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Business-to-business e-commerce adoption: An empirical investigation of business factors

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Abstract We develop an overarching model to explain the adoption of business-to-business e-commerce using five business factors: external environment, organizational context, decision-maker's characteristics, technology context, and organizational learning. Data collected from IS executives was analyzed using logistic regression. Our model has a good fit with over 77 % variance explained. Findings indicate that the existence of informal interest groups, and the tolerant attitude of decision makers towards negative information about business-to-business e-commerce have significant influence on the adoption decision. In addition, our results indicate that price intensity and perceived barriers negatively affect the adoption decision.

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1 Introduction

Over the last few years, very few developments in the field of Information Systems (IS) have been as significant as electronic commerce (e-commerce) (Teo and Ranganathan 2004). The phenomenal adoption and growth rates of e-commerce (EC), commonly classified into two types: business to consumer (B2C) and business to business (B2B), attest to its significance as well. While firms are sellers and individuals are buyers in a B2C EC, both sellers and buyers are supply chain partner organizations in a B2B EC model. B2C EC involves millions of diverse transactions per day with a large number of buyers. Though each customer purchase is small in value, the orders must be processed quickly and products delivered to customers on time. B2B EC is defined as "transactions conducted electronically between organizations that involve the electronic transmission of data and the execution of transactions between business entities, or parts of business entities, using the Internet or privately owned computer networks" (Ghobakhloo et al. 2014). Employment of B2B EC by firms results in increased operational efficiency, reduced inventories, increased sales and improved financial returns (Lin, Huang and Burn 2007). B2B EC enables firms to perform electronic transactions along the value chain activities (Oliveria and Dhillon 2015). Furthermore, the drivers of adoption for B2B EC are different from those of B2C EC. Compared to B2C EC context, the buyers and sellers in B2B EC context are sophisticated business partners with specific demands; thus the decision to continue with B2B EC does not depend on individual perceptions as in B2C EC (Ghobakhloo et al. 2014).

Studies suggest that revenues for all types of B2C e-commerce reached 310 billion USD in 2011, and that the revenues for all types of B2B e-commerce for 2012 exceeded 12.4 trillion USD (Sila 2013; Laudon and Traver 2012). Although such estimates would seem to suggest an increased

understanding of B2B e-commerce as a phenomenon, much of the research in the IS discipline has focused on the B2C aspect. Clearly, the vast potential of B2B e-commerce dictates a need for more studies to investigate different facets related to B2B e-commerce and supplement the findings of existent studies.

In general, studies have examined issues relating to adoption of e-commerce in B2C e-commerce (for example, Liao et al. 2006; Richards and Shen 2006) and in B2B ecommerce (for example, Alam et al. 2007; Awad and Ragowsky 2008). However, as indicated earlier, most of them have focused more on the consumer aspects rather than on the business aspects. Very few studies have examined the issues relating to the adoption of B2B e-commerce (for example, Son and Benbasat 2007) and specifically, the role of business factors affecting B2B e-commerce. We define "business factors" to be a comprehensive set of factors related to industry, organization, and decision maker, which include items, such as, business environment, organizational characteristics, technological context and decision maker's characteristics. The few studies that examined the adoption focused on business issues relating to adoption of e-marketplaces (Loukis et al. 2011; White et al. 2007). trading exchanges (Quaddus and Hofmeyer 2007) and in different countries (Ahmad and Agrawal 2014; Janita and Chong 2013; Tan et al. 2007; Teo and Ranganathan 2004). Till date, there have been few quantitative studies encompassing all the "business factors" affecting the adoption of B2B e-commerce. Most of the B2B adoption studies examined organizational and technological factors with very few studies considering the characteristics or attitude of the adoption decision maker or the factors associated with business environment. These factors are important as the decision maker's perception about the consequences of B2B adoption will impact the adoption decision. Similarly the industry's competitive environment will impact the organizational decision to adopt B2B EC. Ignoring the impact of these factors in determining the B2B adoption decision could lead to inaccurate results and thus could impact the organizational performance as a consequence. Therefore, there is a need to examine different factors that influence the nature of firm participation through a more comprehensive study. A major new research initiative is thus called for to improve our understanding of the business factors contributing to the adoption of B2B EC by firms so as to encourage a more effective use of e-commerce. Thus, the objective of the present study is *to determine the business factors that include those related to business environment, organization, and the decision maker that affect the adoption of B2B EC*.

In doing so, this research extends earlier studies on innovation and diffusion studies by offering a new perspective on the organizational adoption decision of B2B e-commerce. Findings of this study will help senior management or IS decision makers understand the business factors surrounding B2B e-commerce adoption and highlights the problems and concerns that IS managers will have to face during the adoption process. A novel contribution of this research is determination of business factors at three levels – business environment, organizational, and decision maker preferences – that affect the adoption decision of B2B EC. To our knowledge, no other previous study has included all these business factors to influence B2B adoption. The findings will also aid the decision makers to be aware of the various circumstances under which B2B adoption is feasible, thus preparing management for such circumstances and future adoption decision.

The remainder of the paper is structured as follows: First, we review existing literature on B2B e-commerce and IS/IT adoption models. We will then propose an adoption model for B2B e-commerce and present our hypotheses. Following this, we test the model empirically and present the research findings. Finally, we conclude with a discussion on implications for research and managerial practice.

2 Literature review and theoretical framework

Prior research in B2B has examined issues in the areas of inter-organizational systems (IOS), inter-organizational business process standards (IBPS), vertical industry standards (VIS), electronic procurement, and supply chain. B2B Studies in the IOS domain have examined business models of B2B electronic markets (Loukis et al. 2011; Chang and Wong 2010; Dai and Kauffman 2002). the firm, context, and innovation characteristics related to B2B EC, the challenges faced by firms in adopting standards-based B2B EC and deploying B2B EC applications and have proposed an implementation framework (Asher 2007; Niwe 2007). In this section, we will review previous B2B EC studies along with the research gaps followed by a review of IT/IS adoption studies from previous literature. Then, we present our B2B EC adoption research model along with its justification.

2.1 B2B EC adoption studies

Adoption studies describe the degree to which various factors influence B2B e-commerce adoption decisions across cultures as in Taiwan (Thatcher et al. 2006). Europe (Oliveria and Dhillon 2015). Malaysia (Lip-Sam and Hock-Eam 2011), China (Tan et al. 2007). and Middle-East countries (Ahmad and Agrawal 2014) and adoption in Small and Medium Enterprises (SMEs) (Sila and Dobni 2012; Lip-Sam and Hock-Eam 2011; Gunasekaran et al. 2009; Chong & Pervan 2007). Similarly, B2B research in the domain of IBPS has examined the factors influencing the adoption of standards in business-to-business integration

(Bala and Venkatesh 2007; Venkatesh and Bala 2012). Adoption of Standards has also remained a theme in the domain of VIS, wherein research has focused on the role of web services and XML based standards to create a flexible interoperable architecture (Legner and Vogel 2008; Wigand et al. 2005). Likewise, studies in the domain of e-procurement have focused on issues such as the adoption and impact of e procurement as well as its benefits (Chang and Wong 2010; Gunasekaran et al. 2009; Rai et al. 2009; Pires and Stanton 2005; Piotrowicz and Irani 2009; Teo and Kee-hung 2009). Similarly, research has indicated that the use of standard electronic business interfaces (SEBIs) can result in tighter integration among supply chain partners (Malhotra et al. 2007). Finally, B2B research in the area of enterprise systems has looked at issues like audit planning (Pathak and Baldwin 2008). and risk assessment (Sutton et al. 2008). Such studies have underscored the need to examine more issues about B2B e-commerce adoption.

Tables 1 and 2 provides a list of recent B2B EC adoption studies, wherein the variables affecting adoption are presented in five categories – technology variables, organizational context variables, external environment variables, decision maker variables, and organizational learning variables – along with theory bases used in the studies. As seen from Tables 1 and 2, most of the factors considered belong to technology, organization, and external environment and used TOE Framework (Tornatzky and Fleischer 1990) and/or Innovation Diffusion Theory (Rogers 1983). There are very few B2B EC adoption studies that include variables related to decision maker (Lip-Sam and Hock-Eam 2011), or organizational learning (for example, Oliveria and Martins 2010) or industry characteristics. Our B2B EC adoption study fills the above research gaps by including variables in the missing categories (i.e., industry characteristics, decision maker characteristics, and organizational learning variables) along with the variables in technology and organizational contexts as used in previous studies. Thus, our research represents a more comprehensive framework of B2B electronic commerce adoption compared to most previous studies.

2.2 IT adoption studies

The operationalization i.e., implementation and execution of various e-commerce models is done through the adoption and application of IS/IT technologies. Literature on IS/IT adoption models is abundant and could be harnessed to develop a theoretical framework for e-commerce. Therefore, we posit that using IS/IT adoption models would be a good starting point to examine B2B e-commerce adoption. In particular, diffusion models have become important for studying the factors underlying the innovation adoption. The most frequently used theories in B2B EC adoption studies include diffusion of innovation (DOI) theory of Rogers and TOE framework of

Tornatzky and Fleischer (Sila 2013). TOE framework is consistent with DOI theory. The drivers emphasized in DOI are individual characteristics and both internal and external characteristics of the organization. These are similar to technology and organization context in the TOE model. But, TOE framework also includes an additional component, namely, external environment (Oliveria and Martins 2010).

Using the frameworks of DOI and TOE, Table 1 summarizes the existing literature on IS/IT adoption models. These include several variables at the technology level, unit level, firm level and environmental level.

