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Full Length Research Paper

The fit between organizational B2B e-commerce policy, IT maturity and evaluation practices on B2B e-commerce performance in Australian healthcare organizations

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Healthcare organizations have started to make use of business-to-business (B2B) e-commerce technologies in overcoming many of the challenges they face. However, healthcare executives have found it increasingly difficult to justify rising IT expenditures and are often under pressure to find a way to evaluate the contribution of their B2B e-commerce investments to business performance, as well as to find reliable ways to ensure that the business benefits from the investments are actually realized. Despite high expectations for the value of IT in healthcare, its adoption remains poorly understood and is also a relatively under-researched area. Hence, a case study approach was conducted: (1) to examine the relationships between organizational B2B e-commerce policy and strategy, organizational IT maturity, and evaluation practices and their effects on B2B e-commerce performance among Australian healthcare organizations; and (2) to develop a framework which can assist healthcare organizations in realizing B2B e-commerce benefits and satisfaction within the Australian healthcare organizations. A key contribution of this study is the development of a B2B e-commerce benefits and satisfaction framework which can be used by healthcare executives in examining the relationships between organizational B2B e-commerce policy and strategy, organizational IT maturity, IT evaluation practices, and e-commerce benefits and satisfaction.

Key words: E-commerce, healthcare, IT maturity, IT investment evaluation, benefits.

INTRODUCTION

International Data Corporation has estimated that information technology (IT) spending by the Australian healthcare industry will increase from US$1.89 billion in 2010 to US$2.16 billion by 2013 (Chiew et al., 2010). A significant proportion of these spending (US$603 million in 2010) by Australian healthcare organizations is likely to be spent on telecommunications (e.g. business-to-business (B2B) electronic commerce (e-commerce)) (Chiew et al., 2010). B2B e-commerce technologies have gained prominence and strategic importance globally in the last decade and have outpaced all other forms of electronic commerce. It represents the largest growth industry, in terms of revenues, in electronic commerce. However, despite the increased spending and high expectations for the benefits from B2B e-commerce in the healthcare industry, its use remains poorly understood (Bhakoo and Sohal, 2008; Davidson and Heslinga, 2007; Kalyanpur et al., 2007). In addition, the industry has not embraced the technology to the same extent as in other industries (Chiasson et al., 2007), particularly in the adoption of B2B e-commerce in the context of the procurement, supply chain, and distribution of goods and services (NSCRTF, 2008; Lohman, 2010). Little is known about why certain organizations within the

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healthcare industry have adopted and implemented IT such as B2B e-commerce successfully while many others have not (Heeks, 2006; Miller, 2003).

Moreover, very few B2B e-commerce studies have been conducted in the healthcare area (Chiasson et al., 2007; Cullen and Taylor, 2009; Van Akkeren and Rowlands, 2007) and most of these studies deal with strategic marketing of e-health services and systems (Rupert, 2002), customer relationship management (Lerer, 2002), and initial designing stage of e-fulfillment systems (Joyce et al., 2006). This highlights gaps in existing knowledge on the issues relating to B2B e-commerce adoption and implementation in the context of the procurement, supply chain, and distribution of goods and services among healthcare organizations. A review of the relevant literature revealed that factors affecting the performance of B2B e-commerce in both healthcare and other industries often relate to factors, among other things, such as formulation and implementation of organizational B2B e-commerce policy and strategy, effective adoption of IT investment evaluation methodology (IEM) and IT benefits realization methodology (BRM), and the level of organizational IT maturity (Ghosh and Scott, 2007; Huang and Lin, 2008; Hubner and Elmhorst, 2008; Leonard, 2004; Lin et al., 2007; Montealegre, 2002; Reardon and Davidson, 2007; Standing et al., 2008). These factors need to be look at from both the strategic alignment and socio-technical perspectives (Bostrom and Heinen, 1977; Parker, 1996). A well-coordinated formulation and implementation of organizational B2B e-commerce policy and strategy will allow an organization to direct its assets and competencies to develop capabilities to meet its corporate and e-commerce objectives (Montealegre, 2002). These capabilities can assist the organization in manipulating and improving its identifiable and specific organizational processes and resources which in turn affects its level of organizational IT maturity (Galliers and Sutherland, 1991; Montealegre, 2002).

Organizational IT maturity refers to an organization's ability to effectively deploy IT infrastructure (e.g. organizational strategy and skills) towards the achievement of benefits such as competitive advantage in line with corporate objectives (Galliers and Sutherland, 1991). Recent research has suggest that organizations at different stages of IT maturity may adopt different levels of IEM and BRM, reflecting the different value propositions and strategic focus of incremental B2B e-commerce systems (Burn and Ash, 2005; Hackbarth and Kettinger, 2004; Lin et al., 2007). IEM is concerned with making decisions about IT/B2B e-commerce investments and it focuses on the selection and evaluation of projects that offer the greatest benefits against the required investment (Willcocks and Lester, 1997) while BRM ensures expected benefits are identified and realized after a decision to invest has been taken (Ward and Daniel, 2006). A review of the IT evaluation literature reveals that organizations that make extensive use of IEM and BRM have achieved higher IT/B2B e-commerce performance (Lin et al., 2007; Melville et al., 2004; Standing and Lin, 2007; Tallon et al., 2000). Hence, examination of the relationships between these factors will assist healthcare organizations to improve IT/B2B e-commerce performance. After all, effective utilization of B2B e-commerce in the healthcare industry has the potential to, directly or indirectly, increase accessibility to healthcare providers, improve quality of healthcare services, decrease scheduling conflicts, improve inventory management, reduce procurement and supply chain costs, and ultimately result in reduction in healthcare costs and medical errors (Ammenwerth and de Keizer, 2007; Bhakoo and Sohal, 2008; Pastore, 2000).

Hence, the case study approach is conducted to: (1) examine the relationships between organizational IT maturity, organizational B2B e-commerce policy and strategy, and evaluation practices and their effects on e-commerce performance among Australian healthcare organizations; and (2) develop a framework which can assist healthcare organizations in realizing e-commerce benefits and satisfaction within the Australian healthcare organizations. One key contribution of the study is the development of an e-commerce benefits and satisfaction framework which can be used by healthcare executives to examine the relationships between organizational B2B e-commerce policy and strategy, organizational IT maturity, IT evaluation practices, and e-commerce benefits and satisfaction.

LITERATURE REVIEW AND HYPOTHESES

Organizational B2B e-commerce policy and strategy

An Australian study has found that hospitals generally have very poor understanding of the importance of their e-commerce procurement policy and strategy (Chan et al., 2006). The strategic importance of B2B e-commerce and its strategies, empirical studies in this aspect have also been scarce in the literature (Karagozoglu and Lindell, 2004; Montealegre, 2002), particularly in the healthcare area (Chiasson et al., 2007; Van Akkeren and Rowlands, 2007). The use of B2B e-commerce by healthcare organizations includes online activities such as biotechnology online transactions between healthcare organizations and their suppliers and the sales of medical products and services via e-marketplace (Chan et al., 2006; Standing et al., 2008). It enables healthcare organizations to minimize their procurement costs and assists their suppliers to sell via an efficient marketing channel (Chan et al., 2006). B2B e-commerce also allows health organizations' business partners to access their internal business systems via the Internet. Moreover, it facilitates healthcare organizations to efficiently position their organizational procurement structures (i.e. in-sourcing or out-sourcing) by seeking alternative product

and service suppliers via B2B marketplace (Suomi et al., 2001).

Strategic deployment of B2B e-commerce has become increasingly important (Karagozoglu and Lindell, 2004). Healthcare organizations must look at B2B e-commerce from a strategic perspective and measure its contribution because it can assist them in developing and controlling strategic, tactical, and operational plans that define the appropriate role of B2B e-commerce in the organization (McGaughey, 2002). They also need to be formulated in accordance with their corporate procurement strategies (Phan, 2003). The development and institutionalization of appropriate organizational B2B e-commerce policy and strategy can take some time and usually progress in stages (Straub and Klein, 2001). A well-coordinated formulation and implementation of organizational B2B e-commerce policy and strategy will allow an organization to achieve competitive advantage as well as to direct its assets and competencies to develop capabilities to meet its corporate and e-commerce objectives (Montealegre, 2002). These capabilities can assist the organization in manipulating and improving its identifiable and specific organizational processes and resources which in turn affects its level of organizational IT maturity (Galliers and Sutherland, 1991; Montealegre, 2002). Thus, the following hypothesis is proposed:

H_1. Organizational B2B e-commerce policy and strategy are positively related to organizational IT maturity.

Organizational IT maturity

Many Australian healthcare organizations are still using manual procurement systems as they do not have the necessary IT maturity or capability to undertake the Internet-based transactions (More and McGrath, 2002; Standing and Lin, 2007). Organizational IT maturity refers to an organization's capability to utilize its existing IT processes and components to obtain business value (Galliers and Sutherland, 1991). It is pertained to the organization's ability to effectively deploy IT processes and components (e.g. organizational strategy, structure, and style) towards the achievement of benefits such as competitive advantage in line with IT strategies and business goals. The level of organizational IT maturity is critical in assessing IT projects (e.g. Hackbarth and Kettinger, 2004; Lin et al., 2007) and is linked with the ability of an organization to adopt and implement processes and methodologies (Lin et al., 2005). It is also about the balance between the IT being adopted, and the capabilities as well as management processes used to master and utilize IT within the organization (Auer and Reponen, 1997). In addition, these maturity models extend organizations' abilities to evaluate and track impacts of IT investments such as B2B e-commerce initiatives within their organizations (Schuh and Leviton, 2006). It relates to the result of a history of IT performance assessment and modifications which can lead to improved management processes as organizations mature (Jiang et al., 2003). In other words, the level of IT maturity may affect the adoption of IT processes (e.g. IEM and BRM) which can be used as the tools to assessing the functionality required in a proposed IT system and realize benefits from that investment (Browne and Ramesh, 2002; Galliers and Sutherland, 1991).

