.05$).

H2 ($\beta 1$), which posits that DMP is positively associated with BPER, received strong support ($\beta 1 = 0.82$, $p < 0.01$). With respect to the mediating role of DMP between IS-IC and BPER, no support was found for H3a ($\gamma' 3a = \gamma 1a^{*}\beta 1$) since DMP has no significant association with IS-IC. For testing mediation effect of DMP between the other two IS-related capabilities (IS-HRC and IS-AC) and BPER, their total direct effects were analyzed in the absence of the mediating variable, DMP. These relationships for both capabilities were found significant. After re-introducing the mediating variable, DMP, to the structural model, the direct relationship between IS-HRC and BPER, as well as IS-AC and BPER, appeared to be

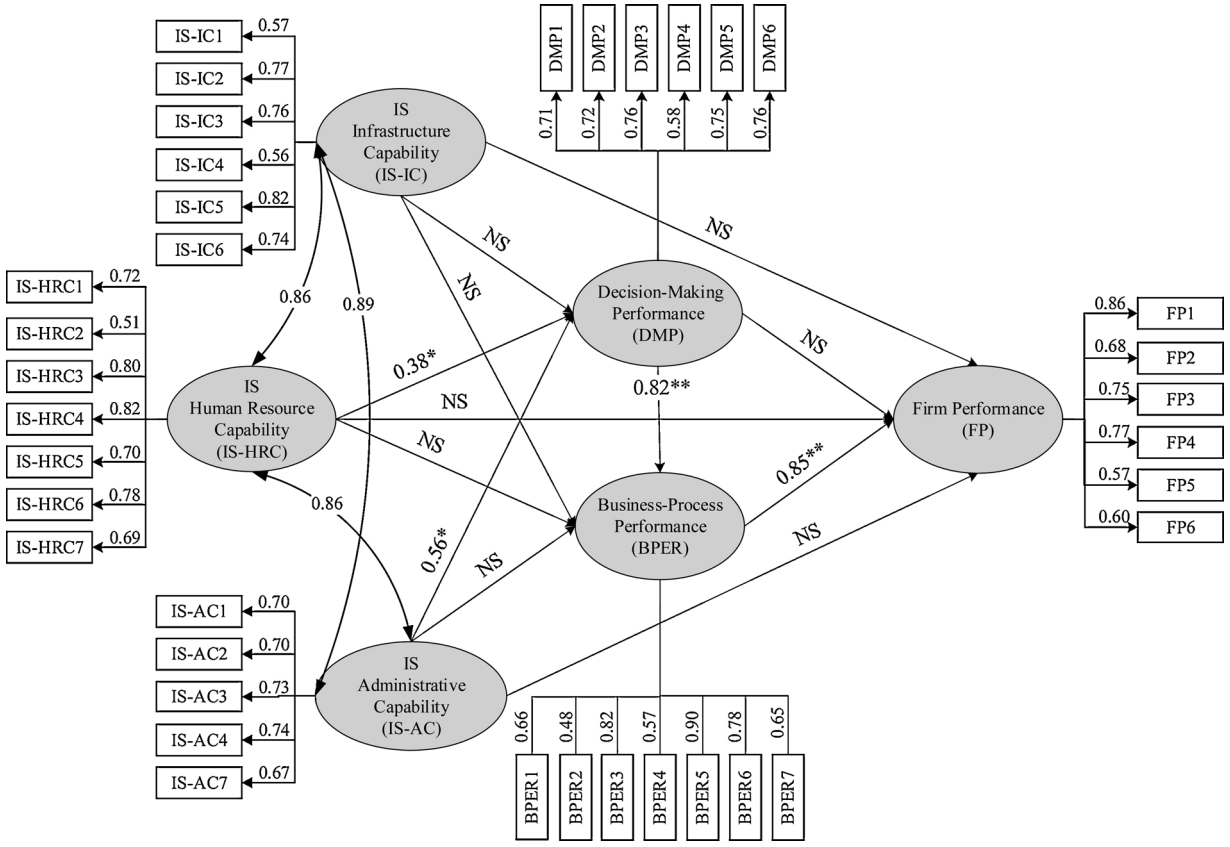

Fig. 2. Results of SEM with two serial multiple mediator effects[+].
[+]: Standardized regression weights are shown.
*$p < 0.05$, **$p < 0.01$, NS: Not significant.

Table 5a
Results of two serial multiple mediations for IS-HRC^{+}.

Paths	Relations	Unstandardized weights	Indirect effect	z score	Mediation
IS-HRC→BPER→FP	IS-HRC→BPER	0.078 (0.108)	0.090 (0.125)	0.719$^{\xi}$	No support for mediation role of BPER
	BPER→FP	1.160 (0.135)			
IS-HRC→DMP→FP	IS-HRC→DMP	0.408 (0.190)	−0.076 (0.086)	−0.879$^{\xi}$	No support for mediation role of DMP
	DMP→FP	−0.187 (0.194)			
IS-HRC→DMP→BPER	IS-HRC→DMP	0.408 (0.190)	0.198 (0.098)	2.016$^{\xi*}$	Support for full mediation role of DMP between IS-HRC and BPER
	DMP→BPER	0.487 (0.083)			
DMP→BPER→FP	DMP→BPER	0.487 (0.083)	0.564 (0.116)	4.845$^{\xi***}$	Support for full mediation role of BPER between DMP and FP
	BPER→FP	1.160 (0.135)			
IS-HRC→DMP→BPER→FP	IS-HRC→DMP	0.408 (0.190)	0.230 (0.117)	1.963$^{\xi\xi*}$	Sobel test for serial mediation effect of DMP and BPER between IS-AC and FP
	DMP→BPER	0.487 (0.083)			
	BPER→FP	1.160 (0.135)			

$^{+}$Standard errors are indicated within the parentheses.
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.
$^{\xi}$2-tail z− score = $\gamma 1^{*}\beta 1 / \sqrt{\beta 1^{2}*Se\gamma 1^{2} + \gamma 1^{2}*Se\beta 1^{2}}$ for single mediation effect.
$^{\xi\ \xi}$2-tail z− score= $\frac{\gamma 1^{*}\beta 1^{*}\beta 2}{\sqrt{\gamma 1^{2}*\beta 1^{2}*Se\beta 2^{2} + \gamma 1^{2}*\beta 2^{2}*Se\beta 1^{2} + \beta 1^{2}*\beta 2^{2}*Se\gamma 1^{2}}}$ for serial multiple mediation effect.

