Core capabilities for practitioners in achieving e-business innovation

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A B S T R A C T

The rapid advance of information technology and its penetration into the core elements of the business model and organizational structures is enabling profound and significant organizational changes. In such a dynamic environment, firms must be able to continually evolve their capabilities to facilitate electronic business (e-business) innovation. Yet, current research pays little attention to the core capabilities that contribute to e-business innovation in general. This research seeks to identify the core capabilities that are necessary for achieving e-business innovation. We propose a tri-core model of e-business innovation adopted from Swanson (1994), which knits together three cores: business technology, the business model and the value network. We use this model initially to specify the functional areas of the capabilities. Based on data collected through an intensive literature review and an exploratory Delphi study, thirteen essential capabilities were considered as the keys to e-business innovation exploitation and exploration. Firms can facilitate their e-business solutions over time through the successful development of these capabilities. These findings provide great insights for practitioners and scholars alike to better understand the core capabilities for achieving e-business innovation. It can also help practitioners form a template of the requisite in-house management for identifying knowledge gaps and developing action plans.

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1. Introduction

The information system (IS) has been considered the main catalyst for stimulating the business transformations that trigger considerable changes in business processes and performance outcomes (Markus, 2004). Most firms are increasingly engaged in business transformations that are triggered by the adoption of new IS. Recently, emerging information technologies (IT) – such as cloud computing, Service-Oriented Architecture (SOA), and Web2.0 – increasingly affect the roots of existing IS applications, and represent a paradigm shift in developing electronic business (e-business) (Hirschheim, Welke, & Schwarz, 2010). Such technology poses considerable opportunities and challenges for contemporary firms in streamlining business processes, creating new services, renewing business models and enhancing relationships with key partners and customers; all of which incubate the emergence of new e-business applications.

E-business activities include the sharing of business information, developing business models, and maintaining business relationships by means of inter-organizational information systems. As such, an innovative e-business application can be characterized by a technical innovation in IT, an innovation of new business models, and new ways of cooperating with stakeholders to expand areas of business and create value (Turban, King, & Viehland, 2004). Drawing upon Zhuang (2005) and Wu and Hsia (2008), we define “e-business innovation” as the innovation originating from innovative e-business applications that impact established business models and collaborations with stakeholders.

As e-business innovation undergoes drastic advances, a number of researchers and practitioners have suggested that the competitive advantage of a firm in such dynamic environments is transient, rather than sustainable (Piccoli & Ives, 2005). The incumbent firms must therefore concentrate on seeking how to exploit innovative IT applications and renew business models, so as to benefit from the new e-business trend. The resulting shift, stemming from e-business innovation, could ultimately alter the way e-business applications relate to and integrate with business models within and across organizations. That is, it will result in greater cohesion between emerging IT and business processes, stakeholder relationships, inter-organizational IS development, business model reinvention and value network reconfiguration. Consequently, a firm’s adoption of an e-business innovation involves significant diversity in technological and business innovations, ranging from IT applications and business operations to e-business transformation.

The dynamic nature of e-business innovation requires incumbent firms to be able to reconfigure resources in new ways and renew their capabilities to respond to changing environments.
However, insufficient attention has been paid to identifying and tackling the capabilities with the potential for facilitating e-business innovation, in the context of current technology. Therefore, it is vitally important for e-business practitioners to both identify the core capabilities for achieving e-business innovation, and to develop these capabilities over time.

In this paper we propose a tri-core e-business innovation model adopted from Swanson (1994). This model is then employed using the Delphi approach, based on an in-depth analysis of secondary data, which is used to explore the essential capabilities required for e-business innovation. The objectives of this study are to identify the capabilities critical in achieving e-business innovation, and to encourage continued inquiry into e-business innovation.

2. E-business innovation and dynamic capabilities

2.1. Information system innovation and the evolution of e-business

The relationship between IT applications and organizational change is always a central concern in the field of IS (Fichman, 2004). New uses of information systems (IS) have the potential for significant transformations in applications development, organizational business processes, and organizational performance – and also hold the potential for all sorts of change for the organization's stakeholders (Markus, 2004). The phenomenon of IS-driven organizational change can be termed an IS innovation (Lyytinen & Rose, 2003; Swanson, 1994).

