U.S. Healthcare Provider Capabilities and Performance: the Mediating Roles of Service Innovation and Quality

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Abstract:

Rapid advancements in information and communication technologies (ICT) combined with improvements in socioeconomic standards of living have led to an increase in consumers' demands for personal services in a variety of industries including healthcare. Despite the tremendous potential of Health Information Technology (HIT), the healthcare industry lags behind in the use of HIT to effectively deliver innovative services. In this study, we combine the capabilities perspective and an adapted Capability-Quality-Performance (CQP) model to investigate the roles service innovation and quality play in the relationship between a healthcare provider's IT-enabled capabilities and provider performance. We propose that IT-enabled capabilities by themselves do not lead to improved healthcare provider performance. It is how those capabilities are manipulated and utilized that determines the competitive advantage the healthcare provider can gain over its competitors. The theory-based model was empirically tested using a survey of 202 U.S. healthcare organizations. Results of exploratory hypotheses testing showed that service innovation and quality play significant roles in mediating the relationship between IT-enabled capabilities and healthcare provider performance.

Keywords: IT-enabled capabilities | Service innovation | Service quality | Healthcare provider performance | Capabilities perspective

Article:

Introduction

Developments in information and communication technologies (ICT) combined with improvements in socioeconomic standards of living have led to an increase in consumers' demands for personal services in a variety of industries including healthcare (Barrett et al. 2015; Kim et al. 2017; Mouttham et al. 2012; O'Connor and O'Reilly 2016). The term service reflects the process of several entities working together to co-create value, rather than units of intangible

goods (Vargo and Lusch 2008). A service involves applying resources for the benefit of others or oneself (Lusch and Nambisan 2015). Service innovation is a technology-enabled, process-oriented approach to creating value for the customer (Chew 2016). Service innovation in healthcare, even though lagging behind other industries such as financial services, has been growing at a steady pace (Barrett et al. 2015). The unprecedented rapid technology improvements combined with a better understanding of consumer behavior have made it easier for organizations to commercialize service innovations (Solaimani et al. 2015).

Most studies on service innovation and firm performance (Ordanini and Maglio 2009; Scherer et al. 2015; Wang 2015, etc.) have been performed in non-healthcare settings. The healthcare context offers unique opportunities and challenges. From a healthcare provider perspective, specific opportunities include better organizational performance (Kilbridge and Classen 2008), fewer medication errors (Berger and Kichak 2004), integration among physicians, hospitals, and insurance companies (Agarwal et al. 2010), improved access to patient data for diagnoses (PCAST 2010), and increased patient satisfaction (Venkatesh et al. 2011). From a patient perspective, specific opportunities in the healthcare context include improved quality of care (Øvretveit et al. 2007), greater patient safety (Bates and Gawande 2003), and increased transparency between the patient and the provider (Agarwal et al. 2010). Despite such significant potential benefits, there are several challenges faced by the healthcare industry including service delivery, resource allocation issues, regulatory compliance requirements, and end-user resistance. The healthcare industry lags in the use of IT-enabled capabilities to effectively deliver innovative services (Menon et al. 2000). Service innovations in the administrative and clinical domains have been slow to develop primarily due to insufficient allocation of information resources (Jha et al. 2009; McAfee and Brynjolfsson 2008; Salge et al. 2015) and regulatory reasons (Mukhopadhyay et al. 2011). Healthcare managers' reluctance to use IT-enabled innovations might be attributed to uncertain payoff expectations (Salge et al. 2015). Nevertheless, there seems to be a pervasive need for digitally enabled services in healthcare (Rai and Sambamurthy 2006).

Two major theoretical foundations have been applied by information systems (IS) researchers to investigate service innovation. They are the service dominant logic (SDL) and the capabilities perspective. SDL questions the traditional distinction between goods and services and argues that goods are delivery mechanisms for the exchange of services (Bolton 2004; Lovelock and Gummesson 2004; Lusch et al. 2007; Vargo and Lusch 2004). The capabilities perspective, on the other hand, shows that firms can both create and sustain superior performance by combining its resources in unique ways to develop capabilities (Kim et al. 2012), which are developed over time (Pearlson and Saunders 2013). Critical to effective deployment of IT-enabled services to improve healthcare provider performance are the underlying resources and IT-enabled capabilities. Although the resource based view and the capabilities perspective have been widely used in both strategic management (Helfat et al. 2007; Teece 2007) and IS (Banker et al. 2006; Kim et al. 2015; Pavlou and El Sawy 2006; Sambamurthy et al. 2003), they have been sparingly used to explore IT-enabled capabilities in healthcare (Singh et al. 2011; Teoh et al. 2012). We combine the capabilities perspective with an adaptation of the Capability-Quality-Performance (CQP) model by Palvia et al. (2010) to investigate the role of IT-enabled capabilities in healthcare service innovation and healthcare provider performance.

Based on a review of the literature, we found limited examples of empirically validated theoretical models that use the capabilities perspective to explain the role of service innovation and quality on healthcare provider performance. Our research addresses this gap in literature by first adapting the CQP model (Palvia et al. 2010) to the healthcare context and then by empirically testing the model using a survey of healthcare organizations. The original CQP model (Palvia et al. 2010) examined the relationships between capability, quality, and organizational performance of offshore information systems vendors. We have adapted the model to the healthcare context.

Thus the focus of this study is to explore how healthcare organizations can use IT-enabled capabilities to innovate with services and to improve quality, thereby improving their organizational performance. Specifically, this article addresses the following research question: *what roles do service innovation and quality play in the relationship between IT-enabled capabilities and healthcare organization performance?*

In the next section, we integrate various concepts from the literature and develop a theoretical model to explore the role of IT-enabled capabilities in enabling service innovation and quality, thereby enhancing the performance of healthcare organizations.

Theoretical Foundation

We use the CQP model (Palvia et al. 2010) and the capabilities perspective (Agarwal and Selen 2009; Bhatt and Grover 2005; Grover and Kohli 2012; Tucker et al. 2007) as our theoretical foundations to explore the mediating roles service innovation and quality play in the relationship between healthcare provider capabilities and healthcare provider performance. We will take a closer look at each of these theoretical foundations along with a review of sample works from the IS literature that have used those perspectives.

The CQP Framework

Using the process perspective, Palvia et al. (2010) presented a theoretical framework and empirically tested a three-level Capability–Quality–Performance (CQP) model to understand outsourcing vendor outcomes and their antecedents. The process perspective provides a powerful framework for conducting a systematic investigation of firm performance and outcomes. In a process model, output or outcome variables are not directly related to input or independent variables, but there are mediating process variables which signify a developmental progression (McGrath 1964) and open the underlying "black box". Payton et al. (2011) highlight the importance of the process perspective in healthcare research. They identify two critical challenges healthcare organizations face in managing their processes: "(1) integrating the technical and organizational features of the processes and (2) identifying ways to change the processes to better support organizational goals." (Payton et al. 2011, p. iii). Thus effective administrative and clinical process redesign enabled by IT can improve hospital performance (Angst et al. 2011; Buntin et al. 2011; Devaraj et al. 2013).

The original CQP model developed by Palvia et al. (2010) is shown in Fig. 1. The model has three levels: capability (Level 1), quality (Level 2), and performance (Level 3). A brief description of each of the three levels in the original CQP model is presented next.

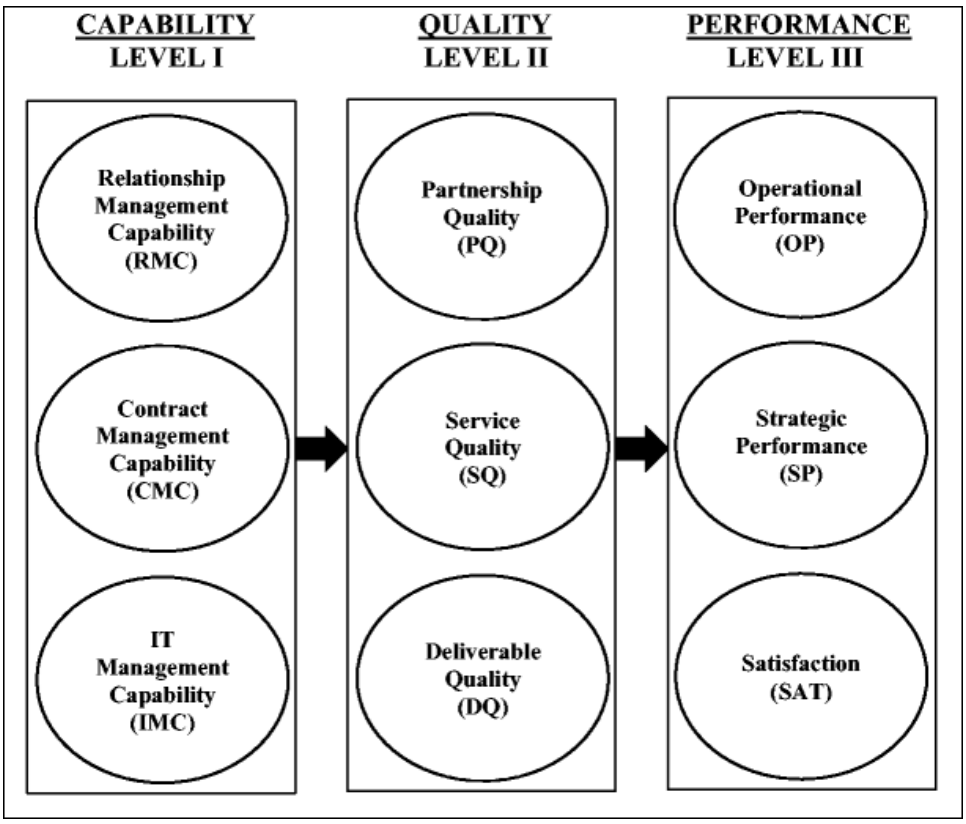

Figure 1. The Capability-Quality-Performance (CQP) model (Source: Palvia et al. 2010)

Level 1 Variables: Capability

In the CQP framework, the first level is capabilities. Capabilities include the following constructs: relationship management capability (RMC), contract management capability (CMC), and IT management capability (IMC). Palvia et al. (2010) define relationship management capability as the IS outsourcing vendor's "ability to communicate and coordinate with the client" (p. 236). Contract management capability is defined as the vendor's "capability to prepare and execute the contract and its relation with performance" (Palvia et al. 2010, p. 236). IT management capability is the vendor's "ability in areas related to computing facilities, software development, quality management, and knowledge integration" (Palvia et al. 2010, p. 236). These three capabilities are developed over time and can be combined in unique ways to attain and sustain competitive advantage.

