Service Innovation for Knowledge Intensive Services in the Digital Age: A Framework

Full Paper

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Abstract

This study develops a framework for service innovation in knowledge intensive services (KIS). Developments in digital technologies have provided unprecedented speed and enabled innovative techniques to initiate and launch new knowledge-oriented services. The potential value of these services raises questions regarding the identification of critical resources, their role, and how they interact with new technologies in service delivery. Building upon service-dominant logic, this research study theorizes that digital technologies, as operand and operant resources, interact with intangible resources to generate digitalization for service innovation. Unlike product innovation, the service innovation process is modularized based on projects. With digitization benefits, the project evaluation timeline is shorter and faster, conveying a sense of information immediacy. This study presents a new framework for service innovation in the digital age and suggests future research paths to confirm, expand, and validate the framework in knowledge intensive services context of academic libraries in higher education institutions.

Keywords

Service innovation, knowledge intensive services, digitalization, operant resources, operand resources, service-dominant logic, higher education, academic libraries.

Introduction

Among the three core sectors of world economies - primary (raw materials), secondary (manufacturing), and tertiary (services) - the service sector has experienced the largest increase in development output and total employment over the past several decades (Soubbotina and Sheram 2000). Rising per capita incomes have been driven by increases in the demand for services, especially knowledge services (Bryson et al. 2004). Furthermore, advances in information and communication technologies (ICT) have enabled a digital-based networked economy, giving rise to a new Information Age (Castells 2009, p. 162). In traditional economies, information was analog or physical, known as "atoms" whereas in the new digital economy, information is in the form of digital "bits." When information is digitized and delivered through a digital network, the vast number of bits can be transmitted at lightning speed, shared across greater distance, and accessed instantly. Information can also be retrieved anywhere through ubiquitous mobile broadband networks and smartphone technologies (Tapscott 2014, p. 116). In short, digital technologies have revolutionized how knowledge is obtained, shared, and retained for knowledge intensive services (KIS).

KIS industries include service entities that incorporate advanced technologies in their services or service delivery (OECD 2006), such as commercially traded business, finance, and information services, as well as publically regulated education and health services (Hill, 2014). The service activities themselves are comprised of research and development (R&D), consulting, accounting, legal services, information services, marketing related services, etc. (OECD 2006). Knowledge, as an essential component in KIS, has become a key asset within the service economy (Giddens 2007), much like fixed assets in traditional economies (Zienkowski, as cited in Wegrzyn 2010). Information technology has also grown in importance due to its role in knowledge generation, processing, and dissemination (Wegrzyn 2010, Tallon 2010). KIS's activities are sources, facilitators, or carriers in innovation. As sources of innovation, they initiate and develop innovation activities in other organizations; as facilitators, they support an organization in its

innovation processes; and as carriers, they integrate and transfer existing knowledge amongst organizations (OECD 2006). Although KIS activities play different roles to a different degree, at different points in an organization's service innovation process, the roles all likely involve one or more digital technologies. Evidence is plentiful; legal cases are no longer in print but searchable online, marketing programs are mainly delivered through mobile devices, and R&D outputs are accessible via the cloud. As these examples suggest, digital technologies, knowledge dynamics, and service innovation processes are highly interrelated. The success of this interrelatedness is especially valuable to higher education institutions given their central role as a social service provider in today's knowledge-based economy (Yeh and Ramirez 2016).

Traditionally, technologies have served as tools to improve the innovative service delivery process (Barras 1990). However, advances in ICT, especially digital technology, have altered service innovation at its core. Consistent with the evolution of technology-enabled product innovation (Tallon 2010), service innovation is transforming. Today, the form of service innovation is more digital in nature. Heterogeneous non-digital artifacts are digitized into digital bits and stored across multiple geographical locations. With programmable instructions, the digital data is available via the Web for experimentation and innovation. Actors from upstream and downstream sources can collaborate and communicate with digital tools, exchanging immediate feedback throughout the innovation process. As-of-late, the prevalent use of social media creates a socio-technical structure that may motivate organizational actions from information-based analytics (Heath et al. 2014). The openness in this scenario offers generative and unbounded opportunities resulting in an innovation which may or may not have been originally intended. This phenomenon is called digitalization which refers to "the encoding of analog information into digital format and the subsequent reconfiguration of socio-technical context of production and consumption of the product and services" (Yoo 2012). In a broader view, digitalization acts as an operant resource capable of initiating service innovation. Such a transformation from traditional product innovation calls for new ways to understand service innovation in the digital age and the transformative role of digital technologies. An examination of the intersection between service innovation and KIS is especially needed in the digital age, given the dearth of research on this topic.