Innovation can be defined as “the first or early use of an idea by one of a set of organizations with similar goals” (Daft, 1978). Here, IS innovation can be broadly defined as either an innovation in the organizational application of IS, or an innovative use of IS in the organization (Swanson, 1994). The IS plays a crucial role in organizational transformation today. Such innovations involve not only IT components, but are often augmented by complementary business innovations, including new forms of services, business processes and organizational structures. Swanson (1994) argued that the IS innovation domain may be incorporated – via IS products and services – into the cores of functional IS, business administration, and business technology.

IS Innovation may also be viewed as an evolutionary process consisting of various phases or stages. Willcocks, Reynolds, and Feeny (2007) indicated that for a larger organization, reaching maturity in IS management is an evolutionary process of three phases: delivery, reorientation and reorganization. In the delivery phase, exploitation of IS centers on contract facilitation, establishing a solid technical architecture, and making the technology work. Here the IS innovation domain is understood to incorporate the three cores from Swanson's model: the functional IS core, and the business administration and technology cores via IS products and services. The chief information officer (CIO) needs to be highly experienced in building technical services.

When IS exploitation proceeds into the reorientation phase, the IS function becomes more strategic and business-focused. In this stage it becomes critical to have a business-oriented CIO. Based on the results of the previous phase, the CIO needs to place more emphasis on business strategy and new IT vision, and also needs to be highly experienced in relationship-building and business systems thinking. Here, as in Swanson’s model, IS innovation should increase its focus on integrating IS products and services with the business model, as well as its impact on business strategy and administration. When IS exploitation evolves through the reorganization phase, the CIO may well be a business innovator with core IT and business management capabilities and the right sourcing capabilities (Willcocks et al., 2007). Here IS innovation focuses more on the external market, integrating IS products and services with business transformations, and impacting the value network.

Today’s firms have evolved to the point where business opportunities can be explored and exploited with new IT applications. As the power and presence of IT continue to expand and more e-business firms gradually mature under IS initiatives, there will be a growing trend for firms to move into more advanced stages of maturity. For example, Hoque, Sambamurthy, Zmud, Trainer, and Wilson (2006) identified three stages in demonstrating the maturity level of different business IT applications: alignment, synchronization and convergence. Similarity, the enterprise architecture maturity stages model identifies four stages in evaluating business maturity in exploiting IS: business silos, standardized technology, rationalized technology, and business modularity (Venkatesh & Bates, 2007).

The evolution of e-business from one stage of maturity to the next requires e-business firms to continually acquire and evolve new capabilities to match the requirements of different evolutionary stages. Over the past decade, we have witnessed the fast growth of innovative e-business applications as more firms mature under e-business initiatives. As the initial wave of e-business matures, there will be a growing trend for e-business firms to move into the next maturity stages as they continue to search for greater value from e-business innovations. In these shifting environments, firms need to constantly renew their organizational capabilities to cope with the changes and achieve better e-business maturity.

As noted earlier, an e-business innovation arises from innovative uses of e-business applications. They can be characterized as specific IS innovations in terms of inter-organizational focus (Wu & Hsia, 2008). In general, innovations normally penetrate organizations through integrating interrelated innovations. These innovations range from the application of emerging IT, to the development of new business models, and to the establishment of new collaborations. The key factors that underpin an e-business innovation may be grouped into three sets: IT applications, business models, and collaboration with stakeholders (Barua, Konana, Winston, & Yin, 2005; Wu & Hsia, 2008). Accordingly, we propose a tri-core model for e-business innovation – adopted from Swanson’s IS innovation model – which considers that overall innovation converges from innovations in the three functional cores: business technology, business model, and value network, as shown in Fig. 1.

Within this model, an e-business innovation is considered as having sprung from changes in business technology, the business model, and the value network. Beginning with Swanson's model, the cores progressively underlie one another. It highlights that an e-business innovation originates with changes in business technology, which are often augmented by complementary transformations in the business model and the value network. The model...
makes it possible to recognize the critical enablers of an e-business innovation that give rise to specific new opportunities. It is also vital to see that many existing and future innovations derive from a combination of the cores.

An e-business innovation characterizes the convergence of new business technology, business models, and value networks. The business technology core refers to the application of new IT to deliver products or services and automate business operations (Howe et al., 2006). In the contemporary realm, these include features that normally characterize improved technological functionality and capability, such as: new IT infrastructure (e.g. mobile connectivity); computing utilities (e.g. cloud computing); architectural principles (e.g. Service-Oriented Architecture); or service delivery (e.g. web 2.0).