Existent literature on technology adoption as summarized in Table 1 suggests the consideration of environmental, organizational (context and innovation), technological and decision maker factors. These variables originate from different environments that an organization faces and, when taken together, provide a more comprehensive framework for investigating the B2B e-commerce technology adoption. Therefore, a holistic research model should encompass all these variables in a research framework. It is also evident from Table 1 that there is relatively greater preponderance of research on the technology factors (TAM model, risk, uncertainty, type, complexity, potential returns, and inherent advantages of technology). However, research studies on other business related contextual factors such as organizational learning are correspondingly scarce. Thus, the analysis presented in Table 1 reveals the importance of implementation phase in technology diffusion and adoption. Consequently, our proposed research model will include all these variables in terms of external environment, organizational factors (context and organizational learning), technology and decision maker factors and is presented next.

2.3 Research framework

Our research model is based on previous IT/IS adoption models, by duly considering research gaps in previous B2B EC adoption models as described above. As shown in Fig. 1, our proposed e-commerce model consists of five sets of business categories: (1) External Environment, (2) Organizational context (3) Technology context (4) Organizational learning and (5) Decision maker's characteristics. Most of these categories have a single variable each and are discussed next. External environment category includes the variable called "price competition". Similarly, organizational context category comprises "informal linkages" as a variable. "IT maturity" is a variable under Technology context category and "preference for negative information" is categorized under decision maker's characteristics. Organizational learning category includes two variables: "perceived operational benefits" and "perceived barriers". As indicated earlier, the above mentioned variables were derived from different studies. Specifically, external

Table 1 Organizational IS/IT Adoption Studies

Sources	Technology Context variables	Organizational Context variables	External Environment variables	Decision Maker Characteristics	Organizational Learning variables	Findings
Tomatzky and Fleischer (1990)	Technology context	Organizational context.	External Environment			Proposed an adoption framework based on a case study of an electric company
Chau and Tam (1997)	Technological factors		Environmental factors			Modified the Tomatzky and Fleischer model and demonstrated the value of their model for complex IS innovations i.e, open systems. Developed an adoption model to study open system adoption
Teo et al. (2003)			External Environmental Factors (mimetic, coercive and normative pressures)			Found that three institutional pressures—mimetic pressures, coercive pressures, and normative pressures—had a significant influence on organizational intention to adopt EDI.
Chen and Forman (2006)			Competitive environment on technology adoption			Open standards are expected to result in faster technology diffusion. However, this study found several competitive methods for raising switching costs in the market for routers and switches.
Cooper and Zmud (1990)	Technology characteristics	Task characteristics, Task complexity				Conducted an adoption survey using 62 manufacturing firms on infusion of MRP systems by industrial firms. Found that task technology compatibility/fit was a major factor in MRP adoption
Fichman (2004)	Technology factors (risk and return)	Firm level factor				Developed a conceptual model that specifies two technology factors (risk and return) and two organizational factors that determine the option value for staged adoption of technology
Fichman and Kemerer (1999)	Acquisition cost of Technology	Knowledge barriers				Found that IT may be widely acquired but only sparsely deployed and developed the concept assimilation gap in organizations
Bharati and Chaudhury (2006)	Technology	Small and Medium Enterprises				Found that technology adoption in small and medium enterprises (SMEs) is a significant source of economic resurgence in US.
Bajwa and Lewis (2003)	Technology complexity	Organizational size				For most IT innovations, size was not asignificant factor. Only for complex and resource-intensive technologies, larger firms showed higher adoption rate.
Gatignon and Robertson (1989)	Innovation developer		Adoption industry	Decision Maker's factors		This model is developed to study the adoption of high technology innovations i.e., using laptop computer for marketing by organizations. The model was found to predict intentions to adopt the high

Table 1 (continued)

Sources	Technology Context variables	Organizational Context variables	External Environment variables	Decision Maker Characteristics	Organizational Learning variables	Findings
						technology (laptop computer in 1989) very well.
Mirchandani and Motwani (2001)	Compatibility		Relative advantage	Decision makers characteristics		Based on an empirical study of small business electronic commerce, the study found that decision makers' characteristics significantly determine the degree technology adoption.
Attewell (1992)	Technology complexity				Organizational learning	Intent to adopt significantly affects adoption rates
Sinha and Chandrashekaran (1992)	Type of IT	Firm level variables	Environmental variables			Two types of quantitative diffusion models are distinguished and empirically tested on ATM adoption using data from 3689 ATM's. Promoters of adoption are income, growth and external environment
Bhattacherjee et al. (2007)	Technology factors (type and performance)					Three types (administrative, clinical and strategic) of IT in hospitals are evaluated for adoption successes. Clinical IT was the best of the three types.
Bajwa and Lewis (2003)	Technology complexity	Organizational size				For most IT innovations, size was not a significant factor. Only for complex and resource-intensive technologies, larger firms showed higher adoption rate.
Sallas et al. (2007)	Technology complexity	User involvement				Using a case study of hand-held medication administration device in hospitals, the study found that active user involvement increased technology adoption.

Table 2 Business-to-Business E-Commerce Adoption Studies

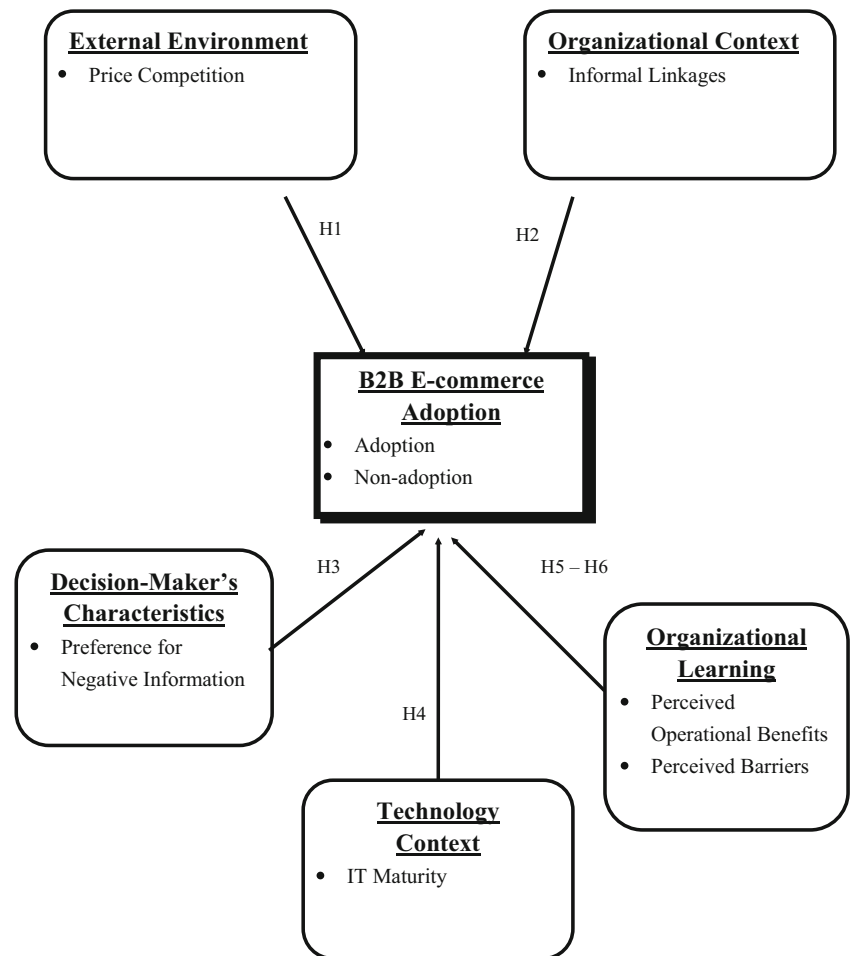| Source	Technology Variables	Organizational Context Variables	External Environment Variables	Decision-Maker Variables	Organizational Learning Variables	Theory bases used	Findings
Oliveria and Dhillon 2015	Technology readiness, technology integration	Obstacles	Competitive pressure, trading partner collaboration			TOE Framework (Technology, Organization, and Environment)	Technology readiness, obstacles, and trading partner collaboration are important drivers of B2B EC adoption
Ghobakhloo et al. 2014	EC Readiness					IS Success Model	EC Readiness is a determinant of B2B success
Ahmad and Agrawal 2014	Difficulty of integrating EC with existing systems		Lack of business law support			Framework by Kraemer et al. 2006	Integration difficulty, lack of business law, and small market size are the impediments to B2B EC in Kuwait
Alsaad et al. 2014			Power exercise			Innovation charateristics	Conceptual paper – the dominant partner can put pressure on the other partner.
Sila 2013	Network reliability, scalability	Top management support, trust	Pressure from Competitors			TOE Framework	These factors play a significant role in firms' adoption decision
Sila and Dobni 2012	Network reliability, scalability	Top management support				TOE Framework	Based on TOE framework, these variables were found to impact B2B EC usage among SMEs
Loukis et al. 2011	Difficulty of integration, lack of common technological standards,	Lack of trust				Innovation diffusion theory	Based on case study from the Hellenic Aerospace Industry in Greece, these barriers of adoption of B2B e-marketplaces were identified
Lip-Sam and Hock-Eam 2011			External support	CEO attributes		TOE Framework	External support, such as finances from Govt. and CEOs with high educational and computer qualifications lead to increased adoption by SMEs in Malaysia
Al-Somali et al. 2011	Organizational IT Readiness	Top management support, Strategic orientation	Customer pressure, Regulatory environment, National readiness			TOE framework	Organizational IT readiness, management support, and regulatory environment

Table 2 (continued)