Various stage models have been used to study the implementation of IT and e-commerce systems and processes (e.g. manufacturing resource planning systems (Cooper and Zmud, 1990); software process (Niazi et al., 2005); electronic data interchange (Premkumar et al., 1994); enterprise resource planning systems (Rajagopal, 2002)). The revised stages of growth model by Galliers and Sutherland (1991) was used in this study to examine the level of organizational IT maturity of the case study organizations and its impact on the IT evaluation process (i.e. IEM and BRM). Galliers and Sutherland's (1991) revised stages of growth model is meant to overcome some of the limitations of previous stages of growth models by introducing a means of bringing together a range of key elements associated with the operation and management of an organization generally. The revised model of Galliers and Sutherland (1991) can be represented as six stages, each with its particular set of conditions associated with the seven "S" elements which have provided a rich set of conditions upon which an organization can analyze and measure its IT maturity.

The seven elements are strategy, structure, systems, staff, style, skills, and superordinate goals. The original seven elements for IT investments had been examined and tested in the e-commerce context by Lin et al. (2007) and were therefore reduced to four elements (strategy, style, skills, and overall goals). The six stages of the revised model are: ad hocracy, starting the foundations, centralized dictatorship, democratic dialectic and cooperation, entrepreneurial opportunity, and integrated harmonious relationships. The central tenet of an IT maturity model is that every organization has to go through each of these stages and that there are no shortcuts although certain stages can take less time than others (Akkermans and van der Horst, 2002). Organizations are more capable to track and manage user information requirements of the proposed IT systems once sufficient organizational IT maturity in both processes and technology has been achieved (Akkermans and van der Horst, 2002; Schuh and Leviton, 2006). It has been suggested that there might be a connection between organizational IT maturity and the adoption of IEM and BRM (e.g. Hackbarth and Kettinger, 2004; Lin et al., 2007).

Findings from a study of an Electronic Medication Management System in a major Australian public hospital reveal that effective evaluation of a system requires appropriate level of IT capability and a deep understanding

of its nature and complexity (Westbrook et al., 2007). Organizations which have place more emphasis on increasing their organizational IT maturity are more likely to adopt IEM and BRM (Lin et al., 2005). Therefore, the following hypotheses are proposed:

H_2. Organizational IT maturity is positively related to the adoption of IT investment evaluation methodology (IEM).

H_3. Organizational IT maturity is positively related to IT benefits realization methodology (BRM).

IT Investment Evaluation Methodology (IEM)

Health information systems are used extensively in the healthcare organizations to support a number of functions ranging from simple data processing, patient billing to more complex systems such as clinical decision support systems and procurement transaction systems via Internet (e.g. B2B e-commerce systems) (Smith, 2000; Yusof et al., 2008a). However, difficulties in the adoption of health information systems (e.g. B2B e-commerce) by healthcare organizations are well-documented (Heeks, 2006; Lorenzi and Riley, 2004). Factors contributing to low adoption vary and one important factor is the inability by healthcare organizations to evaluate the business value of their IT investments (e.g. e-commerce) (Lin et al., 2008a) as well as to ensure that the expected benefits are eventually realized or delivered (Yusof et al., 2008a). Evaluation of health information systems (HIS) has been defined as "the act of measuring or exploring attributes of a HIS (in planning, development, implemen-tation, or operation), the result of which informs a decision to be made concerning that system in a specific context" (Ammenwerth et al., 2004). Evaluation of any HIS (e.g. healthcare e-commerce systems or initiatives) is not straightforward and can be confusing and problematic due to its complexity (Gremy et al., 1999; Wyatt and Wyatt, 2003; Yusof et al., 2008a). Despite the high expectations for the value from the increasing number of HIS being developed, its evaluation issues and processes remain poorly understood and relatively under-researched (Van der Meijden et al., 2003; Yusof et al., 2008a). In addition, the selection and effective use of an evaluation methodology for HIS such as B2B e-commerce can be difficult and time-consuming (Ammenwerth et al., 2004; Yusof et al., 2008b).

In particular, the problems and difficulties in measuring benefits and costs are often the main reason for un-certainty about the expected benefits of B2B e-commerce investments and hence are the major constraints to investments in e-commerce (Lin et al., 2007). Indeed, the evaluation of B2B e-commerce investments is a complex tangle of financial, organizational, social, procedural and technical threads, many of which are currently either avoided or dealt with ineffectively (Lin et al., 2008a; Standing and Lin, 2007).

Often e-commerce projects fail to deliver what is expected of them because most organizations focus on implementing the technology without the adoption of the tools necessary to help to track and measure the e-commerce projects (Lin et al., 2007). The less precisely bounded environment of B2B e-commerce technology adds more complexity to the traditional IT measurement problem as this type of investment is physically distributed between suppliers and customers (Straub et al., 2002; Torkzadeh and Dhillon, 2002).

There are several IEM methodologies (e.g. Five-step Evaluation Process (Gremy et al., 1999), Health Technology Assessment (Kazanijian and Green, 2002), System Development Stage (Stead et al., 1994), and The 4Cs (communication, care, control, and context) Framework (Kaplan, 1997)) that can be used to evaluate e-commerce investments in a healthcare setting. Relevant IT evaluation research indicates that organizations that appropriate IT investment evaluation and benefits realization processes and practices may result in higher level of IT/B2B e-commerce benefits which in turn lead to higher degree of e-commerce satisfaction (e.g. Lin et al., 2007; Melville et al., 2004; Tsao et al., 2004; Yusof et al., 2008a). Therefore, the selection of a formal IT evaluation methodology or process (IEM) which a healthcare organization can implement is crucial in improving its organizational performance (Ammenwerth et al., 2004). Hence, the following two hypotheses were proposed:

H_4. IT investment evaluation methodology (IEM) is positively related to B2B e-commerce benefits.

IT Benefits Realization Methodology (BRM)

However, the adoption of an IEM on B2B e-commerce investments alone is insufficient to ensure that the benefits identified by healthcare organizations are realized (Lin et al., 2008b; Ward and Daniel, 2006). The use of a BRM (e.g. Cranfield Process Model of Benefits Management (Ward et al., 1996), Model of Benefits Identification (Changchit et al., 1998), and The IT Benefits Measurement Process (Andresen et al., 2000)) would enable healthcare organizations to ensure that desired business changes have been clearly defined, and they are measurable (Ward et al., 1996). While an IEM focuses on selecting and monitoring B2B e-commerce investments that offer the greatest benefits, a BRM needs to be used in order to extend investment evaluation further into the project life cycle by ensuring expected benefits are eventually realized after a decision to invest has been taken (Standing and Lin, 2007). As a result, A BRM is, in most cases, used along with an IEM. According to Lin and Pervan (2003), it is simply too risky for organizations to adopt a BRM without doing a proper evaluation through an IEM. Thus, the following hypothesis is proposed:

H_5. IT investment evaluation methodology (IEM) is positively related to IT benefits realization methodology (BRM).

Assessing the effective delivery of benefits from these services is very difficult (Ward et al., 1996). Irani (2002) argue that IT cost identification, measurement and control remains a significant challenge for businesses. To overcome this problem, IT projects should be evaluated in the context of accumulated costs and benefits from related initiatives, not solely judged on single initiatives (Galliers et al., 1996). To determine if the desired IT benefits have been achieved in practice, it is necessary to undertake an ex-post evaluation of benefits (Ward et al., 1996). Moreover, if no measurable effects can be identified other than the implementation of the technology itself, then it can be assumed that no benefits have been realized (Ward et al., 1996). While the search for benefit identification can contribute to the perceived success of a B2B e-commerce initiative, organizations have often found it difficult to evaluate them and as a result tend to use arbitrary values for assessing benefits. Few organizations have a benefits realization approach and, while much attention is paid to justifying investments, little effort is extended to ensuring that the benefits are realized (Ward et al., 1996). Furthermore, benefits realization and identification are also seen as a function of strategic information systems planning (Changchit et al., 1998). Benefits may be considered the effect of the changes or the difference between the current and pro-posed way that work is done (Ward and Griffiths, 1996). Things only get better when people start doing things dif-ferently by, for example, utilizing a BRM effectively within the organization. Therefore, the following hypothesis is proposed:

H_6. IT benefits realization methodology (BRM) is positively related to B2B e-commerce benefits.

Theoretical framework

Research studies have continued to report contradictory findings of the effect of IT investments on business benefits (Brynjolfsson and Hitt, 2003; Hu and Quan, 2005; Osei-bryson and Ko, 2004; Thatcher and Pingry, 2004). While many research studies have concluded that organizations that make full use of IT investment evaluation and benefits realization methodologies or processes had achieved higher performance from their IT/e-commerce investments (Melville et al., 2004; Standing and Lin, 2007; Tallon et al., 2000), several studies have also found that organizations are often unable to deliver the expected benefits of their IT/B2B e- commerce investment (Lin et al., 2008b; Pan et al., 2006). There are several reasons why IT/B2B e-commerce investments do not deliver expected e-commerce performance and three of the major reasons are the lack of proper use of IEM and BRM (Lin and Pervan, 2003; Ward and Daniel, 2006; Willcocks and Lester, 1997), the inappropriate level of organizational IT maturity (Auer and Reponen, 1997; Lin et al., 2008b), and lack of well-defined organizational B2B e-commerce policy and strategy (Damanpour, 1999; Goodhue et al., 2002; Kaefer and Bendoly, 2004).

Recent research has suggested that there is some connection between the use of IEM/BRM and the level of organizational IT maturity in the B2B e-commerce setting (e.g. Hackbarth and Kettinger, 2004; Lin et al., 2008b). The level of IT maturity has been found to have significant impact on an organization's IT investment evaluation processes and practices in e-commerce (Lin et al., 2007). Similar, a well-defined organizational B2B e-commerce policy and strategy can also have a positive impact on the performance of the e-commerce projects (Damanpour, 1999; Goodhue et al., 2002; Kaefer and Bendoly, 2004). Willcocks and Lester (1997) and Ryan and Harrison (2000) have argued that the lack of strategic alignment and harmonious working relationship among business, social-technical, and IT domains/subsystems can impact on an organization's IT investment evaluation and benefits realization efforts as well as business performance. In addition, several theoretical and empirical research studies have argued that both strategic and social-technical aspects need to be considered (Parker et al., 1988; Pasmore, 1995; Slater, 1995). Hence, the strategic alignment model (Parker, 1996) and socio-technical theory (Cherns, 1976; Clegg, 2000) have been drawn to examine the relationships between the use of IT investment evaluation and benefits realization methodologies, the level of organizational IT maturity, organizational B2B e-commerce policy and strategy, and their effects on e-commerce benefits.

