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Does IT innovation asset lead to business innovations?

IT Business Innovation Capability Lens

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Abstract

The aim of this research is to understand the factors that affect the ability of an organization to innovate, using information technologies, in its business – including products, processes, and business models. IT business innovation (ITBI) assets, i.e. integration; data analysis; and social media technologies, are proposed to have an impact on business innovation. Since IT in itself is not a source of value without a proper organizational capability to absorb its capacity, IT business innovation capability is proposed as a robust concept between the impact of IT innovation assets and business innovation. Business innovation capabilities are proposed to be generating valid ideas (interpretive, critical, and positive competences) and idea implementation (innovation sponsorship and organizational flexibility competences) capabilities.

Keywords: IT business innovation, organization flexibility, capability theory, exploratory competences, exploitative competences, Knowledge Creation theory

1. Introduction

Nowadays, achieving sustainable business innovation becomes critical for organization survival in hyper market competition. Notably, an organization ability to survive is based on its ability to adapt to changes in its environment (Schumpeter, 1950). Consequently, survival is conditioned by the ability to achieve sustainable innovation through continuous exploring and exploiting new opportunities (McGrath, 2001; Sidhu et al., 2007); we could call it the routine of innovation. Information Technology Business Innovation (ITBI) is defined in this research as using Information Technology as an enabler for business innovation (Joshi et al., 2010; Kleis et al., 2012; Ashurst et al., 2012; Tambe et al., 2012). Business Innovation is defined as doing novel things that are ultimately appreciated and valued by customers – not only developing new products (Luo et al., 2012) and services (Hidalgo and D'Alvino, 2014) or new product/service designs (Nambisan, 2013) , but also developing new business processes (Tarafdar and Gordon, 2007), new communication channels (Song and Song, 2010) and new business models (Cash et al., 2008; Sawhney et al., 2011). In addition to organizational changes that are required to achieve sustainable business innovation (Cash et al., 2008), it has been found that IT has a critical role in realizing business innovation (Tambe et al., 2012).

IT investment has a significant impact on product innovation when R&D competence, in terms of skills and knowledge of R&D employees, is existed (Kleis et al., 2012). The picture is somehow clear about product innovation (Song and Song, 2010) and process innovation (Tarafdar and Gordon, 2007) through using IT resources. Additionally, although it is known that IT investment has an impact on business innovation (Luo et al., 2012), it is not clearly known what are organizational capabilities required to leverage this relationship.

Literature investigated the impact of IT capabilities on organisation performance (Stoel and Muhanna, 2009; Chen et al., 2013). Others investigated the IT capabilities building on the IT Business Value (Wang et al., 2012). Furthermore, researchers show the relationship between IT capabilities, in terms of IT department competences, and innovation (Ashurst et al., 2012). However, few theories have studied what are organizational capabilities required to enable organizations to innovate through their IT assets (Tambe et al., 2012). For instance, Joshi et al (2012) shows that IT as an enabler to increase social integration capacity has a robust impact between the idea generation and commercialization of the idea. Indeed, social integration capacity with external and internal stakeholders is one step toward understanding the organization capabilities required to realize innovation through IT assets. It is known the impact of IT on organizational capabilities that lead to business innovation, such as knowledge capabilities (Cohen and Levinthal, 1990). However, research in identifying organizational capabilities that leverage the relationship between IT-enabling innovation assets and business innovation is still new and needs more investigations.

Motivated by our incomplete understanding how organizational capabilities mediates the relationship between the quality/existence of using IT assets and business innovation, this research develops IT innovative organizational capability model, as illustrated in Figure 1, to explain why not all organizations are able to achieve innovation from the same use of the same IT assets.