There is compelling evidence that business model innovation is important for the e-business industry, because even established firms must continuously innovate to mitigate the threat of changes resulting from emerging IT (Christensen & Bower, 1997). Amit and Zott (2001) indicated the business model as a locus of innovation. Generally, the business model is the business logic by which a specific firm uses its resources to create customer value and gain while profit doing so, with a mediating link between IT-enabled innovation and business value implementation (Osterwalder, Pigneur, & Tucci, 2005). It consists of four interlocking base elements: value proposition, profit formula, key resources, and key processes; which, when taken together, create and deliver value (Afuah & Tucci, 2003; Johnson, Christensen, & Kagermann, 2008). In this research, the business model core covers these identified elements. It is a description of the value a firm offers to customers and/or the business architecture of the firm. In the contemporary realm, this includes business model renewal and e-business transformation.

The value network is a business configuration that describes the collaborative architecture of sourcing agreements and alliances that firms implement to gain complementary resources from other firms for the execution of value-generating activities (Rai, Sambamurthy, & Agarwal, 2008). Because the separation between firms and their surrounding environments is increasingly more blurred in e-business environments, the collaborative network is a source of innovation and business growth (Pisano & Verganti, 2008). Thus, it is necessary for modern firms to create a sustainable network of cooperative agreements with partners to arrange resources and create value. This research therefore considers a value network which describes the relationship network between firms and external partners to be a locus of e-business innovation.

Specifically, successful e-business firms often exploit e-business innovations through value networks outside of their current operations in order to generate value co-creation. In other words, firms need to understand how to maintain, transform, and govern these networks with suppliers, customers and other trading partners for co-production and co-creation of value. Capabilities in partnership development, network governance and participation, co-production, and open innovation are important in configuring an effective value network (Pisano & Verganti, 2008).

An e-business innovation can pose breakthroughs in the existing business technology and lead to a revision of the business model and an expansion of the value network so as to trigger business transformations. As a result, the changes normally penetrate e-business firms by integrating a set of interrelated changes, covering the development of new IS capabilities, reinvention of business models, and reconfiguration of the value network.

### 2.2. Dynamic capabilities perspective

A firm must continually gain, reconfigure, and dispose of organizational capabilities and resources to match the requirements of a rapidly changing business environment (Teece, Pisano, & Shuen, 1997). The term “dynamic capabilities” refers to the ability to identify new market opportunities, determine their potential strategic importance, and renew competencies to respond these opportunities. Dynamic capabilities vary with the environment. Essentially, they are change-oriented capabilities that help a firm redeploys its resources and renew its capabilities to sustain competitive advantages and achieve congruence with shifting business environments. The development of dynamic capabilities reflects an organizational ability to cope with the change in a timely way.

Recently, the dynamic capabilities perspective has been applied to the e-business domain. For instance, Rindova and Kotha (2001) employed the dynamic capabilities concept to examine how organizational form and function dynamically co-evolved with the competitive advantage of e-businesses. Daniel and Wilson (2003) proposed two types of dynamic capabilities – innovative and integrative – necessary for addressing e-business transformation, as well as the practices in developing them. Dynamic capabilities can be beneficially applied to understanding the core capabilities that are necessary for implementing e-business in a turbulent environment. Wheeler (2002) proposed the Net-Enabled Business Innovation Cycle (NEBIC) model for measuring, predicting and understanding a net-enabled organization’s ability to create customer value through the use of innovative IT. This approach incorporates both the variance and process views of net-enabled business innovation, and defines four capabilities essential to net-enabled business innovation that creates customer value: choosing new IT, matching economic opportunities with technology, executing business innovation for growth, and accessing customer value. In particular, the study found that the dynamic capabilities can be used to predict the firm’s ability to create value through net-enabled business innovation. Sawy and Pavlou (2008) indicated four dimensions of IT-enabled dynamic capabilities, which include sensing the environment, learning, integrating knowledge, and coordinating activities.

### 3. Methodology

Given the exploratory nature of this research, we used an inductive and qualitative research approach, based on an in-depth analysis of secondary data, to evolve the initial capability set. A Delphi approach was then used to evaluate and enhance the results. Inductive and qualitative analysis work well when the phenomenon under study is relatively new and/or the purpose of the research is to not test a hypotheses, but rather to increase understanding of a phenomenon by generating new theoretical propositions (Eisenhardt, 1989).

We follow the procedure proposed by Eisenhardt (1989) for handling a qualitative analysis. First, the IS innovation model was used to develop the framework based on an initial framework, which was synthesized from the literature. We chose four criteria for framework critique and evaluation in this process: conciseness, comprehensiveness, correctness and clarity (Bacharach, 1989). Conciseness relates to parsimony, comprehensiveness relates to scope criteria, and correctness and clarity relate to the specification of constructs. Each criterion played a role in guiding the development of the framework and assessing its degree of usefulness.