Table 5b
Results of two-serial multiple mediations for IS-AC^{+}.

Paths	Relations	Unstandardized weights	Indirect effect	z score	Mediation
IS-AC→ BPER→FP	IS-AC→BPER	0.060 (0.121)	0.069 (0.140)	0.495$^{\xi}$	No support for mediation role of BPER
	BPER→FP	1.160 (0.135)			
IS-AC→DMP→FP	IS-AC→DMP	0.470 (0.218)	−0.087 (0.099)	−0.879$^{\xi}$	No support for mediation role of DMP
	DMP→FP	−0.187 (0.194)			
IS-AC→DMP→BPER	IS-AC→DMP	0.470 (0.218)	0.228 (0.113)	2.023$^{\xi*}$	Support for full mediation role of DMP between IS-AC and BPER
	DMP→BPER	0.487 (0.083)			
DMP→BPER→FP	DMP→BPER	0.487 (0.083)	0.564 (0.116)	4.845$^{\xi***}$	Support for full mediation role of BPER between DMP and FP
	BPER→FP	1.160 (0.135)			
IS-AC→DMP→BPER→FP	IS-AC→DMP	0.470 (0.218)	0.265 (0.134)	1.969$^{\xi\xi*}$	Sobel test for serial mediation effect of DMP and BPER between IS-AC and FP
	DMP→BPER	0.487 (0.083)			
	BPER→FP	1.160 (0.135)			

$^{+}$Standard errors are indicated within the parentheses.
$^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$.
$^{\xi}$2-tail z− score = $\gamma 1^{*}\beta 1 / \sqrt{\beta 1^{2}*Se\gamma 1^{2} + \gamma 1^{2}*Se\beta 1^{2}}$ for single mediation effect.
$^{\xi\ \xi}$2-tail z− score= $\frac{\gamma 1^{*}\beta 1^{*}\beta 2}{\sqrt{\gamma 1^{2}*\beta 1^{2}*Se\beta 2^{2} + \gamma 1^{2}*\beta 2^{2}*Se\beta 1^{2} + \beta 1^{2}*\beta 2^{2}*Se\gamma 1^{2}}}$ for serial multiple mediation effect.

insignificant, but an indirect relationship through DMP was found significant for both IS-HRC and IS-AC. This indirect effect between IS-HRC and BPER may be quantified as the product of unstandardized regression weight of IS-HRC on DMP (γ1b) and DMP on BPER (β1), as shown in Table 5a (Hayes, 2013). Similarly, the indirect effect of IS-AC on BPER may be calculated by the product of γ1c and β1, as depicted in Table 5b. Furthermore, the Sobel test was also applied to check whether the mediation effects of DMP were statistically significant (Baron & Kenny, 1986). The first row of both Tables 5a and 5b shows that there is support for H3b (γ´3b = γ1b*β1) and H3c (γ´3c = γ1c*β1), respectively ($p < 0.05$). Therefore, DMP establishes a full positive mediation effect between both IS capabilities (i.e., IS-HRC and IS-AC) and BPER.

To check the mediation effect of DMP between IS-related capabilities and FP as stated in H4a, H4b and H4c (γ´4a = γ1a*β3, γ´4b = γ1b*β3 and γ´4c = γ1c*β3), a series of tests were conducted. First, in the absence of the mediation of DMP, the total effect was tested for each one of the

IS-related capabilities. The results were found insignificant for IS-IC, but positively significant for IS-HRC and IS-AC. Second, the full model was run to identify the mediating effect of DMP on FP. The test results showed that the link between DMP and FP did not indicate any significant effects. Thus, no support was found for H4a, H4b, and H4c. Fredrickson and Mitchell (1984) note that there is a negative relationship between DMP and FP in an unstable environment, but a positive relationship is expected in a stable environment. However, the results are unable to verify either of these cases. In other words, DMP itself is not enough to mediate the links between IS-related capabilities and FP.

In order to test the serial multiple mediation models denoted by H5a, H5b, and H5c ($\gamma''5a = \gamma1a*\beta1*\beta2$, $\gamma''5b = \gamma1b*\beta1*\beta2$ and $\gamma''5c = \gamma1c*\beta1*\beta2$), we first tested the mediating roles of DMP and BPER separately on the relationship between IS-HRC and FP, as well as IS-AC and FP. They were found not significant, as shown on the first two rows of Tables 5a and 5b, respectively. Then, the total effect of each IS-IC, IS-HRC, and IS-AC on FP in the absence of the mediators (DMP and BPER) in the conceptual model was checked. As noted earlier, the results were found to be insignificant for IS-IC, but positive and significant for IS-HRC and IS-AC. Next, the full serial mediating effects were tested under the presence of the mediators. The direct relationships between IS-related capabilities (IS-IC, IS-HRC, and IS-AC) and FP were found to be insignificant. The indirect effect of IS-IC was also found insignificant since the relationship between IS-IC and DMP was insignificant. Therefore, there is no support for H5a with respect to the serial mediation effect between IS-IC and FP. However, the indirect effects of IS-HRC and IS-AC on FP via DMP and BPER together were noted to be positive and significant. Moreover, the serial mediating effects were calculated by multiplying the unstandardized regression weights of the effects, $\gamma1b * \beta1 * \beta2 = 0.23$ for IS-HRC, and $\gamma1c * \beta1 * \beta2 = 0.26$ for IS-AC, as the details are shown in Tables 5a and 5b, respectively (Taylor, Mackinnon, & Tein, 2008). The estimates of the serial multiple indirect mediation effect were found significant ($p < 0.05$). Thus, these findings support the full serial mediating role of DMP and BPER for H5b and H5c. The distinctive serial relationship of DMP and BPER together establishes a link between IS-HRC and IS-AC, and FP.