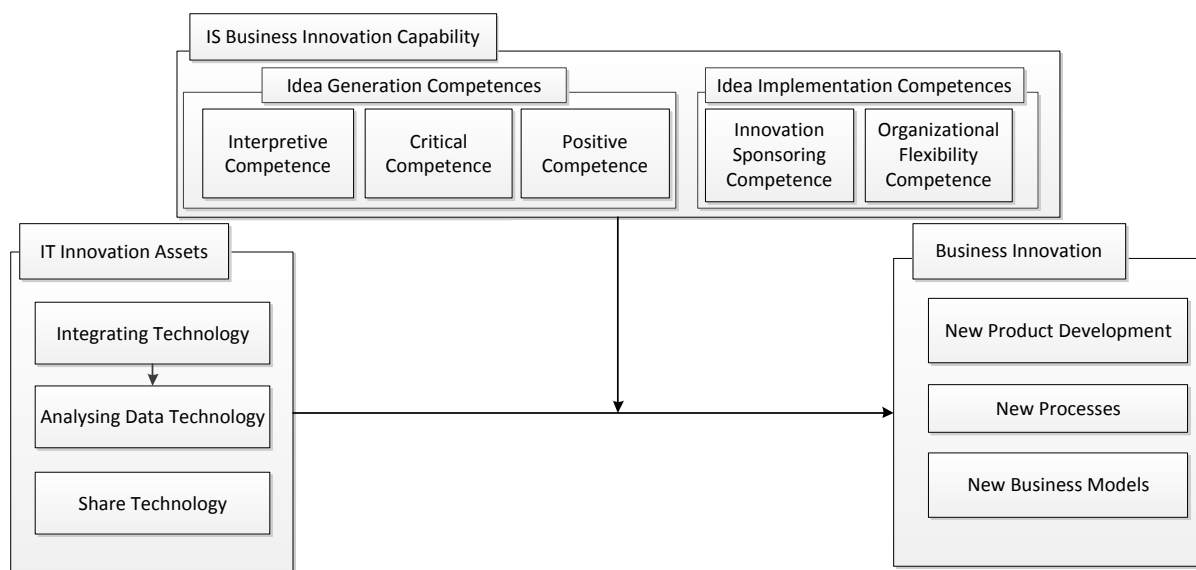


Figure 1: Theoretical Framework

2. Theoretical Development

2.1 IT innovation Assets

Although innovations in IT have an impact on business innovations (Swanson, 1994), it is believed that organizations could innovate in their business within the existing information technologies for decades (Brynjolfsson and Saunders, 2010). Joshi et al (2010) uses

absorptive capacity theory developed by (Zahra and George, 2002) to classify IT assets into IT technologies that enable organization to acquire and assimilate the knowledge (IT-enabled Potential Absorptive Capacity (IT-PACAP), IT technologies enable transformation and exploitation of the knowledge (IT-enabled Realized Absorptive Capacity (IT-RACAP), and IT technologies that enhances social integration capacity (IT-SIC). However, we derive a new taxonomy for IT assets that enable innovation. They are classified into IT assets that enable integration among different systems (IT-Integration), e.g. ERP systems, IT assets that enable “bio-sociation” between different disciplines and departments (IT-Intelligence), and IT assets that enable stakeholders to communicate new findings, results, and insights across the organization (IT-Sharing).

In order to explore new patterns in data or to test the validity of new ideas, it is very difficult to do so without using data business intelligence applications (Sabherwal and Becerra-Fernandez, 2011). Business intelligence applications, for instance, enable organizations to either explore new patterns in customer perceptions, supplier trends, and processes efficiency or test new ideas using historical data (Marchand and Peppard, 2013). Additionally, visualization and simulation applications, such as creativity tools, enable engineers and product designers to enhance knowledge creation in the organizations that utilize them (Shneiderman, 2007). Furthermore, the “bisociation” capability, the ability to bridge between two disciplines of thoughts, of intelligent information systems enables an organization to transform and exploit its knowledge in a way that may lead to firm innovation (Joshi et al., 2010). Therefore, the use of data analysis applications is hypothesized to have an impact on business innovation.

RH1: The use of data analysis applications has an impact on business innovation

The reliability, and therefore the usability, of organizational data are based on the quality of the data in terms of accuracy and timeline. Therefore, the higher the accuracy and timeline of the data, the more usage and dependence is on the data (Sabherwal and Becerra-Fernandez, 2011). According to Elliot (2009), many intelligent efforts in organizations are not successful as the information available in their depositories are not clean, consistent, timeline, and relevant. One of the best ways to enforce the reliability of the data is stopping human intervention in data entry. Therefore, the more the integration between the systems, the higher the accuracy and timeline of the data is. Since the higher the usage of the system, the higher the benefits that are realized from the system (DeLone and McLean, 2003; Petter et al., 2008), it is hypothesized that the level of integration between different information technologies enables organizations to use intelligent systems to achieve business innovation.

RH2: A level of integration across information technologies has a second order impact on business innovation.