Source	Technology Variables	Organizational Context Variables	External Environment Variables	Decision-Maker Variables	Organizational Learning Variables	Theory bases used	Findings
							are the strongest factors in B2B EC initial adoption in Saudi Arabian firms.
Oliveira and Martins 2010	Technology readiness		Competitive pressure, trading partner collaboration		Perceived benefits and obstacles	TOE framework and Iacovou et al. (1995) model	The drivers for e-business adoption in telco and tourism industries.
Chang and Wong 2010		Trust				Selected variables used	Trust was a significant moderator in e-procurement adoption and e-marketplace participation
Gunasekaran et al. 2009	Perceived Readiness	Perceived future organizational performance			Perceived barriers and benefits	Gunasekaran et al. (2009) framework	The barriers for e-procurement adoption by SMEs were lack of top management initiative and other barriers such as, technological immaturity and lack of financial support.
Huang et al. 2008	Technological maturity	Organizational readiness	Environmental pressure, Inter-organizational factors			Chwelos et al. (2001) model	Several factors from each of these constructs are shown to affect Internet-EDI adoption
Lin and Lin 2008	IS-infrastructure IS-expertise	Organizational compatibility, expected benefits of e-business	Competitive pressure, trading partner readiness			Innovation diffusion theory (Rogers 1983) and TOE framework	Factors shaping e-business diffusion by Taiwanese firms include IS infrastructure, IS expertise, expected benefits of e-business, and competitive pressure.
Chong and Pervan 2007	Trialability		Relative advantage, competitive pressure, non-trading institutional influences			Innovation diffusion theory.	Both internal and external environmental factors significantly affected B2B EC adoption of SME forms in Australia
Yu 2007		Firm characteristics, promotion from top management	Competitiveness of the business environment			Select variables	These are the significant factors affecting firm's decision to participate in B2B e-marketplaces in Taiwan

Table 2 (continued)

Source	Technology Variables	Organizational Context Variables	External Environment Variables	Decision-Maker Variables	Organizational Learning Variables	Theory bases used	Findings
Tan et al. 2007	Restricted access to computers	Lack of internal trust, lack of enterprise-wide information sharing, intolerance towards failure, incapability to deal with rapid change				Perceived eReadiness model (Molla and Licker 2005)	These are the inhibiting factors for adoption of B2B e-commerce in China.
Cho 2006			External pressure		Perceived benefits, perceived hindrances		It was found that these factors along with firm size were the key factors affecting the adoption of third-party B2B portals
Barua et al. 2004			Supplier readiness, supplier process alignment, customer readiness, and customer/supplier IT capabilities			Resource-based view	Supplier and customer side factors are determinants of B2B EC implementation
Ranganathan et al. 2004	IT activity intensity, centralization and formalization of IT unit	Managerial IT knowledge	Supplier interdependence, competitiveintensity			Innovation diffusion theory	These factors affect the diffusion of B2B EC.

Fig. 1 Research Model: B2B E-Commerce Adoption Model

environment and organizational context variables are derived from the studies of Gatignon and Robertson (1989). Tornatzky and Fleischer (1990). Chau and Tam (1997). and Sinha and Chandrashekaran (1992). Similarly, technology context and organizational learning characteristics arise from Sinha and Chandrashekaran (1992). Swanson (1994). Attewell (1992). Leonard-Barton (1985). and Cooper and Zmud (1990). Kuan and Chau (2001). and Chau and Tam (1997). Finally, the decision maker's variables are derived from Mirchandani and Motwani (2001) and Gatignon and Robertson (1989).

As we aim to develop a model of organizational adoption of B2B e-commerce, we included only select items in each of the five factors (external environment, organizational context, organizational learning, decision maker's characteristics, and technology context). While previous research includes industry concentration, price competition, markets served, and ISP marketing strategies as part of external environment, we used only price competition to represent external environment. Other items are less important – for example, industry concentration has less influence on e-commerce adoption, and ISP strategies are more applicable in consumer adoption of technology rather than to B2B environments (Frambach

et al. 1998). We used IT maturity to represent technology context because it includes the characteristics of the IT environment that is necessary to integrate e-commerce transactions into the enterprise systems. While some previous researchers have used web knowledge to describe technology context, we only considered IT maturity for the above reason. Organizational learning variable should describe the costs and benefits associated with a specific innovation, which is the natural outcome/result of organizational learning. The costs and benefits of the innovation will lead to perceptions towards gains and barriers. Thus, we used the items "perceived operational benefits" and "perceived barriers" to represent the characteristics as these adequately describe the perceptions of users in adopting B2B e-commerce (Kuan and Chau 2001; Chau and Tam 1997).

Studies have already established that decision maker's characteristics such as innovativeness and knowledge of IS influence the adoption of technologies (Thong 1999; Abdul-Gader and Kozar 1995). What is little known in IT/IS is the effect of negativity bias on decision making, more specifically, on the adoption of B2B. Therefore, we include "preference for negative information" as part of the decision maker characteristics. Finally, as part of the organizational

context, we investigate whether informal networks such as the role of project champions impact the adoption of B2B e-commerce. We focus on this particularly because while the role of champions in advocating new technologies is well known, little is known about their role in the context of B2B adoption.

Next, we present and discuss our research hypotheses using the research model as illustrated in Fig. 1.

3 Hypotheses

3.1 Impact of external environment on e-commerce adoption

3.1.1 Price competition

External environment may refer to the numerous social, legal, economic, business factors among other things. For the purposes of this study, we chose to focus only on business factors for relevance, and, in particular on price competition because of its impact on the adoption decision. Seminal studies have recognized the importance of the degree of price competition and have referred to it as a variable that characterizes an industry (Porter 1979, 1980). The adoption of new technology oftentimes requires additional firm level resources that would impact the cost structure of the firm. As such, adoption of new technology becomes more difficult in industries where price erosion and price competition dictate the competitive intensity such as B2B EC. In particular, in the Internet boom-bust cycle, several firms introducing novel technologies failed when faced with intense price competition in the market place, amongst other variables. Subsequently, this has had an adverse impact on innovation, and in the introduction and diffusion of newer technologies. In reality however, the relationship between price competition and innovation adoption is probably curvilinear (Robertson and Gatignon 1986). We posit that in the early stages of the cycle the increase in the number of competitors probably leads to an increase in the adoption of newer technologies by a firm in order to remain competitive. However, beyond a certain point of price competition among the firms in the industry, the financial resources of the industry will be depleted resulting in reduced levels of innovation adoption. This is especially true in the case of B2B EC which is characterized by intense price competition (Davis-Sramek et al. 2009). Hence a firm will be less likely to deploy its stretched resources to adopt new technology in the case of B2B EC and we postulate that

H1 The greater the degree of price competition in an industry, the lesser the likelihood of adoption of B2B e-commerce by the firm.

3.2 Impact of organizational context on e-commerce adoption

3.2.1 Informal linkages

For the purposes of this study, organizational context refers largely to the role of the internal factors within. Of these, informal linkages and communication processes within existing firms, such as the role of product champions and idea generators, play an important role in facilitating technological innovation (Kautz and Nielsen 2004; Tornatzky and Fleischer 1990) and therefore are considered for this study. For example, project champions exhibit transformational behaviors – they are innovative, charismatic, self-confident, persistent, and risk their personnel reputation to bring changes in the organization. These transformational behaviors allow project champions to be influential in advocating new information technologies and handling resistance successfully (Beath 1991). It also allows them to seek political support to protect the new project, motivate users of the high-level purpose of the new technology, and convince users of the benefits of the new innovation (Linying et al. 2007). These findings have also been supported by many other studies which found that champions, facilitators, informal teams and informal communication networks positively influence the usefulness and adoption of technology (Kang and Kang 2009; Stewart 2007; Linying et al. 2007; Prescott and Conger 1995a; Jarvenpaa and Ives 1996). Following these studies, we posit that informal work teams would positively influence the adoption of B2B e-commerce and propose the following:

H2 The more active the informal group within a firm, the greater the likelihood of adoption of B2B e-commerce of that firm.

3.3 Impact of decision maker's characteristics on e-commerce adoption

3.3.1 Preference for negative information

Studies have indicated that a decision maker's characteristics influence the adoption of technologies (Thong 1999; Abdul-Gader and Kozar 1995). It is generally assumed that decision makers might react the same to both positive and negative news and adopt B2B EC or other technologies which may not be true. Among the many decision maker's characteristics that influence the adoption of new technologies, emphasis on negative information (negativity bias) is a significant variable in information processing and the decision making processes. A study on online reviews found that negativity bias caused by anxiety influenced helpfulness (Yin et al. 2014). Similarly. Cao et al. (2011)

and Mahajan et al. (1984) found that negative information outweighs positive information in the customer's decision processes. Some sociological studies also hint about the existence and importance of anti-innovation information in the social system. Further, consumers weigh negative information about an innovation more heavily than positive information as unfavorable information about a product tend to be more influential with prospective buyers than favorable information (Wright 1974). Otherwise stated, "bad things will produce larger, more consistent, more multifaceted or more lasting effects than good things" (Baumeister et al. 2001, p. 325). A commonly cited reason is that because negative information is rare or unexpected, it is perceived as more useful for decisions (Fiske 1980). This logic is especially applicable to online word-of-mouth, where negative feedback tends to be much rarer than positive feedback (e.g., eBay, see Resnick and Zeckhauser 2002). This asymmetry in the use of negative information relative to positive is further compounded by the difficulty of assessing the usefulness of EC in gaining customer attention among the many alternative web methodologies on the internet. Hence, we can expect that decision makers who preferentially seek out negative information would more critically assess the e-commerce innovation and thereby be in a better position to adopt e-commerce technologies. Therefore, we postulate:

H3 The greater the use of negative information by a decision maker, the greater the likelihood of adopting e-commerce.