As for the control variables, only IND was found to significantly influence FP ($p < 0.05$) where firms operating in manufacturing industries had a better level of FP as compared to firms in service industries.

A summary of the level of support for the study's hypotheses is shown in Table 6.

5. Discussion

The past two decades have witnessed a remarkable growth of studies and advances in our understanding of IS resources or capabilities and organizational performance. Recent studies highlight the need to make further progress in this direction using relevant mediating variables in opening up the black box of the relationship between IS capabilities and performance. To this end, the present study makes a progress in this direction. The novelty of the study lies in the fact that it considers the joint mediating effect of both DMP and BPER in the IS capabilities-FP relationship through a multiple mediation model.

The test results confirm the proposed serially mediating model, according to which DMP and BPER play a critical serial mediating role in the IS-HRC and IS-AC, and FP relationships. No support, however, has been found concerning the serial mediation effect between IS-IC and FP. The results obtained have theoretical as well as practical consequences.

5.1. Theoretical contributions

This study contributes to the adoption of RBV in IM research from many respects. IT/IS infrastructure is an imitable resource easy to access in the market with many substitutes. By itself, building IT/IS infrastructure is not enough for a firm to create sustained competitive advantage. However, IS-HRC and IS-AC are idiosyncratic firm attributes. They are valuable and rare, so imperfectly imitable because of the causally ambiguous and socially complex nature of the constructs. Moreover, to remark about the capabilities built on human resources and administrative aspects of IS, they should penetrate to decision-making and business processes of a firm to increase the performance of these processes, as well as the overall FP. The serial mediation model developed in this study makes an original contribution to RBV by opening the black box concerning the relationship between the IS-related capabilities and FP by setting DMP and BPER as the missing keys.

IS capabilities provide firms with access to rapidly available, timely, accurate, and comprehensive information in order to identify their problems as well as seize the market opportunities. Managers who gather information and knowledge and make decisions through the implementation of analytical techniques are more effective than those who do not (James & Mark, 1996). As indicated by this study, IS capabilities are envisaged to enhance the DMP of the firms. However, the study finds out that IS-HRC and IS-AC help to improve DMP but IS-IC does not. This clearly illustrates that IT infrastructure itself develops an ability to disseminate the necessary knowledge within the organization, but this is not sufficient to improve the DMP. Presence of a strong IS-AC and IS-HRC for the entire firm is what really matters for DMP. Consequently, these findings underline the distinctive nature of IT/IS infrastructure as an imitable resource, and thus highlight the importance of IS-HRC and IS-AC for DMP.

The results of the study indicate that superior DMP helps firms to make accurate and timely decisions, and aligns their business processes better with their objectives. Therefore, the improved DMP increases the efficiency and effectiveness of business processes in a firm through

Table 6
Summary of support for the study's hypotheses.

Hypotheses	Explanation	Level of support
H1a	*IS infrastructure capability (IS-IC) is positively associated with decision-making performance.*	Not Supported
H1b	*IS human resource capability (IS-HRC) is positively associated with decision-making performance.*	Supported
H1c	*IS administrative capability (IS-AC) is positively associated with decision-making performance.*	Supported
H2	*Decision-making performance is positively associated with business-process performance.*	Supported
H3a	*Decision-making performance mediates the relationship between IS-IC and business-process performance.*	Not Supported
H3b	*Decision-making performance mediates the relationship between IS-HRC and business-process performance.*	Supported
H3c	*Decision-making performance mediates the relationship between IS-AC and business-process performance.*	Supported
H4a	*Decision-making performance mediates the relationship between IS-IC and firm performance.*	Not Supported
H4b	*Decision-making performance mediates the relationship between IS-HRC and firm performance.*	Not Supported
H4c	*Decision-making performance mediates the relationship between IS-AC and firm performance.*	Not Supported
H5a	*Decision-making performance and business-process performance serially mediate the relationship between IS-IC and firm performance.*	Not Supported
H5b	*Decision-making performance and business-process performance serially mediate the relationship between IS-HRC and firm performance.*	Supported
H5c	*Decision-making performance and business-process performance serially mediate the relationship between IS-AC and firm performance.*	Supported

faster customer responses and simplified customer-centric operation designs. This direct positive relationship between DMP and BPER leads us to a superior BPER.

While there are mixed results in the literature about the direct versus indirect effects of IS-related capabilities on BPER (Elbashir et al., 2008; Ray, Muhanna, & Barney, 2005), the findings of this study provide no support for either direct or indirect effect of IS-IC on BPER. However, there is a support for the mediating role of DMP between IS-HRC and BPER, as well as IS-AC and BPER. This full mediation effect of DMP on IS-HRC and IS-AC emphasizes the critical role of decision-making for the BPER. The development of IS-HRC and IS-AC in an organization creates a necessary infrastructure to make better decisions that are aligned with the organizational objectives. These capabilities will increase the effectiveness and efficiency in the business processes of a firm, and lead to the delivery of superior BPER (Luo et al., 2012).