The framework development was executed in a top-down fashion by progressively adding levels of greater detail. Drawing from Swanson’s IS innovation model and the literature, an e-business innovation co-evolves with changes in business technology, the business model and the value network. As a result, it manifests that the innovation will lead to a drastic overhaul of the existing ways of doing e-business, rendering the established capabilities of the current e-business firms obsolete. However, because of the volatile nature of e-business innovation, the capabilities required are sig-
significantly different from the existing capabilities. In such an environment, firms must be able to timely reconfigure their established capabilities in order to respond to capability-destroying changes.

In the light of the proposed tri-core model, the critical capabilities that underpin the ability to implement e-business innovation must be developed from the three functional cores: business technology, the business model and the value network. To this end, the dynamic capabilities perspective, together with extant research results on IS capabilities (Hoque et al., 2006; Wheeler, 2002; Willcocks et al., 2007) and e-business capabilities (Daniel & Wilson, 2003; Savvy & Pavlou, 2008; Wu & Hsia, 2008), served as a theoretical foundation for exploring the core capabilities for e-business innovation. To ensure the reliability of the secondary data, the literature was chosen mainly from top-tier IS journals such as MIS Quarterly and Information Systems Research. Once the initial list of capabilities was generated (see Appendix A), we refined the list through an iterative in-depth interview with a small group of academic and industrial experts. From this, the researchers could gauge the clarity of the capabilities presented and assess whether the list of capabilities effectively captured the desired phenomenon. It also ensured that the aspects of business technology, business management, and collaboration were not omitted. This process was continued until no further modification to the list was necessary. Feedback from the interview process served as the basis for correcting, refining and enhancing the experimental scales. For instance, we eliminated any scale items that represented the same aspects with only slightly different wording, and modified those items with ambiguous semantics. This was done in order to enhance the psychometric properties of the survey instrument. Four new capabilities were proposed to supplement the initial list of capabilities, including managing the sourcing of the new IT, ensuring IT and information security, developing enterprise absorptive capacity, and enabling open innovation.

For the Delphi method, a panel was created of 20 senior IS managers (panelists) from multiple industries (see Appendix B), who are involved in their firm’s e-business innovation activities. Each manager received a participation fee of 4000NT (about US$130), a statement of a problem in the area of e-business innovation, and a questionnaire which aimed to elicit his or her independent views regarding the problem. For instance, panelists were asked to indicate those capabilities listed in the questionnaire that they believed were crucial in developing e-business innovations, and to provide an explanation. The responses from the panelists were organized and analyzed by a moderator, who produced a summary of their views. This summary was then sent to each panelist along with a revised questionnaire. This process was repeated until no further modifications were made.

4. Core capabilities for e-business innovation

Based on the results of our Delphi study, we identified thirteen core capabilities for e-business innovation, as illustrated in Table 1. Based on our tri-core model, these capabilities were grouped into three domains: business technology, business management, and collaboration. All capabilities are required in the pursuit of innovative applications of emerging IT, and in realizing the transformation of established business models and value networks. Each capability is discussed below in terms of its domain.

4.1. The business technology domain

Business technology capabilities refer to the ability to gain, configure, apply and evaluate IT to establish enterprise-wide IT infrastructure, initiate various sorts of business applications and services, and integrate IT functions with business processes in order to automate business operations and supply chains (Hoque et al., 2006). These capabilities were demonstrated as critical IT capabilities for organizations across the spectrum of IS and e-business capability research. In terms of the business technology domain, we identified five core capabilities: planning new IT infrastructure and architecture, aligning and integrating emerging IT applications with business operations, enabling the new IT to deliver novel process and coordination services, managing the sourcing of emerging IT, and ensuring information security. Each capability is described as follows.

4.1.1. Planning new IT infrastructure and architecture

This capability focuses on the functionalities that the emerging IT and its associated technical infrastructure and architecture (e.g., cloud computing and SOA) have to offer; as well as understanding how and when to use them, and how to take advantage of specific IT functionalities and their applications to simplify the existing business technology environment. Fostering this capability can help firms monitor the evolution and assess the viability of emerging IT, choose the right IT and architectural standards, and then create a blueprint for an adaptive IT infrastructure and architecture conducive to current e-business innovations.