3.4 Impact of technology factors on e-commerce adoption

3.4.1 IT maturity

The IT infrastructure available within firms plays a very important role in the adoption decision. This has been substantiated in many studies as shown in appendix. In particular, studies focused on the technological complexity within firms. We term this as IT Maturity which refers to the degree of the sophistication and experience in IT of the firm. Studies have indicated that IT maturity of a firm is an important factor on the adoption of IT investment evaluation and benefits realization methodologies (Chad et al. 2007) and an organization's innovative capability (Iacovou et al. 1995). Firms with greater IT or IS maturity have a superior corporate view of Internet as an integral part of overall information management. As the level of IT maturity becomes higher, firms will be increasingly able to integrate corporate data into various information systems and have access to technological resources such as hardware, software, and skilled IT professionals. Hence, firms with higher IT maturity will be able to realize the benefits of technology. It is therefore anticipated that such firms will

expedite B2B e-commerce adoption. Thus, we advance the following hypothesis.

H4 The higher the level of IT maturity of a firm, greater the likelihood of adopting B2B e-commerce.

3.5 Impact of organizational learning characteristics on e-commerce adoption

Prior research in IS has recognized the benefits of organizational learning characteristics on IS/IT adoption. Templeton et al. (2002) have argued that business and IT knowledge would stimulate organizational learning. In the context of B2B e-commerce adoption, we posit that benefits from organizational learning manifest as themselves as perceived operational and strategic benefits. Relatedly, we also examine the role of barriers to e-commerce adoption and discuss it next:

3.5.1 Perceived operational benefits

Significant empirical research exists that shows strong relationship between operational benefits that accrue due to technology and its adoption. Specifically, studies have shown that adoption of information technology leads to better inventory control, improved market reach, shorter time to market for new products and services, more efficient processes, improve seller capabilities in market reach, strengthen buyer-seller relationship by having continuous feedback, reduced errors and costs (Jarvenpaa and Ives 1996; Kayas et al. 2008). For these reasons, we expect such perceived operational benefits would facilitate the adoption of B2B e-commerce as seen in previous studies (Mukhopadhyay and Kekre 2002) and postulate:

H5 The higher degree of perceived operational benefits, the greater the likelihood of the adoption of B2B e-commerce.

3.5.2 Perceived barriers

This construct refers to the perception of respondents regarding the barriers in adopting B2B e-commerce. Prior studies have suggested several barriers for firms in adopting e-commerce (Hong and Zhu 2006; Fichman 2004). Barriers included several factors such as: security and ethical concerns of firms and customers, privacy, costs of IT infrastructure, technological obsolescence, ISP reliability, platform interoperability, data security, and piracy. In addition to privacy and security, studies (Shih et al. 2005) also indicate that legal protections and business laws are very important barriers to e-commerce adoption. Furthermore, the adoption of e-commerce requires higher level of organizational knowledge and human expertise. The notion of learning by

doing implies that it takes time and expertise to integrate complex technologies into an organization (Hong and Zhu 2006). During this time consuming process, managers may not be willing to continue adoption of e-commerce as they perceive/ experience the barriers of adoption. The scope and depth of the above risk factors are likely to impede the B2B e-commerce adoption process of firms. Therefore, we posit the following:

H6 The higher the degree of perceived barriers, the lesser the likelihood of adoption of B2B e-commerce.

4 Research methodology

4.1 Measures

To ensure adequate reliability and validity of the measurement scales, instruments used to operationalize the constructs in this study were employed from previous e-commerce studies. However, since research on the decision to adopt B2B EC was rather scant, some of the measurement concepts were borrowed from other IT/IS studies and adapted to this study (See Table 3).

4.2 Data collection and data validation

The data for this study was collected by a self-administered questionnaire. A preliminary questionnaire was developed and pilot tested with five IT/IS executives in order to evaluate the presentation, ease of understanding, and the logical sequence of the questions. The pilot-test was conducted by means of personal interviews so as to ensure the respondents were able to understand the questions clearly and to observe their immediate feedback. Some of the modifications done to the questionnaire as a result of pilot test include insertion of a brief definition on B2B EC at the beginning of the questionnaire and a brief description of the purpose for each section. In addition, more precise definitions on some terms were made. The results of the pilot-test were not included in the analysis of this study.

4.3 Research subjects

Since our study was about the adoption of B2B e-commerce by firms, the respondents chosen for this study were senior executives who were responsible for managing the IT/IS functions of an organization. An important criterion for the selection of respondents was their background knowledge about the research problem being addressed (Chau and Tam 1997). Since these IT/IS executives held senior positions in the firms, they were likely to be most knowledgeable with regard to the

technical, managerial, and organizational factors affecting B2B EC adoption. For this reason, we did not choose other general managers who would not have been as knowledgeable about the IT/IS aspects as the informants we used. A mailing list of 400 companies was compiled from the companies listed in the Hong Kong Stock Exchange. A covering letter stating the purpose of this study was sent, together with the questionnaire and a self-addressed envelope, to the IT/IS managers of the companies. Follow-up telephone calls were also made to those companies that did not respond to the first letter after three weeks. A reminder with the questionnaire was then sent to them, in order to encourage a higher response rate.

Ninety-seven questionnaires were completed and returned. However, one of the respondents indicated that his response could be considered as the views of the other three listed companies of the same list. After hearing from the respondent, all three questionnaires were discarded and not considered further in our study thereby resulting in 94 usable questionnaires. Besides, 28 letters with questionnaires were returned because of removal of address. Therefore, the effective sample size of the mailing list was 369 (400 less 31) and the response rate of the study was 25.5 % (94 usable questionnaires out of 369).

The respondents included 76 (81 %) IT/IS executives and 18 (19 %) non-IT/IS executives. Our follow up calls with the latter respondents revealed that they were either the senior executives with titles such as general manager or financial controller who were either the head of the IT/IS departments or administration executives such as accountant and administration manager who also assumed the role of IT/IS manager in smaller firms having no formal IT/IS department. The profile of the companies that the respondents were engaged represented a wide range of industries including manufacturing (31 %), banking and finance (11 %), information technology and communication (10 %), property and construction (16 %), service (3 %), and retail/wholesaling (19 %), and others (11 %). Hence, though the sample was not randomly selected, they were considered as representing major IT/IS executives in various industries.

In order to test whether the sample of respondents was representative of the population, 30 responding companies and 30 non-responding companies were randomly selected from the original mailing list of 369 companies. These two groups were then statistically compared in terms of annual sales turnover and number of employees. This information was compiled from completed questionnaires for respondents. The data for non-respondents were collected from the company's annual report. Phone calls were also made to the IT/IS departments or public relation departments to collect the employee size data. The ANOVA results, as shown in Table 4, indicate that there are no statistical significant differences between respondents and non-respondents with respect to the two variables. This

Table 3 Operationalization of Constructs	Constructs	Operationalization
	Price competition	We adapted the two item measure from Gatignon and Robertson (1989) and operationalized price competition as a 5-point Likert-type scale. The respondents were asked two questions: "How frequently does price cutting take place in the industry" and "How large is the price cutting during the last year".
	Informal Linkages	Measurement of informal linkages in this study was operationalized based on previous research of telework adoption (Ruppel and Howard 1998). The variable was operationalized by a two-item measure: the respondents were asked whether the company has strong advocates by informal group in Internet including WWW and whether there exists non-IT staff that is very eager to push e-commerce within the organization. This was a 5-point Likert-type measure (1 = strongly agree; 5 = strongly disagree).
	Preference for negative Information	Similar to Gatignon and Robertson (1989), we adopted a 3-item measure for the preference for negative information: respondents were asked about their preference to seek negative information out of vague information, preference to seek positive information out of vague information, and preference to seek positive information even when they receive negative information regarding B2B e-commerce. These were measured by a 5-point Likert-type scale (1 = strongly agree, 5 = strongly disagree).
	IT Maturity	IT maturity was operationalized based on the items developed by Grover and Goslar (1993). We used a 6-item measure that asked the respondents about the extent to which: different functions are supported by company, various hardware/ software installed in the company, IS managers have business knowledge, IS planning is formalized, IS planning considers business plan, and top management is involved in IS planning. These were measured using a 5-point Likert-type scale (1 = very little extent, 5 = very great extent).
	Perceived Operational Benefits	The operational benefits perceived by a firm were measured using items from several e-commerce studies (Jarvenpaa and Ives 1996; Lederer et al. 1998; Gogan 1996; Hoffman et al. 1995). Respondents were asked to give their degree of agreement on a 5 point Likert scale (1 = strongly agree, 5 = strongly disagree) regarding 6 benefits that may be associated with the adoption of B2B e-commerce: easier access to information, increased flexibility of information requests, quick response time, help establish useful linkages with other organizations, save money by communication cost reduction, and shortening transaction time.
	Perceived Barriers	The perceived barriers were measured with 6 items that were identified from previous e-commerce studies (Hoffman, et al. 1995; Gogan 1996). For example, Hoffman et al. (1995) identified barriers such as ease of use of Web Technology and security concerns of transactions on the "Net". Respondents were asked to give their degree of agreement on a 5 point scale (1 = strongly agree to 5 = strongly disagree) regarding the following barriers in adopting e-commerce: data security problems, ethical, legal, and customer-relations issues, slow data transmission on the Web, ISPs unable to provide solutions quickly for breakdown of systems, effort needed to handle voluminous data on the Web, and additional need for cross-functional co-ordination in the company.
	B2B E-Commerce Adoption Decision	We adapt from past studies (Gatignon and Robertson 1989; Chau and Tam 1997) and designate the dependent variable, decision to adopt B2B e-commerce, as a binary variable with the following choices: whether a firm has decided to adopt B2B e-commerce or not. Decision to adopt would include a range of firm level decisions such as commitment of financial budget, top management endorsement and actual adoption.