Level 2 Variables: Quality

Quality is the second level of the CQP framework. Quality includes the following constructs: partnership quality (PQ), service quality (SQ), and deliverable quality (DQ). Palvia et al. (2010) define partnership quality as the vendor's "perceptions about the client's trustworthiness and

commitments" (p. 238). Service quality is related to the vendor's "responsiveness, assurance, reliability, and empathy" (Palvia et al. 2010, p. 239). Deliverable quality is "the extent to which the vendor delivers tangible and intangible products within schedule, within budget, and within the predefined error/quality level" (Palvia et al. 2010, p. 239). These quality variables are mediators and represent a causal chain linking capabilities (Level 1) to performance (Level 3).

Level 3 Variables: Performance

The third level of the CQP model is performance. Performance related constructs in the model include: operational performance (OP), strategic performance (SP), and satisfaction (SAT). Palvia et al. (2010) define operational performance as the IS outsourcing vendor's "efficiencies and improvement in the utilization of IT resources, development of capabilities, and improved management of various resources" (p. 237). Strategic performance is defined as the vendor's "market growth, market dominance, business value, and customer referrals" (Palvia et al. 2010, p. 237). Satisfaction refers to satisfaction in the client-vendor exchange relationship. These three performance variables are the dependent variables representing benefits to the focal firm as a result of focusing on developing capabilities and refining process quality.

The Capabilities Perspective

The capabilities perspective is widely used as a theoretical lens in IS literature to study service innovation. The Resource Based View (RBV) of the firm (Barney 1991, 2002; Wernerfelt 1984) postulates that competitive advantage is derived from having resources that are unique and create value in the marketplace (Medcof 2001). Resources are defined as "the available data, technology, people, and processes within an organization to be used by the manager to perform business processes and tasks" (Pearlson and Saunders 2013, p. 47). RBV has evolved into the capabilities perspective. This theoretical lens links the performance of organizations to resources and capabilities that are firm-specific, rare, and difficult to imitate, substitute or transfer.

Capabilities, which are firm-specific and developed over time, are derived from a firm's capability to combine resources in unique ways to both create and sustain superior firm performance (Pearlson and Saunders 2013). Specific examples include: IT capability (Lu and Ramamurthy 2011; Piccoli and Ives 2005; Rai et al. 2009, 2012), relationship management capability (Grover and Kohli 2012; Palvia et al. 2010; Pearlson and Saunders 2013), organizational learning capability (Bhatt and Grover 2005), and governance capability (Grover and Kohli 2012). The capabilities perspective has been used in the IS literature to conceptualize service innovation readiness (Yen et al. 2012), to investigate the impact of interfirm IT capability and communications on co-creating relational value (Rai et al. 2012), to explore the role of IT capability in organizational agility (Lu and Ramamurthy 2011), and to examine the impact of collaboration on service innovation (Agarwal and Selen 2009).

Framework Used in this Study

We combine the Capability-Quality-Performance (CQP) and the capabilities perspective model to investigate the roles service innovation and quality play in the relationship between IT-enabled capabilities and healthcare provider performance. Prior to discussing how we adapted

the CQP model to our study, an explanation of why we combined the CQP model and the capabilities perspective is in order. Payton et al. (2011) state that healthcare organizations face a key challenge in understanding the processes through which capabilities lead to organizational performance. The CQP model helps address this challenge by explaining the processes by which capabilities lead to organizational performance. The CQP model not only helps identify specific service provider capabilities which serve as significant predictors of intermediate quality measures, but also shows how those quality measures mediate the relationships between capabilities and organizational performance. Our rationale for using the capabilities perspective as opposed to other theoretical perspectives such as service dominant logic (SDL) is as follows. SDL is a framework in which a services ecosystem is created where different actors can participate in order to co-create value (Lusch and Nambisan 2015). The healthcare industry lags behind other industries when it comes to service innovations (Barrett et al. 2015). Furthermore, the current state of service innovations in the healthcare industry is that those innovations are a direct result of conscious efforts by healthcare providers to invest in developing their capabilities. The healthcare sector has not yet reached a point where patients can participate as equal actors in a services ecosystem to co-create value with healthcare providers. Hence, we believe that the capabilities perspective is better suited to our study compared to SDL. While the capabilities perspective does a good job of explaining which capabilities can lead to superior organizational performance, it does not explain how those capabilities lead to improved performance. Thus, we use the capabilities perspective to adapt the CQP model to the healthcare context.

The CQP Model Adaptation

Our research uses the CQP framework and adapts it to the healthcare context by focusing on context-specific capabilities and incorporating the service innovation construct. The changes made to each level in the CQP model are presented next.

Changes Made to Level I Variables: IT-Enabled Capabilities

The first level variables in the adapted CQP model refer to IT-enabled capabilities of the healthcare provider. Capabilities, which are firm-specific and developed over time, are derived from a firm's ability to combine resources in unique ways to both create and sustain superior firm performance.

Based on the literature, we added service innovation capability to the capabilities construct. The capability of healthcare organizations to offer innovative services to their patients depends on the potential of the organization to explore new innovations and exploit existing innovations (Wheeler 2002). We refer to this as service innovation capability. *Service innovation capability* is the "organization's capability to reconfigure its products, services, sales channels, supply chain, etc. in a timely manner, or more simply, its ability to get the change done" (Wheeler 2002, p. 133). Contract management capability was dropped from our model as no explicit individual-level service contracts are maintained between the healthcare organizations and their patients. We retained IT management capability from the original model. Palvia et al. (2010) define *IT management capability* as the "ability in areas related to computing facilities, software development, quality management, and knowledge integration" (p. 236). In the

healthcare context, it is defined as the organization's capability in areas related to computer hardware, information systems, network infrastructure, and IT services support. We also retained relationship management capability from the original model. *Relationship management capability* is the capability of a firm to develop and nurture a relationship with the client (Palvia et al. 2010). In the present context, it is the healthcare provider's capability to communicate and coordinate with the patient. Thus, IT-enabled capabilities in the adapted CQP model include *service innovation capability*, *IT management capability*, and *relationship management capability*.

Changes Made to Level II Variables: Service Innovation

With the increased role of service innovation (Barrett and Davidson 2008; Spohrer and Riecken 2006) enabled by technology, service innovation was added as a new construct to level II of the CQP model. *Service innovation* is defined as service offerings and processes that are intended to create value for service stakeholders and that are new to the organization and/or new to the market (customers) (Thakur and Hale 2012). Avlonitis et al. (2001) found six distinct types of service innovations using a degree of innovativeness continuum to characterize each type of innovation. "At the most innovative extreme of the continuum we find the new-to-the-market services followed by new-to-the-company services, new delivery processes, service modifications, service line extensions, while at the least innovative end service repositionings are placed" (Avlonitis et al. 2001, p. 324). Service innovation captures the healthcare organization's use of IT to come up with new services (Jansen et al. 2006).

Changes Made to Level II Variables: Quality

In level II quality constructs, system quality was added since it is one of the major dimensions of IS success (DeLone and McLean 1992). The healthcare industry lags behind other industries, such as the automobile industry, in terms of quality improvements (Nembhard et al. 2009). Improved system quality can help bridge this gap. Healthcare organizations use information systems such as patient portals to deliver services to patients. From a patient's perspective, the quality of the service is often synonymous with the quality of the system that delivers the service along with the quality of the information that the system delivers. *System quality* describes "characteristics of the information system itself which produces the information" (DeLone and McLean 1992, p. 62) and includes such attributes as reliability, response time, security features, flexibility, and ease of use. Deliverable quality was dropped since in the context of service-based healthcare providers, the essence of this variable is already captured by service quality and partnership quality. We retained service quality and partnership quality from the original CQP model. *Service quality* refers to intangible and process activities involving the patient, including interpersonal factors such as reliability, responsiveness, assurance, and empathy. It is a subjective assessment of the customer interaction with the service provider and how well the service needs have been met (Dabholkar et al. 2000; Parasuraman et al. 1985, 1988). *Partnership quality* refers to integrative and cooperative behavior between the healthcare organization and the patient, including factors such as trust, mutual understanding and commitment (Grover et al. 1996; Lee and Kim 1999; Swar et al. 2012).While the original CQP model focused on service quality only from an interpersonal point of view (assurance, empathy, reliability, responsiveness etc.), our research model adapts the model to study service quality from an IS success point of

view by incorporating the system quality dimension. Thus, in the adapted CQP model, quality is made up of three dimensions, namely *service quality*, *system quality*, and *partnership quality*.

Changes Made to Level III Variables: Performance

In terms of level III performance variables, we retained operational performance and strategic performance from the original CQP model. *Operational performance* includes efficiencies, utilization of IT resources, development of capabilities, and management of resources (Grover et al. 1996; Lee and Kim 1999). *Strategic performance* includes market growth, market dominance, business value, and customer referrals (Palvia et al. 2010). We dropped the satisfaction performance measure from our adapted model since our data collection efforts were focused on healthcare providers as opposed to patients who are consumers of the service innovations. Thus, in the adapted CQP model, organizational performance comprises two dimensions, namely *operational performance and strategic performance.*

Proposed Relationships and Hypotheses Development

The proposed relationship between the above constructs is that first the capabilities lead to service innovation and improved quality. We further hypothesize that these intermediate variables in turn lead to improved organizational performance. The link between capability and performance has been studied extensively and well established in the IS and strategic management literature (e.g., Bhatt and Grover 2005; Palvia et al. 2010; Ray et al. 2004). Our model provides an unfolding of this relationship to its constituent process elements.

Relationship Between IT-Enabled Capabilities and Service Innovation

Based on their CQP model, Palvia et al. (2010) suggest that firms seeking superior organizational performance should constantly seek innovation without relying on the status quo. In this paper, we argue that three IT-enabled capabilities serve as critical predictors of service innovation in the healthcare industry. The three IT-enabled capabilities in our research model are service innovation capability, IT management capability, and relationship management capability. Service innovation capability is in many ways IT-enabled, since achieving service innovation for growth assumes that "an organization has vetted (information) technologies, matched them with economic opportunities, selected strategic options for execution, and committed to reconfiguring its organizational resources" (Wheeler 2002, p. 133). Wheeler (2002) adds that healthcare organizations which have the potential to develop capabilities designed to both explore and exploit innovations are more successful in terms of being able to deliver innovative services to their patients. Contemporary service organizations use higher-order capabilities such as customer engagement, collaborative agility, entrepreneurial alertness, and collaborative innovative capacity not only to explore new opportunities, but also to help anticipate threats from competing service innovations from competitors (Agarwal and Selen 2009). Service innovation capabilities of employees are significant predicators of organizational innovation performance (Tan et al. 2013).

In their CQP model, Palvia et al. (2010) define IT management capabilities in terms of the service provider's "ability in areas related to computing facilities, software development, quality

management, and knowledge integration" (p. 236). IT management capability is critical to "envisioning creative IT solutions to business problems" (Pearlson and Saunders 2013, p. 49). Firms that have superior IT management capability can better understand business priorities, business opportunities, and needs for strategic exploitation of IT in order to promote IT-enabled business innovations (Chen and Wu 2011). IT management capability allows a firm to integrate knowledge and this integrated knowledge is critical to the firm's ability to introduce new innovations to obtain competitive advantage (Kim et al. 2012).