We respond to this need by first examining the definitions of KIS and what service innovation means to the service industry. While KIS has been referred to as "knowledge-intensive business services" (Miles et al. 1995; Hipp 1999; Muller and Zenker 2001; Wegrzyn 2010), "knowledge-intensive industries" (Liao, et al. 2007), and "knowledge-intensive firms" (von Nordenflycht 2010), these definitions reflect characteristics of internal and external knowledge integration that is applicable to higher education as a non-profit organization. Secondly, we examine research of information technology (IT) innovation in information systems (IS) literature and identify the emerging service-dominant (S-D) logic perspectives as a relevant theoretical foundation for our research. Recent update of *institutions* and *institutional arrangements* in addition to *skills* and *knowledge* as operant resources in S-D logic provide a more dynamic and wider configuration for service innovation (Vargo and Lusch 2016). These resources interact with digital technologies creating the phenomenon of digitalization for service innovation in the digital age. The perspectives of S-D logic are particularly relevant to the higher education context because these institutions are recognized as the producers and consumers of knowledge, with skills and knowledge being the essence for innovation.

We draw on extant research on service innovation and digital technologies to develop a new framework for service innovation in knowledge intensive services and propose a set of relevant propositions to answer the following important research questions: (1) What are the critical resources for service innovation in KIS? (2) What are the processes for service innovation in KIS? and (3) How do digital technologies interact with resources for service innovation in KIS? We conclude our study by proposing future research to confirm and expand our framework in the context of academic libraries in higher education institutions. The contribution of this research is two-fold: (1) the theoretical model contributes to the understanding of service innovation in KIS, and (2) future findings will highlight the role of digital technologies in service innovation for the creation of value in the digital age. For practical implications, this research will assist leaders positioning service innovation for their strategic benefits.

Related Literature

We begin with a review of KIS and innovation, followed by research on IT oriented service innovation grouped into output-based, dimension-bases, and S-D logic perspectives. We then review the dual roles of digital technologies as operand and operant resources and the phenomenon of digitalization. We conclude the review on service innovation processes.

KIS, Knowledge and Innovation

Miles et al. (1995, p. 18) defines KIS as "services involve economic activities which are intended to create, accumulate, or disseminate knowledge." Hipp (1999) characterizes KIS "by the ability to receive information from outside the company and to transform this information together with firm-specific knowledge into useful services for their customers." Muller and Zenker (2001) describe KIS as "firms performing, mainly for other firms, services encompassing a high intellectual value-added." These definitions assume a two-fold role that KIS play as the intermediaries of knowledge: (1) they contribute to economic growth with their internal knowledge base, and (2) they acquire external knowledge to enhance their internal knowledge base to further contribute to economic growth (Martinez-Fernandez 2004). They are the producers and processors of knowledge offering a service that has the capacity of knowledge to respond to specific questions, problems, or needs. To gain competence, KIS strive to raise their aptitude in processing knowledge in competitive ways (Gallouj 2002, p. 258).

What constitutes knowledge? Lundvall and Johnson (1994) identify knowledge in the forms of know-what, know-how, know-why, and know-who. Cohen and Bacdayan (1994) distinguish knowledge in the forms of declarative, procedural, and causal, in response to a given event. However, the most widely known distinction is associated with the contrasts between tacit knowledge (also known as implicit knowledge) and codified knowledge (also known as explicit knowledge) specified by Polanyi (1966, p. 22). Tacit knowledge is subjective and difficult to articulate while codified knowledge can be easily transmitted to others. These knowledge types are reflected at both individual and organizational levels. Based on Polanyi's topology, Nonaka et al. (1996) suggests modes of knowledge conversion switching between tacit and explicit knowledge. Although independent of each other, these modes of process constitute a learning environment for an organization (Gallouj 2002, p. 263) where competitive advantage is tied to the organization's possessing and leverage individual workers' and organizational knowledge (Bontis 2001). KIS is thus considered as a "bridge for innovation" through its role as a knowledge repertoire and intermediary (Czarnitzki and Spielkamp 2003). In practice, a unique KIS provides a knowledge intensive type of service that no other service provider supplies (Muller and Zenker 2001).