Table 4 Response Bias Analysis: Simple Demographic Data

	Respondents (Mean)	Non–respondents (Mean)	Analysis of variance	
			F	P
Annual sales turnover ($000)	4,476,754	2,459,597	1.683	0.200
No. of Employee	2319	1025	3.373	0.071

[n] respondents = 30, [n] non-respondents = 30

suggests that the responding companies are representative of the listed company's population.

4.4 Testing the factors

The variables and factors developed in the research model as prescribed earlier were assessed for reliability, convergent validity and discriminant validity respectively. The reliability test assesses the internal consistency of the variables and is calculated by the Cronbach's alpha coefficient. The result of the test is shown in Table 5.

The alpha values of the factors range from 0.7406 to 0.9435. Since these values were above the threshold of 0.6 necessary for basic research study, the factors were considered as satisfactorily passing the reliability test (Nunnally 1967).

Convergent validity meant that items measuring the same factor would highly correlate with one another. The one-tailed *t*-test was computed on the variables to assess this validity. Since all of the correlations were statistically different from zero at 5 % level of significance, convergent validity was achieved.

Discriminant validity meant that an item of a factor correlated more highly with items aimed to measure the same factor rather than with items used to measure a different factor. This validity is tested by counting the number of times an item has a higher correlation with an item from another factor than with items in its set of factors. Campbell and Fiske (1959) proposed that a count of less than half was considered as valid. The correlation matrix demonstrated that 187 (25 %) of the 741

comparisons of within-factor correlation's associate higher on an item outside the factor. Therefore, discriminant validity was also established.

To ensure that factors proposed in the research model are measuring the same constructs, a principal components factor analysis was conducted for each factor. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy, which ranges from 0 to 1, is an index for comparing the magnitudes between the observed and partial correlation coefficients. These values ranged from 0.5 to 0.846, indicating that they were marginal acceptable to very high correlations between the pairs of variables, which was a pre-requisite to performing a good factor analysis. It is also apparent that there was only one factor for each set of variables with eigenvalues greater than 1. In that sense, the factors developed in the model were convergent on its own constructs.

5 Results

Logistic regression technique, a popular method in social science research (Morgan and Teachman 1988). was used to validate the research hypotheses in this research. Although Structural Equation Modeling (SEM) may be a preferred method for studying cause and effect relationships, it was more appropriate to use logistic regression in this study because it allows dependent variables to be dichotomous and requires far fewer assumptions than discriminant analysis (Menard 1995). Since the dependent variable i.e., adoption of B2B e-commerce was dichotomous in nature, this multivariate statistical method was also selected over multiple regression analysis. Dichotomous variable in multiple regression would violate the assumptions necessary for hypotheses testing. More importantly, we also note that logistic regression has been used by previous researchers in adoption studies. For example: Chau and Tam (1997) used logistic regression in their technological innovation study in which organizational adoption of open systems and its factors were related. To and Ngai (2006) used logistic regression to predict organizational adoption of B2C e-commerce. Kuan and Chau (2001) had also used logistic regression to determine factors affecting Electronic Data Interchange (EDI) adoption in small businesses. The various factor scores, obtained from the previous

Table 5 Reliability Tests of Factors/Variables

Factors / Variables	Cronbach's Alpha
1. Price Intensity (2 items)	0.9435
2. Informal Linkage (2 items)	0.8601
3. Decision Maker Characteristics (3 items)	0.7406
4. IT Maturity of the Firms (6 items)	0.8690
5. Perceived Operational Benefits (6 items)	0.8964
6. Perceived Barriers (6 items)	0.8639
7. Adoption of B2B e-commerce	N.A.

Table 6 Logistic Regression Analysis Results

Factor	Coefficient b_k	Wald statistic	Significance
External Environment			
1. Price Competition	−3.545	4.945	0.0262 [a]
Organizational Context			
2. Informal Linkage	1.947	4.363	0.0367 [a]
Decision Maker Characteristics			
3. Preference for Negative Information	3.790	4.668	0.0307 [a]
Technology Context			
4. IT Maturity	0.923	0.656	0.4181
Organizational Learning			
5. Perceived Operation Benefits	0.420	0.102	0.7490
6. Perceived Barriers	−3.420	4.233	0.0396 [a]

-2 log likelihood (with constant only D_0) = 123.37

−2 log likelihood (with constant & independent variable D_M) = 28.193

Goodness of Fit = 32.094

Model Chi-square (G_M) = 95.176 (d.f. = 14) significance 0.0000

[a] significant at level of 5 %

factor analysis, were used in the prediction analysis. The logistic regression analysis results are tabulated in Table 6.

5.1 Goodness of fit of the model

The log-likelihood is the criterion for selecting parameters in the logistic regression model. The Initial Log likelihood function "-2 log likelihood, D_o" in the SPSS output includes the constant only while the "-2 log likelihood, D_M" includes the constant and the independent variables. The difference between D_0 and D_M is called the "Model chi-square, G_M" in the logistic regression, which is analogous to the multivariate F test for linear regression. G_M provides a test of the null hypothesis that the coefficients of the independent variables are zero (i.e., $\beta_1 = \beta_2 = ... \beta_k = 0$). Therefore, if G_M is statistically significant ($p <= 0.05$), then the null hypothesis can be rejected indicating that the independent variables can be used to predict dependent variables (Menard 1995; SPSS 1996). In logistic regression, $R_L^2 = G_M / D_0$, which is analogues to the linear regression R^2. Based on our results, G_M is statistically significant ($p = .0000$) and $R_L^2 = 0.771$. This indicates that the research model has high goodness of fit and that the independent variables selected for the research model can explain over 77 % of the variance in the dependent variable, i.e., B2B e-commerce adoption decision. Since there were many independent variables in our model, we also tested for multicollinearity between the independent variables using tolerance and variance inflation factor (VIF). Tolerance (0.23) was greater than 0.1 and VIF value of 4.3 was less than 5, thereby indicating that the possibility of multicollinearity between the variables was low.

5.2 Classification table

The classification table has been suggested as one of the summary statistics for the evaluation of goodness of fit (Hosmer and Lemeshow 1989). As shown in Table 7, the overall rate of correct classification is estimated at a high 93 %, with 93 % each for the "Adopt" group and the "Non-adopt" group being correctly classified. Nevertheless, there was still a possibility of misclassification since it is sensitive to the relative sizes of the two components groups. Thus the classification table is only most appropriate when classification is a stated goal of the analysis; otherwise it should only be used as supplement to assessment of goodness of fit of the model.

Table 7 Classification Table

Actual adoption of B2B e-commerce	Predicted adoption of B2B e-commerce		Correct classification (%)
	Adopt	Non-adopt	
Adopt	42	3	93.33
Non-adopt	3	41	93.18
Overall			93.26

5.3 Logistic regression coefficients

Wald statistic was used for the statistical significant test of individual coefficients. The Wald statistic (W_k^2) is calculated as $W_k = b_k$ /(standard error of b_k) which follows a standard normal distribution (Hosmer and Lemeshow 1989). and its formula parallels the formula for the ratio for coefficients in linear regression. The Wald statistic was used to assess the statistical significance of the coefficients of the model.

As results indicate, support was found for Hypothesis (H1). There is a strong negative association (significant at 5 % level) between the price intensity in the industry and adoption of B2B e-commerce by the firm. Support was also found for hypothesis H2, which states that the more active the informal groups within an organization, the more likely a firm would adopt B2B e-commerce. The relationship is positive and significant at 5 % level. In addition, hypothesis H3 was supported. Our results indicate that there is a strong positive relationship ($p < 0.05$) between decision maker's preference towards negative information and the adoption decision by the firm. However, no support was found to support hypotheses H4 and H5. IT maturity (H4) and perceived operational benefits (H5) did not impact a firm's adoption of e-commerce. Finally, support was found for the Hypothesis H6 in that there is strong negative relationship (at 5 % significance level), between perceived barriers of e-commerce and adoption decision.

In summary, the decision maker's characteristics, firm's external environment, organization context, and organizational learning characteristics have influence on B2B e-commerce adoption. However, technology context does not influence the e-commerce adoption.

6 Discussion

Though there is abundant research on the adoption of IT and IS, studies on the role of business factors in B2B EC adoption is scarce. In this research, we address this shortcoming and develop a model for B2B EC adoption based on several models developed in IS adoption and diffusion. It is worth noting that more than 50 % (45 out of 99) of the respondents indicated that their companies have either adopted or have made a decision to adopt B2B e-commerce as a tool for conducting business.

6.1 External environment

External environment includes the competitive forces among the firms in the industry and the characteristics of suppliers of innovation. This construct consisted of a single variable named price competition in our model.

Our results support the hypothesis (H1) that price competition is related to adoption of B2B e-commerce. Gatignon and

Robertson (1989) argued that the price competition would negatively affect the likelihood of technology adoption, as low price competition would free the resources required for adoption. On the contrary, our results show a positive relationship between price competition and B2B e-commerce adoption (Please note that the scale is reverse ordered in measuring price competition). This can be explained as follows: since B2B e-commerce adoption does not consume high financial resources, low price competition does not necessarily result in decision to adopt B2B e-commerce. Our results are consistent with those of Teo et al. (2003) and Warrts et al. (2002) – in case of high price cutting situations, organizations are positively inclined to adopt innovations, especially when they observe other successful adopters of IT. Since it is a generally perceived that doing business on the Internet will lower operational costs and increase operational efficiency (Lederer et al. 1997; Lee et al. 2009). organizations tend to adopt B2B e-commerce in high price competition situations.