In their CQP model, Palvia et al. (2010) define relationship management capabilities in terms of the service provider's "ability to communicate and coordinate with the client" (p. 236). Firms which have superior communication and collaboration capabilities have the capability to come up with better service innovations for their clients since end-user participation has been identified as a key strategy in overcoming end-user resistance (Tavassoli and Toland 2008). For service innovations to be effective, it is important to understand not only the underlying work systems, but also the organizational relationships and how to support them (Orlikowski and Scott 2015). Service providers "who have created favorable impressions can attempt to capitalize on ongoing relationships by allocating more effort to convincing their existing customers to try the new services" (Bharadwaj et al. 1993, p. 90). In today's technology-rich environment, the relationship management capability can be enhanced by using IT resources, since communication and coordination place a heavy emphasis on the firm's information systems capabilities due to increased information processing requirements (Krishnan and Ulrich 2001; Nambisan 2003). Dynamic relational capabilities have been shown to affect components of service innovation (Kim et al. 2015). Based on the above arguments, we hypothesize the following:

> H1: A healthcare service provider's IT-enabled capabilities are positively related to the provider's service innovations.

Relationship Between IT-Enabled Capabilities and Quality

In the CQP model, Palvia et al. (2010) not only found support for the capability-quality linkage, but also break down the capability construct and quality construct into specific components. Their capability construct included IT management capability and relationship management capability, and their quality construct included service quality and partnership quality (Palvia et al. 2010). The U.S. healthcare system is "plagued with quality problems" (Nembhard et al. 2009, p.24). According to the 2007 Agency for Healthcare Research and Quality Report, the annual increase in quality from 2000 to 2007 has been a paltry 1.5% (AHRQ 2007). Nembhard et al. (2009) draw on management research to study why improving the quality of care is so difficult to do despite the proliferation of evidence-based medicine and quality-improving service innovations. They found that healthcare organizations' inconsistent or improper use of innovations is the primary cause of failure in improving the quality of care. The healthcare sector can effectively use IT for quality improvement (Agarwal et al. 2010; Fichman et al. 2011). Plugge et al. (2013) state that "continuous delivery of high quality services over time, has been a recurring problem that occurs due to do a lack of capabilities of IT providers and/or the way in that they are organized" (p. 275). IT management capability provides direct inputs into development of a service and hence has a direct impact on service quality (Palvia et al. 2010).

Palvia et al. (2010) state that relationship management capability potentially impacts multiple aspects of quality. The above arguments lead us to the following hypothesis:

> H2: A healthcare service provider's IT-enabled capabilities are positively related to the provider's quality.

Relationship Between Service Innovation and Organizational Performance

In their CQP model, Palvia et al. (2010) state that firms seeking to improve their organizational performance should constantly seek innovation. Service innovations are closely linked to business strategy and hence have been shown to increase firm performance (Chew 2016). Organizational performance can be measured by "innovation in the actions promoted by the organization in public service delivery" (Tonelli et al. 2017, p. 600). IT-enabled service innovations may be "fundamental drivers of organizational transformation for successful business outcomes" (Chen 2012, p.142). Jansen et al. (2006) found that the relationship between service innovation and organizational performance is moderated by environmental factors such as dynamism and competitiveness. They classify innovations into two types: exploratory innovation and exploitative innovation; both are captured in our study.

In the context of healthcare, service innovation is defined as "adoption of those best-demonstrated practices that have been proven to be successful and implementation of those practices while ensuring the safety and best outcomes for patients and whose adoption might also affect the performance of the organization" (Thakur et al. 2012, p. 564). Healthcare innovation refers to those changes "that help healthcare practitioners focus on the patient by helping healthcare professionals work smarter, faster, better and more cost effectively" (Thakur et al. 2012, p.564). HIT service innovations such as computerized physician order entry (CPOE) (Davidson and Chismar 2007), electronic health records (EHRs) (Hanseth et al. 2006), telemedicine (Cho and Mathiassen 2007), and application of bar coding for medication administration can improve care delivery and increase efficiency (American Hospital Association 2011). Based on these arguments, we developed the hypothesis that follows:

> H3: A healthcare service provider's service innovations are positively related to the provider's organizational performance.

Relationship Between Quality and Organizational Performance

In the CQP model, Palvia et al. (2010) not only found support for the quality-performance linkage, but also break down the quality construct and performance construct into specific components. Their quality construct included service quality and partnership quality, and their performance construct included strategic performance and operational performance (Palvia et al. 2010). While quality has been shown to have an important effect on firm performance (Gu and Jung 2013), healthcare lags behind other industries in quality improvements, such as the automobile industry where there is a constant focus on quality improvements year after year (J.D. Power and Associates 2007). Firms seeking to improve their organizational performance and hence increase their value using IS should "do more than just merely invest in IS but also focus on the improvements of IS processes and qualities in their organizations" (Gu and

Jung 2013, p.88). Quality is composed of aspects related to IS use, such as service quality and system quality (Chang and King 2005; DeLone and McLean 2003), and aspects related to the relationship management, such as partnership quality (Grover et al. 1996; Lee 2001). Service quality impacts strategic and economic factors which mirror a firm's operational performance (Palvia et al. 2010). Cenfetelli et al. (2008) has established that service quality leads to improved organizational performance. System quality has been shown to impact organizational performance through satisfaction (DeLone and McLean 2003). Partnership quality can help improve operational performance metrics such as reducing cost due to repeated interactions (Goo et al. 2007) and can help improve strategic performance metrics such as market growth due to activities such as client referrals (Palvia et al. 2010). Palvia et al. (2010) state that superior partnership quality leads to better operational performance due to a reduction in *ex post* costs such as "monitoring/enforcement costs, adaptation costs, bonding costs, and dissolution costs" (p. 242). Given the above arguments, we propose the following hypothesis:

> H4: A healthcare service provider's quality is positively related to the provider's organizational performance.

The above four hypotheses (H1, H2, H3, and H4) are broad and hence the major hypotheses; a detailed exploration can be conducted by expanding each major hypothesis into sub-parts. For example, H2 will have 9 sub-parts where each construct within IT-enabled capability is related with each construct within Quality. In total, there are 20 sub-hypotheses. A list of all sub-hypotheses in the research model is presented in Table 1.

Table 1. Sub-hypotheses in the research model

Hypothesis #	Hypothesis
H1a	A healthcare service provider's service innovation capabilities are positively related to the provider's service innovations.
H1b	A healthcare service provider's IT management capabilities are positively related to the provider's service innovations.
H1c	A healthcare service provider's relationship management capabilities are positively related to the provider's service innovations.
H2a1	A healthcare service provider's service innovation capabilities are positively related to the provider's service quality.
H2a2	A healthcare service provider's service innovation capabilities are positively related to the provider's system quality.
H2a3	A healthcare service provider's service innovation capabilities are positively related to the provider's partnership quality.
H2b1	A healthcare service provider's IT management capabilities are positively related to the provider's service quality.
H2b2	A healthcare service provider's IT management capabilities are positively related to the provider's system quality.
H2b3	A healthcare service provider's IT management capabilities are positively related to the provider's partnership quality.
H2c1	A healthcare service provider's relationship management capabilities are positively related to the provider's service quality.
H2c2	A healthcare service provider's relationship management capabilities are positively related to the provider's system quality.
H2c3	A healthcare service provider's relationship management capabilities are positively related to the provider's partnership quality.

Hypothesis #	Hypothesis
H3a	A healthcare service provider's service innovations are positively related to the provider's strategic performance.
H3b	A healthcare service provider's service innovations are positively related to the provider's operational performance.
H4a1	A healthcare service provider's service quality is positively related to the provider's strategic performance.
H4a2	A healthcare service provider's service quality is positively related to the provider's operational performance.
H4b1	A healthcare service provider's system quality is positively related to the provider's strategic performance.
H4b2	A healthcare service provider's system quality is positively related to the provider's operational performance.
H4c1	A healthcare service provider's partnership quality is positively related to the provider's strategic performance.
H4c2	A healthcare service provider's partnership quality is positively related to the provider's operational performance.

As shown in Table 1, there are a total of 20 sub-hypotheses. We looked at the literature to find which sub-hypotheses among the twenty were justifiable. In general, the literature did not provide much direction. In most cases, literature or theoretical arguments were non-existent (or there was mixed evidence). We found some isolated examples of support for the following sub-hypotheses presented in Table 1: H2a1 (Nembhard et al. 2009), H2b1 (Plugge et al. 2013), H2b3 (Li and Lin 2006), H2b4 (Li and Lin 2006). Rather than rely on these isolated cases and for the sake of comprehensiveness, we decided to examine all twenty relationships presented in Table 1. In a sense, in the absence of much theory, we will be building theory from our data.

The proposed research model and the main hypotheses are shown in Fig. 2. We propose that service innovation and quality mediate the relationship between IT-enabled capability and organizational performance.

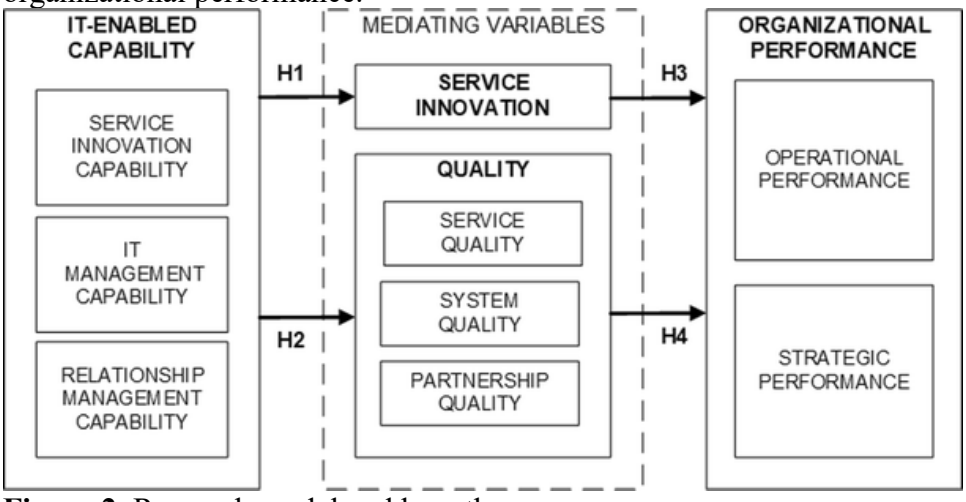

Figure 2. Research model and hypotheses

Methodology

The survey research methodology was employed to test the proposed relationships in our research model. Survey methodology consistently ranks as one of the top methodology choices for Management Information Systems (MIS) researchers (Palvia et al. 2004). Surveys are an appropriate methodology since they use a quantitative data collection approach to "bring breadth to a study by helping researchers gather data about different aspects of a phenomenon from many participants" (Venkatesh et al. 2013, p. 25). The unit of analysis is the healthcare organization. The unit of data collection is the individual, i.e., a senior IS/IT executive in the healthcare organization. Senior IS/IT executives are taking on a more strategic role within their organizations as evidenced by more and more CIOs reporting directly to the CEO (Pearlson et al. 2016). Thus, they are suitable key informants for answering questions related to IT-enabled capabilities, service innovations, quality, and organizational performance.