IT and Service Innovation in IS Research

Output-based Service Innovation

Based on the types of innovation output – product or service – two opposite viewpoints suggested in Lusch and Nambisan (2015) are reflected in this study: a residual view where service is a residue of product innovation and a dichotomous view in which service innovation is distinct from product innovation. For the residual view, Coombs and Miles (2000, p. 85) suggest the assimilation concept with the idea that services innovation is fundamentally similar to manufacturing innovation. This school of thought emphasizing sectoral taxonomy views services industries as mainly supplier-dominated sectors (Pavitt 1984), scale-intensive sectors, physical network sectors, and science-based sectors (Soete and Miozzo 1989). They are the leftover sector that does not produce raw materials and tangible artifacts (Miles 2008), but receive technological impetus assimilated from manufacturing for their service innovation process (Barras 1990; Djellal et al. 2013). In this view, services are intangible goods (Djellal et al. 2013), and the new service development (NSD) can have the same underlying dimensions as the new product innovation development (NPD) (Nijssen et al. 2006; Djellal et al. 2013). Specifically, they both require strategic objectives with formalized and staged process activities (Nijssen et al. 2006).

Taking a demarcation approach, the unique characteristics of services call for concepts and models unique to service innovation (Coombs and Miles 2000, p. 92). The common characteristics are intangibility and interactivity (Miles 2008). Intangibility denotes service as a non-tangible artifact and the need to produce and consume it at the same time (Coombs and Miles 2000, p. 93), while interactivity emphasizes the

multiplicity of actors involved in innovation including producers and clients (Miles 2008). This contradicts the goods-dominant (G-D) logic in the manufacturing context where goods are the unit of exchange and customer is secondary and seen as value receiver and destroyer (Varge and Lusch 2004). However, such generalization about services has its limitations because the distinction between products and services are not clear-cut, and are problematic (Miles 2008). For example, a valued brand produced by a manufacturing firm as a product is intangible and a specialized component supplier may have high interactivity with clients during production processes.

Dimension-based Service Innovation

Contrarily, researchers provide insights from the perspective of service activities. In their views, service innovation is seldom limited to a change in the service product characteristics and is better thought of in terms of dimensions in activities (Miles 2008). Den Hertog (2002) proposes four dimensions of service innovation including service concept, client interface, service delivery system, and technology. Many innovations involve some combination of those four dimensions (Miles 2008), IT dimension, in particular has consistently played an enabling role to all other dimensions (Barrett et al. 2015). For example, an automatic teller machine (technology dimension) enabled a new client interface in the banking industry; and the mobile boarding pass mechanism (technology dimension) delivers a new check-in system in the airline industry. These are also new service concepts. Although dimension-based service innovation literature separates the artifact of product and service, it does not resolve the age-old debate of whether service innovation is different from product innovation.

Recently, researchers have voiced the opinion that such a distinction is no longer relevant because products have been recognized as mechanisms for delivering services (Lusch and Nambisan 2015; Orlikowski and Scott 2015), and services are demanded as added value to products (Wegrzyn 2010). It has been especially evident in the last decade that products and their related services have been packaged as a service, giving rise to the concept of *servitization* in which products and services function side by side (Rust 1998). In other words, services have been interwoven into the physical production of products (Bryson et al. 2004). Thus, Preissl (2000) suggests the alternative view that the boundaries between industries should be based on innovation dynamics rather than narrowly defined output characteristics. Given this view, what might a service innovation model look like? The model should include factors required by both product and service innovation. A unique model of each type of innovation would not be sufficient, instead, a comprehensive model is called for given the integrated nature of servitization today.

S-D Logic

Focusing on innovation dynamics with a synthesis approach, service-dominant (S-D) logic has emerged as a foundation for understanding innovation in general (Barrett et al. 2015). The logic examines the intangible resources of humans and technology in service innovation to provide a telescopic view of their roles, opposite to product-centric view. Three relevant concepts related to innovation in KIS can be drawn from the extended and updated S-D logic foundational premises: (1) *service* as a process, (2) value co-creation through actors-generated institution and institutional arrangements, and (3) operant resources as the source of strategic benefit. When service is conceptualized as a process representing both social and economic exchange, producers and consumers are *co-creators* of value in a networked system (Vargo and Lusch 2011). Traditionally, producer and customer were divided in business-to-customer (B2C) exchange. However, expanding out from the traditional mode, an institution's rules, norms, meanings, symbols, practices, routines, and collaboration arrangements as well as its interdependencies with other institutions are all factors of a service. Producers and consumers should be expanded as *actors* co-creating value through resource-integration (Vargo and Lusch 2016). In addition, institutional arrangements embody an organization's structural tacit knowledge when coupled with information systems that enhance an organization's know-how (Bontis 2001).