The strategic alignment model proposed by Parker (1996) has outlined the relationship required between the business strategy and IT strategy in order to derive positive outcomes for IT project development and implementation. The model outlines the interdependent relationship required between the business and IT domains in order to derive positive outcomes for IT investments. The model suggests that IT strategy should both derive from and shape business strategy in a dynamic environment in order to achieve functional integration and strategic fit (Parker, 1996). In particular, IT functional integration focuses on the connection between IT strategy and IT execution. The interdependent relationship between business and IT domains ensures that even a small improvement in one domain is likely to have a positive impact on other the domain. Therefore, a small intervention (the integration of IT strategy and IT execution) is likely to open up additional possibilities for generating and delivering positive outcomes such as e-commerce benefits to the organizations. in IT domain. Since the adjustment of the level of organizational IT maturity often form parts of an organizational IT strategy and that IT investment evaluation and benefits realization methodologies are also frequently used in conjunction with IT/business strategies in order to assist in the execution

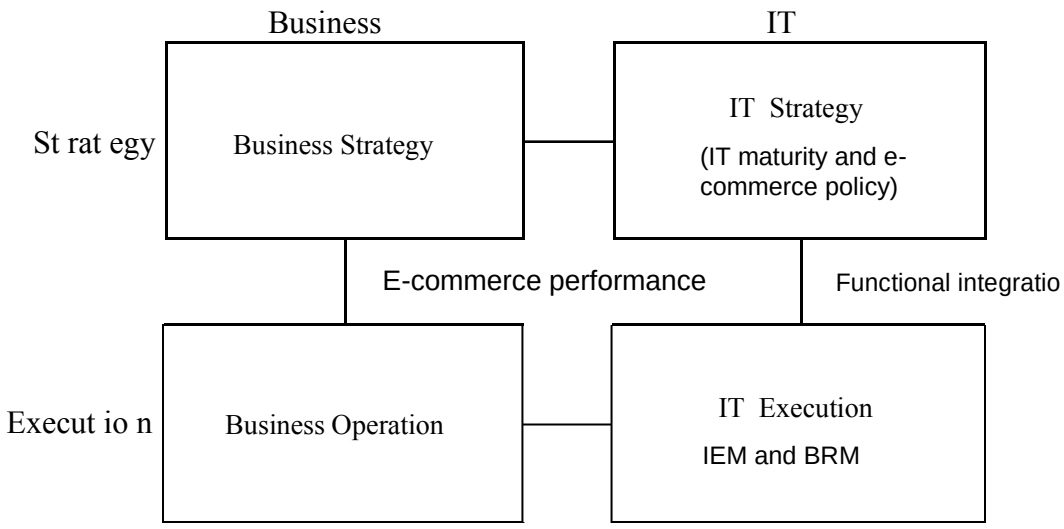

Figure 1a. Strategic alignment between IT maturity, B2B e-commerce policy, IEM, and BRM (Adapted from Parker (1996).

of IT plans, we view the terms "IT strategy" and "IT execution" as synonymous to "organizational IT maturity and B2B e-commerce policy" and "IT investment evaluation and benefits realization methodologies" (Figure 1a).

The socio-technical theory, on the other hand, examines the impact of IT on an organization's business performance from both the social and technical subsystems (Cherns, 1976; Clegg, 2000). The social subsystem includes various elements such as the staff and the knowledge, skills and goals they bring to the work environment as well as the management styles, the reward system, strategies, and authority structures that exist in the organization (Avgerou et al., 2004; Clegg, 2000). This is very similar to the seven elements contained within the Galliers and Sutherland's Revised Stages of Growth Model (Galliers and Sutherland, 1991). In addition, organizational B2B e-commerce policy and strategy also form part of an organization's social subsystem. The technical subsystem consists of the devices, processes, tools, methodologies, and techniques needed to convert inputs into outputs in a way which increases the organizational performance (Avgerou et al., 2004; Cherns, 1976). In the same vein, appropriate use of IT investment evaluation and benefits realization methodologies or processes can assist organizations in ensuring that their B2B e-commerce investments are properly evaluated and expected e-commerce benefits are identified and realized (Lin et al., 2007; 2008b). These methodologies and processes can assist these organizations in obtaining higher e-commerce benefits by making sure that e-commerce investments remain aligned with desired business outcomes in a changing environment (Ward and Daniel, 2006).

Therefore, for the purpose of this research study we can also view the terms "social subsystem" and "technical subsystem" as synonymous to "organizational IT maturity and B2B e-commerce policy and strategy" and "IT investment evaluation and benefits realization methodologies". The alignment of IT strategy and IT execution as well as fit between social and technical sub-systems is likely to help organizations to achieve superior e-commerce performance (Figure 1b). Therefore, we extend our argument to posit that closer strategic alignment and social-technical fit between the levels of organizational IT maturity, the adoption of appropriate organizational B2B e-commerce policy and strategy, and the adoption of proper IT investment evaluation methodology and IT benefits realization methodology can lead to higher level of B2B e-commerce benefits. Finally, higher level of benefits can assist healthcare organizations to achieve higher degree of satisfaction from its B2B e-commerce investments (Figure 1c). Thus, the last hypothesis is proposed:

H_7. B2B e-commerce benefits are positively related to B2B e-commerce satisfaction.

METHODOLOGY

An overview of B2B e-commerce adoption in Australian healthcare industry

In Australia, healthcare organizations' utilization of B2B e-commerce is generally lower than those in other industries. This is despite the fact that there is a higher rate of human errors and failures in the procurement process within the Australian healthcare industry (Chan et al., 2006). In addition, certain healthcare organizations such as hospitals tend to on average overstocked by 30% of their total inventory (Chan et al., 2006). A substantial number of organizations in the Australian healthcare industry is still using mainly paper-based procurement systems with manual processing,

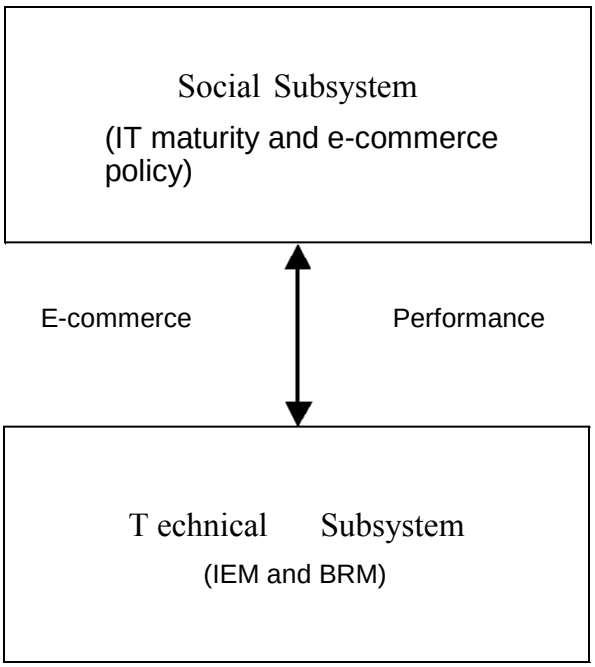

Figure 1b. Social-technical fit between IT maturity, B2B e-commerce policy, IEM, and BRM (Adapted from Bostrom and Heinen (1977).

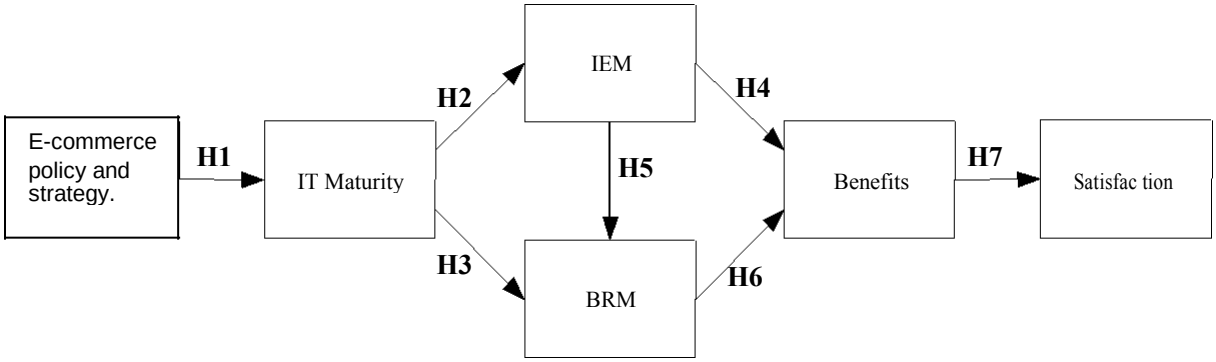

Figure 1c. A proposed framework for the realization of B2B e-commerce benefits and satisfaction.

while other industries such as the retail and mining industries have made substantial cost savings from using B2B e-commerce in the supply chain (More and McGrath, 2002; Standing and Lin, 2007). The proportion of Australian healthcare organizations that use the Internet to place orders is 44%, and to receive orders is 11%. The corresponding figures for other Australian industries are 46 and 27%, respectively (Australian Bureau of Statistics, 2010).

Moreover, a large number of Australian healthcare organizations have been conducting business via EDI systems which often link customers to only one healthcare supplier. These proprietary EDI systems are expensive to develop and maintain. Driven by con cerns about low e-commerce uptake and escalating procurement costs within the industry, several B2B e-commerce initiatives have been launched by Australian Federal and State governments during the last decade to develop better ways of, among other things, ordering and procuring medical supplies electronically within the Australian healthcare industry: Project Electronic Commerce and Communication (PECC) and the Pharmaceutical Extranet Gateway (PEG) in 1998 (More and McGrath, 2002), National Supply Chain Reform Task Force in 2000 (NSCRTF, 2008), the Monash Pharmacy Project under the Victorian Government's e-Commerce Exhibition Projects Program (ECEPP) in 2003 (GS1 Australia, 2005), Queensland Health pilot e- Procurement project in 2004 (Morgan, 2004), National E-Health Transition Authority in 2004 (NEHTA, 2004), the GS1 Australasian Healthcare User Group Local Interest Team (HUGLIT) group in 2006 (GS1 Australia, 2006) and GS1Locatenet GLN Directory for Healthcare in 2010 (NEHTA, 2010). These initiatives have attempted to assist in supply chain management (e.g. integration of supply chain/B2B e-commerce functionality with other healthcare IT systems) as well as to set standards (e.g. numbering structures and information exchange protocols) for B2B e-commerce in the Australian healthcare industry

in Australia. However, despite substantial amount of resources being spent by the Australian Federal and State governments, these initiatives have achieved only limited success so far. Organizations in the Australian healthcare industry are still finding difficulties to fine-tune their e-commerce policy and strategies and to evaluate and leverage their B2B e-commerce investments in the process of managing their medical supply chains and in realizing the expected benefits and satisfaction.