The first step of the research process involved reviewing the extant literature and coming up with multi-item measures for the variables in the research model. In the instrument design, existing validated scales were used wherever possible and were adapted for the healthcare context. After the preliminary instrument was prepared, it was followed by a pre-test, a pilot test, and then the full study. The instrument was pre-tested by researchers who work at the corresponding author's university. Pre-test procedures included making the instrument available online, identifying six researchers for the pre-test, contacting them by email, collecting pre-test data, and analyzing pre-test data to refine the measures. The goal of the pre-test was to ensure that the questions in the instrument were easy to understand and were not misleading or biased in any way. Minor changes were made as a result. The objective of the pilot test was to refine the measures using a field-based validation of the instrument. Eight CIOs of healthcare organizations serving on the advisory board of the local research center were invited to fill the online survey. Only minor changes were made to the instrument based on their feedback.

The full study procedures included identifying the target sample, sending emails to the subjects in the sample, collecting data, and analyzing the data for further instrument refinement as well as for hypotheses testing. The Healthcare Information and Management Systems Society (HIMSS) Analytics database of healthcare executives sponsored by the Dorenfest Institute was used for data collection. A $10 Barnes and Noble gift certificate was offered as an incentive to get senior healthcare executives to participate in the survey. Using the HIMSS Analytics database, we surveyed a national sample of IT decision makers within healthcare organizations. In total, 4097 email requests were sent and 202 completed responses were received. Low response rates are endemic to healthcare IT research (Hikmet and Chen 2003); therefore tests were conducted for response bias (as reported later). In any case, the sample size is comparable to other such surveys. For example, the Frost and Sullivan 2010 U.S. Healthcare CIO survey solicited responses from the CIOs and top IT management professionals representing 100 healthcare organizations across the U.S. (Frost and Sullivan 2010). Similarly, the College of Health Information Management Executives (CHIME) 2010 survey received participation from 191 CIOs of healthcare organizations (CHIME 2010). The Health Data Management 2008 CIO survey attracted 90 participants (Health Data Management 2008).

Measures

The complete list of measurement items for each construct along with an explanation of the constructs, the literature the constructs are based on, and the sources of the measurement items is shown in Appendix Table 12.

Analysis and Results

The questionnaires were reviewed for completeness and consistency. This resulted in an effective sample size of 202 complete responses representing different healthcare organizations.

Sample Response Bias

The first step in the data analysis is to check for sample response bias. A commonly used method is to compare the characteristics of the early respondents with those of late respondents. The sample was divided into two groups of early and late respondents based on the time each response was completed. Their comparison is shown in Table 2. The respondent characteristics are very similar for both early and late respondents and there are no significant differences between the two groups. Thus response bias is not a significant issue that could confound our results.

Table 2. Sample response bias – comparing early and late respondents

Demographic	Group	Mean	t-value	Sig (2-tailed)
Healthcare Experience	Early	20.61	0.40	0.6875
	Late	20.01		
IT experience	Early	11.01	−0.43	0.6661
	Late	11.76		
Healthcare organization size	Early	2253	0.35	0.7291
	Late	2052		
Healthcare organization age	Early	69.89	0.91	0.3641
	Late	64.87		
Healthcare organization location	Early	1.59	−1.12	0.2647
	Late	1.67		
Healthcare organization type	Early	3.87	−1.60	0.1114
	Late	4.05		

Table 3. Respondents by job title

Job title	
CxO	34%
Director/VP of IT/IS/HIM	34%
Senior Healthcare Manager/Administrator	17%
Senior IT/IS Manager	9%
Other	6%

Demographics

As shown in Table 3, the respondents represent senior IS management in healthcare organizations. They have significant healthcare experience (median of 20 years) as well as much IT experience (median of 10 years). The sample represents different types of healthcare

organizations nationwide (Table 4) and include community, for-profit, university and government hospitals. Generally these are large and established organizations with the median number of employees being 1004 and the median age of the organization being 59 years old.

Table 4. Type of healthcare organization

Type of healthcare organization	
Community/Not-for-Profit	80%
For profit	10%
University	6%
Government	4%

Instrument Validation

The first step in instrument validation was to estimate the initial reliability for the instrument. This is a two-step process where the reliability is estimated for the whole instrument as well as for each construct. A reliability score of 0.8 or above is considered good for confirmatory purposes (Doll and Torkzadeh 1988; Straub 1989). These are shown in Table 5. The initial reliabilities of five constructs in our research model satisfy the suggested cutoff requirement of 0.8. Five other constructs in our research model have reliability values slightly lower than the cutoff value.

Table 5. Initial construct reliabilities

Initial construct reliabilities		
Construct	**Number of items**	**Cronbach's α (Standardized)**
Service innovation capability	5	0.787
IT management capability	3	0.737
Relationship management capability	3	0.779
Service innovation	6	0.871
Service quality	6	0.785
System quality	5	0.812
Partnership quality	4	0.823
Strategic performance	3	0.724
Operational performance	4	0.904
Entire instrument	39	0.969

In the next stage of instrument validation, item-to-corrected total correlations were estimated at the construct level. Doll and Torkzadeh (1988) suggest using 0.5 as the cutoff for item-to-corrected total correlations. Using this criterion, five items were eliminated (IMC1, RMC1, SQ2, SQ4, and SYSQ1 – please see Appendix Table 12 for a list of dropped items).

Confirmatory factor analysis was performed next. The factor loadings for each item are presented in Table 6. All item loadings are greater than 0.60 as recommended by Hair et al. (1998, 2010). Thus the items are representative of their respective constructs.

Next, the construct validities are assessed using convergent and discriminant validities. Each factor loading (Table 6) is above 0.50 and the AVE of each construct (Table 7) is above 0.50, as suggested by Fornell and Larcker (1981). Therefore convergent validity is established.

Table 6. Confirmatory factor loadings

Construct	Item	Factor loadings
Service innovation capability	SIC1	0.629
	SIC2	0.751
	SIC3	0.736
	SIC4	0.757
	SIC5	0.792
IT management capability	IMC2	0.788
	IMC3	0.819
Relationship management capability	RMC2	0.860
	RMC3	0.847
Service innovation	SI1	0.659
	SI2	0.777
	SI3	0.775
	SI4	0.827
	SI5	0.793
	SI6	0.840
Service quality	SQ1	0.773
	SQ3	0.888
	SQ5	0.625
	SQ6	0.754
System quality	SYSQ2	0.855
	SYSQ3	0.728
	SYSQ4	0.810
	SYSQ5	0.783
Partnership quality	PQ1	0.742
	PQ2	0.900
	PQ3	0.773
	PQ4	0.816
Strategic performance	SP1	0.857
	SP2	0.876
	SP3	0.671
Operational performance	OP1	0.847
	OP2	0.904
	OP3	0.867
	OP4	0.814

Table 7. Average Variance Extracted (AVE)

Construct	AVE
SIC	0.677
ITMC	0.801
RMC	0.730
SI	0.730
SQ	0.586
SYSQ	0.675
PQ	0.641
SP	0.752
OP	0.714

For discriminant validity, Fornell and Larcker (1981) suggest that the SAVE (square root of AVE) should be greater than the correlations between each construct and all other constructs. The correlation matrix (Table 8) indicates that this is true for all constructs except in four out of the total seventy-two comparisons between the correlations and the SAVE. In order to explain this discrepancy, we sought guidance from extant literature on the inherent difficulties associated with assessing discriminant validity (Campbell and Fiske 1959; Straub 1989) and literature that describes the limitations of the Fornell-Larcker criterion to assess discriminant validity (Henseler et al. 2015). Campbell and Fiske (1959) state that complete discriminant validity "is not easily achieved" (p. 103). Straub (1989) states that "interpretations of aberrations such as these can be difficult" (p.159) and adds that "it is well known that high but spurious correlations will occur by chance alone in large matrices" (p.159). Henseler et al. (2015) state that the Fornell-Larcker criterion to assess discriminant validity is not without its limitations. Variance-based SEM methods tend to overestimate indicator loadings due to the use of composites of which the indicator is a part and due to the fact that the composite also includes each indicator's error variance further compounding the inflation in indicator loadings (Henseler et al. 2015). These reasons help explain the small number of violations in the matrix in Table 8.

Table 8. Correlation matrix

	ITMC	**OP**	**PQ**	**RMC**	**SI**	**SIC**	**SP**	**SQ**	**SYSQ**
ITMC	**0.895**								
OP	0.749	**0.845**							
PQ	0.491	0.590	**0.801**						
RMC	0.465	0.624	0.714	**0.854**					
SI	0.668	0.780	0.727	0.651	**0.854**				
SIC	0.645	0.800	0.641	0.658	0.875	**0.823**			
SP	0.665	0.813	0.663	0.611	0.868	0.819	**0.867**		
SQ	0.620	0.706	0.706	0.666	0.580	0.582	0.603	**0.766**	
SYSQ	0.776	0.715	0.501	0.519	0.662	0.739	0.654	0.669	**0.821**

The final step in instrument validation is to assess final reliabilities. Table 9 presents the composite reliabilities for each construct in the research model. Composite reliability is a better measure of internal consistency than Cronbach's alpha (Werts et al. 1974). The composite reliability for each construct is well above 0.70, as suggested by Nunnally and Bernstein (1978). Hence the instrument is considered reliable.

Table 9. Composite reliabilities

Construct	**Composite reliability**
SIC	0.913
ITMC	0.890
RMC	0.844
SI	0.942
SQ	0.847
SYSQ	0.892
PQ	0.877
SP	0.901
OP	0.925

Hypotheses Testing

Hypotheses testing was conducted using SmartPLS - Version 3.2.7. Results from testing the research model are shown in Fig. 3. The statistics shown on the paths in Fig. 3 are the t-values for the beta coefficients.