Despite the common belief about the presence of a positive direct relationship between IS-related capabilities and FP in the literature (Peppard, Lambert, & Edwards, 2000; Ravichandran & Lertwongsatien, 2005; Wade & Hulland, 2004), this study denotes the serial mediation effect of DMP and BPER together on the links between IS-HRC and IS-AC, and FP. There are various consequences of these findings. There is no doubt that infrastructure is the backbone for all IS efforts, but it is, by itself, not enough to contribute to the FP. IS systems should be supported with IS personnel with adequate quality and skill sets. Administration of IS should also be present to decide which tools to implement in which areas of business, at which level of capacity to achieve the objective of the organization. Notably, these resources should be converted into a capability to the extent that decision-making processes should help the firm to make better decisions regularly, and business processes should be capable of satisfying the needs of the organization consistently. Under these circumstances, IS capabilities will contribute to the FP. This finding is also consistent with Rai, Arikan, Pye, and Tiwana, (2015) who emphasize the importance of strategic fit for a firm developing IT-enabled process integration capability to create business value.

Many previous studies have focused on organizational capabilities, but failed to address the decision-making explicitly. Instead, decision-making has been considered under business-process performance (Elbashir et al., 2008). In this study, DMP is considered as a separate construct, and its essential role to link the IS capabilities to BPER is underlined. Thus, this study also provides evidence that IS capabilities related to IS support staff and IS administration enhance the quality, speed, and effectiveness of the strategic and operational level decisions. This will enable a firm to identify problems faster, foresee the opportunities for economies of scale, find alternative uses of resources, save costs, achieve better labor productivity, and determine new distribution channels and markets. Improved DMP, then, leads to more efficient business processes that focuses on faster consumer responses. All these efforts have impact on return on sales, distribution costs, market shares, return on investment, administrative expenses, inventory levels, staff costs, and customer satisfaction and loyalty, which all together contributes to improve the FP.

Finally, as an emerging country, Turkey is very well known for its growing level of investment activity in IT/IS. This study proves that technology investment itself is not enough to create a competitive advantage, even in the context of emerging country markets where such investments are envisaged to directly contribute to superior FP. Furthermore, highlighting the strategic importance of IS-HRC and IS-AC, the present study provides guidance for emerging country firms to invest in building tacit capabilities to gain competitive advantage with better FP, not only in the local market, but also in the global markets.

5.2. Managerial implications

The findings have implications for managers and policymakers. Firms that continuously invest in technology remain active in a highly fluctuating and competitive environment. Advanced IS capabilities are adopted to search for ways to exploit information and knowledge more efficiently (Aydiner et al., 2019). People have access to extremely capable technologies, such as highly proficient enterprise applications that exist throughout organizations with vast resources. Porter (1985) notes that the imprudent integration of IT systems may not provide the desired result of increased competitiveness (Tippins & Sohi, 2003). The reason that the direct effect of IS-IC is not supported may be explained by the shortfall of the IT itself to generate business value. Nonetheless, the integrated resources and competencies that comprise IS-HRC and IS-AC need to be considered by organizations. From a practical perspective, this study demonstrates that having IT infrastructure only is not a “silver bullet.” Tangible and intangible capabilities of IS should be present all together in order to have a coherent strategy deployment, so that IS capabilities may produce business value and maintain the competitiveness of a firm in the market. In addition to the hardware/software infrastructure to disseminate information within the organization, the IS-HRC to apply and maintain the technological solutions, and IS-AC to plan, organize, and integrate business objectives into business processes are unavoidable capabilities for a successful IS.

Ongoing investments in evolving capabilities push organizations to utilize the technology and the IS solutions in their business. These additional investments should provide explicit and measurable value through the release of organizational capabilities for their contribution to FP (Peppard & Ward, 2004). This study emphasizes that investments in IS capabilities should support decision-making and business processes to improve their performance with intangible assets because both establish the organizational backbone to enhance the strength of a firm. Improved DMP is also not enough by itself to enhance the FP of a firm in today’s competitive market. IS capabilities should penetrate strategically every aspect of the firm to leverage the investments in IS to create an impact on FP. The findings suggest that a firm leaving any one of them out may end up with failure to reach the expected performance gains. Likewise, the distinct but integrated model as suggested in this study highlights the need for good alignment of IS-HRC and IS-AC as well as IS-IC with a strong strategy deployment to distinguish a firm from its competitors.

6. Conclusion

Relying on RBV, the serial mediation model of this study proves that multiple constructs can be linked serially to obtain the desired output of the model. The results in general confirm the existence of pure serial mediation in the proposed framework by opening the black box of the relationship between IS capabilities and FP through DMP and BPER.

In order to yield a business value, IS capabilities should positively leverage the decision-making processes. In the pursuit of a company’s goals, the improvement of its DMP is a critical management activity. The empirical results of this study support the conclusion that intangible assets of IS-related capabilities, IS-HRC and IS-AC, are important elements for boosting DMP. A company with timely and accurate data enhances its ability to analyze and judge business opportunities and make decisions for business actions based on the facts, rather than intuition.

One of the notable findings of the study is that there is no empirical support for a direct relationship between IS capabilities and FP under the proposed model. Likewise, DMP itself does not mediate the relationship between each of the underlying dimensions of IS capabilities (i.e. IS-IC, IS-HRC, and IS-AC) and FP. As widely acknowledged by the literature, the result also supports the finding that DMP does not have a direct link with FP, which necessitates the presence of the other factors. However, DMP supported by intangible IS-HRC and IS-AC is expected to improve goal-seeking activity in a firm, and to assume an active role to reengineer the business processes to enhance their performances as well as FP. Otherwise, DMP without having any implication in the business practices of a firm will not produce any value-added outcome. Similarly, IS-IC as a tangible asset itself does not improve decision-making capacity and as FP. Therefore, sound decisions in the absence of reasonable BPER do not lead the firms to improved FP. The study

concludes that the operational and organizational capabilities for business processes are sustained only by DMP. Therefore, BPER through the DMP with the impact of intangible IS-HRC and IS-AC helps to build a sustainable competitive advantage and improves FP through better utilization of a firm's resources and competencies.