6.2 Organizational context

The results of our study support the hypothesis (H2) that a positive relationship exists between the presence of informal group linkages and the B2B e-commerce adoption. Our results are in agreement with those of previous studies. For example, the importance of champions is shown in diffusion of innovation (Prescott and Conger 1995b; Teo and Ranganathan 2004; Johnson 2010). telework adoption (Ruppel and Howard 1998). and innovation adoption in small and medium enterprises (Archer et al. 2008). Internet, having originated for academic purposes has open culture and thus attracted many interest groups. Therefore, an informal team who may not be responsible for the IT/IS development for the firm usually serves as catalyst and leads the Web development. Persons responsible for IS/IT function in the firms are not taking responsibility to promote e-commerce and to integrate with other business information. The results also imply that the e-commerce adoption and the related information processing may be done independently of the business information systems. Additionally, e-commerce may be still in the beginning stages of the organizational adoption cycle: initiation-adoption-implementation (Rogers 1983). Probably, this accounts for a lot of skepticism on the part of organization. However, in the future, IS/IT departments should take initiative in transforming the existing (legacy) information systems and to tie with information processing through internet.

6.3 Decision maker's characteristics

Our results found support to hypothesis H3 that decision maker's preference for negative information is related to B2B e-commerce adoption decision. This is consistent with previous research that shows that negative information is more

effective than positive information in decision making (Mahajan et al. 1984). In the case of e-commerce adoption, the pros and cons of doing business on the Internet are well known. Thus if the decision-maker is knowledgeable about the security and reliability problems on the Internet, he/she is likely to make a more informed decision of B2B e-commerce adoption. There has also been counter-evidence in that negative feedback regarding software is negatively associated its future use (Mendoza et al. 2010). Very few studies consider decision-maker information processing characteristics in electronic commerce studies. More research is needed in exploring this variable further. Thus, it is important that the decision maker be provided with both costs and benefits of technological innovation so that they are more confident in making their decision.

6.4 Technology factors

IT maturity is concerned with the level of sophistication regarding IS development, planning and management. Several studies found no significant relationship between IT maturity and the adoption of technological innovations in other domains (Chau and Tam 1997). Similarly, this study did not find a significant relationship between IT maturity and B2B e-commerce adoption (H4). A possible reason may be that doing business on the Internet is much broader in scope and encompasses management functions that are not limited to just IS activities. For example, business partners' IT adoption and government regulations will also impact the B2B e-commerce adoption (Zhang and Dhaliwal 2009; Teo et al. 2003).

6.5 Organizational learning characteristics

Several operational benefits from adoption of B2B e-commerce are expected. These include easier access to information, providing new products or services to customers, and increasing flexibility of information requests. The cost of selecting the 'best' seller, which includes cost of searching, cost of communicating with suppliers, and cost of evaluating suppliers decrease using internet. Our study found no significant relationship between perceived operational benefits of adopting B2B e-commerce and adoption decision (H5). This is inconsistent with the results of Iacovou et al. (1995) who found that perceived benefits has moderate influence on EDI adoption in small organizations and with those of Zhu et al. (2010) who showed the evidence of ERP adoption success (with operational benefits) when proper management controls are applied. A possible explanation is that managers may be more receptive to strategic benefits than operational benefits from B2B e-commerce. This perhaps can be explained by the relative difficulty of quantifying the operational benefits of B2B e-commerce.

Our results (Hypothesis H6) support the hypothesis that perceived barriers to adoption of B2B e-commerce are negatively related with the adoption decision. This result is consistent with those of previous findings (Chau and Tam 1997) on the adoption of IT/IS innovations, which reported that higher levels of perceived barriers to adoption of IT/IS innovations negatively affect the likelihood of their adoption. While the barriers for e-commerce adoption have been publicized and include issues such as security and privacy (Ahmed et al. 2007). trust on the Internet and reliability of online vendors have also been highlighted as important barriers to online transactions (Thaw et al. 2009). In B2B e-commerce, the security issues manifest in a number of ways such as, hacking and eavesdropping, password-sniffing (gain access to systems where proprietary information is stored), and data modification (changing the payee or the amount on the electronic check). However, the case study of e-commerce at Bank of America illustrates the fact that internet security is more than a technical matter; it is also an administrative matter at the strategic level (Segev et al. 1998). These findings have important implications and suggest that in order to facilitate adoption of B2B e-commerce, one must strive to reduce potential barriers perceived by decision makers.

6.6 Limitations

While our study offers significant insights concerning the adoption of e-commerce by enterprises, it has several limitations that fall under three categories- i) generalizability, ii) validity and iii) post-adoption issues. The research sample was selected from the listed companies in the HK stock exchange, which predominantly consists of medium to large establishments. Smaller firms exhibit different technology adoption behavior compared to larger organizations (Rogers 1983). In addition, the sample size is relatively small. Finally, we used the decision maker as a proxy for the firm and used his/her decision to adopt as that of the firms which might not be totally accurate. However, given the paucity of empirical research on B2B e-commerce adoption, this is a reasonable sample for an exploratory study. Thus, the results may not necessarily be extended to smaller companies, especially those in other cultures and countries.

With regard to the operationalization of variables, we obtained a high goodness of fit (the proportion of variance that is explained by the model is 77 %). However, B2B e-commerce is increasing in complexity and thus may warrant inclusion of additional variables that could potentially increase the fit even further. For example, culture variables from Hofstede's seminal study (1994) could enhance the validity of this study. Also, while the correlations for a few items were low, their factor loadings were acceptable. On further review, the content of the questions also reflected face validity and therefore we decided to keep including the items in the model. However, there is a

need to understand the confounding effects behind the low correlations.

Our research has shown that there is no significant relationship between B2B adoption and IT maturity, implying that doing business successfully using internet involves several other factors. While our research has explored some of these factors (price intensity, informal champions, and decision maker and organizational learning), yet there are other factors that are related to resource-based and institutional theories. For example, external institutional factors such as strong business partnerships in supply chains and inter-dependence among supply-chain partners have been shown increase e-commerce adoption (Zhang and Dhaliwal 2009). Thus validity of our study can be enhanced by incorporating other factors such as business partners' IT adoption (Teo et al. 2003) and perceived strategic benefits. Finally, the study does not control for factors such as the type of business involved in B2B ecommerce and this is an issue for future research to look into to see if there are any differential impacts.

This study does not address the post-adoption phase, and therefore acceptance of technology after adoption is not considered in the study. For example, issues stemming from the technology acceptance model (TAM) are outside the scope of this study. In addition, this study on adoption is mainly at an organizational level and does not include variables at the user level such as user's satisfaction, evaluation and behaviors as proposed by Davis (1989) and Pavlou and Fygenson (2006).

7 Research and practice implications

The study has the following research implications. First, our study presents a comprehensive model for B2B e-commerce adoption. The model possesses a high goodness of fit index, having much of the variance ($R^2 > 0.77$) being explained by the model variables. By reaffirming existent literature and empirically testing significant variables in technology adoption, this study contributes to a foundation for understanding the adoption of e-commerce.

Second, our findings suggest that organizations under severe price competition are most likely to adopt B2B e-commerce. This implies that organizations consider B2B e-commerce when they are under pressure to cut prices in response to competition. Thus organizations might use B2B e-commerce to attain competitive advantage in order to achieve cost leadership (Porter 1980). For example: Exostar is a multi-firm B2B marketplace serving a consortium consisting of Lockheed Martin, BAE Systems, Raytheon, Boeing, Rolls Royce and their suppliers, resulting in reduced transaction costs for participating firms. An implication might be that organizations that adopt B2B e-commerce are able to cut prices easily because of reduced buyer search costs and derive an economical price for their products (Bakos 1991).

Another implication is that when firms face price pressures from their competitors, firms will adopt B2B e-commerce in order to counter the competition (Teo et al. 2003).

Third, our research found that informal communication processes would influence the adoption of B2B e-commerce. These informal communication mechanisms include champions, virtual teams, social networks that quickly disseminate information about new technologies and promote their adoption in the organization. This finding is consistent with those from other studies (Loonam and McDonaghi 2005) that found that champions act as agents of change management, which is also essential for IS/IT adoption. Organizations should encourage such informal communication processes even though such processes are not directly related to IS/IT. As such, involvement of IS department in the informal communication processes is desirable to promote adoption of e-commerce. IS departments should take more active role in understanding, promoting and integrating e-commerce within the traditional information processing systems in the organization. Else, the approaches taken within the organizations will be fragmented and unconnected. This will result in systems or subsystems that need to be integrated later, which will be difficult and time consuming.

Fourth, we find that perceived barriers of e-commerce will negatively influence the adoption decision. Some of these barriers are security concerns on the internet, ethical and legal issues, resistance to change, and reliability/capability of networks. In order to alleviate the concerns of organizations, perceived or real, ISP and IT firms should inform them of the technological solutions available. IT consultants should educate the firms' executives that Internet security is not purely a technical issue but a management issue as well. Also, adopting the internet technology requires corresponding changes in corporate policies, practices and IS. Additionally, governmental bodies should establish required laws by incorporating the legal and ethical issues of the Internet transactions. These internet-related regulations should be known to the organization for conducting proper business transactions on the Internet. In recent studies, trust on the Internet, reliability of the web, and trustworthiness of online vendors have also been highlighted as important barriers to online transactions (Thaw et al. 2009). In order to overcome these barriers, IT consultants and ISPs should provide training and education to firms on security and reliability assurances and benefits of using e-commerce. A possible marketing strategy that may be used by IT consultants / ISPs is risk absorption strategy, such as assuring that a part of the possible liability will be absorbed by the innovation provider or offering discounts (Easingwood and Beard 1989).