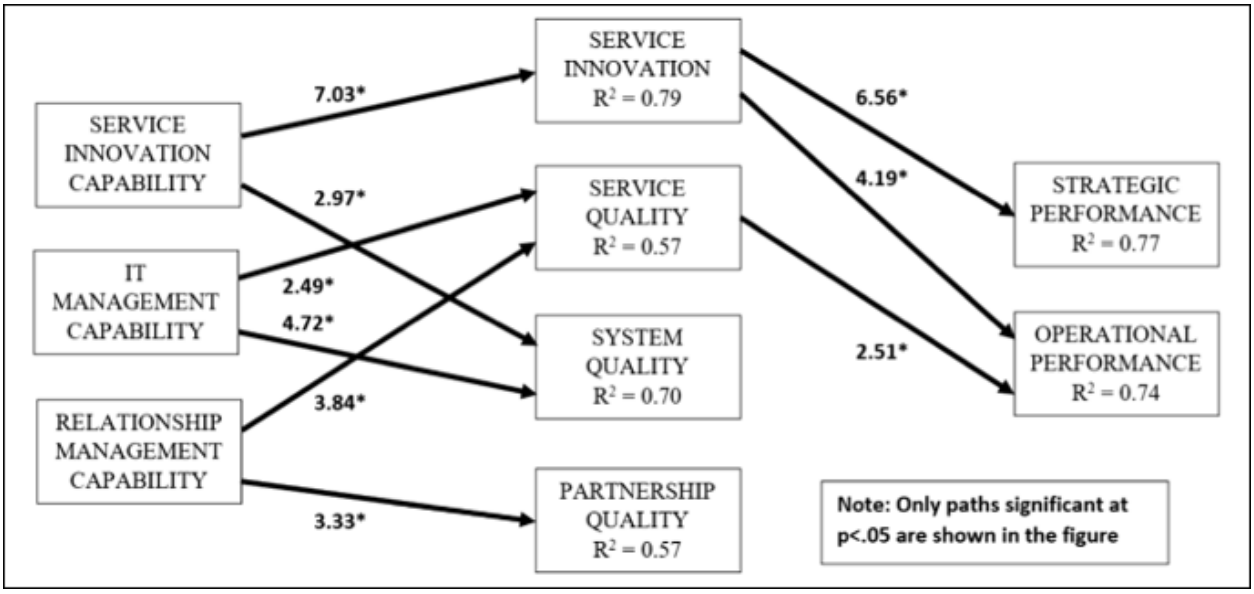

Figure 3. Results of hypotheses testing

For clarity, only the supported sub-hypotheses are included in Fig. 3. Nine of the twenty sub-hypotheses are supported at the 0.05 level of significance. These supported relationships are summarized in Table 10.

Table 10. Results of hypotheses testing

Hypothesis #	Hypothesis	Supported (Yes/No)
H1a	A healthcare service provider's service innovation capabilities are positively related to the provider's service innovations.	Yes
H1b	A healthcare service provider's IT management capabilities are positively related to the provider's service innovations.	No
H1c	A healthcare service provider's relationship management capabilities are positively related to the provider's service innovations.	No
H2a1	A healthcare service provider's service innovation capabilities are positively related to the provider's service quality.	No
H2a2	A healthcare service provider's service innovation capabilities are positively related to the provider's system quality.	Yes
H2a3	A healthcare service provider's service innovation capabilities are positively related to the provider's partnership quality.	No
H2b1	A healthcare service provider's IT management capabilities are positively related to the provider's service quality.	Yes
H2b2	A healthcare service provider's IT management capabilities are positively related to the provider's system quality.	Yes

Hypothesis #	Hypothesis	Supported (Yes/No)
H2b3	A healthcare service provider's IT management capabilities are positively related to the provider's partnership quality.	No
H2c1	A healthcare service provider's relationship management capabilities are positively related to the provider's service quality.	Yes
H2c2	A healthcare service provider's relationship management capabilities are positively related to the provider's system quality.	No
H2c3	A healthcare service provider's relationship management capabilities are positively related to the provider's partnership quality.	Yes
H3a	A healthcare service provider's service innovations are positively related to the provider's strategic performance.	Yes
H3b	A healthcare service provider's service innovations are positively related to the provider's operational performance.	Yes
H4a1	A healthcare service provider's service quality is positively related to the provider's strategic performance.	No
H4a2	A healthcare service provider's service quality is positively related to the provider's operational performance.	Yes
H4b1	A healthcare service provider's system quality is positively related to the provider's strategic performance.	No
H4b2	A healthcare service provider's system quality is positively related to the provider's operational performance.	No
H4c1	A healthcare service provider's partnership quality is positively related to the provider's strategic performance.	No
H4c2	A healthcare service provider's partnership quality is positively related to the provider's operational performance.	No

The R-Square values for the dependent constructs are provided in Table 11. The R-square values for the two dependent constructs namely strategic performance and operational performance are 0.77 and 0.74 respectively. Thus our model is effective in explaining much of the variance in the dependent variables.

Table 11. R-Square values for full model

Construct	R-Square
Service Innovation	0.79
Service Quality	0.57
System Quality	0.70
Partnership Quality	0.57
Strategic Performance	0.77
Operational Performance	0.74

Control Variables

In order to test the robustness of the relationships, the following control variables were added to the model: size of the healthcare organization (number of employees), status of the healthcare organization (profit/not-for-profit), location of the healthcare organization (urban/rural), healthcare management experience of the respondent, and IT experience of the respondent. While the results are not included here due to space considerations, none of them significantly affected the path coefficients, thus providing further credibility to our results.

Discussion

In this study, we conducted an exploratory investigation into the roles service innovation and quality play in mediating the relationships between a healthcare service provider's IT-enabled capabilities and firm performance. In hypothesis H1, we proposed that a healthcare service provider's IT-enabled capabilities are positively related to the provider's service innovations. Hypothesis H1 was subdivided into three sub-hypotheses for each of the following IT-enabled capabilities: service innovation capability, IT management capability, relationship management capability and their relationships to service innovation. Results of hypotheses testing provided strong support for the relationship between service innovation capability and service innovation. This suggests that healthcare organizations that have in-house IT-enabled service innovation capabilities are able to effectively respond to patients' needs for new services. We did not find support for the relationships between IT management capability and service innovation, and between relationship management capability and service innovation. One possible explanation for the lack of a relationship between IT management capability and service innovation is that most healthcare organizations do not consider IT management as one of their core competencies and typically rely on outsourced IT services for IT management. Based on prior literature (e.g., Bharadwaj et al. 1993; Orlikowski and Scott 2015), we expected a significant positive relationship between relationship management capability and service innovation. However, this relationship was not supported. One possible explanation for the lack of significance could be that in the healthcare context, service innovations are more likely than not, a result of healthcare providers' investments in capability development. The healthcare sector has not yet reached service maturity where patients can develop relationships and participate as equal actors in the service ecosystem to co-create service innovation and value with healthcare providers.

Hypothesis H2 and its nine sub-hypotheses were associated with the relationships between the three IT enabled capabilities (service innovation capability, IT management capability, relationship management capability), and the three quality dimensions (service quality, system quality, and partnership quality). Only selected paths were found to be significant. Support was found for the relationships between service innovation capability and system quality, between IT management capability and service quality, between IT management capability and system quality, between relationship management capability and service quality, and between relationship management capability and partnership quality. The important point to note is that not every capability is useful in improving every service dimension. For example, service innovation capability influences actual innovation, which is not surprising, but it seems to have no influence on aspects of service quality and partnership quality. Given the rapid consumerization of IT-enabled healthcare service innovations such as healthcare apps for smartphones, it is not surprising that the relationship between service innovation capability and system quality was significant. While IT management capability did have a significant impact on service quality and system quality, it did not have impact partnership quality. This could possibly be explained by the fact that partnership quality relies on the ability to communicate and studies have shown that the healthcare industry lags behind other industries such as financial services in its use of information and communication technologies (Barrett et al. 2015). Relationship management capability is helpful in several quality aspects, but seems to have no bearing on system quality. Thus healthcare organizations may selectively build capabilities based on their desired quality attributes.

In hypothesis H3, we proposed that a healthcare service provider's service innovations are positively related to the provider's organizational performance. This hypothesis was subdivided into two, one for each organizational performance dimension (strategic performance and operational performance). We found strong support for the relationship between service innovation and both dimensions of organizational performance. Thus, both sub-hypotheses of H3 were supported. This finding is in line with prior work by Jansen et al. (2006), who found that service innovation leads to improved organizational performance in dynamic and competitive environments. Thus service innovation plays a very important role in healthcare organizations, affecting both operational and strategic performance. It is worth emphasizing that this was a new construct added to the CQP model; its inclusion has turned out to be an important theoretical contribution of our study.

Hypothesis H4 and its six sub-hypotheses were associated with the relationships between the three quality dimensions (service quality, system quality, and partnership quality) and the two organizational performance variables (strategic performance and operational performance). Of all the sub-hypotheses, only the relationship between service quality and operational performance was supported. This finding is in line with prior research (Cenfetelli et al. 2008) which established that service quality leads to improved organization performance. There are several possible explanations. One possible reason is that in the healthcare context, service quality refers to the healthcare service provider's "responsiveness, assurance, reliability, and empathy" (Palvia et al. 2010, p. 239) it offers to its patients and all of those dimensions of service quality are related to the operational day-to-day performance goals of the healthcare service provider. Given that prior research found support for the relationship between system quality and organizational performance (DeLone and McLean 2003), and between partnership quality and operational performance (Goo et al. 2007; Palvia et al. 2010), we were surprised by the lack of support for these relationships. An explanation may be that service quality includes some aspects of system quality and partnership quality. Thus system quality and partnership quality may be secondary or complementary to service quality. An important lesson from these results is that "context matters". Most such studies have been performed in non-healthcare settings. The healthcare setting is both novel and unique; it offers its own challenges in the application of traditional concepts from other contexts. For example, while we included partnership quality as an intermediate construct, the construct may be inappropriate in the patient-provider relationship (Bell et al. 2002) as the patient is largely dependent on and subservient to the provider. Summarizing, as per our evidence in the healthcare context, service innovation impacts both operational and strategic performance while service quality is the only quality variable that impacts operational performance.

Implications for Research

Our research contributes to the extant literature in the following ways: (i) it analyzes the dynamic relationship between healthcare provider's capabilities and performance for the benefit of both theory development and decision-making perspectives; (ii) it adapts the CQP model, which is grounded in literature and theory, to the healthcare context in order to examine the relationships between healthcare provider capabilities, quality, and performance by including the service innovation aspects; (iii) it empirically verifies the adapted CQP model at the firm level using

data from major healthcare organizations in the U.S., providing further support to the generalizability of the CQP model; and (iv) it shows that not every IT-enabled capability is useful in service innovation.

Of particular significance is the insight provided that the Level II variable groups (service innovation and quality) mediate the relationship between the healthcare organization's capabilities and its strategic and operational performance. While the link between capabilities and performance has been established in literature, the process by which that happens is often deemed a "black box". By providing more light on the mediator variables, this black box has been opened to facilitate a better understanding of how capabilities lead to healthcare organization performance. Our research shows that healthcare providers can improve their strategic and operational performances by exploiting capabilities to focus on service innovation and service quality.

There are a number of opportunities for further research based on the current work. First, we have not analyzed the relationships within the variable groups at each level. For example, one interesting research question could be to understand the relationship between IT management capability and service innovation capability. By the same token, the relationships between the two mediator variable groups were not explored. Future researchers can extend this work by exploring whether a relationship exists between service innovation and the quality variables. Another avenue for research is to identify new capabilities and quality variables that were not included in this study. A fourth opportunity is to gain a further understanding of the service innovation construct. The IS and healthcare literature would benefit from delineating the different types and varieties of service innovation and furthermore by studying the mediating role of the more granular service innovation construct. Future researchers can use other theoretical perspectives such as the service dominant logic to justify the importance of patient participation and co-creation in healthcare services. Finally, the adapted CQP model can be evaluated in other business domains to validate its generalizability.