6.1. Limitations and future research directions

This study proposes some valuable insights and important empirical findings through the serial mediation model in the IM field; nonetheless, some caution should be exercised when interpreting the results. The choice of Turkey as the survey setting creates a limitation because it hinders the generalizability of the study's findings. Although Turkey is classified as a sizable emerging country, its cultural, historical, and institutional realities may create obstacles to the generalizability of the findings from a more global perspective. Hence, future research that focuses on the behaviors of both developed and other emerging country firms may provide interesting observations by allowing comparisons. Relying on a single respondent from each company constitutes another limitation of the study, and a similar study could be implemented with more than one respondent to better understand the behaviors of different people and departments with respect to IS capabilities and also to circumvent CMV bias. A longitudinal approach may be utilized to ascertain the differences before and after IS. The serial mediation model adopted in this study can also be improved in future research initiatives. In addition to using two serial mediations, a number of moderators could be tested to identify the behavior in more complex relationships. For instance, innovation performance and firm culture, which may affect FP and competitive advantage, could be the subject of future research. Both DMP and BPER could also be used as moderators in examining the relationship between IS capabilities and firms performance.

Appendix A. CFA results

Constructs	Items	Model SRW[a]	AVE[b]	CR[c]	Cronbach's Alpha
Information System Capabilities					
Infrastructure Capability	**IS-IC**		**0.51**	**0.86**	**0.77**
Our IS infrastructure is suitable for developing customized software applications when the need arises.	IS-IC1	0.57			
Our IS infrastructure is able to respond quickly to the requests from internal and external customers.	IS-IC2	0.77			
The capacity of our network infrastructure is fully competent to meet our company needs.	IS-IC3	0.76			
Our company`s data can be shared with internal as well as external units of the company.	IS-IC4	0.56			
Our IS infrastructure is highly secure to protect our company from intruders and hackers.	IS-IC5	0.82			
Our IS infrastructure provides fast and flexible operations for the internet based systems.	IS-IC6	0.74			
Human Resource Capability	**IS-HRC**		**0.52**	**0.88**	**0.88**
Our IS staff has adequate knowledge of computer based systems.	IS-HRC1	0.72			
Our company seeks high degree of computer based technical expertise for IS department/unit`s employees.	IS-HRC2	0.51			
Our IS staff has ability to learn quickly and apply new technologies as they become available.	IS-HRC3	0.80			
Our IS staff has the skills and knowledge to manage projects in our current business environment.	IS-HRC4	0.82			
Our IS staff has the ability to work closely and efficiently with our employees and customers.	IS-HRC5	0.70			
Our IS staff is capable of discovering potential problems rapidly in the systems.	IS-HRC6	0.78			
Our IS staff is capable of quickly maintaining the system whenever a failure occurred.	IS-HRC7	0.69			
Administrative Capability	**IS-AC**		**0.51**	**0.83**	**0.82**
Our company`s IS strategy is in line with our corporate strategy.	IS-AC1	0.70			
Our company`s IS managers have an executive level authority.	IS-AC2	0.70			
Our company is able to make IS plans for internal as well as external units of the company.	IS-AC3	0.73			
Our IS software development process can be easily adapted to different business development projects in our company.	IS-AC4	0.74			
IS service quality is assessed by using appropriate performance standards.	IS-AC5	0.67			
Decision-Making Performance	**DMP**		**0.51**	**0.86**	**0.85**
Our company communicates the results of organizational level analysis to work group and/or functional level operations to enable effective support for decision-making.	DMP1	0.71			
Our company has a culture to facilitate long term strategic planning.	DMP2	0.72			
Our company makes strategic decisions effectively.	DMP3	0.76			
Our company reduces the time required to make decision.	DMP4	0.58			
Our company`s organizational intelligence is designed to reach accurate and comprehensive information in a timely manner.	DMP5	0.75			
Decisions are more consistent between various departments in our company.	DMP6	0.76			
Business-Process Performance	**BPER**		**0.50**	**0.87**	**0.79**
Our company establishes close relationships with the customers.	BPER1	0.66			
Our company maintains close relationships with the suppliers.	BPER2	0.48			
Our company has rapid and effective internal and external coordination for its regional, national, and global activities.	BPER3	0.82			
The percentage of utilization of tools and equipment has been improved.	BPER4	0.57			
Our customers' requests have been adequately responded.	BPER5	0.90			
Market trends have been identified more quickly.	BPER6	0.78			
Our products and/or services are differentiated from those of our competitors.	BPER7	0.65			
Firm Performance	**FP**		**0.51**	**0.86**	**0.77**
Our company has achieved a high level of return on sales.	FP1	0.86			
Our company's distribution cost has been reduced.	FP2	0.68			
Our company has increased its market share.	FP3	0.75			
Our company has achieved a high level of return on investment.	FP4	0.77			
Our company's inventory has been reduced.	FP5	0.57			
Our company has achieved a higher level of customer loyalty.	FP6	0.60			

Notes:
[a]Model standardized regression weights are significant at $p < 0.001$.
[b]Average variance extracted.
[c]Composite reliability.

References

Ainin, S., Mohd, A., Salleh, N., Bahri, S., & Mohd Faziharudean, T. (2015). Organization's performance, customer value and the functional capabilities of information systems. *Information Systems Management, 32*(1), 2–14.

Aringhieri, R., Carello, G., & Morale, D. (2016). Supporting decision making to improve the performance of an Italian emergency medical service. *Annals of Operations Research, 236*(1), 131–148.

Armstrong, J. S., & Overton, T. S. (1977). Estimating nonresponse bias in mail surveys. *Journal of Marketing Research, 14*, 396–402.

Avgerou, C. (2008). Information systems in developing countries: A critical research review. *Journal of Information Technology, 23*(3), 133–146.

Aydiner, A. S., Tatoglu, E., Bayraktar, E., Zaim, S., & Delen, D. (2019). Business analytics and firm performance: The mediating role of business process performance. *Journal of Business Research, 96*, 228–237.

Babakus, E., & Mangold, W. G. (1992). Adapting the SERVQUAL scale to hospital services: An empirical investigation. *Health Services Research, 26*(6), 767–786.

Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120.

Barney, J. B. (2001). Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. *Journal of Management, 27*(6), 643–650.

Baron, R. M., & Kenny, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.

Bassellier, G., Reich, B. H., & Benbasat, I. (2001). Information technology competence of business managers: A definition and research model. *Journal of Management Information Systems, 17*(4), 159–182.

Baum, J. R., & Wally, S. (2003). Strategic decision speed and firm performance. *Strategic Management Journal, 24*(11), 1107–1129.

Bayraktar, E., Demirbag, M., Koh, S. C. L., Tatoglu, E., & Zaim, H. (2009). A causal analysis of the impact of information systems and supply chain management practices on operational performance: Evidence from manufacturing SMEs in Turkey. *International Journal of Production Economics, 122*(1), 133–149.

Bellamy, M. A., Ghosh, S., & Hora, M. (2014). The influence of supply network structure on firm innovation. *Journal of Operations Management, 32*(6), 357–373.

Bernhard, W., Peter, B., Zoltan, M. P., & Maria-Luise, O. (2006). The impact of ERP systems on firm and business process performance. *Journal of Enterprise Information Management, 19*(1), 13–29.

Bharadwaj, A. S. (2000). A resource-based perspective on information technology capability and firm performance: An empirical investigation. *MIS Quarterly, 24*(1), 169–196.

Bharadwaj, A. S., Sambamurthy, V., & Zmud, R. W. (1999). *IT capabilities: Theoretical perspectives and empirical operationalization. ICIS 1999 Proceedings. Paper 35*378–385.

Bisogno, S., Calabrese, A., Gastaldi, M., & Ghiron, N. L. (2016). Combining modelling and simulation approaches. How to measure performance of business processes? *Business Process Management Journal, 22*(1), 56–74.

Bloch, M., Blumberg, S., & Laartz, J. (2012). *Business technology: McKinsey & company*. Retrieved from McKinsey & Company:http://www.mckinsey.com/business-functions/business-technology/our-insights/delivering-large-scale-it-projects-on-time-on-budget-and-on-value.

Bughin, J., Catlin, T., Hirt, M., & Willmott, P. (2018). *Why digital strategies fail.* JanuaryMcKinsey Quarterlyhttp://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/why-digital-strategies-fail?cid=eml-web.

Byrne, B. M. (2010). *Structural equation modeling with AMOS.* New York: Taylor and Francis Group, LLC.

Carr, N. G. (2003). IT doesn't matter. *Harvard Business Review, 81*(5), 41–49.

Cepeda-Carrion, G., Cegarra-Navarro, J. G., & Jimenez-Jimenez, D. (2012). The effect of absorptive capacity on innovativeness: Context and information systems capability as catalysts. *British Journal of Management, 23*(1), 110–129.

Céspedes-Lorente, J. J., Magán-Díaz, A., & Martínez-Ros, E. (2018). Information technologies and downsizing: Examining their impact on economic performance. *Information & Management.* https://doi.org/10.1016/j.im.2018.09.012 in-press.

Chae, H. C., Koh, C. E., & Prybutok, V. R. (2014). Information technology capability and firm performance: Contradictory findings and their possible causes. *MIS Quarterly, 38*(1), 305–326.

Chae, H. C., Koh, C. E., & Park, K. O. (2018). Information technology capability and firm performance: Role of industry. *Information & Management, 55*(5), 525–546.

Checkland, P., & Holwell, S. (1998). *Information, systems and information systems: Making sense of the field.* John Wiley & Son.

Chen, J. L. (2012). The synergistic effects of IT-enabled resources on organizational capabilities and firm performance. *Information & Management, 49*(3-4), 142–150.

Chen, Y.-C., & Wu, J. H. (2011). IT management capability and its impact on the performance of a CIO. *Information & Management, 48*(4-5), 145–156.

Chen, Y., Wang, Y., Nevo, S., Benitez-Amado, J., & Kou, G. (2015). IT capabilities and product innovation performance: The roles of corporate entrepreneurship and competitive intensity. *Information & Management, 52*(6), 643–657.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling A Multidisciplinary Journal, 9*(2), 233–255.

Collings, D. G., Demirbag, M., Mellahi, K., & Tatoglu, E. (2010). Strategic orientation, human resource management practices and organizational outcomes: Evidence from Turkey. *International Journal of Human Resource Management, 21*(14), 2589–2613.

Cox, E. P. (1980). The optimal number of response alternatives for a scale: A review. *Journal of Marketing Research, 17*(4), 407–422.

Craighead, C. W., Ketchen, D. J., Dunn, K. S., & Hult, G. T. M. (2011). Addressing common method variance: Guidelines for survey research on information technology, operations, and supply chain management. *IEEE Transactions on Engineering Management, 58*(3), 578–588.

Davidson, R., & MacKinnon, J. G. (1993). *Estimation and inference in Econometrics.* New York: Oxford University Press.

Day, G. S., & Wensley, R. (1988). Assessing advantage: A framework for diagnosing competitive superiority. *Journal of Marketing, 52*(2), 1–20.

Dedrick, J., Gurbaxani, V., & Kraemer, K. L. (2003). Information technology and economic performance: A critical review of the empirical evidence. *ACM Computing Surveys (CSUR), 35*(1), 1–28.

Dess, G. G., & Robinson, R. B. (1984). Measuring organizational performance in the absence of objective measures: The case of the privately-held firm and conglomerate business unit. *Strategic Management Journal, 5*, 265–273.

Devaraj, S., & Kohli, R. (2003). Performance impacts of information technology: Is actual usage the missing link? *Management Science, 49*(3), 273–289.

Devece, C., Palacios, D., & Martinez-Simarro, D. (2017). Effect of information management capability on organizational performance. *Service Business, 11*(3), 563–580.