Social media technologies, sometimes called sharing technology, enable communication among organization members and with external members. This variety of IT-enabled-communication enables accumulation of knowledge which helps in in maturing infant ideas. Innovators are anxious of rejection, ridicule, and rip-off the new innovative ideas. Thus,

providing a safe environment to communicate and share these new ideas helps in maturing the emergent ideas (Shneiderman, 2007).

Sharing technologies, such as Web 2.0 Technologies, are perceived by executives as an enabler to share, and therefore to accumulate, knowledge among employees, customers, and suppliers (Bughin et al., 2008). Actually, it has been perceived that Web 2.0 technologies have mixed results (Birkinshaw et al., 2011). For instance, in a global survey conducted, McKensey (2008) revealed that 22% dissatisfied and 7% stopped using one or more of Web 2.0 technologies. The reason for these disappointing results could be because the new technology in general needs time to be absorbed by organizations (Kohli and Grover, 2008) or it could be because there are no organizational capabilities to support the use of the sharing technologies (Cash et al., 2008; Birkinshaw et al., 2011).

From another perspective, according to McKensey (2008), satisfied respondents see that web 2.0 tools have altered the interaction with customer and suppliers and helped in creating improved roles, functions, products, and culture. Indeed, sharing technology enables sharing not only text among peers either internal or external an organization; but also videos and graphics. Sharing texts and ideas enables organizations to overcome the problem of physical separations between departments, and the problem of cultural differences since both of the problems have an impact on new product development ability (Song and Song, 2010). Furthermore, this sharing technology enables an organization to accumulate and absorb its knowledge because of the interactions from the organization's members. It is suffice to say, the ability of accumulating and absorbing the organizational knowledge is a source of continuous innovation (Leonard-Barton, 1995). Consequently, Sharing Technology is hypothesized to have an impact on business innovation

RH3: using sharing technology has an impact on business innovation

Therefore, IT innovation assets are defined as the Information Technology hardware and software applications that enable organizations to integrate operational data, analyse theses data, and share ideas and knowledge across organizations.

Research Proposition 1: IT innovative assets, integration; data analysis; and social media; have an impact on business innovation

2.2 IT Business Innovation Capabilities

An IT innovation asset, as any class of IT assets, delivers above average performance only when the organization is able to utilize the strategic purpose of it (Aral and Weill, 2007). The ability of an organisation to deploy, integrate and utilize its assets toward a specific goal is called Capability (Amit and Schoemaker, 1993). Since IT capability is the ability of an organisation to deploy, integrate and utilize its IT assets to enhance organisation performance (Wang et al., 2012), IT Business Innovation capability is the ability of an organisation to deploy, integrate and utilize its IT innovation assets to achieve business innovation.

IT capabilities are different from IT organizational capabilities: While the IT capabilities, e.g. IT department capabilities in managing and integrating IT into organization process, are

heavily studied in literature (Stoel and Muhanna, 2009), the IT organizational capabilities, the abilities of an organization to absorb the IT functions and capacity, are not well investigated in literature. IT organization capabilities include, but not limited to, IT absorptive capacity capabilities (Cohen and Levinthal, 1990; Zahra and George, 2002; Ritala and Hurmelinna-Laukkanen, 2013) and knowledge creation capabilities (Nonaka and Von Krogh, 2009; Shu et al., 2012). Unlike the traditional IT capabilities that focus on IT department competences (Wang et al., 2012; Chen et al., 2013), IT organizational capabilities focus on non-IT department competence to assimilate and utilize the technology toward a specific objective. For instance, active management, as the IT organization capability, is the main source to achieve sustainable process innovation through using ERP systems (Srivardhana and Pawlowski, 2007).

Although business innovation cannot be realized without thoughtful ideas from different search efforts; demand-side, supply-side and spatial search (Sidhu et al., 2007), following-up and implementing these ideas are the real challenges to the most organizations (Birkinshaw et al., 2011). Therefore, business innovation capability is an equation of generating valid ideas competences and idea implementation competences (Govindarajan and Trimble, 2010), sometimes called exploration and exploitation competences (Jansen et al., 2006). Consequently, an innovation capability, as illustrated in Table 1, is rooted in a couple of main sub capabilities: generating valid ideas capability and idea implementation capability.