Furthermore, despite the growing popularity of B2B e-commerce and its numerous benefits in healthcare, there is a paucity of published literature on the effects of organizations factors such as organizational IT maturity, organizational B2B e-commerce policy and strategy, and evaluation practices on e-commerce performance in the healthcare organizations. Most of the studies have been conducted in the US or the UK. Very few studies have been conducted in Australia (Bhakoo and Sohal, 2008). To the best of our knowledge, only three B2B e-commerce papers have been published in the Australian healthcare area (i.e., Bhakoo and Sohal, 2008; Chan et al., 2006; More and McGrath, 2002). Bhakoo and Sohal (2008) presented some preliminary case study results from 15 Australian pharmaceutical healthcare supply chains with respect to drivers and benefits of adopting e-business technologies. Chan et al. (2006) highlighted some business implementation issues for e-procurement from four private hospitals in Australia. More and McGrath (2006) presented details about Australia's first B2B e-commerce project, Project Electronic Commerce and Communication (PECC), and its likely impacts on Australian healthcare industry.

Research objectives

However, none of these Australian studies examined the impact of organizational factors (e.g., organizational B2B e-commerce policy and strategy, organizational IT maturity and IT evaluation practices) on B2B e-commerce performance within the Australian healthcare organizations. Hence, the case study approach was utilized: (1) to examine the relationships between organizational IT maturity, organizational B2B e-commerce policy and strategy, and evaluation practices and their effects on e-commerce performance among Australian healthcare organizations; and (2) to develop a framework which can assist healthcare organizations in realizing e-commerce benefits and satisfaction within the Australian healthcare organizations. In order to achieve the above-mentioned research objectives, seven hypotheses are proposed (Figure 1c).

Data collection

Data was collected in three steps from three sources: an expert panel, pilot interviews, and case study with 26 Australian healthcare organizations. The expert panel was conducted to solicit and understand the major issues that arise in the evaluation of B2B e-commerce in the healthcare organizations. For the expert panel, a focus group of eight IT healthcare professionals that have been involved with evaluating e-commerce projects was used to extract their perspectives on IT/B2B e-commerce evaluation in the healthcare organizations. The group discussions focused on the following issues: organizational e-commerce evaluation practices and processes, organizational B2B e-commerce policy and strategy, objectives, and strategies, organizational IT maturity, and organizational performance. The focus group lasted for approximately one hour and qualitative content analysis was used to analyze the data in order to extract the major principles and concepts from the focus group.

A total of five pilot interviews were then conducted with IT managers from five healthcare organizations. These interviews explored these IT managers' understanding of each of the interview questions, their feelings about the questions asked and any unintended restrictiveness in the range of questions asked or response options available. The pilot interviews allowed the researchers to determine whether the questions posed were being interpreted in the manner in which they were intended, and that there were no ambiguous questions. A challenge in the design of the interview questions was to cover all key topics/constructs without making the interview too burdensome for interview respondents.

Structured interviews were used as one of the data collection methods for the case study. According to Burns (1994), structured interviews are repeated face-to-face interactions between the researchers and participants and allow the researchers to focus on certain themes and issues with rich insights for exploring, identifying, and understanding participants' viewpoints and opinions.

Sample characteristics

Case studies were conducted with participants (i.e. IT managers, IT procurement/supply chain managers, and/or CIOs) from 26 Australian healthcare organizations (Table 1). All of the healthcare organizations that took part in the research had been using at least a B2B e-commerce system for more than ten years and the most popular B2B e-commerce system used by the responding organizations was Electronic Data Interchange (EDI). All responding organizations had adopted at least an informal IEM and/or BRM process. These cases were deliberately chosen in order to focus efforts on theoretically useful cases (following the theoretical, non-random sampling strategy by Eisenhardt (1989)). Extensive notes were taken during the interviews.

Measurements

The questions asked related to their B2B e-commerce investments, relevant organizational B2B e-commerce policies, objectives, and strategies, their level of organizational IT maturity, IT/B2B e-commerce evaluation and benefits realization practices and processes, IT/B2B e-commerce benefits and satisfaction, and other B2B e-commerce adoption and implementation issues. The study focuses mainly on the summative (ex post) evaluation of B2B e-commerce systems adopted by the responding healthcare organizations. The main constructs and items used in the structured interviews are shown in Table 2.

Data analyses

Other data collected and analyzed included contract documents, planning documents and minutes of relevant meetings. Notes taken during the interviews were coded and analyzed. Structured interviews utilizing the subjectivist approach were used to gain a deeper understanding of issues and the research was conducted based on the judgments of e-commerce system stakeholders and organizational evaluation experts in its natural environment (Friedman and Wyatt, 1997; Van Bemmel and Musen, 1997). In addition, some staff from the participating organizations were also contacted to confirm some of the materials collected via the case study. This serves as a method of triangulation of research data and ensures that the questions and answers are properly understood by repeating or rephrasing the questions and through paraphrasing the responses back to the interviewee (Silverman, 2001). This reasoning has been supported by Rouse and Dick (1994) who have stated that many information systems practices are difficult to investigate using only survey approaches.

The findings from the information gathering approaches were analyzed iteratively by the researchers on an individual level, differences reconciled and then a judgment made on each of the

Table 1. Case study organization profiles.

Type of healthcare organization	Position of participant	Type of B2B e-commerce system	Years in running these systems
1. Healthcare Services	IT Procurement manager	Fully functional EDI and e-market systems	6
2. Healthcare Services	CIO	Fully functional EDI and e-market systems	7
3. Aged Care	IT Manager	Limited EDI system	2
4. Biotechnology	Supply chain manager	Functional EDI system	6
5. Healthcare Services	IT Procurement manager	Functional EDI system	2
6. Hospital	IT Manager	Unreliable EDI and extranet systems	2
7. Hospital	IT Manager	Functional EDI, e-market, and Extranet systems	9
8. Hospital	IT Manager	Very limited and unreliable EDI system	1
9. Hospital	IT Manager	Limited EDI and supply chain management systems, not compatible with medical suppliers	1
10. Hospital	IT Procurement manager	Limited EDI and supply chain management systems	2
11. Healthcare Services	IT Procurement manager	Functional EDI and web forms system	6
12. Healthcare Services	IT Manager	Functional EDI system	2
13. Hospital	IT Manager	Limited EDI system	2
14. Pharmaceutical	Supply chain manager	Limited EDI systems and fully functional e-market system	3
15. Hospital	Supply chain manager	Functional EDI and Extranet systems	4
16. Hospital	IT Manager	Functional EDI and Extranet systems	5
17. Hospital	IT Manager	Functional EDI system	4
18. Medical Product Distribution	IT Manager	Functional EDI, Extranet and e-market systems	11
19. Hospital	IT Procurement manager	Functional EDI system	3
20. Pharmaceutical	Supply chain manager	Fully functional EDI and e-market systems	6
21. Pharmaceutical	IT Procurement manager	Fully functional EDI, B2B portal, supply chain management systems	10
22. Medical Equipment	IT Manager	Functional EDI system	6
23. Medical Product Distribution	IT Manager	Limited EDI and Extranet systems	3
24. Medical Supply Wholesale	IT Procurement manager	Fully functional EDI, B2B portal, and e-market systems	4
25. Medical Supply Wholesale	IT Manager	Functional EDI system	5
26. State Health Services	IT Manager	Functional EDI and Extranet systems	8

major constructs. The responses to interview questions were rated by the researchers relative to the pool of responses. For example, interviewees were asked about the perceived satisfaction of suppliers with their B2B e-commerce systems. Their answers were judged and then rated in terms of the financial significance of the organizational contribution and were then compared with the results for the other healthcare organizations resulting in the categories of low (1), medium (2) and high (3). For example, medium satisfaction is determined by reasonable satisfaction overall; it may involve lower satisfaction on some factors but balanced by higher satisfaction on others.

The responses for the following three main constructs (i.e., organizational IT maturity, B2B E-commerce Benefits, B2B E-commerce Satisfaction) were coded into three categories: (1) '1' – low level; (2) '2' medium level; and (3) '3' – high level. The responses for the following two constructs (i.e., IEM and BRM) were coded into three categories: (1) '1' – ineffective use; (2) '3' – effective use; (3) '2' – somewhere in between. The responses for the remaining construct (i.e., organizational B2B e-commerce policy and strategy) were coded into the three following categories: (1) '1' – no; (2) '2' – informal; (3) '3' – yes.

Table 2. Constructs and measures used in the data gathering.