Implications for Practice

There are several implications for healthcare organizations that are seeking ways to improve services and relationship with their patients. This study is aimed at providing a better understanding of how healthcare providers can use IT-enabled capabilities to increase competence in delivery of high-quality, innovative services. We believe that our CQP-based approach is one of the unique attempts to study issues related to healthcare provider-patient relationship. Ultimately, healthcare organizations that use IT to offer innovative services to their patients and have higher levels of service quality stand to gain the loyalty of their patients thereby resulting in higher patronage from their existing patients as well as more opportunities through new referrals.

Specifically, our research contributes to practice in many ways. First, it sheds light on the link between healthcare provider's capabilities and performance for the benefit of healthcare decision-makers. Practitioners in the healthcare context can benefit from the finding that it is not the capabilities by themselves that lead to better firm performance, but it is how to harness these capabilities to improve service innovation and quality that leads to improved organizational

performance. A second key contribution to practice is the finding that not every IT-enabled capability is useful or equally useful in improving service innovation. Given that resource allocation is one of the key challenges to service innovation and service delivery in the healthcare industry (Jha et al. 2009; McAfee and Brynjolfsson 2008; Salge et al. 2015), this finding is all the more important since practitioners can now employ scarce resources only on those capabilities that lead to service innovation and consequently enhanced firm performance. By acquiring such IT-enabled capabilities and harnessing them to improve innovation and quality, healthcare organizations can appeal to and retain more patients. It is worth noting that while any healthcare organization can acquire IT resources (e.g., hardware, software and infrastructure) to match its competitors, IT-enabled capabilities such as IT management, service innovation, and partnership management are unique and are hard to duplicate. A third finding is that healthcare organizations can use service innovation as a means to stay ahead of competitors. The healthcare industry is a service-based industry and any healthcare organization that leads others in terms of offering innovative services stands to gain more patients. Service innovation can take multiple forms including new services in the local market, services that are completely new, new information dissemination channels, refinements to existing services, services to increase economies of scale in existing markets, and expanded services for existing patients. A fourth implication is that healthcare organizations that focus on improving service quality can benefit from superior operational performance. Healthcare service providers who are interested in enhancing their operational performance can do so by focusing on service quality through improved "responsiveness, assurance, reliability, and empathy" (Palvia et al. 2010, p. 239) to their patients.

Limitations

The limitations of this study include issues common to the survey methodology (e.g., sample size and representativeness). Our study suffered from low response rates, which are endemic to healthcare IT research (Hikmet and Chen 2003). While our sample size, which is 202, is comparable to other such studies (CHIME 2010; Frost and Sullivan 2010; Health Data Management 2008), we understand that further large-scale data collection and testing can improve the generalizability of our results. While validated preexisting items were adapted from the literature, new ones that did not exist in the literature had to be created. We also acknowledge that using only two items to measure a construct can sometimes be problematic (Emons et al. 2007; Little et al. 1999; Marsh et al. 1998). However, due to cost and time constraints and elimination of items during instrument validation, it is not uncommon to find questionnaires that use only two items to measure a construct (Eisinga et al. 2013). Another issue may be the research model's complexity, especially the number of relationships. As a natural result of having so many constructs and relationships, we acknowledge the concerns related to multicollinearity and discriminant validity. Multicollinearity can lead to biased standard errors and unstable *p*-values associated with explanatory variables (Hoffmann and Shafer 2015; Mela and Kopalle 2002). Finally, while we observed violations related to discriminant validity, they were minimal and considered in the acceptable range. We also acknowledge the fact that there may have been measurement issues in our study due to the fact that we asked CIOs for their perceptions of patient perceptions. These concerns can be allayed in future efforts.

Conclusion

In this research, we use a unique capability-based approach to conduct an exploratory investigation into how healthcare organizations can use IT-enabled capabilities for improved firm performance. Our findings indicate that healthcare organizations use IT-enabled capabilities for service innovation and for improving service quality and this in turn leads to enhanced performance at both strategic and operational levels. The recently published CQP model was adapted by including those IT-enabled capabilities that apply to the healthcare provider–patient relationship, by adding service innovation, and by including quality variables unique to the healthcare context. The theory-based model was empirically tested with data from U.S. healthcare organizations. Empirical testing provided mixed support for the mediating role that service innovation and quality play in the relationship between healthcare provider capabilities and organizational performance.

References

Agarwal, R., & Selen, W. (2009). Dynamic capability building in service value networks for achieving service innovation. *Decision Sciences, 40*(3), 431–475. Article Google Scholar

Agarwal, R., Gao, G., DesRoches, C., & Jha, A. K. (2010). The digital transformation of healthcare: current status and the road ahead. *Information Systems Research, 21*(4), 796–809. Article Google Scholar

AHRQ. (2007). *Agency for healthcare research and quality: national healthcare quality report*. Rockville: Author. Google Scholar

American Hospital Association (2011). 2011 HIT Advocacy Issue Paper. www.aha.org/content/11/11-health-it.pdf, retrieved on April 21, 2012.

Angst, C. M., Devaraj, S., Queenan, C. C., & Greenwood, B. (2011). Performance effects related to the sequence of integration of healthcare technologies. *Production and Operations Management, 20*(3), 319–333. Article Google Scholar

Avlonitis, G. J., Papastathopoulou, P. G., & Gounaris, S. P. (2001). An empirically-based typology of product innovativeness for new financial services: success and failure scenarios. *The Journal of Product Innovation Management, 18*(5), 324–342. Article Google Scholar

Bailey, J. E., & Pearson, S. W. (1983). Development of a tool for measuring and analyzing computer user satisfaction. *Management Science, 29*(5), 519–529. Article Google Scholar

Banker, R. D., Bardhan, I. R., Chang, H., & Lin, S. (2006). Plant information systems, manufacturing capabilities and plant performance. *MIS Quarterly, 30*(2), 315–337. Article Google Scholar

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

Barney, J. B. (2002). *Gaining and sustaining competitive advantage*. Upper Saddle River: Prentice Hall. Google Scholar

Barrett, M., & Davidson, E. (2008). Exploring the Diversity of Service Worlds in the Service Economy. In M. Barrett, E. Davidson, C. Middleton, & J. DeGross (Eds.), *Information technology in the service economy: challenges and possibilities for the 21st century* (pp. 1–10). Boston: Springer. Google Scholar

Barrett, M., Davidson, E., Prabhu, J., & Vargo, S. L. (2015). Service innovation in the digital age: key contributions and future directions. *MIS Quarterly, 39*(1), 135–154. Article Google Scholar

Bates, D. W., & Gawande, A. A. (2003). Improving safety with information technology. *The New England Journal of Medicine, 348*, 2526–2534. Article Google Scholar

Bell, R. A., Kravitz, R. L., Thom, D., Krupat, E., & Azari, R. (2002). Unmet expectations for care and the patient-physician relationship. *Journal of General Internal Medicine, 17*(11), 817–824. Article Google Scholar

Berger, R. G., & Kichak, J. P. (2004). Computerized physician order entry: helpful or harmful? *Journal of the American Medical Informatics Association, 11*(2), 100–103. Article Google Scholar

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

Bharadwaj, S. G., Varadarajan, P. R., & Fahy, J. (1993). Sustainable competitive advantage in service industries: a conceptual model and research propositions. *The Journal of Marketing, 57*(4), 83–99. Article Google Scholar

Bharadwaj, A. S., Sambamurthy, V., & Zmud, R. W. (2002). Firm-wide IT capability: an empirical examination of the construct and its links to performance. *Working Paper*.

Bhatt, G. D., & Grover, V. (2005). Types of information technology capabilities and their role in competitive advantage: an empirical study. *Journal of Management Information Systems, 22*(2), 253–277. Article Google Scholar

Bolton, R. (2004). Invited commentaries on "Evolving to a new dominant logic for marketing". *Journal of Marketing, 68*(1), 18–27. Article Google Scholar

Buntin, M. B., Burke, M. F., Hoaglin, M. C., & Blumenthal, D. (2011). The benefits of health information technology: a review of the recent literature shows predominantly positive results. *Health Affairs, 30*(3), 464–471. Article Google Scholar

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56*(2), 81–105. Article Google Scholar

Cenfetelli, R., Benbasat, I., & Al-Natour, S. (2008). Addressing the what and how of online services: positioning supporting-services functionality and service quality for business to consumer success. *Information Systems Research, 19*(2), 161–181. Article Google Scholar

Chang, J. C. J., & King, W. R. (2005). Measuring the performance of information systems: a functional scorecard. *Journal of Management Information Systems, 22*(1), 85–115. Article Google Scholar

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

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

Chew, E. K. (2016). iSIM: an integrated design method for commercializing service innovation. *Information Systems Frontiers, 18*(3), 457–478. Article Google Scholar

CHIME (2010). CHIME survey finds healthcare CIOs less optimistic about getting EHR incentive funding early. College of healthcare information management executives. November 2010. Retrieved from http://www.cio-chime.org/chime/press/surveys/pdf/chime_mu2_survey_report.pdf.

Cho, S., & Mathiassen, L. (2007). The role of industry infrastructure in telehealth innovations: a multilevel analysis of a telestroke program. *European Journal of Information Systems, 16*(6), 738–750. Article Google Scholar

Dabholkar, P., Shepherd, C. D., & Thorpe, D. I. (2000). A comprehensive framework for service quality: an investigation of critical conceptual and measurement issues through a longitudinal study. *Journal of Retailing, 76*(2), 139–173. Article Google Scholar

Davidson, E. J., & Chismar, W. G. (2007). The interaction of institutionally triggered and technology-triggered social structure change: an investigation of computerized physician order entry. *MIS Quarterly, 31*(4), 739–758. Article Google Scholar

Day, G. (1994). The capabilities of market-driven organizations. *Journal of Marketing, 58*(4), 37–52. Article Google Scholar

DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean model of information systems success: a ten-year update. *Journal of Management Information Systems, 19*(4), 9–30. Article Google Scholar

Devaraj, S., Ow, T. T., & Kohli, R. (2013). Examining the impact of information technology and patient flow on healthcare performance: a Theory of Swift and Even Flow (TSEF) perspective. *Journal of Operations Management, 31*(4), 181–192. Article Google Scholar

Dibbern, J., Goles, T., Hirschheim, R., & Jayatilaka, B. (2004). Information systems outsourcing: a survey and analysis of the literature. *ACM SIGMIS Database, 35*(4), 6–102. Article Google Scholar

Doll, W. J., & Torkzadeh, G. (1988). The measurement of end-user computing satisfaction. *MIS Quarterly, 12*(2), 259–274. Article Google Scholar

Eisinga, R., Grotenhuis, M. T., & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach, or Spearman-Brown? *International Journal of Public Health, 58*(4), 637–642. Article Google Scholar

Emons, W. H., Sijtsma, K., & Meijer, R. R. (2007). On the consistency of individual classification using short scales. *Psychological Methods, 12*(1), 105–120. Article Google Scholar

Ethiraj, S. K., Kale, P., Krishnan, M. S., & Singh, J. V. (2005). Where do capabilities come from and how do they matter? A study in the software services industry. *Strategic Management Journal, 26*(1), 25–45. Article Google Scholar

Fichman, R. G., Kohli, R., & Krishnan, R. (2011). The role of information systems in healthcare: current research and future trends. *Information Systems Research, 22*(3), 419–428. Article Google Scholar

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

Frost and Sullivan (2010). *Frost and Sullivan U.S. Healthcare CIO Survey* available at http://www.ihealthtran.com/pdf/Frost%20&%20Sullivan_Q4%202010%20US%20Healthcare%20CIO%20Survey_Selected%20Excerpts.pdf.