Table 1: IT Business Innovation Organizational Competences

Capabilities	Competences	Description	Literature Review
Generating Valid Ideas	Interpretive Competence	The ability of organizations to understand and comprehend the reality through the data in the system	(Shneiderman, 2007; Sidhu et al., 2007; Sabherwal and Becerra-Fernandez, 2011)
	Critical competence	The ability of organizations to criticize its current reality to generate new ideas.	
	Positivist Competence	The ability of organizations to test new ideas through experiments using data available in databases	(Hopkins, 2010; Marchand and Peppard, 2013)
Idea Implementation	Innovation Sponsoring	A dedicated unit for scouting and implementing new ideas	(Cash et al., 2008; Govindarajan and Trimble, 2010)
	Organization Flexibility	The level of organization ability to be flexible enough to accept the new innovative ideas in processes and business model	(Chen et al., 2013; Bock et al., 2012)

Generating valid ideas capability is the other side of knowledge creation capability. However, whereas generating valid idea capabilities is proposed to have a direct impact on enhancing or redesigning the current product, service, process, or business model, knowledge creation has a direct impact on understanding the current processes to enable innovations (Leonard-Barton, 1995; Nonaka and Von Krogh, 2009)

Knowledge creation, gaining the “truth”, usually comes into three epistemologies: interpretive, positive, or critical epistemology (Kanellis and Papadopoulos, 2009). While interpretive epistemology focuses on understanding the reality (Walsham, 2006), positive epistemology focuses on gaining knowledge through formulating hypotheses and testing them (Singleton and Straits, 2005). However, critical epistemology focuses on criticizing the reality (Myers and Klein, 2011). Indeed, combining between these epistemologies has many functions such as validating the new knowledge through positive research (Venkatesh et al., 2012; Teddlie and Tashakkori, 2008). Therefore, in order to generate new validated ideas, organizations go through three sequential activities: understanding the reality (interpreting the reality), proposing new ideas based on understanding reality (criticizing the reality), testing the proposition in an objective way (testing the reality). In other words, organizations should be competent in understanding their realities, proposing new ideas, and testing these new ideas before implementing them.

RH4: The ability of an organization to interpret its data in meaningful way (Interpretive Competence) has a robust impact on the relationship between IT innovation Assets and Business Innovation

RH5: The ability of an organization to criticize its current reality (Critical Competence) has a robust impact on the relationship between IT innovation assets and business innovations

RH6: The ability of an organization to test new ideas in an objective way (Positive Competence) has a robust impact on the relationship between IT innovation assets and business innovations

Idea implementation capability focuses on the ability to implement new ideas successfully. Innovation always contradict with organization routine (Obstfeld, 2012) since innovation requires “slack” (Birkinshaw et al., 2011) such as time to develop and test new ideas. Although it is believed that devoting a special entity could solve the problem of an organization routine (Cash et al., 2008; Govindarajan and Trimble, 2010; Obstfeld, 2012), others believe that organization flexibility could be another solution (Bock et al., 2012), or structuring an organization based on projects to overcome the problem of routine and functional structure of organizations (Davies and Hobday, 2005). Actually, it is not easy for organizations to be project-based structure due to its limitations to standardized production systems (Project Management Institute, 2008). Indeed, project-based organizations, such as construction organizations, lack the routine capabilities which are necessary, in terms of cost efficiency and organization stability (Cyert and March, 1963), but not sufficient (Obstfeld, 2012). Therefore, this research considers the first two options: devoting a special entity for innovation and organization flexibility.

RH 7: devoting a special organizational entity to business innovation robust the impact of IT assets innovation on organization business innovation.

RH8: Organization flexibility leverages the successful implementation of business innovations

Research proposition 2: IT Business innovation capabilities, represented by organizational idea generation and implementation competences, have a robust impact on the relationship between IT innovation assets and business innovation.

3. Conclusion and Future Research

This paper aims to propose a theoretical framework explaining how organizations, through developing and building its IT organizational capabilities, can utilize their IT portfolio to innovate in their business. IT innovation assets are technologies that enable organizations to integrate, analyse, and share the data, information, and wisdom.

In order to leverage IT innovation assets impact on business innovations, there is a couple of organizational capabilities required: generating valid ideas and idea implementing capability. Generating valid ideas capability consists of three organizational competences: understanding the reality (interpretive competence), criticizing this reality (critical competence), and testing the new ideas (critical competences).

This research needs to be backed by positive survey research in order to construct and modify new concepts, e.g., organizational critical competences and interpretive competences, and test this theoretical framework.