Construct	Measure	Reference
Organizational B2B e-commerce policy and strategy	Organizational policy for investing in B2B e-commerce systems Priority of organizational B2B e-commerce in strategic plan Types of organizational B2B e-commerce policy and strategy	Damanpour (1999); Karagozoglu and Lindell (2004); Rao et al. (2003)
Organizational IT maturity	The Strategy element: Stages 1 - 6 The Style element: Stages 1 - 6 The Skills element: Stages 1 - 6 The Superordinate Goals element: Stages 1 – 6	Galliers and Sutherland (1991); Lin et al. (2007)
IT Investment Evaluation Methodology (IEM)	Effective use of IEM, effective in ensuring successful e-commerce initiatives and projects Years of experience and number of people with technical and managerial expertise in IT investment evaluation Number of key staff involved in evaluation process. Responsiveness of key staff to IT investment evaluation.	Kaefer and Bendoly (2004); Lin et al. (2008b); Ward et al. (1996)
IT Benefits Realization Methodology (BRM)	Effective use of BRM, effective in ensuring successful e-commerce initiatives and projects Years of experience and number of people with technical and managerial expertise in IT benefits realization Number of key staff involved in benefits realization process. Responsiveness of key staff to IT benefits realization	Kaefer and Bendoly (2004); Lin et al. (2008b); Ward et al. (1996)
B2B E-commerce benefits	Dollar cost savings Better relationships with suppliers and customers, e.g. fewer customers complaints and conflicts with suppliers Improved quality of systems, e.g. fewer technical problems and system user complaints Greater efficiency, e.g. streamlined processes and shorter turnaround times	Carayannis et al. (2001); Standing and Lin (2007); Subramani (2004)
B2B E-commerce Satisfaction	Assessment of the perceived user satisfaction with the e-commerce systems, e.g. Results of surveys and analysis of complaints Assessment of the perceived satisfaction of suppliers with the e-commerce system, e.g. Establishment of stronger linkage with suppliers Assessment of the perceived economic value of the system, e.g. Improved efficiency and development of new business opportunities	DeLone and McLean (2004); Standing and Lin (2007); Subramaniam and Shaw (2002)

Higher ratings for these six constructs indicated having a: (1) more formal organizational B2B e-commerce policy and/or strategy; (2) higher level of organizational IT maturity; (3) more effective adoption of IEM; (4) more effective adoption of BRM; (5) higher level of B2B e-commerce benefits; and (6) higher level of B2B e-commerce satisfaction. The responses and coding were checked and confirmed by other experts in the field. Correlation coefficients for the seven hypotheses were examined (Table 3).

The correlation relationships were significant at the 0.05 level for all hypotheses (except for H_5). Furthermore, questions relating to a particular research theme, for example, level of organizational IT maturity, were examined as a cluster. Divergent views within the

Table 3. Correlation coefficients for the variables.

Relationship between variables	Hypothesis	Correlation coefficient
Policy ----- IT Maturity	H_1	0.717***
IT Maturity ----- IEM	H_2	0.595**
IT Maturity ----- BRM	H_3	0.466*
IEM ----- BRM	H_4	0.581**
IEM ----- Benefits	H_5	0.305
BRM ----- Benefits	H_6	0.793***
Benefits ----- Satisfaction	H_7	0.772***

*= p< 0.05, **= p< 0.01, ***= p< 0.001

same healthcare organization were assessed in terms of the relative strength of the perspective according to the numbers of responses falling in particular categories. This was done as a form of in-case analysis and to develop general explanations and interpretations (Eisenhardt, 1989).

These steps enhance the construct validity, reliability and overall quality of the research (Yin, 2002). Then, qualitative content analysis by Miles and Huberman (1994) was used to analyze the data from the case study. The analysis of the results of the case study was conducted in a cyclical manner and the results were checked by other experts in the field. The external experts were asked to trace the logical flow of the research study, research questions, case findings and analysis and identification of constructs and thereby identifying any gaps in the chain of evidence (Yin, 2002).

Finally, the guidelines set out by Klein and Myers (1999) for conducting and evaluating interpretive case studies were also followed in an attempt to improve the quality of this research by minimizing some of the case study's main weaknesses (e.g. human subjectivity). Where there were discrepancies in the interpretation of responses to the questions these were resolved by consultation between the researchers and in some cases further explanation from the interviewees to improve the mapping of the responses to the research constructs (Yin, 2002). Both researchers evaluated the responses from the interviews and classified them according to the research themes. The Cohen's Kappa statistic was used to analyze the level of correspondence between the researchers and there was a high degree of reliability between the researchers in relation to the interpretation (0.80). This is well above the 61% level suggested for a substantial strength of agreement (Fleiss, 1981).

RESEARCH FINDINGS

Details about each case are presented in Table 4 below in terms of organizational B2B e-commerce policy and strategy, evaluation practices (i.e. IEM and BRM), B2B e-commerce benefits, and overall degree of satisfaction with their B2B e-commerce systems. The research findings presented below are structured according to the proposed seven research hypotheses. The findings to each question are summarized graphically in matrices to highlight the clustering of occurrences that demonstrate relationships between the factors included in Table 4.

H_1: Organizational B2B e-commerce policy and strategy and the level of organizational IT maturity

Most respondents indicated that it was difficult to just to implement a business methodology or process without first building some sort of B2B e-commerce policies and strategies to improve their technical and infrastructure support/capability. Most case study respondents stated that their B2B e-commerce policies, objectives or strategies had an impact on their level of organizational IT maturity. Most respondents indicated that the level of organizational IT maturity could only be improved if it is explicitly stated in their B2B e-commerce policies, objectives or strategies.

Indeed, results of the case study revealed that there appeared to be a direct connection between B2B e-commerce policies, objectives or strategies in relation to an organization's IT maturity (Figure 2). The only exceptions were cases 3 (Aged Care) and 18 (Medical Product Distribution). The Aged Care centre was not interested in investing further resources into their ineffective IEM and BRM as they had directed resources into other areas whereas The Medical Product Distribution company already had effective IEM and BRM and they found it too expensive to keep directing IT resources to maintain high level of IT maturity. For example, one IT manager from a hospital stated:

> "……funding and other resources provided through our e-commerce strategy and this can affect the level of IT maturity achieved within our organization……" Hence, H_1 is supported.

H_2; H_3: The level of organizational IT maturity and effective use of IEM and BRM

Case study respondents were also asked to describe about where they thought their organizations stand in terms of its stage of growth for each of the four elements as described in Galliers and Sutherland's Stage of Growth Model (1991). The results showed that the "average" organizations are in Stages 3.5 – 4.5 in most of the four elements. The results also revealed that about 80% of the responding healthcare organizations achieved Stages 4 and above for the 'overall goals' element while less than half of the participating healthcare organizations achieved Stage 4 and above for the 'strategy' and 'skills'

Table 4. Organizational B2B e-commerce policy and strategy, evaluation practices, B2B e-commerce benefits and satisfaction in the case study organizations.

Type of Healthcare Organization	Organizational B2B e-commerce Policy and Strategy	IEM/BRM	E-commerce Benefits	E-commerce Satisfaction
1. Healthcare Services	Some informal e-commerce policies and strategies included as part of its IT strategies	Very effective use of IEM and BRM	High level of benefits in terms of cost savings, better relationships with external suppliers and customers, improved quality of systems, and greater efficiency	Very satisfied with their e-commerce systems, particularly in terms of cost reduction and improved relationship with suppliers
2. Healthcare Services	Organizational B2B e-commerce policy and strategy received high priority in its IT plan (cost leadership strategy)	Very effective use of IEM and BRM	High level of benefits in terms of cost savings, improved quality of systems	Reasonably satisfied with cost reduction and improvements in business opportunities
3. Aged Care	Lack of obvious organizational B2B e-commerce policy and strategy	Very limited use of IEM but no BRM	Some benefits in terms of cost savings	Dissatisfied because of its inability to improve efficiency and market share
4. Biotechnology	Some informal e-commerce strategies were included in the IT plan	Very effective use of IEM but no BRM	Only limited benefits in relationship to fewer system user complains	Somewhat satisfied. Achieved reasonable user satisfaction
5. Healthcare Services	Organizational e-commerce strategies received high priority in its organizational plan (cost leadership strategy)	Very effective use of IEM and BRM	High level of benefits in terms of cost savings, improved quality of systems, and greater efficiency	Highly satisfied with cost reduction, improved relationship with suppliers and efficiency improvement
6. Hospital	Organizational B2B e-commerce policy received high priority in its business plan	Some use of IEM and BRM	None	Not satisfied. Was disappointed particularly with its inability to establish stronger linkage with suppliers
7. Hospital	Informal e-commerce policies were prioritized and implemented (cost leadership and differentiation strategies)	Very effective use of IEM and BRM	Some benefits in relation to cost savings, better relationships with external suppliers and customers, and improved quality of systems	Highly satisfied in terms of improved relationship with suppliers, cost reduction, and improved efficiency
8. Hospital	Some e-commerce policies included as part of its IT strategies	IEM and BRM not used effectively	None	Very low user and external supplier satisfaction in most aspects of the system
9. Hospital	Organizational B2B e-commerce policy received high priority in its corporate business plan	An Informal IEM was used successfully; Very limited use of BRM	None	Users were dissatisfied with economic value of the system

Table 4. Contd.

10. Hospital	Informal e-commerce strategies and plans included as part of its corporate strategies	Limited use of IEM and no BRM	Limited benefits in relation to better relationships with external suppliers and customers	Somewhat satisfied with new business opportunities and corporate image enhancement
11. Healthcare Services	Some e-commerce policies included as part of its IT strategies (cost leadership strategy)	Very effective use of IEM; Some use of BRM	Some benefits in terms of cost savings, better relationships with external suppliers and customers, and improved quality of systems	Reasonably satisfied with costs reduction and market share enlargement
12. Healthcare Services	Organizational B2B e-commerce policy received high priority in its business plan (differentiation strategy)	Very effective use of IEM and BRM	High level of benefits in terms of cost savings, better relationships with external suppliers, and fewer user complains	Reasonably satisfied with development of new business opportunities and efficiency improvements
13. Hospital	Organizational strategic plan included informal e-commerce policies (cost leadership strategy)	Some use of IEM and BRM	None	Very dissatisfied because of its inability to increase reduce costs and market share
14. Pharmaceutical	Organizational B2B e-commerce policy received some priority in its IT plan (cost leadership strategy)	Some use of IEM and BRM	None	Totally dissatisfied with the system in terms of corporate image enhancement, new business opportunities, costs reduction and market share enlargement
15. Hospital	Detailed organizational e-commerce strategies were implemented with high priority (cost leadership strategy)	Very effective use of both IEM and BRM	High level of benefits in terms of cost savings, fewer customer complains, and shorter turnaround times	Highly satisfied in terms of corporate image enhancement, the development of new business opportunities and efficiency improvement
16. Hospital	Informal B2B e-commerce policy included in the business plan (cost leadership and differentiation strategies)	Some use of IEM and BRM	Some benefits in relation to better relationships with external suppliers and customers, and greater efficiency	Somewhat satisfied in terms of better relationships with suppliers, increased sales and efficiency improvement; but unsatisfied with corporate image enhancement
17. Hospital	A formal B2B e-commerce policy was included in its organizational IT strategy	Both IEM and BRM were not used effectively	Some benefits in relation to cost reduction and greater efficiency	Very dissatisfied in terms of developing new business opportunities

Table 4. Contd.