Operand resources are often static and require dynamic resources to act on, while operant resources are often intangible and dynamic that initiate, trigger, or operate on other resources to produce effects (Nambisan 2003; Vargo and Lusch, 2004; Lusch and Nambisan 2015). From a G-D logic perspective, operand resources are primary. Manufacturers take operand resources as centers for production, applying them to produce outputs for customers. Similarly, customers and markets are researched and segmented so that they can be marketed with the specific outputs (Castro-Leon and Harmon 2016, p. 40). In the S-D logic, however, the primacy of resources is shifted from operand to operant. Operant resources include

human skills and knowledge, organizational controls, routines, cultures, and competences, informational knowledge about market segments, competitors, technology, and relational factors with competitors, suppliers, and customers. The integration of these resources is manifested as core competencies and capabilities which are fundamental source of strategic benefit (Vargo and Lusch 2016).

The Dual Roles of Digital Technologies and Digitalization in Service Innovation

IT has opened tremendous opportunities for service offerings and innovation to create competitive advantages (Robinson et al. 2002), and to enhance efficiency and effectiveness of service deliveries (Den Hertog 2002). The scope of these technologies is largely limited to devices and formats that are unique to a product or service (Tilson et al. 2010). In this role, IT is a material artifact (Orlikowsky and Iacono 2001) that is traditionally viewed as an operand resource facilitating technological service innovation (Lusch and Nambisan 2015). An example of digital technology as an operand resource can be found in the early state of the Internet as a packet-switching network that facilitated internetworking. However, with the birth of the World Wide Web, hypertext linking capability led information superhighways to an unprecedented landscape of digital service innovations. Businesses embracing open architecture experience process modifications with new forms of collaboration by digital technologies. Huge amounts of digital data are mined to initiate or suggest business changes. Through social networking, a virtual community can be configured or reconfigured with collected user feedback. Employees and users are required to be digital literate navigating in the digital environment. The list goes on. In this view, digital technology transforms existing socio-technical structures that were previously mediated by non-digital artifacts into ones that are mediated by digitized artifacts in the phenomenon called digitalization (Yoo et al. 2010). In summary, digital technologies exist as operand resources, and they exploit, integrate, co-create, and act on other operant resources to promote digitalization that is also viewed as an operant resource for service innovation.

Service Innovation Process in the Digital Age

Martin and Horne's (1993) empirical study suggests that when innovation is strongly associated with all actors, the level of process formalization of new service offerings is much lower than the new goods offerings. If and when services do formalize development, they appear to perform the process on a case-by-case modular basis. This characteristic of modularization is especially supported in the open architecture of the digital era where IT is no longer seen as a black box (Fishenden and Thompson 2013). Strambach (2008) notes the features of knowledge exploration in KIS with which a project-based development is necessary to both extract knowledge from its client within project-specific contexts, and to combine the context with the preexisting knowledge base for new knowledge development. For the prototype and testing of a service innovation, Ettlie and Rosenthal (2011) suggest that the iterative process of value co-creation between actors gives advantage only if faster and shorter testing cycles is given consideration. The short cycle provides rapid feedback known as "information immediacy" that has become a theme and a key driver in digital economy (Tapscott 2014). This shorter temporal structure also bears a greater level of unpredictability and overlap in their time horizons (Nambisan 2017).

Conceptual Framework

Based on the three emphases proposed in S-D logic - service as a process, value co-creation through actors-generated institution and institutional arrangements, and operant resources as the source of strategic benefit, as well as the understanding of digitalization within the social context - a conceptual framework is proposed below. This framework recognizes the existence of digital technologies (as operand resources) that are operated on by operant resources, including skills, knowledge, institution's norms and culture, and institutional arrangements in the form of value co-creation with customers/users. The integration of these resources creates digitalization as a broader operant resource to initiate a service innovation process. The process is formalized, however, less in degrees, than a traditional product development process. The process also assumes the characteristics of modularization that are frequently and rapidly evaluated by the customers/users conveying a sense of immediacy. With frequent testing

needs, the feedback is merged with the existing resources for knowledge reuse. Although product development and service development process cycles are both iterative, in the former case, the interaction is mainly contained within the development stage, whereas in the latter case, the interaction is multi-directional between the creation, development, and evaluation processes in service innovation in KIS.