4.1.2. Aligning and integrating emerging IT applications with business operations

This capability centers on visualizing the ways in which the applications of emerging IT can contribute to business operations and help to create synergies between them. Where new IT is ubiquitously immersed in the e-business domain, alignment and synchronization of IT and business operations is imperative (Hoque et al., 2006). The alignment of IT and business operations can make business processes easier to execute, facilitates timely information sharing, and provides consistent coordination with stakeholders (D’Aubert et al., 2008). Our Delphi study has also found that the alignment of business operations with emerging IT is a major challenge for current firms in developing e-business innovation. Therefore, the emerging IT and business operations should complement and support each other relative to e-business innovation.

4.1.3. Enabling the emerging IT to deliver novel process and coordination services

While the Web 2.0, SOA and cloud computing services have presented a new perspective on on-line service design and delivery, firms must possess the capability to enable the emerging IT capabilities to
to deliver novel IT services. In the new context of e-business, the delivery of IT services must be more modular and flexible. Moving toward the service modes will require a firm to restructure its existing business processes to be more modular, which requires organization-wide redesign to foster the new technical capability to search for web services, and to configure and integrate them to implement appropriate services (Hirschheim et al., 2010). This capability is employed to establish and manage service-oriented application portfolios, develop and deploy new processes, coordinate services, and improve the inter-firm integration of cash, logistics and information flow within the value network.

4.1.4. Managing the sourcing of emerging IT

This capability concentrates on analyzing the external market for IT resources, selecting a sourcing strategy to meet business needs and technology issues, and leading the contracting and service management processes. The emergence of service-oriented e-businesses permits dynamically scalable and virtualized IT infrastructure, platforms, or applications to be promoted as a "service". The service is billed on a utility computing basis, and on the amount of resources consumed. A firm can outsource most of its IT resources and pay only for the services that they use. As firms exploit the burgeoning outsourcing market for new IT resources, vendor selection and contract monitoring become important capabilities. To outsource successfully, firms require the ability to identify, evaluate, and select the best service providers, as well as the ability to hold vendors accountable for both outsourcing contracts and performance of new IT services.

4.1.5. Ensuring IT and information security

Since e-business involves the extensive digitization of business operations and transactions, there are many accompanying security problems which can result in serious disasters. The importance of the capability to ensure IT and information security is self-evident. Moreover, the emerging IT services will be embodied in a centralized IT architecture supported by cloud computing. In addition to centralization, new policy and control mechanisms are needed in areas such as security, reliability, and privacy over the service life-cycle. Thus, it is necessary for e-business practitioners to possess the technical capability to deal with security-related issues such as privacy policies, government privacy regulations, and various security threats.

4.2. The business management domain

Business management capabilities refer to the ability to understand the overall market environment and the specific organizational context, and execute business practices for achieving strategic and operational goals (Kohli & Gover, 2008; McDonald, 2007). In our research, it represents a firm's business capabilities for utilizing market opportunities, delivering new value propositions, reinventing business models, and absorbing new knowledge and skills. These capabilities include fostering business agility and market responsiveness, identifying customer value proposition, reinventing established business models, and developing enterprise absorptive capacity. Each capability is described as follows.

4.2.1. Fostering business agility and market responsiveness

This capability centers on the ability to sense market changes and business opportunities, and take advantage of them in order to enable e-business innovation. As firms face new challenges and opportunities derived from e-business innovations, the ability to explore and exploit opportunities speedily is considered to be correspondingly critical for innovation success. In this, two core capabilities – business agility and market responsiveness – are imperative. Market responsiveness is the ability to be alert to changes in technology, customer needs, and markets by continuously scanning the business environment. Business agility focuses on the timely capture and utilization of new business opportunities resulting from environmental changes. Sambamurthy, Bharadwaj, and Grover (2003) also noted that business agility underlies a firm's success in continuously shaping innovation through enhancing interactions with customers, orchestrating internal operations, and maintaining alliances with external business partners.

4.2.2. Identifying customer value proposition

The customer value proposition conveys the value a firm's products and services offer to customers. Any new business model will require a clear definition of customer value proposition (Johnson et al., 2008). Firms must therefore demonstrate proficiencies in valuing an e-business innovation from the viewpoint of customer needs. It represents a firm's routines in assessing, understanding, and communicating customer value signals in markets. This core capability can underlie a firm's success in enhancing customer value creation and improving business model design through innovations in products, services, channels and market segmentation.