Goh, J., Gao, G., & Agarwal, R. (2011). Evolving work routines: adaptive routinization of information technology in healthcare. *Information Systems Research, 22*(3), 565–585. Article Google Scholar

Goles, T., & Chin, W. (2005). Information systems outsourcing relationship factors: detailed conceptualization and initial evidence. *ACM SIGMIS Database, 36*(4), 47–67. Article Google Scholar

Goo, J., Kishore, R., Nam, K., Rao, H. R., & Song, Y. (2007). An investigation of factors that influence the duration of it outsourcing relationships. *Decision Support Systems, 42*(4), 2107–2125. Article Google Scholar

Goo, J., Huang, C. D., & Koo, C. (2015). Learning for healthy outcomes: exploration and exploitation with electronic medical records. *Information Management, 52*(1), 550–562. Article Google Scholar

Grant, R. M. (1996). Toward a knowledge-based theory of the firm. *Strategic Management Journal, 17*(10), 109–122. Article Google Scholar

Grover, V., & Kohli, R. (2012). Cocreating IT value: new capabilities and metrics for multifirm environments. *MIS Quarterly, 36*(1), 225–232. Article Google Scholar

Grover, V., Cheon, M. J., & Teng, J. T. C. (1996). The effect of service quality and partnership on the outsourcing of information systems functions. *Journal of Management Information Systems, 12*(4), 89–116. Article Google Scholar

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), 87–97. Article Google Scholar

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (1998). *Multivariate data analysis*. Upper Saddle River: Prentice-Hall. Google Scholar

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis* (7th ed.). Englewood Cliffs: Prentice Hall. Google Scholar

Hanseth, O., Jacucci, E., Grisot, M., & Aanestad, M. (2006). Reflexive standardization: side effects and complexity in standard making. *MIS Quarterly, 30*(Special Issue), 563–581. Article Google Scholar

Health Data Management (2008). *Health Data Management 2008 CIO Survey* available at http://www.healthdatamanagement.com/CIO_Survey/.

Helfat, C. E., Finkelstein, S., Mitchell, W., Peteraf, M. A., Singh, H., Teece, D. J., & Winter, S. G. (2007). *Dynamic capabilities: understanding strategic change in organizations* (First ed.). Malden: Blackwell Publishing Ltd..

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science, 43*(1), 115–135. Article Google Scholar

Hikmet, N., & Chen, S. K. (2003). An investigation into low mail survey response rates of information technology users in healthcare settings. *International Journal of Medical Informatics, 72*(1–3), 29–34. Article Google Scholar

Hoffmann, J. P., & Shafer, K. (2015). *Linear regression analysis: applications and assumptions* (2nd ed.). Washington, DC: NASW Press. Google Scholar

Holmström, H., Fitzgerald, B., Ågerfalk, P. J., Conchúir, Ó., & E. (2006). Agile practices reduce distance in global software development. *Information Systems Management, 23*(3), 7–18. Article Google Scholar

J. D. Power and Associates (2007). *J. D. Power and associates reports: Ford motor company captures most awards in 2007 initial quality study [Electronic Version]*. Retrieved October 15, 2008, from http://www.jdpower.com/corporate/news/releases/pdf/2007088.pdf.

Jansen, J. J. P., Van Den Bosch, F. A. J., & Volberda, H. W. (2006). Exploratory innovation, exploitative innovation, and performance: effects of organizational antecedents and environmental moderators. *Management Science, 52*(11), 1661–1674. Article Google Scholar

Jha, A. K., DesRoches, C. M., Campbell, E. G., Donelan, K., Rao, S. R., Ferris, T. G., Shields, A., Rosenbaum, S., & Blumenthal, D. (2009). Use of electronic health records in U.S. hospitals. *New England Journal of Medicine, 360*(16), 1628–1638. Article Google Scholar

Keith, M., Demirkan, H., & Goul, M. (2013). Service-oriented methodology for systems development. *Journal of Management Information Systems, 30*(1), 227–260. Article Google Scholar

Kilbridge, P. M., & Classen, D. C. (2008). The informatics opportunities at the intersection of patient safety and clinical informatics. *Journal of the American Medical Informatics Association, 15*(4), 397–407. Article Google Scholar

Kim, D. R., Cheon, M. J., & Aiken, M. (2005). Towards an understanding of the relationship between is outsourcing vendors' service quality and outsourcing effects. *International Journal of Information Technology and Management, 4*(1), 12–24. Article Google Scholar

Kim, Y. J., Song, S., Sambamurthy, V., & Lee, Y. L. (2012). Entrepreneurship, knowledge integration capability, and firm performance: an empirical study. *Information Systems Frontiers, 14*(5), 1047–1060. Article Google Scholar

Kim, M., Song, J., & Triche, J. (2015). Toward an integrated framework for innovation in service: a resource-based view and dynamic capabilities approach. *Information Systems Frontiers, 17*(3), 533–546. Article Google Scholar

Kim, Y. J., Kim, C. Y., & Shin, Y. J. (2017). The effects of ubiquitous healthcare service on the south Korean Economy: using input–output analysis. *Information Systems Frontiers, 19*(5), 1149–1160. Article Google Scholar

King, W. R., & Epstein, B. J. (1982). Assessing information systems value: an experimental study. *Decision Sciences, 13*(4), 34–45. Google Scholar

King, W. R., & Malhotra, Y. (2000). Developing a framework for analyzing IS sourcing. *Information Management, 37*(6), 323–334. Article Google Scholar

Krishnan, V., & Ulrich, K. T. (2001). Product development decisions: a review of the literature. *Management Science, 47*(1), 1–21. Article Google Scholar

Kumar, N., & Palvia, P. (2002). Global IT outsourcing management: key influence factors and strategies. *Journal of Information Technology Cases and Applications, 4*(1), 56–75. Article Google Scholar

Lee, J. N. (2001). The impact of knowledge sharing, organizational capability and partnership quality on IS outsourcing success. *Information Management, 38*(5), 323–335. Article Google Scholar

Lee, J. N., & Kim, Y. G. (1999). Effect of partnership quality on is outsourcing success: conceptual framework and empirical validation. *Journal of Management Information Systems, 15*(4), 29–61. Article Google Scholar

Levina, N., & Ross, J. W. (2003). From the vendor's perspective: exploring the value proposition in information technology outsourcing. *MIS Quarterly, 27*(3), 331–364. Article Google Scholar

Li, S., & Lin, B. (2006). Accessing information sharing and information quality in supply chain management. *Decision Support Systems, 42*(3), 1641–1656. Article Google Scholar

Lin, W. B. (2007). An empirical of service quality model from the viewpoint of management. *Expert Systems with Applications, 32*(2), 364–375. Article Google Scholar

Little, T. D., Lindenberger, U., & Nesselroade, J. R. (1999). On selecting indicators for multivariate measurement and modeling with latent variables: when "good" indicators are bad and "bad" indicators are good. *Psychological Methods, 4*(2), 192–211. Article Google Scholar

Lovelock, C., & Gummesson, E. (2004). Whither services marketing? In search of a new paradigm and fresh perspective. *Journal of Services Research, 7*(1), 20–41. Article Google Scholar

Lu, Y., & Ramamurthy, K. (2011). Understanding the link between information technology capability and organizational agility: an empirical examination. *MIS Quarterly, 35*(4), 931–954. Article Google Scholar

Lusch, R. F., & Nambisan, S. (2015). Service innovation: a service-dominant logic perspective. *MIS Quarterly, 39*(1), 155–175. Article Google Scholar

Lusch, R. F., Vargo, S. L., & O'Brien, M. (2007). Competing through service: insights from service-dominant logic. *Journal of Retailing, 83*(1), 5–18. Article Google Scholar

Marsh, H. W., Hau, K. T., Balla, J. R., & Grayson, D. (1998). Is more ever too much? The number of indicators per factor in confirmatory factor analysis. *Multivariate Behavioral Research, 33*(2), 181–220. Article Google Scholar

McAfee, A., & Brynjolfsson, E. (2008). Investing in the IT that makes a competitive difference. *Harvard Business Review, 86*(7/8), 98–107. Google Scholar

McGrath, J. E. (1964). *Groups: interaction and performance*. Englewood Cliffs: Prentice-Hall. Google Scholar

Medcof, J. (2001). Resource-based strategy and managerial power in networks of internationally dispersed technology units. *Strategic Management Journal, 22*(11), 999–1012. Article Google Scholar

Mela, C. F., & Kopalle, P. K. (2002). The impact of collinearity on regression analysis: the asymmetric effect of negative and positive correlations. *Applied Economics, 34*(6), 667–677. Article Google Scholar

Menon, N. M., Lee, B., & Eldenburg, L. (2000). Productivity of information systems in the healthcare industry. *Information Systems Research, 11*(1), 83–92. Article Google Scholar

Mouttham, A., Kuziemsky, C., Langayan, D., Peyton, L., & Pereira, J. (2012). Interoperable support for collaborative, mobile, and accessible health care. *Information Systems Frontiers, 14*(1), 73–85. Article Google Scholar

Mukhopadhyay, T., Singh, P., & Kim, S. (2011). Learning curves of agents with diverse skills in information technology-enabled physician referral systems. *Information Systems Research, 22*(3), 586–605. Article Google Scholar

Nambisan, S. (2003). Information systems as a reference discipline for new product development. *MIS Quarterly, 27*(1), 1–18. Article Google Scholar

Nembhard, I. M., Alexander, J., Hoff, T., & Ramanujam, R. (2009). Why does the quality of health care continue to lag? Insights from management research. *Academy of Management Perspectives, 23*(1), 24–42. Article Google Scholar

Nunnally, J. C., & Bernstein, I. H. (1978). *Psychometric theory*. New York: McGraw-Hill. Google Scholar