Devece, C., Palacios-Marqués, D., Galindo-Martín, M.Á., & Llopis-Albert, C. (2017). Information systems strategy and its relationship with innovation differentiation and organizational performance. *Information Systems Management, 34*(3), 250–264.

Devlin, S. J., Dong, H. K., & Brown, M. (1993). Selecting a scale for measuring quality. *Marketing Research, 5*(3), 12–17.

Dillman, D. A. (2007). *Mail and internet surveys: The tailored design method.* John Wiley Sons Inc.

Duhan, S. (2007). A capabilities based toolkit for strategic information systems planning in SMEs. *International Journal of Information Management, 27*(5), 352–367.

Dwivedi, Y. G., Kapoor, K. K., Williams, M. D., & Williams, J. (2013). RFID systems in libraries: An empirical examination of factors affecting system use and user satisfaction. *International Journal of Information Management, 33*(2), 367–377.

Elbashir, M. Z., Collier, P. A., & Davern, M. J. (2008). Measuring the effects of business intelligence systems: The relationship between business process and organizational performance. *International Journal of Accounting Information Systems, 9*(3), 135–153.

Feeny, D. F., & Willcocks, L. P. (1998). Core IS capabilities for exploiting information technology. *Sloan Management Review, 39*, 9–21.

Fisher, F. M., & McGowan, J. J. (1983). On the issues of accounting rates of return to infer monopoly profits. *The American Economic Review, 73*(1), 82–97.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research, 18*(1), 39–50.

Fredrickson, J. W., & Mitchell, T. R. (1984). Strategic decision processes: Comprehensiveness and performance in an industry with an unstable environment. *The Academy of Management Journal, 27*(2), 399–423.

Gable, G. G., Sedera, D., & Chan, T. (2008). Re-conceptualizing information system success: The is-impact measurement model. *Journal of the Association for Information Systems, 9*(7), 377–408.

Garrison, G., Wakefield, R. L., & Kim, S. (2015). The effects of IT capabilities and delivery model on cloud computing success and firm performance for cloud supported processes and operations. *International Journal of Information Management, 35*(4), 377–393.

Geringer, M. J., & Hebert, L. (1991). Measuring performance of international joint ventures. *Journal of International Business Studies, 22*(2), 249–263.

Glaister, K. W., Dincer, O., Tatoglu, E., Demirbag, M., & Zaim, S. (2008). A causal analysis of formal strategic planning and firm performance: Evidence from an emerging country. *Management Decision, 46*(3), 365–391.

Gölgeci, I., Gligor, D. M., Tatoglu, E., & Arda, O. A. (2019). A relational view of environmental performance: What role do environmental collaboration and cross-functional alignment play? *Journal of Business Research, 96*, 35–46.

Gu, J. W., & Jung, H. W. (2013). The effects of IS resources, capabilities, and qualities on organizational performance: An integrated approach. *Information & Management, 50*(2-3), 87–97.

Guide, V. D., & Ketokivi, M. (2015). Notes from the editors: Redefining some methodological criteria for the journal. *Journal of Operations Management, 37*, v–viii.

Hair, J. F., Money, A., Samouel, P., & Page, M. (2007). *Research methods for business.* West Sussex, England: John Wiley and Sons.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: A global perspective.* Pearson Education, Inc.

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis.* NY: The Guilford Press.

Henderson, J. C., & Venkatraman, H. (1993). Strategic alignment: Leveraging information technology for transforming organizations. *IBM Systems Journal, 32*(1), 472–484.

Hinkin, T. R. (1998). A brief tutorial on the development of measures for use in survey questionnaires. *Organizational Research Methods, 1*(1), 104–121.

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods, 6*(1), 53–60.

Hu, Y. P., Chang, I. C., & Hsu, W. Y. (2017). Mediating effects of business process for international trade industry on the relationship between information capital and company performance. *International Journal of Information Management, 37*(5), 473–483.

Huber, G. P. (1984). The nature and design of post-industrial organizations. *Management Science, 30*(8), 928–951.

Huber, G. P. (1990). A theory of the effects of advanced information technologies on organizational design, intelligence, and decision making. *The Academy of Management Review, 15*(1), 47–71.