4.2.3. Reinventing established business models

Business model reinvention is a main source of sustaining competitive advantage for e-business firms (Johnson et al., 2008). In fact, some successful companies such as Google.com and Apple have cultivated an excellent capability in reinventing their business model. As a result, it is especially crucial for e-business firms to reconfigure, integrate, and acquire existing or new resources to reshape business models to align with e-business innovation. Reinvention implies that a firm can deploy proper solutions as inputs, match them with business opportunities, deliver innovative products and services for customer value creation, design a profit formula for execution, and commit to reconfiguring its key resources and processes. This capability comprises the routines for change management, organizational commitment, and a culture that embraces business transformation (Willcocks et al., 2007).

4.2.4. Developing enterprise absorptive capacity

Prior research has shown a significant relationship between absorptive capacity and innovative outcomes (Zahra & George, 2002). Enterprise absorptive capacity refers to the ability to continuously acquire, adopt, assimilate and exploit e-business innovations (Malhotra, Gosain, & Sawy, 2005). Essentially, it is a dynamic capability pertaining to knowledge creation and experience accumulation via organizational learning. It implies that firms have to continually identify and acquire the external knowledge critical to leveraging emerging IT for e-business innovation. They must then internalize the obtained knowledge and combine it with existing knowledge to improve their established skills and capabilities.

4.3. The collaboration domain

Collaboration capabilities refer to the ability to build and govern inter-organizational partnerships and collaborative relationships with customers and partners for the execution of value co-creation activities. It facilitates e-business innovations by broadening partnerships and allowing firms to easily collaborate with their partners and customers. External partnerships are a key resource for firms in improving the efficiency of inter-firm operations and developing market innovations. Collaboration helps build momentum around an e-business innovation by facilitating the vitality of
long-term supply chain relationships (Rai, Patnayakuni, & Seth, 2006). It also creates resilient links with partners which enhance the firm’s collaborative ability. For instance, Dell’s sustained success in innovation and logistical agility is largely due to its excellent collaborative capability, which facilitates an effective global value network. We identify four core capabilities in this domain, including: developing partnerships, governing the value network, enabling open innovation, and improving co-production and co-creating value.

4.3.1. Developing partnerships

This capability refers to the ability to develop and sustain effective relationships with business partners and customers. This is crucial for a rapid response in the e-business environment, where few products or services are fully produced and distributed by a single firm. This capability enhances a firm’s understanding of market needs and the potential of the industry; facilitates a wider dialog between firms, their customers, and business partners; and improves effectiveness in cooperation and in the establishment of long-term collaboration. Developing partnerships with customers involves sustaining customer relationships, promoting them through involvement and cooperation, and ensuring stakeholder satisfaction and proprietorship over their links in the value chain. Moreover, firms must look beyond the existing stakeholders to explore the long-term potential for creating win–win situations with its partners, in which the partners increase their business value by providing special services that increase alliance benefits (Saraf, Langdon, & Gosain, 2007).

4.3.2. Governing the value network

This capability represents the ability to gain and integrate complementary resources from the value network for the execution of business activities. In order to respond to inter-firm e-business innovations, firms must build an effective value network through a portfolio of sourcing agreements and alliances to realize benefits from external stakeholders. Thus, it is imperative for a firm to choose the right governance approach for its value network and then govern it accordingly (Rai et al., 2008). This task involves the effective structuring of information exchanges, transaction mechanisms, and decision rights of a firm with its partners in executing supply chain activities, making decisions, and developing collaborative relationships. This capability also includes establishing a proper value network mode, matching e-business services to the value network, and governing the cooperative relationships appropriately by using emerging IT.

4.3.3. Enabling open innovation

The traditional boundaries of firms have become more permeable in e-business markets; innovations can easily transfer from inward to outward (Schultze, Prandelli, Salonen, & Alstyne, 2007). Open innovation is a new paradigm that emphasizes a firm’s potential for using external as well as internal ideas, and in using both internal and external channels for marketing as the firms look to advance their IT (Chesbrough, 2003). A single firm cannot afford to depend entirely on its internal innovations for e-business innovation, but should instead involve collaborative inventions from the stakeholders in the value network. Incumbent firms must therefore develop the capability to converge internal ideas with ideas, resources, and channels from the surrounding environment in order to achieve open e-business innovations.