O'Connor, Y., & O'Reilly, P. (2016). Examining the infusion of mobile technology by healthcare practitioners in a hospital setting. *Information Systems Frontiers*. https://doi.org/10.1007/s10796-016-9728-9. Article Google Scholar

Ordanini, A., & Maglio, P. (2009). Market orientation, internal process, and external network: a qualitative comparative analysis of key decisional alternatives in the new service development. *Decision Sciences, 40*(3), 601–625. Article Google Scholar

Orlikowski, W., & Scott, S. V. (2015). The algorithm and the crowd: considering the materiality of service innovation. *MIS Quarterly, 39*(1), 201–216. Article Google Scholar

Øvretveit, J., Scott, T., Rundall, T. G., Shortell, S. M., & Brommels, M. (2007). Improving quality through effective implementation of information technology in healthcare. *International Journal for Quality in Health Care, 19*(5), 259–266. Article Google Scholar

Palvia, P., Leary, D., Mao, E., Midha, V., Pinjani, P., & Salam, A. F. (2004). Research methodologies in MIS: an update. *Communications of the Association for Information Systems, 14*(1), 526–542. Google Scholar

Palvia, C. P., King, R. C., Xia, W., & Palvia, S. C. J. (2010). Capability, quality, and performance of offshore is vendors: a theoretical framework and empirical investigation. *Decision Sciences, 41*(2), 231–270. Article Google Scholar

Parasuraman, A., Zeithaml, V. A., & Berry, L. L. (1985). A conceptual model of service quality and its implications for future research. *Journal of Marketing, 49*(4), 41–50. Article Google Scholar

Parasuraman, A., Zeithamm, V., & Berry, L. (1988). SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality. *Journal of Retailing, 64*(1), 12–40. Google Scholar

Paswan, A., D'Souza, D., & Zolfagharian, M. (2009). Toward a contextually anchored service innovation typology. *Decision Sciences, 40*(3), 513–540. Article Google Scholar

Pavlou, P. A., & El Sawy, O. A. (2006). From IT leveraging competence to competitive advantage in turbulent environments: the case of new product development. *Information Systems Research, 17*(3), 198–227. Article Google Scholar

Payton, F. C., Pare, G., Le Rouge, C. M., & Reddy, M. (2011). Health care IT: process, people, patients and interdisciplinary considerations. *Journal of the Association for Information Systems, 12*(2), i–xiii. Article Google Scholar

PCAST (2010). President's Council of Advisors on Science and Technology (PCAST): report to the president realizing the full potential of the health information technology to improve healthcare for Americans: the path forward. Executive Office of the President.

Pearlson, K. E., & Saunders, C. S. (2013). *Managing and using information systems: a strategic approach*. New York: Wiley. Google Scholar

Pearlson, K. E., Saunders, C. S., & Galletta, D. F. (2016). *Managing and using information systems: a strategic approach*. Hoboken: John Wiley & Sons. Google Scholar

Piccoli, G., & Ives, B. (2005). Review: IT-dependent strategic initiatives and sustained competitive advantage: a review and synthesis of the literature. *MIS Quarterly, 29*(4), 747–776. Article Google Scholar

Pitt, L. F., Watson, R. T., & Kavan, C. B. (1995). Service Quality: a measure of information systems effectiveness. *MIS Quarterly, 19*(2), 173–187. Article Google Scholar

Plugge, A., Bouwman, H., & Molina-Castillo, F. J. (2013). Outsourcing capabilities, organizational structure and performance quality monitoring: toward a fit model. *Information Management, 50*(6), 275–284. Article Google Scholar

Rai, A., & Sambamurthy, V. (2006). Editorial notes–the growth of interest in services management: opportunities for information systems scholars. *Information Systems Research, 17*(4), 327–331. Article Google Scholar

Rai, A., Im, G., & Hornyak, R. (2009). How CIOs can align IT capabilities for supply chain relationships. *MIS Quarterly Executive, 8*(1), 9–18. Google Scholar

Rai, A., Pavlou, P. A., Im, G., & Du, S. (2012). Interfirm IT capability profiles and communications for cocreating relational value: evidence from the logistics industry. *MIS Quarterly, 36*(1), 233–262. Article Google Scholar

Ray, G., Barney, J. B., & Muhanna, W. A. (2004). Capabilities, business processes, and competitive advantage: choosing the dependent variable in empirical tests of the resources-based view. *Strategic Management Journal, 25*(1), 23–37. Article Google Scholar

Richmond, W. B., & Seidmann, A. (1993). Software development outsourcing contract: Structure and business value. *Journal of Management Information Systems, 10*(1), 57–72. Article Google Scholar

Salge, T. O., Kohli, R., & Barrett, M. (2015). Investing in information systems: on the behavioral and institutional search mechanisms underpinning hospitals' is investment decisions. *Management Information Systems Quarterly, 39*(1), 61–89. Article Google Scholar

Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping agility through digital options: reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly, 27*(2), 237–263. Article Google Scholar

Scherer, A., Wünderlich, N. V., & von Wangenheim, F. (2015). The value of self-service: long-term effects of technology-based self-service usage on customer retention. *MIS Quarterly, 39*(1), 177–200. Article Google Scholar

Seddon, P. B. (1997). A respecification and extension of the DeLone and McLean model of IS success. *Information Systems Research, 8*(3), 240–253. Article Google Scholar

Singh, R., Mathiassen, L., Stachura, M. E., & Astapova, E. V. (2011). Dynamic capabilities in home health: IT-enabled transformation of post-acute care. *Journal of the Association for Information Systems, 12*, 163–188. Article Google Scholar

Solaimani, S., Bouwman, H., & Itälä, T. (2015). Networked enterprise business model alignment: a case study on smart living. *Information Systems Frontiers, 17*(4), 871–887. Article Google Scholar

Song, L. Z., Song, M., & Di Benedetto, C. A. (2009). A staged service innovation model. *Decision Sciences, 40*(3), 571–599. Article Google Scholar

Spohrer, J., & Riecken, D. (2006). Services science. *Communications of the ACM, 49*(7), 30–32. Article Google Scholar

Srinivasan, A. (1985). Alternative measures of system effectiveness: associations and implications. *MIS Quarterly, 9*(3), 243–253. Article Google Scholar

Srivastava, S. C., & Shainesh, G. (2015). Bridging the service divide through digitally enabled service innovations: evidence from indian healthcare service providers. *MIS Quarterly, 39*(1), 245–267. Article Google Scholar

Straub, D. W. (1989). Validating instruments in MIS research. *MIS Quarterly, 13*(2), 147–169. Article Google Scholar

Subramani, M. (2004). How do suppliers benefit from information technology use in supply chain relationships? *MIS Quarterly, 28*(1), 45–73. Article Google Scholar

Swar, B., Moon, J., Oh, J., & Rhee, C. (2012). Determinants of relationship quality for IS/IT outsourcing success in public sector. *Information Systems Frontiers, 14*(2), 457–475. Article Google Scholar

Swinarski, M., Kishore, R., & Rao, H. R. (2006). Impact of service provider process capabilities on service provider performance: an empirical study. *Proceedings of the 39th Hawaii International Conference on System Sciences*, HICSS '06, Waikoloa, Hawaii, (8), January, pp. 199c.

Tallon, P. P., & Pinsonneault, A. (2011). Competing perspectives on the link between strategic information technology alignment and organizational agility: insights from a mediation model. *MIS Quarterly, 35*(2), 463–484. Article Google Scholar

Tavassoli, L., & Toland, J. (2008). Strategies for dealing with end-user resistance. ACIS 2008 proceedings, 88.

Teece, D. J. (2007). Explicating dynamic capabilities: the nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal, 28*(13), 1319–1350. Article Google Scholar

Teoh, S. Y., Pan, S. L., & Ramchand, A. M. (2012). Resource management activities in healthcare information systems: a process perspective. *Information Systems Frontiers, 14*(3), 585–600. Article Google Scholar

Thakur, R., & Hale, D. (2012). Service innovation: a comparative study of U.S. and Indian service firms. *Journal of Business Research.* https://doi.org/10.1016/j.jbusres.2012.03.007. Article Google Scholar

Thakur, R., Hsu, S. H. Y., & Fontenot, G. (2012). Innovation in healthcare: issues and future trends. *Journal of Business Research, 65*, 562–569. Article Google Scholar

Tonelli, A. O., de Souza Bermejo, P. H., dos Santos, P. A., Zuppo, L., & Zambalde, A. L. (2017). IT governance in the public sector: a conceptual model. *Information Systems Frontiers, 19*(3), 593–610. Article Google Scholar

Tucker, A. L., Nembhard, I., & Edmondson, A. C. (2007). Implementing new practices: an empirical study of organizational learning in hospital intensive care units. *Management Science, 53*(6), 894–907. Article Google Scholar

Vargo, S. L., & Lusch, R. F. (2004). The four service marketing myths: remnants of a good-based manufacturing model. *Journal of Services Research, 6*(4), 324–335. Article Google Scholar

Vargo, S. L., & Lusch, R. F. (2008). Why service? *Journal of the Academy of Marketing Science, 36*(1), 25–38. Article Google Scholar

Vatcheva, K. P., Lee, M., McCormick, J. B., & Rahbar, M. H. (2016). Multicollinearity in regression analyses conducted in epidemiologic studies. *Epidemiology (Sunnyvale, Calif.), 6*(2), 227. Google Scholar

Venkatesh, V., Zhang, X., & Sykes, T. A. (2011). "Doctors do too little technology": A longitudinal field study of an electronic healthcare system implementation. *Information Systems Research, 22*(3), 523–546. Article Google Scholar

Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the qualitative-quantitative divide: guidelines for conducting mixed methods research in information systems. *MIS Quarterly, 37*(1), 21–54. Article Google Scholar

Wang, K. (2015). Determinants of mobile value-added service continuance: the mediating role of service experience. *Information Management, 52*(3), 261–274. Article Google Scholar

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal, 5*(2), 171–180. Article Google Scholar

Werts, C. E., Linn, R., & Jorkesog, K. G. (1974). Intraclass reliability estimates: testing structural assumptions. *Educational and Psychological Measurement, 34*(1), 25–33. Article Google Scholar

Weston, J. F., Kwang, S. C., & Hoag, S. E. (1990). *Mergers, restructuring, and corporate control*. Englewood Cliffs: Prentice-Hall, Inc. Google Scholar

Wheeler, B. C. (2002). NEBIC: a dynamic capabilities theory for assessing net-enablement. *Information Systems Research, 13*(2), 125–146. Article Google Scholar

Yen, H. R., Wang, W., Wei, C. P., Hsu, S. H. Y., & Chiu, H. C. (2012). Service innovation readiness: dimensions and performance outcome. *Decision Support Systems, 53*(4), 813–824. Article Google Scholar

Zahra, S. A., & George, G. (2002). The net-enabled business innovation cycle and the evolution of dynamic capabilities. *Information Systems Research, 13*(2), 147–150. Article Google Scholar