18. Medical Product Distribution	No formal organizational B2B e-commerce policy or strategy was in place (mainly differentiation strategy)	Very effective use of IEM and BRM	High level of benefits in terms of cost savings, and greater efficiency	Extremely satisfied with market share enlargement and increased sales, and better relationships with suppliers
19. Hospital	Organizational B2B e-commerce policy received high priority in its IT plan (cost leadership strategy)	IEM was used effective; an informal BRM was used	Some benefits in terms of cost savings, improved quality of systems, and greater efficiency	Reasonably satisfied with reduction of costs and improvements in efficiency
20. Pharmaceutical	Organizational B2B e-commerce policy received high priority in its business plan (cost leadership strategy)	Very effective use of IEM and BRM	High level of benefits in terms of greater efficiency, improved quality of systems, and streamlined processes	Somewhat satisfied in terms of corporate image enhancement, better relationships with suppliers and cost reduction
21. Pharmaceutical	Formal organizational B2B e-commerce policy was included as part of its business/IT strategies (differentiation strategy)	Very effective use of IEM and BRM	High level of benefits in terms of cost savings, better relationships with external suppliers and customers, improved quality of systems, and greater efficiency	Very satisfied with increased sales and market share
22. Medical Equipment	E-commerce policies received only some attention	Some use of IEM and BRM	Some benefits in relation to better relationship with suppliers and greater efficiency	Very dissatisfied with enhancement of corporate image, establishment of relationship with suppliers, and efficiency
23. Medical Product Distribution	Informal e-commerce policies included as part of its business strategies	Very limited use of IEM and BRM	None	Dissatisfied with external relationship with suppliers and operational efficiency
24. Medical Supply Wholesale	No organizational B2B e-commerce policy or strategy was in place	Very limited use of IEM and an informal BRM was used	High level of benefits in terms of better relationships with customers, improved quality of systems, and greater efficiency	Reasonably satisfied with stronger linkage with suppliers and development of new business opportunities
25. Medical Supply Wholesale	No organizational B2B e-commerce policy or strategy was in place	Very limited use of IEM and BRM	Some benefits in relation to better relationship with suppliers and greater efficiency	Reasonably satisfied in terms of better relationships with suppliers, and efficiency improvement; but is disappointed with increases in sales
26. State Health Services	No organizational B2B e-commerce policy or strategy was in place (cost leadership strategy)	Some use of IEM and BRM	High level of benefits in terms of fewer system user complains, fewer customer complains, improved quality of systems, and greater efficiency	Highly satisfied in terms of better relationships with suppliers, cost reduction and efficiency improvement

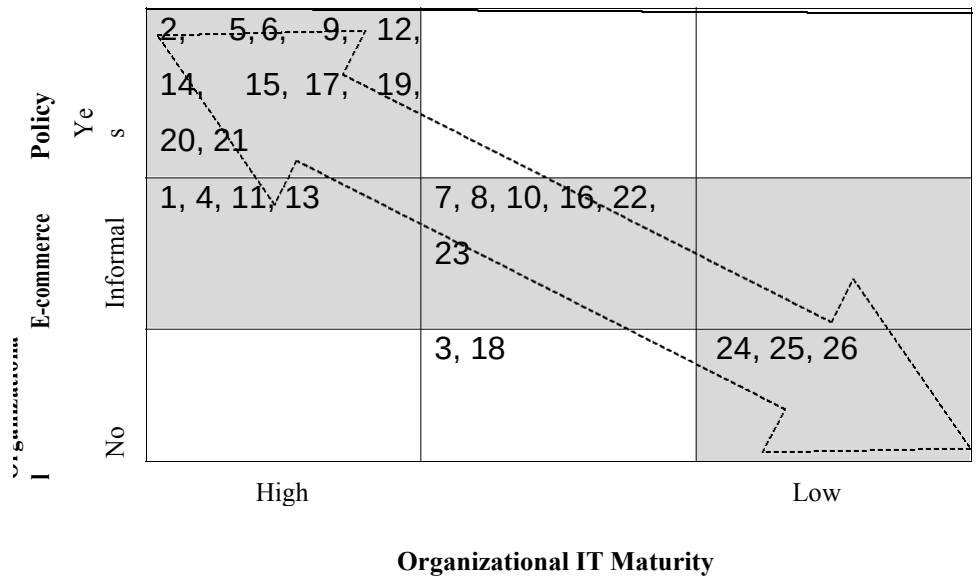

Figure 2. Organizational B2B e-commerce policy and strategy vs. organizational IT maturity.

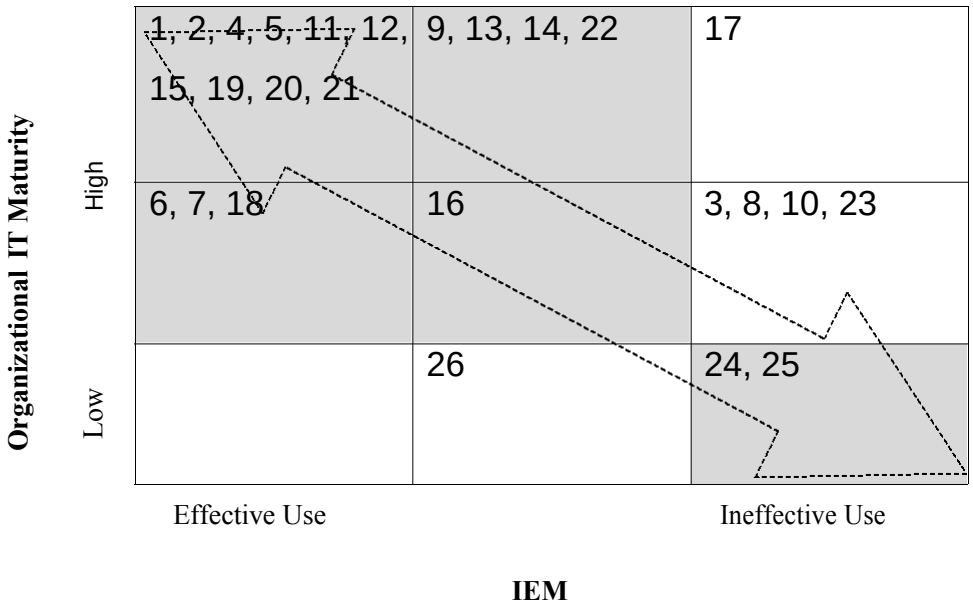

Figure 3. The level of organizational IT maturity vs. effective use of IEM.

elements.

Results from the case study demonstrated a relationship between more mature organizations (i.e. higher stages on the four elements) and the effective use of both investment evaluations (IEM) and benefits realization (BRM) methodologies. In other words, the results supported the notion that higher level of IT maturity made easier for healthcare organizations to adopt IEM and BRM more effectively on their e-commerce investments and projects, and vice versa (Figures 3 and 4). For example, the IT procurement manager from a healthcare service provider stated that:

> "…… yes, we had invested a lot of money to improve our IT infrastructure and IT expertise in the last few years…… they have a positive impact on our ability to carry out necessary measures and evaluation of our EDI system……"

In Figure 3, with some exceptions, the level of IT maturity had a positive relationship with the effective use of IEM. There are more exceptions in Figure 4 than in Figure 3.

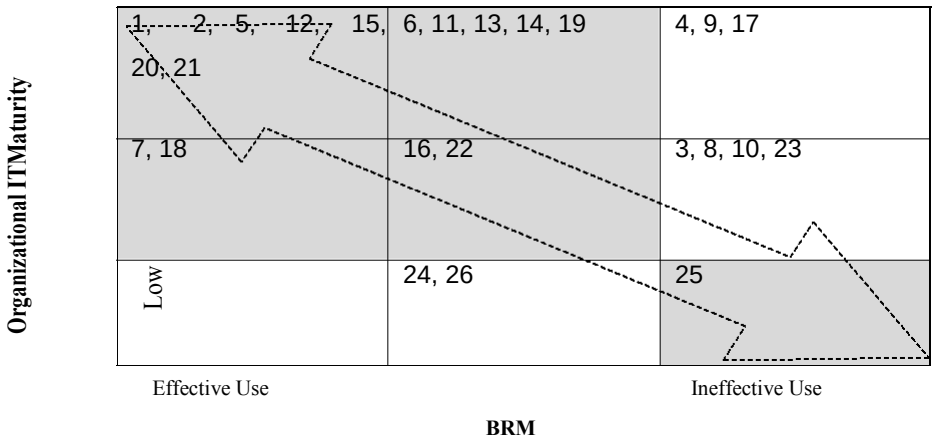

Figure 4. The level of organizational IT maturity vs. effective use of BRM.

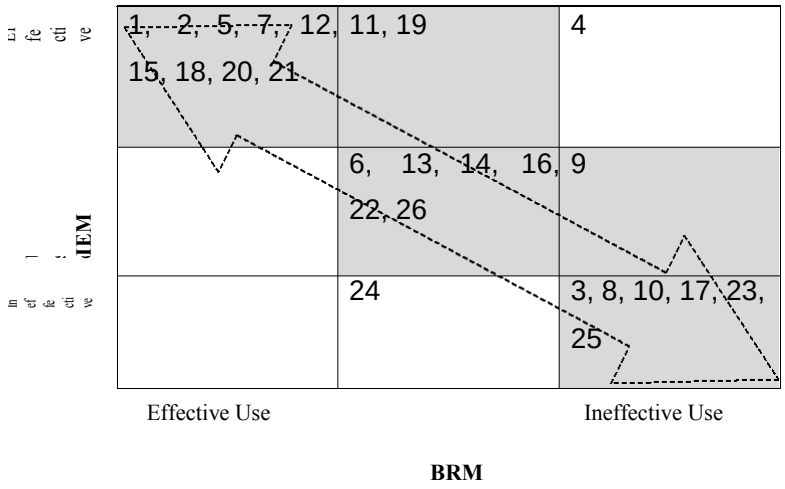

Figure 5. Effective use of IEM and BRM.