4.3.4. Improving co-production and value co-creation

This capability involves the ability to improve co-production activities to realize the value co-creation of e-business innovations. As inter-organizational information and process integration intensify, it provides co-production environments in which firms can co-create products or services with their business partners or customers. Thus, firms need to start a co-production strategy that utilizes the direct involvement of customers and business partners in the generation of value by creating a service context, and by participating in the design, delivery and marketing of their new products and services (Ordanini & Parasini, 2008). In the co-production process, business partners and customers become co-developers, and firms can continually solicit their feedback. While co-production will be an important enabler of e-business innovation, firms must focus on how to realize value from the innovations within these multi-firm networks. Evaluating potential risks and benefits, managing robust collaborative relationships, and designing appropriate mechanisms and incentives for key partners to partake in and equitably share value are necessary for realizing value co-creation.

As mentioned previously, there is a reasonable amount of evidence to suggest that unabated e-business innovation will continue to create greater changes in business technology, business models, and value networks for the foreseeable future. In such a volatile situation, the identified capabilities must evolve into dynamic capabilities in order to demonstrate swift responsiveness and to exploit rapid innovation. A firm can refresh and maintain superior dynamic capabilities through organizational learning (Wheeler, 2002). In innovating with IT, effective learning requires sufficient organizational mindfulness regarding IT innovation (Swanson & Ramiller, 2004). Mindfulness is a flexible state of mind in which a firm is actively engaged in the present, is able to notice novelty, has implicit awareness of multiple perspectives, and is sensitive to different environments (Langer, 1989). It concerns the adaptive management of expectations in uncertain contexts.

There is often much that is unexpected in the realm of e-business innovation. The concept of mindfulness offers a practical focus for a firm seeking to foster its dynamic capabilities and to respond in the face of the uncertainties associated with e-business innovation. Being mindful leads firms to greater sensitivity to new opportunities and more openness to innovation, and in this way strengthens their entrepreneurial alertness, capabilities, and innovativeness. By this we suggest that the dynamic development of core capabilities for e-business innovation must entail constant learning through mindful engagement. In sum, the ongoing interplay between organizational learning and mindfulness can make the firm’s core capabilities dynamic, even as e-business environments change.

5. Discussion and conclusion

Why do some firms have greater overall e-business innovation than other firms, and what are the important capabilities for achieving e-business innovation? This paper provides insight into this issue by investigating the core capabilities that may play an important role in facilitating a firm’s e-business innovation. We proposed a tri-core model of e-business innovation based on the IS innovation model, which we used in addition to an extensive literature review and the Delphi approach to identify core capabilities for achieving e-business innovation.

Thirteen core capabilities for achieving e-business innovation were identified. Based on our tri-core model, we grouped these capabilities into three domains that must be balanced. One relates to the capabilities for utilizing emerging business technology, while another is associated with the capabilities for the reinvention of the business model. The third is associated with the capabilities for collaborating with stakeholders in the value network. These core capabilities can be viewed as a blueprint for developing an e-business firm’s ability to explore and exploit ongoing e-business innovation. The findings of this research provide a foundation.
for enhancing our understanding of the nature of e-business innovation. It can also help practitioners form a template of the requisite in-house management for identifying knowledge gaps and developing action plans that contribute to a firm’s strategic advantage in the changing e-business environment. This includes several implications for managerial action.

A firm that adopts e-business innovation may confront complex and disruptive issues related to technological change and business repositioning. The proposed tri-core model of e-business innovation helps e-business practitioners understand the e-business innovation domain as a whole. This holistic view can be used effectively to focus on utilizing business technology, business models, and the value networks that contribute to e-business innovation. The implications can be viewed in two ways. On one hand, firms need to develop new services and products in concert with emerging IT. On the other hand, they need to reshape their corresponding business models and value networks in order to be effective and innovative, so as to maximize synergies. From this holistic point of view, practitioners can use the model to map their exploitation of e-business innovation in terms of business initiatives and strategic options.

The model can be employed to steer capability development and business initiatives in the direction of achieving e-business innovation. By understanding the required capabilities for e-business innovation, managers can begin to assess their e-business innovation capabilities, evaluate barriers and capability lag, and take the necessary corrective actions for strengthening them. The identified core capabilities can serve as a strategic enabler of e-business innovation.

Finally, this study makes it clear that the development of core capabilities is an iterative and repeating cycle, and that these capabilities must be enhanced through continuous learning. Firms need to develop a long-term strategic focus through applying all its capabilities, rather than being drawn into fire-fighting mode and focusing only on shorter term capabilities. It implies that firms which attempt to respond to change by duplicating established capabilities will fail. Thus, e-business practitioners should be mindful of e-business innovation. They can draw on the guidance of this work to examine the efficacy of their dynamic capabilities development. They can create new forms of competitive advantage by achieving e-business innovation through building these core capabilities.