Fifth, our research shows that B2B e-commerce adoption is likely in organizations where the decision-maker has preference towards negative information. This implies that decision maker's information processing characteristics make a

difference in the firms' adopting or non-adopting of e-commerce. However, there is little research in electronic commerce concerning the decision maker's characteristics. A prior study examined decision-maker variables such as job tenure and positional power of the decision maker and found that these characteristics impact IS/IT adoption (Sharma and Rai 2003). Since perceived barriers have negative effect on e-commerce adoption, it may imply that decision-makers should be educated and trained in the knowledge of e-commerce and its capabilities and protection. The adoption can be accelerated by IT consultants who provide necessary training to the organizations and break these knowledge barriers.

Present research can be extended in the following directions. First, it is important to know the effect of adopting B2B e-commerce in organizations. The research may be extended in this direction by conducting longitudinal studies. Longitudinal studies provide in depth analysis of pre and post adoption of e-commerce, in addition to assessing the impact of adoption. These studies, in effect, will provide more temporal analysis than the present study provides.

Second, there are several other factors that could affect the adoption behavior of organizations and interfere with our factors, such as firm size (Bigne-Alcaniz et al. 2009), type of e-commerce channel used for transactions (Chang et al. 2009). and inter-dependence among supply-chain partners (Zhang and Dhaliwal 2009). For example, the influence of decision maker's preferences for information is even more important for B2B e-commerce adoption in smaller firms compared to larger organizations. Thus, more comprehensive models should be built in future considering the moderating effects of other factors.

Third, most previous models consider B2B e-commerce independently of organizational information systems (such as enterprise resource planning systems) or supply chain management systems or customer relationship management systems. Such an isolated view of e-commerce makes the final analyses inadequate. Future B2B e-commerce models should be made more comprehensive by incorporating several of the above inter-related systems and the associated factors, so that B2B e-commerce models can be made more effective and useful.

8 Conclusion

Despite the obvious importance of B2B e-commerce, little research has been conducted on the role of business factors in its adoption in organizations. Even in the previous studies on the subject of B2B EC adoption, most studies have used the TOE (Technology-Organization-Environment) framework (Tornatzky and Fleischer 1990) and/or the DOI framework (Diffusion of Innovation) (Rogers 1983). While these are overlapping frameworks used for B2B EC adoption, they capture mostly technological and organizational variables. For example, they do not include industry characteristics or decision maker characteristics. These factors are very important as they influence adoption decision considerably. Excluding these factors could result in wrong adoption decisions, which may have negative consequences to the organization. Our model captures these missing constructs along with the constructs used by the TOE and DOI frameworks. Thus our model provides a novel contribution to the B2B EC adoption literature as it represents major efforts towards developing an adoption model for this IT innovation.

In this research, we developed a holistic model to describe the factors that influence the adoption of B2B e-commerce. We considered variables in five contexts: external environment, organizational context, decision maker's characteristics, technology factors, and (organizational) learning context. We find that price competition in the industry, the informational preferences of decision makers, perceived barriers, and informal linkages have strong influence on the adoption decision of B2B e-commerce. Furthermore, we find that IT maturity and perceived operational benefits have no effect on B2B e-commerce adoption. The fact that IT maturity and perceived operational benefits are not important factors is counter intuitive. In conclusion, this study identifies business factors facilitating the adoption of B2B e-commerce technology and prescribes normative guidelines for successful B2B e-commerce implementation.

As noted from the above, we obtained a comprehensive model of B2B e-commerce adoption using business factors. The factors were comprehensive as the model included both internal factors (such as, decision maker attitude towards information and informal groups within the organization) and external factors (such as, price competition in industry and perceived barriers). Furthermore, our model has a predictive capability of over 93 % based on the factors discussed in our research.

References

Abdul-Gader, A. H., & Kozar, K. A. (1995). The impact of computer alienation on information technology investment decisions: an exploratory cross-national analysis. *MIS Quarterly, 19*(4), 535–559.

Ahmad, I. & Agrawal, A.M. (2014). Major impediments in the Growth of B2B E-Commerce market in Kuwait: an empirical study from industrial perspective. *European Journal of Business and Management, (6).*

Ahmed, M., Hussein, R., Minakhatun, R., & Islam, R. (2007). Building consumers' confidence in adopting e-commerce: a Malaysian case. *International Journal of Business and Systems Research, 1*(2), 236–255.

Alam, S. S., Khatibi, A., Ahmad, M. I. S., & Ismail, H. B. (2007). Factors affecting e-commerce adoption in the electronic manufacturing

companies in Malaysia. *International Journal of Commerce and Management, 17*(1/2), 129–139.

Alsaad, A. K. H., Mohamad, R., & Ismail, N. A. (2014). The Moderating Role of Power Exercise in B2B E-commerce Adoption Decision. *Procedia – Social and Behavioral Sciences, 130*, 515–523.

Al-Somali, S.A., Gholami, R., & Clegg, B. (2011). Determinants of B2B e-commerce adoption in Saudi Arabian firms. *International Journal of Digital Society (IJDS), 2*(2).

Archer, N., Wang, S., & Kang, C. (2008). Barriers to the adoption of online supply chain solutions in small and medium enterprises. *Supply Chain Management: An International Journal, 13*(1), 73–82.

Asher, A. (2007). Developing a B2B E-Commerce implementation framework: a study of EDI implementation for procurement. *Information Systems Management, 24*(4), 373–390.

Attewell, P. (1992). Technology diffusion and organizational learning: the case of business computing. *Organization Science, 3*(1), 1–19.

Awad, N., & Ragowsky, A. (2008). Establishing trust in electronic commerce through online word of mouth: an examination across genders. *Journal of Management Information Systems, 24*(4), 101–121.

Bajwa, D. S., & Lewis, L. F. (2003). Does size matter? An investigation of collaborative information technology adoption by U.S. firms. *Journal of Information Technology Theory and Application, 5*(1), 29.

Bakos, J. P. (1991). A strategic analysis of electronic marketplaces. *MIS Quarterly, 15*(3), 295–310.

Bala, H., & Venkatesh, V. (2007). Assimilation of interorganizational business process standards. *Information Systems Research, 18*(3), 340–362.

Barua, A., Konana, P., & Whinston, A. B. (2004). An empirical investigation of net enabled business value. *MIS Quarterly, 28*(4), 585–620.

Baumeister, R. F., Bratslavsky, E., Finkenauer, C., & Vohs, K. D. (2001). Bad is stronger than good. *Review of General Psychology, 5*, 323–370.

Beath, C. M. (1991). Supporting the information technology champion. *MIS Quarterly, 15*(3), 355–374.

Bharati, P., & Chaudhury, A. (2006). Studying the current status of technology adoption. *Communications of the ACM, 49*(10), 88.

Bhattacherjee, A., Hikmet, N., Menachemi, N., Kayhan, V. O., & Brooks, R. G. (2007). The differential performance effects of healthcare information technology adoption. *Information Systems Management, 24*(1), 5–14.

Bigne-Alcaniz, E., Aldas-Manzano, J., Andreu-Simo, L., & Ruiz-Mafe, C. (2009). Business-to-Business e-commerce adoption and perceived benefits: evidence from small and medium Spanish enterprises. *International Journal of Electronic Business, 7*(6), 599–624.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminate validation by the multi-trait multi-method matrix. *Psychology Bulletin, 56*(1), 81–150.

Cao, Q., Duan, W., & Gan. Q. (2011). "Exploring determinants of voting for the "helpfulness" of online user reviews: A text mining approach" *Decision Support Systems, 50*, 511–521.

Chad, L., Yu-An, H., Man-Shin, C., & Wo-Chung, L. (2007). Effects of information technology maturity on the adoption of investment evaluation methodologies: a survey of large Australian organizations. *International Journal of Management, 24*(4), 697–711.

Chang, H. H., & Wong, K. H. (2010). Adoption of e-procurement and participation of e-marketplace on firm performance. *Information and Management, 47*, 262–270.

Chang, H.-L., Easley, R. F., & Shaw, M. J. (2009). Market model-based channel selection in B2B E-Commerce: exploring a buyer's adoption decisions. *Journal of Organizational Computing and Electronic Commerce, 19*(4), 237–264.

Chau, P. Y. K., & Tam, K. Y. (1997). Factors affecting the adoption of open systems: an exploratory. *MIS Quarterly, 21*(1), 1–21.

Chen, P., & Forman, C. (2006). Can Vendors Influence Switching Costs and Compatibility in an Environment with Open Standards? *MIS Quarterly, 30*, 541–562.

Cho, V. (2006). Factors in the adoption of third-party B2B portals in the textile industry. *The Journal of Computer Information Systems, 46*(3), 18–31.

Chong, S., & Pervan, G. (2007). "Factors Influencing the Extent of Deployment of Electronic Commerce for Small and Medium-sized Enterprises. *Journal of Electronic Commerce in Organizations 5*(1), 1–29.

Chwelos, P., Benbasat, I., & Dexter, A. (2001). "Empirical Test of an EDI Adoption Model," *Information Systems Research, 12*(1), 304–321.

Cooper, R. B., & Zmud, R. W. (1990). Information Technology Implementation Research: A Technological Diffusion Approach. *Management Science, 36*(2), 123–139.