Islei, G., Lockett, G., Cox, B., Gisbourne, S., & Stratford, M. (1991). Modeling strategic decision making and performance measurements at ICI pharmaceuticals. *Interfaces, 21*(6), 4–22.
James, D. W., & Mark, S. P. (1996). Does decision process matter? A study of strategic decision-making effectiveness. *The Academy of Management Journal, 39*(2), 368–396.
Kapoor, K., Dwivedi, Y., Piercy, N. C., Lal, B., & Weerakkody, V. (2014). RFID integrated systems in libraries: Extending TAM model for empirically examining the use. *Journal of Enterprise Information Management, 27*(6), 731–758.
Kim, C., Oh, E., Shin, N., & Chae, M. (2009). An empirical investigation of factors affecting ubiquitous computing use and U-business value. *International Journal of Information Management, 29*(6), 436–448.
Land, M. O., Proper, E., Waage, M., Cloo, J., & Steghuis, C. (2009). *Enterprise architecture, creating value by informed governance.* Netherlands: Springer.
Liu, H., Wei, S., Ke, W., Wei, K. K., & Hua, Z. (2016). The configuration between supply chain integration and information technology competency: A resource orchestration perspective. *Journal of Operations Management, 44*, 13–29.
Luo, J., Fan, M., & Zhang, H. (2012). Information technology and organizational capabilities: A longitudinal study of the apparel industry. *Decision Support Systems, 53*(1), 186–194.
Mahmood, M. A., & Soon, S. K. (1991). A comprehensive model for measuring the potential impact of information technology on organizational strategic variables. *Decision Sciences, 22*(4), 869–897.
Malhotra, N. K., Kim, S. S., & Patil, A. (2006). Common method variance in IS research: A comparison of alternative approaches and a reanalysis of past research. *Management Science, 52*(12), 1865–1883.
Mclaren, T. S., Head, M. M., Yufe, Y., & Chan, Y. E. (2011). A multilevel model for measuring fit between a firm`s competitive strategies and information system capabilities. *MIS Quarterly, 35*(4), 909–929.
Melville, N., Kraemer, K., & Gurbaxani, V. (2004). Review: Information Technology and Organizational Performance: An Integrative Model of IT Business Value. *MIS Quarterly, 28*(2), 283–322. https://doi.org/10.2307/25148636.
Mithas, S., & Rust, R. T. (2016). How information technology strategy and investments influence firm performance: Conjecture and empirical evidence. *MIS Quarterly, 40*(1), 223–246.
Mithas, S., Ramasubbu, N., & Sambamurthy, V. (2011). How information management capability influences firm performance. *MIS Quarterly, 35*(1), 237–256.
Molloy, S. C. (1990). *A study of the factors effecting the use and performance of information technology in the strategic decision making process.* USA: Indiana, Indiana University Unpublished Manuscript.
Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.)). New York, NY: McGraw-Hill.
Ordanini, A., & Rubera, G. (2010). How does the application of an IT service innovation affect firm performance? A theoretical framework and empirical analysis on e-commerce. *Information & Management, 47*(1), 60–67.
Peng, J., Quan, J., Zhang, G., & Dubinsky, A. J. (2016). Mediation effect of business process and supply chain management capabilities on the impact of IT on firm performance: Evidence from Chinese firms. *International Journal of Information Management, 36*(1), 89–96.
Peppard, J., & Ward, J. (2004). Beyond strategic information systems: Towards an IS capability. *The Journal of Strategic Information Systems, 13*(2), 167–194.
Peppard, J., Lambert, R., & Edwards, C. (2000). Whose job is it anyway? Organizational information competencies for value creation. *Information Systems Journal, 10*(4), 291–322.
Pérez-López, S., & Alegre, J. (2012). Information technology competency, knowledge processes and firm performance. *Industrial Management & Data Systems, 112*(4), 644–662.
Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. *Journal of Management, 12*(4), 531–544.
Porter, M. E. (1985). Technology and competitive advantage. *The Journal of Business Strategy, 5*(3), 60–78.
Powell, T. C., & Dent-Micallef, A. (1997). Information technology as competitive advantage: The role of human, business, and technology resources. *Strategic Management Journal, 18*(5), 375–405.
Rahimi, F., Møller, C., & Hvam, L. (2016). Business process management and IT management: The missing integration. *International Journal of Information Management, 36*(1), 142–154.
Rai, A., Arikan, I., Pye, J., & Tiwana, A. (2015). Fit and misfit of plural sourcing strategies and it-enabled process integration capabilities: Consequences of firm performance in the US electric utility industry. *MIS Quarterly, 39*(4), 865–885.
Ravichandran, T., & Lertwongsatien, C. (2005). Effect of information systems resources and capabilities on firm performance: A resource-based perspective. *Journal of Management Information Systems, 21*(4), 237–276.
Ray, G., Muhanna, W. A., & Barney, J. B. (2005). Information technology and the performance of the customer service process: A resource-based analysis. *MIS Quarterly, 29*(4), 625–652.
Rose, D. S., Sidle, S. D., Griffith, K. H., Rose, D. S., & Griffith, K. H. (2007). A penny for your thoughts. *Organizational Research Methods, 10*(2), 225–240.
Rothaermel, F. T. (2015). *Strategic management.* McGraw-Hill Education.
Santhanam, R., & Hartono, E. (2003). Issues in linking information technology capability to firm performance. *MIS Quarterly, 27*(1), 125–153.
Shareef, M. A., Kumar, V., Dwivedi, Y. K., & Kumar, U. (2016). Service delivery through mobile-government (mGov): Driving factors and cultural impacts. *Information Systems Frontiers, 18*(2), 315–332.
Stoel, M. D., & Muhanna, W. A. (2009). IT capabilities and firm performance: A contingency analysis of the role of industry and IT capability type. *Information & Management, 46*(3), 181–189.
Taylor, A. B., Mackinnon, D. P., & Tein, J. Y. (2008). Tests of the three-path mediated effect. *Organizational Research Methods, 11*(2), 241–269.
Templeton, G. F. (2011). A two-step approach for transforming continuous variables to normal: Implications and recommendations for IS research. *Communications of the Association for Information Systems, 28*, 41–58 Article 4.
Tippins, M. J., & Sohi, R. S. (2003). IT competency and firm performance: Is organizational learning a missing link? *Strategic Management Journal, 24*(8), 745–761.
Venkatraman, N., & Ramanujam, V. (1986). The measurement of business performance in strategy research: A comparison of approaches. *The Academy of Management Review, 11*, 801–814.
Wade, M., & Hulland, J. (2004). Review: The resource-based view and information systems research: Review, extension, and suggestions for future research. *MIS Quarterly, 28*(1), 107–142.
Wang, Y., Shi, S., Nevo, S., Li, S., & Chen, Y. (2015). The interaction effect of IT assets and IT management on firm performance: A systems perspective. *International Journal of Information Management, 35*(5), 580–593.
Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal, 5*(2), 171–180.
Wheelen, T. L., Hunger, J. D., Hoffman, A. N., & Bamford, C. E. (2017). *Strategic management and business policy.* Pearson.
Wildavsky, A. (1983). Information as an organizational problem. *Journal of Management Studies, 20*(1), 29–40.
Yeh, C. H., Lee, G. G., & Pai, J. C. (2012). How information system capability affects e-business information technology strategy implementation: An empirical study in Taiwan. *Business Process Management Journal, 18*(2), 197–218.
Yusoff, M. S. B. (2011). Psychometric properties of the learning approach inventory: A confirmatory factor analysis. *Education in Medicine Journal, 3*(2), e24–e31.
Zwass, V. (1997). *Foundations of information systems.* Irwin: McGraw-Hill.