Our research is positioned as exploratory, with the aim of seeking to extend the dynamic capabilities perspective to the e-business context. The results provide incumbents with appropriate recommendations for responding to changes, derived from the e-business innovation model. It is valuable in enhancing our understanding of the nature of e-business innovation, and also for providing insights into the transformation of different e-business innovation settings. Being preliminary in nature, this study cannot be exhaustive, and further rigorous research studies employing the empirical approach are necessary for assessing the identified core capabilities. We hope that this research will serve as a foundation and a catalyst for the triggering of new research agendas in e-business innovation, paving the way for other researchers who wish to build on the findings of this study.

Acknowledgements

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Appendix A. Initial list of core capabilities

<table>
<thead>
<tr>
<th>Capability domain</th>
<th>Core capabilities</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Integrating existing e-business systems</td>
<td>Daniel and Wilson (2003), Barua et al. (2005)</td>
</tr>
<tr>
<td></td>
<td>Creating new information services</td>
<td>Wilcocks et al. (2007)</td>
</tr>
<tr>
<td></td>
<td>Aligning IT with business operations</td>
<td>Barua et al. (2005), Hoque et al. (2006)</td>
</tr>
<tr>
<td>Business model</td>
<td>Entrepreneurial alertness and market responsiveness</td>
<td>Sambamurthy et al. (2003), Malhotra et al. (2005)</td>
</tr>
<tr>
<td></td>
<td>Reinventing business models</td>
<td>Johnson et al. (2008)</td>
</tr>
<tr>
<td>Value network</td>
<td>Developing partnerships</td>
<td>Wilcocks et al. (2007), Pisano and Verganti (2008)</td>
</tr>
<tr>
<td></td>
<td>Value network governance</td>
<td>Rai et al. (2008)</td>
</tr>
<tr>
<td></td>
<td>Fostering co-production and knowledge sharing</td>
<td>Schultzze et al. (2007), Osterwalder et al. (2005)</td>
</tr>
<tr>
<td></td>
<td>Co-creating relational value</td>
<td>Saraf et al. (2007), Kohli and Gover (2008)</td>
</tr>
</tbody>
</table>

Appendix B. The profile of 20 panelists

<table>
<thead>
<tr>
<th>Name</th>
<th>Company</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Huang, Jianhao</td>
<td>Simpal Electronics Co., Ltd.</td>
<td>Senior IT manager</td>
</tr>
<tr>
<td>Sun, Anyong</td>
<td>Simpal Electronics Co., Ltd.</td>
<td>CIO</td>
</tr>
<tr>
<td>Liu, Lingling</td>
<td>Walton Chaintech</td>
<td>CIO</td>
</tr>
<tr>
<td>Jan, Rujluck</td>
<td>Walton Chaintech</td>
<td>Senior IT manager</td>
</tr>
<tr>
<td>Wang, Jinqui</td>
<td>Orient Semiconductor Electronics</td>
<td>Senior IT manager</td>
</tr>
<tr>
<td>Yu, Lizhu</td>
<td>Orient Semiconductor Electronics</td>
<td>CFO</td>
</tr>
<tr>
<td>Zhang, Lizhi</td>
<td>Emerging Display Technologies Corp.</td>
<td>Senior IT manager</td>
</tr>
<tr>
<td>Zhuang, Shun Ru</td>
<td>Emerging Display Technologies Corp.</td>
<td>CIO</td>
</tr>
<tr>
<td>Li, Guoyuan</td>
<td>Walton Chaintech</td>
<td>CIO</td>
</tr>
<tr>
<td>Zhang, Maoting</td>
<td>Walton Chaintech</td>
<td>CIO</td>
</tr>
</tbody>
</table>
Appendix B. (continued)

Name | Company | Title
--- | --- | ---
Hong, Zhihong | E-Da Hospital | CIO
Su, Mei Juan | E-Da Hospital | Senior IT manager
Ke, Jiongting | Taiwan Air Cargo Terminal | CIO
Chen, Yiren | Sun Light group | CIO
Lian, Guozhong | BankPro E-service Technology Co. Ltd. | CIO
Su, Zhihong | Hang Hong International Co. | CIO
Ye, Chencang | 7-Eleven | CIO
Ji, Jun | Da Tai Science and Technology | CIO
Miao, Qixie | Ching Shin company | CIO
Jiang, Chengxin | 7-Eleven | CIO

References