Figure 1. A Framework for Service Innovation for Knowledge Intensive Services
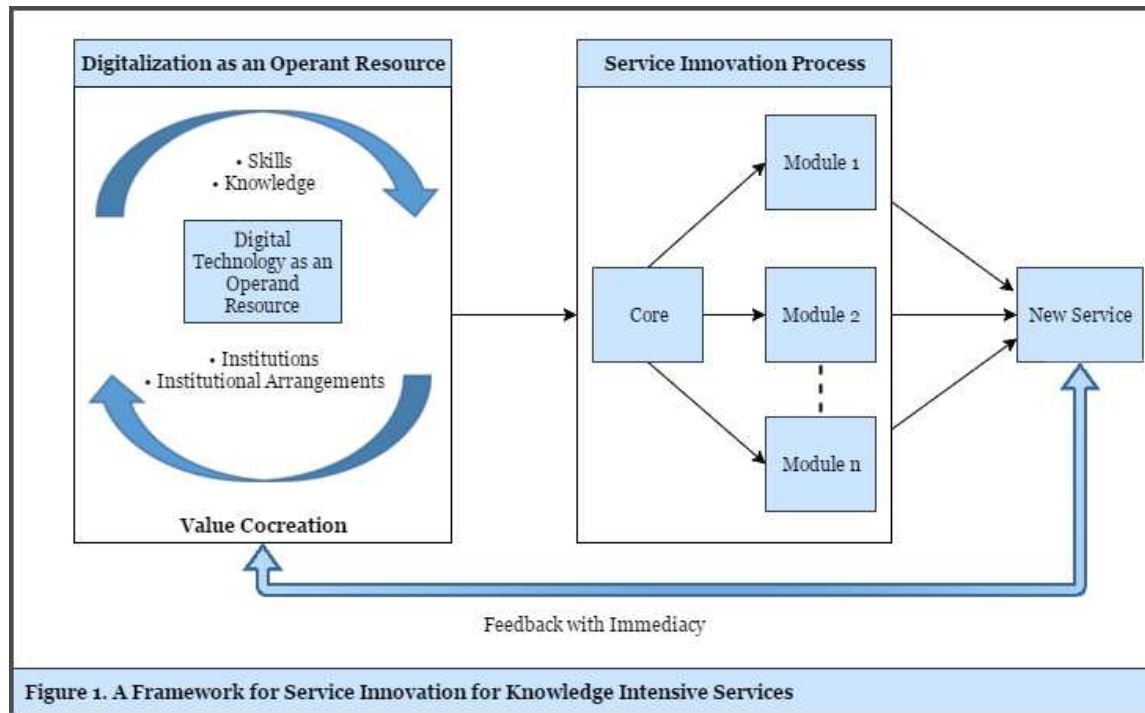
Based on the proposed framework, we present seven propositions:

- P1: Skills within an organization integrated with digital technologies contribute to service innovation for KIS.
- P2: Knowledge within an organization integrated with digital technologies contributes to service innovation for KIS.
- P3: Institutional norms within an organization integrated with digital technologies contribute to service innovation for KIS.
- P4: Collaborative arrangements within an organization integrated with digital technologies contribute to service innovation for KIS.
- P5: Users as co-creators when exploited with digital technologies contribute to service innovation for KIS.
- P6: Project-based modularization within the innovation process contributes to service innovation for KIS.
- P7: Frequent beta testing with immediate user feedback from the innovation process contributes to service innovation for KIS.

A good example validating this framework of digital technologies as operant resources for a knowledge intensive service can be seen in the creation and use of a digital library. A digital library is a collection of information services where the information is stored in digital formats and accessible over a network to meet the information needs of a given user population (MacCall et al. 1999). It consists of digital technologies such as digitization equipment and ICT, integrates with knowledge presented on pages of printed manuscripts to create an innovative digital repository consumed by the information society. The library with its digital data open through Web application programming interface (API) can offer

crowdsourcing opportunity which in turn, enhances the metadata quality of the digital library itself creating a digitalization phenomenon. A digital library is a service innovation in library practices.

Future Research and Conclusion

The proposed framework will be confirmed and expanded with interview and secondary data obtained from higher education libraries, which are the gatekeeper for knowledge in this information age. Administrators from doctoral granting universities known for their service innovation success will be interviewed. In the next stage, a survey method will be employed in academic libraries across the United States to validate the refined framework. The results of this research will help KIS leadership understand how to leverage collective skills and knowledge, institutional norms and cultures, collaboration with other institutions, as well as digital technologies that play a significant role in integrating resources to initiate service innovation. As a theoretical contribution, this study identifies digitalization as an operant resource for service innovation and proposes project-based modularization and information immediacy as new dimensions for service innovation processes in this digital age. This research provides a basis for future studies to build upon this framework for service innovation.

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