Figure 3. This is due to the fact that it was more difficult to implement BRM effectively as it requires more time, expertise, and resources than IEM (Lin et al., 2008b; Ward and Daniel, 2006). Therefore, both H_2 and H_3 are supported.

H_5: Effective use of IEM and BRM

Two most cited reasons for undertaking IEM/BRM by the participating healthcare organizations were: (1) to improve quality of their B2B e-commerce systems or initiatives; and (2) to ensure the expected benefits/ objectives from their e-commerce systems or initiatives are met. Respondents were also asked about the effectiveness of the adoption of IT investment evaluation (IEM) and benefits realization (BRM) methodologies or processes for their various B2B e-commerce investments within their organizations. The two constructs include the reported effective use of IEM or BRM as well as other measures such as years of experience, number of key staff involved in IEM or BRM, and number of people with technical managerial expertise in IEM or BRM. In addition, the constructs also measure the responsiveness of key staff to IEM or BRM.

Almost half of the healthcare organizations indicated their IEM has been used effectively in ensuring successful e-commerce investments or projects and about a quarter of the participants reported that their IEM was not used effectively. Only about one-third of the respondents revealed that their BRM was effective in achieving their B2B e-commerce initiatives and a smaller number of healthcare organizations did not adopt it effectively. With the exception of two healthcare organizations (Cases 4 and 24) there appeared to be a positive relationship between the use of IEM and BRM in terms of their effectiveness (Figure 5). In other words, those

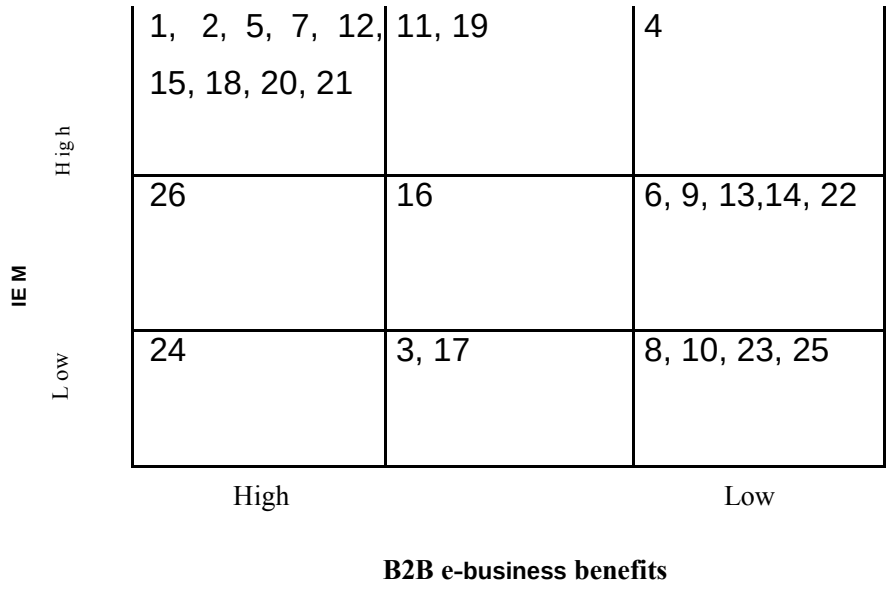

Figure 6. Effective use of IEM vs. the level of B2B e-commerce benefits.

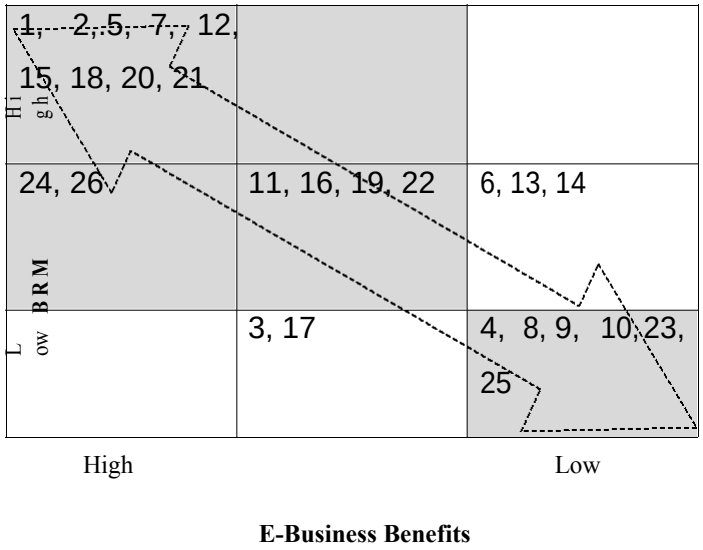

Figure 7. Effective use of BRM vs. the level of B2B e-commerce benefits.

those organizations which were able to use IEM effectively in ensuring successful B2B e-commerce initiatives tend to be able to use BRM effectively. Results of the case study also supported the findings by Lin and Pervan (2003) and Ward et al. (1996) that it is easier for organizations to adopt IEM first before the adoption of BRM. Cases 9, 11, and 19 were expected since it was generally more difficult and time consuming to adopt BRM than IEM (Lin and Pervan, 2003; Ward et al., 1996). One CIO stated:

> "Yeah…… it is definitely a lot harder and expensive to implement a benefits realization methodology than an IT evaluation methodology……" Thus, H5 is supported.

H_4; H_6: Effective use of IEM/BRM and B2B e-commerce benefits

Results of the case study revealed that effective use of BRM appeared to have more impact on the realization of B2B e-commerce benefits than the effective use of IEM (Figures 6 and 7). More healthcare organizations had benefited from the effective use of BRM than IEM with respect to the realization of B2B e-commerce benefits. Many respondents also revealed that the use of IEM

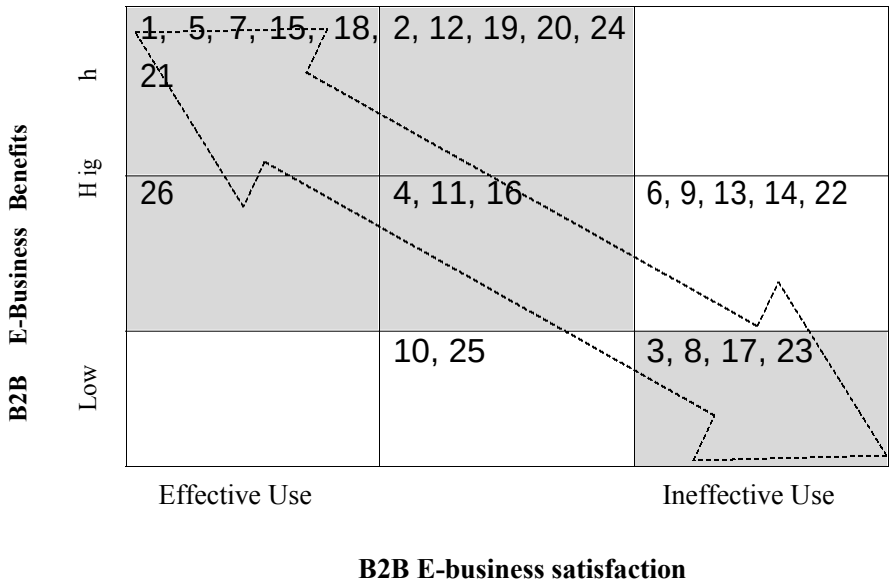

Figure 8. B2B e-commerce benefits vs. B2B e-commerce satisfaction.

alone did not bring about much e-commerce benefits. According to these respondents, effective use of both IEM and BRM would ensure the realization of e-commerce benefits. For example, one IT manager stated that benefits only started to flow in after a BRM was used:

> "…… an evaluation process was used in conjunction with a benefits realization approach to bring about significant benefits such as cost savings and increased revenue from our e-commerce investments……the main aim of an evaluation process was to measure the investments…… our benefits realization approach ensured that benefits were delivered." Therefore, H_4 is not supported whereas H_6 is supported.

H_7: The level of B2B e-commerce benefits and the degree of B2B e-commerce satisfaction

There appeared to be a positive relationship between the level of B2B e-commerce benefits and the degree of B2B e-commerce satisfaction (Figure 8). One supply chain manager from a pharmaceutical company revealed that:

> "……benefits such as increased cost savings, more streamlined business processes, and improved system efficiency from our EDI and e-market systems and other IT systems……have definitely affected the way our users, management and other company stakeholders look at the systems….. Without doubt, the higher the benefits the higher the user satisfaction……"

Overall, approximately one third of the responding healthcare organizations indicated they had obtained a high level of benefits from their B2B e-commerce systems or initiatives. The most often mentioned B2B e-commerce benefits were cost reduction and improved system quality. Moreover, just over a quarter of the healthcare organizations interviewed indicated they were highly satisfied with their B2B e-commerce systems or initiatives. B2B e-commerce satisfaction is determined by overall measures of satisfaction in terms of general satisfaction with B2B e-commerce usage, satisfaction of users, economic, and supplier satisfaction (Table 2). Responding healthcare organizations were most satisfied with the establishment of stronger linkage with their suppliers as well as the ability of B2B e-commerce to assist in improving the organizational efficiency. Thus, H_7 is supported.

Organizational B2B e-commerce policy and strategy and effective use of IEM/BRM

When asked about whether or not the organizational B2B e-commerce policy and strategy, had any direct impact on the effective use of IEM and BRM, most respondents did not think so. For example, one CIO of a healthcare organization said:

> "a business objective or strategy itself alone will not translate into the successful and effective implementation of an IT investment evaluation process……"

Results of the case study showed that there was no direct relationship between business policy/strategy and effective adoption of IEM.

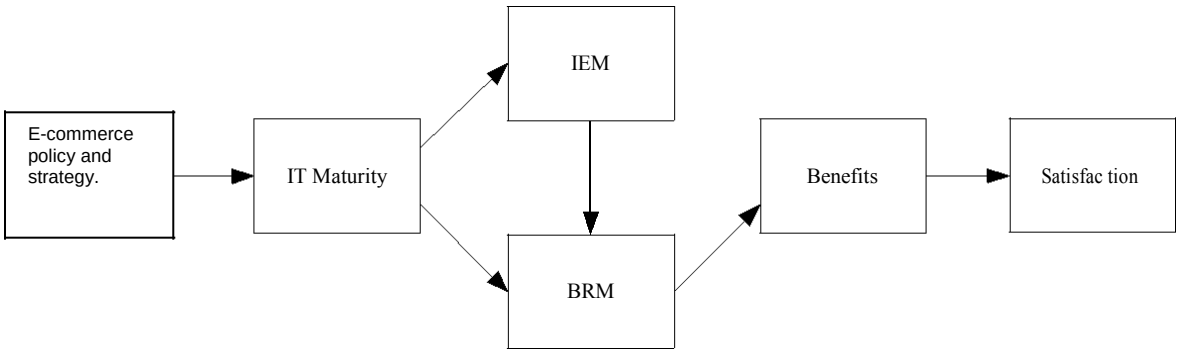

Figure 9. A framework for e-commerce benefits and satisfaction.

The level of organizational IT maturity and B2B e-commerce benefits/satisfaction

Most respondents agreed that high level of IT maturity alone does not automatically lead to higher levels of B2B e-commerce benefits and satisfaction. For example, one IT manager said:

> "Yes, you need to have appropriate e-commerce strategies to help you to achieve benefits from your business-to-business e-commerce investments……"

Effective use of IEM/BRM and the degree of B2B e-commerce satisfaction

As mentioned earlier, results of the case study indicated that those healthcare organizations which adopted IEM and BRM effectively were more able to solicit higher level of B2B e-commerce benefits. However, most respondents agreed that the adoption of IEM and BRM had little or lesser impact on the degree of B2B e-commerce satisfaction. For example, the IT manager from a medical product distribution company stated:

> "……the evaluation of the systems is not enough…… from the user's perspective, you don't feel satisfied without seeing some tangible benefits from using the B2B e-commerce system….."

DISCUSSION AND THEORETICAL IMPLICATIONS

Results of this case study showed that there was a positive relationship between the organizational B2B e-commerce policy and strategy and organizational IT maturity (Figure 2). The results also established the positive linkage between organizational IT maturity and the effective use of IEM and BRM (Figures 3 and 4). In addition, the level of healthcare organization's IT maturity was the key determinant in the effective use of IEM and BRM as higher levels of organizational IT maturity improved the ability and capability of the participating organizations to adopt IEM and BRM more effectively. The results are consistent with findings by Bakker et al. (2008) in which IT infrastructure and other organizational factors were found to be critical in the successful implementation of B2B e-commerce/supply chain systems among UK healthcare organizations. Our results, however, also showed that organizational IT maturity did not appear to have any direct connection with B2B e-commerce benefits and satisfaction without having in place the effective adoption of IEM and BRM. Moreover, the results demonstrated the positive relationship between effective use of IEM and BRM (Figure 5). Only approximately half of the healthcare organizations were able to adopt IEM effectively and just over one-third of healthcare organizations were able to use BRM effectively in ensuring successful B2B e-commerce investments and projects. The results also indicated that the effective use of BRM had a positive bearing on the level of B2B e-commerce benefits (Figure 7). However, there appeared to be no obvious relationship between IEM and B2B e-commerce benefits (Figure 6).

The study also found that the level of B2B e-commerce benefits had a positive relationship with the degree of B2B e-commerce satisfaction (Figure 8). This is consistent with findings by Cullen and Taylor (2009) in which perceived benefits would motivate healthcare users to use B2B e-commerce systems and be satisfied with the systems. However, no positive relationships were found between organizational e-commerce policy and effective use of IEM/BRM as well as between effective Use of IEM/BRM and the degree of B2B e-commerce satisfaction. Nevertheless, a key finding of this study is the positive relationships between the organizational B2B e-commerce policy and strategy, organizational IT maturity, effective use of IEM and BRM, the level of B2B e-commerce benefits, and the degree of B2B e-commerce satisfaction (Figure 9). Careful formulation and implementation of organizational B2B e-commerce policy and

strategy can lay a good foundation for building and improving healthcare organizations' level of IT maturity. Capabilities to use IEM and BRM effectively by healthcare organizations stem largely from their levels of organizational IT maturity. As mentioned earlier in the paper, the use of IEM alone does not guarantee the delivery of benefits. Effective use of IEM assists healthcare organizations in the effective use of BRM. This, in turn, helps these healthcare organizations to realize B2B e-commerce benefits. Results of the case studies also highlight the fact that understanding the benefits has a positive impact on the degree of satisfaction with a system since stakeholders and users realize the value being delivered by their B2B e-commerce projects and systems. There is some evidence to suggest that high degrees of B2B e-commerce satisfaction provide a further rationale and impetus for healthcare organizations to fine-tune and formulate appropriate organizational B2B e-commerce policies, business objectives and/or strategies which address other outstanding constraints in building and improving their organizational IT maturity.

Moreover, this study also defined and examined the significant role played by organizational B2B e-commerce policy and strategy and organizational IT maturity as the antecedent factors of IEM and BRM and their role in realizing and enhancing B2B e-commerce benefits and satisfaction. Our data provided support for H_1, H_2, H_3 and H_5 and hence confirmed the central tenets of strategic alignment and social-technical theories. That is, the level of IT integration and social-technical fit had a significant impact on organizational performance (i.e. B2B e-commerce benefits and satisfaction). The support for H6 and H7 reinforced this point. Furthermore, our data provided a theoretical explanation for past research which have found that IT/B2B e-commerce investments do not always result in improved organizational performance (Osei-Bryson and Ko, 2004; Thatcher and Pingry, 2004). Due to the strategic alignment and social-technical fit of the organizational factors examined in this study, these factors need to be managed together, not in isolation. Focusing on one factor of a strategic alignment/social-technical fit and neglecting the other factor can potentially lead to negative organizational B2B e-commerce performance (Grant, 2003). For example, the results showed that the adoption of IEM in isolation did not lead to higher level of B2B e-commerce benefits (H_4). Rather, IEM needs to be adopted in conjunction with BRM in order to achieve higher level of B2B e-commerce benefits. It is therefore critical for senior executives of the healthcare organizations to take a more complete picture of their B2B e-commerce investments and carefully assess their investments in order to ensure that organizational B2B e-commerce policy and strategy are formulated and institutionalized. It is also crucial for healthcare organizations to ensure that, in the process of realizing and improving their B2B e-commerce benefits and satisfaction, the level of their organizational IT maturity are appropriate for the adoption of IEM and BRM.

CONCLUSIONS AND MANAGERIAL IMPLICATIONS

Case studies were conducted in 26 healthcare organizations which had been using at least a B2B e commerce system for more than ten years and had adopted at least an informal IEM and/or BRM process. The relationships between organizational B2B e-commerce policy and strategy, organizational IT maturity, IEM/BRM, B2B e-commerce benefits and satisfaction were examined from the strategic alignment and social-technical perspectives. Seven research hypotheses were subsequently proposed and six of them were supported. These perspectives have provided a platform for developing a framework for e-commerce benefits and satisfaction. The findings have the potential to assist healthcare organizations in assessing and understanding their B2B e-commerce systems and projects.

This paper has examined various factors which affect the realization of B2B e-commerce benefits and satisfaction in Australia healthcare organizations. To date, there has not been much research undertaken in this particular area in healthcare organizations (both in the global and Australian context) (Chiasson et al., 2007; Cullen and Taylor, 2009; Van Akkeren and Rowlands, 2007), so the findings presented should provide the impetus for organizations to re-consider their approaches to B2B e-commerce investment. The inherent difficulties in identifying and assessing B2B e-commerce investments are often a cause for uncertainty about the expected impact the investments might have on the business. As a result, it is all too easy for healthcare organizations to ignore the various factors which affect their organizational performance (e.g. B2B e-commerce benefits and satisfaction). In particular, the results have provided evidence that the organizational B2B e-commerce policy and strategy and organizational IT maturity play a key role in Australian healthcare organization's ability to undertake evaluation and benefits realization of their B2B e-commerce investments. The results also imply that healthcare executives should start with a thorough analysis of their B2B e-commerce policy and strategy and level of IT maturity. In doing so, they can develop requisite capacities and abilities to better equip themselves with evaluation of their B2B e-commerce investments in the process of improving their organizational performance.

The results of this study also demonstrate that for Australian healthcare organizations the key to improved organizational performance in adopting B2B e-commerce systems are the organizational factors. Some can leverage B2B e-commerce to reduce costs, to build better relationships with suppliers, or to develop new markets. Others are more intent on aligning its use with their corporate strategies. For those with a decision to make over B2B e-commerce implementation, the adoption of IEM and BRM alone are not guarantees of successful outcomes. Rather, the key is to integrate the evaluation practices with appropriate level of organizational IT maturity in line with institutionalization of organizational

B2B e-commerce policies and strategies. Finally, the investments in B2B e-commerce is a new way of doing business which has the potential to increase overall organizational performance. However, the successful organizational performance cannot be obtained without taking into account the various factors examined in this research. To acquire the most from the B2B e-commerce investments, Australian healthcare organizations must re-examine their underlying organizational and business processes, capabilities, resources, strategies, and policies. This will ensure that they are aligned to deliver organizational/customer value and satisfaction.

FUTURE RESEARCH DIRECTIONS AND LIMITATIONS

Some limitations in the research need to be acknowledged. First, there has been a lot of research undertaken on generic e-commerce investments, but limited studies into the specific area of B2B e-commerce investments in healthcare, and as result comparisons are difficult to undertake. Second, the factors examined in this research may not fully capture, for example, the complex nature of the evaluation and benefits realization processes within Australian healthcare organizations. For example, this research focused on only three aspects of organizational B2B e-commerce policy and strategy (i.e. organizational policy for investing in B2B e-commerce systems, priority of organizational B2B e-commerce in strategic plan, types of organizational B2B e-commerce policy and strategy). Further research can include other aspects of organizational B2B e-commerce policy and strategy. Equally, the level of organizational IT maturity, and B2B e-commerce benefits and satisfaction do not remain static during the different stages of B2B e-commerce project implementation. Another limitation of this study relates to the generalizability of the research findings. The study involved 26 Australian healthcare organizations and the findings are based on the Australian context. It would be interesting to conduct the research in other countries and/or with different business applications. Finally, this research has relied on the information provided at a particular point in time. Further research could take a longitudinal approach as the perception and management of benefits and satisfaction is likely to change over time.

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