Dai, O., & Kauffman, R. J. (2002). Business Models for Internet-Based B2B Electronic Markets. *International Journal of Electronic Commerce, 6*(4), 41–72.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*(3), 318–340.

Davis-Sramek, B., Droge, C., Mentzer, J. T., & Myers, M. B. (2009). Creating commitment and loyalty behavior among retailers: what are the roles of service quality and satisfaction? *Journal of the Academy of Marketing Science, 37*(4), 440–454.

Easingwood, C., & Beard, C. (1989). High Technology Launch Strategies in the U.K. *Industrial Marketing Management, 18*, 125–138.

Fichman, R. G. (2004). Real Options and IT Platform Adoption: Implications for Theory and Practice. *Information Systems Research, 15*(2), 132–154.

Fichman, R. G., & Kemerer, C. F. (1999). The Illusory Diffusion of Innovation: An Examination of Assimilation Gaps. *Information Systems Research, 10*(3), 255–275.

Fiske, S. T. (1980). "Attention and Weight in Person Perception: The Impact of Negative and Extreme Behavior," *Journal of Personality and Social Psychology, 38*(6), 889–906.

Frambach, R. T., Barkema, H. G., Nooteboom, B., & Wedel, M. (1998). Adoption of a Service Innovation in the Business Market: An Empirical Test of Supply-Side Variables. *Journal of Business Research, 41*(2), 161–174.

Gatignon, H., & Robertson, T. S. (1989). Technology Diffusion: An Empirical Test of Competitive Effects. *Journal of Marketing, 53*(1), 35–49.

Ghobakhloo, M., Hong, T. S., & Standing, C. (2014). Business-to-Business Electronic Commerce Success: A Supply Network Perspective. *Journal of Organizational Computing and Electronic Commerce, 24*, 312–341.

Gogan, J. L. (1996). The Web's Impact on Selling Techniques: Historical Perspective and Early Observations. *International Journal of Electronic Commerce, 1*(2), 89–108.

Grover, V., & Goslar, M. D. (1993). The Initiation, Adoption, and Implementation of Telecommunications Technologies in U.S. Organizations. *Journal of Management of Information Systems, 10*(1), 141–163.

Gunasekaran, A., McGaughy, R. E., Ngai, E. W. T., & Rai, B. K. (2009). E-Procurement adoption in the Southcoast SMEs. *International Journal of Production Economics, 122*, 161–175.

Hofstede, G. (1994). The Business of International Business Is Culture. *International Business Review, 3*(1), 1–14.

Hoffman, D. L., Novak, T. P., & Chatterjee, P. (1995). Commercial Scenarios for the Web: Opportunities and Challenges. *Journal of Computer-Mediated Communication, 1*(3), 0–0.

Hong, W., & Zhu, K. (2006). Migrating to internet-based e-commerce: Factors affecting e-commerce adoption and migration at the firm level. *Information and Management, 43*(1), 204–221.

Hosmer, D. W., & Lemeshow, J. S. (1989). *Applied Logistic Regression.* New York: Wiley.

Huang, Z., Janz, B. D., & Frolick, M. N. (2008). A Comprehensive Examination of Internet-EDI Adoption. *Information Systems Management, 25,* 273–286.

Iacovou, C. L., Benbasat, I., & Dexter, A. (1995). Electronic Data Interchange and Small Organizations Adoption and Impact of Technology. *MIS Quarterly, 19*(4), 465–485.

Janita, I., & Chong, W. K. (2013). Barriers of B2B e-Business Adoption in Indonesian SMEs: A Literature Analysis. *Procedia Computer Science, 17,* 571–578.

Jarvenpaa, S. L., & Ives, B. (1996). Introducing Transformational Information Technologies: The case of the WWW Technology. *International Journal of Electronic Commerce, 1*(2), 95–126.

Johnson, M. (2010). Barriers to innovation adoption: a study of e-markets. *Industrial Management & Data Systems, 110*(2), 157–174.

Kang, K. H., & Kang, J. (2009). How do Firms Source External Knowledge for Innovation? Analysing Effects of Different Knowledge Sourcing Methods. *International Journal of Innovation Management, 13*(1), 1–17.

Kautz, K., & Nielsen, P. A. (2004). Understanding the implementation of software process improvement innovations in software organizations. *Information Systems Journal, 14,* 3–22.

Kayas, O. G., McLean, R., Hines, T., & Wright, G. H. (2008). The pan-optic gaze: Analyzing the interaction between enterprise resource planning technology and organizational culture. *International Journal of Information Management, 28*(6), 446–452.

Kraemer, K. L., Melville, N. P., Zhu, K., & Dedrick, J. (2006). Global e-commerce: Impacts of National Environment and Policy. Cambridge, Cambridge University Press, 389–402.

Kuan, K. K. Y., & Chau, P. Y. K. (2001). A perception-based model for EDI adoption in small businesses using a technology-organization-environment framework. *Information and Management, 38,* 507–521.

Larsen, T. J. (1993). Middle Managers' Contribution to Implemented Information Technology Innovation. *Journal of Management Information Systems, 10*(2), 155–176.

Laudon, K. C., & Traver, C. G. (2012). *Ecommerce 2012- Business-Technology-Society.* Eighth Edition. Pearson Education Incorporation, Prentice Hall

Lederer, A. L., Mirchandani, D. A., & Sims, K. (1997). The Link Between information Strategy and Electronic Commerce. *Journal of Organizational Computing and Electronic Commerce, 7*(1), 17–34.

Lederer, A. L., Mirchandani, D. A., & Sims, K. (1998). Using WISs to Enhance Competitiveness. *Communications of the ACM, 41*(7), 94–95.

Lee, Y.-C., Chu, P.-Y., & Tseng, H.-L. (2009). Exploring the relationships between information technology adoption and business process reengineering. *Journal of management and organization, 15*(2), 170–185.

Legner, C., & Vogel, T. (2008). Service-based Interoperability-Leveraging Web Services for Implementing Industry Standards. *Electronic Markets, 18*(1), 39–52.

Leonard-Barton, D. (1985). Experts as Negative Opinion Leaders in the Diffusion of a Technological Innovation. *Journal of Consumer Research, 11*(4), 914–92.

Liao, C., Prashant, P., & Hong-Nan, L. (2006). The roles of habit and website quality in ecommerce. *International Journal of Information Management, 26*(6), 469–483.

Lin, H.-F., & Lin, S.-M. (2008). Determinants of e-business diffusion: A test of the technology diffusion perspective. *Technovation, 28,* 135–145.

Lin, C., Huang, Y. & Burn, J. (2007). Realising B2B e-Commerce Benefits: The Link with IT Maturity, Evaluation Practices, and B2B e-Commerce Adoption Readiness. *European Journal of Information Systems, 16*(6), 806–819.

Linying, D., Heshan, S., & Yulin, F. (2007). Do Perceived Leadership Behaviors affect User Technology Beliefs? An Examination of the Impact of Project Champions and Direct Managers. *Communications of AIS, 19,* 655–679.

Lip-Sam, T., & Hock-Eam, L. (2011). Estimating the Determinants of B2B E-commerce Adoption Among Small & Medium Enterprises. *International Journal of Business and Society, 12,* 15–30.

Loonam, J. A., & McDonaghi, J. (2005). Exploring Top Management Support for the Introduction of Enterprise Information Systems: A Literature Review. *Irish Journal of Management, 26*(1), 163–178.

Loukis, E., Spinellis, D., & Katsigiannis, A. (2011). *Information Systems Management, 28*(2), 130–146.

Mahajan, V., Muller, E., & Kerin, R. A. (1984). Introduction Strategy for New Products with Positive and Negative word-of-mouth. *Management Science, 30*(12), 1389–1404.

Malhotra, A., Gosain, S., & El Sawy, O. A. (2007). Leveraging Standard Electronic Business Interfaces to Enable Adaptive Supply Chain Partnerships. *Information Systems Research, 18*(3), 260–279.

Menard, S. (1995). *Applied Logistic Regression Analysis. Sage University Paper Series* (pp. 07–107). Thousand Oaks: Quantitative Applications in Social Sciences.

Mendoza, A., Stern, L., & Carroll, J. (2010). Support mechanisms for early, medium and longer-term use of technologies. *21st Australasian Conference on Information Systems Proceedings,* Paper 73.

Mirchandani, D. A., & Motwani, J. (2001). Understanding Small Business Electronic Commerce Adoption: An Empirical Analysis. *Journal of Computer Information Systems, 41*(3), 70–73.

Molla, A., & Licker, P. S. (2005). E-Commerce adoption in developing countries: a model and instrument. *Information and Management, 42*(6), 877–899.

Morgan, P. S., & Teachman, J. D. (1988). Logistic Regression: Description, Examples, and Comparison. *Journal of Marriage and the Family, 50,* 929–936.

Mukhopadhyay, T., & Kekre, S. (2002). Strategic and Operational Benefits of Electronic Integration in B2B Procurement Processes. *Management Science, 48*(10), 1301–1313.

Niwe, M. (2007). Standards-based B2B e-Commerce adoption. In J.M. Kizza, J. Muhirwe, J. Aisbett, K. Getao, V. Mbarika, D. Patel, & A.J. Rodrigues (Eds) *Special Topics in Computing and ICT Research: Strengthening the role of ICT in Development,* Fountain Publishers (pp. 335–346), 3.

Nunnally, J. C. (1967). *Psychometric Theory.* New York: McGraw-Hill.

Oliveria, T., & Dhillon, G. (2015). From Adoption to Routinization of B2B e-Commerce: Understanding Patterns Across Europe. *Journal of Global Information Management, 23*(1), 24–43.

Oliveria, T., & Martins, M. F. (2010). Understanding e-business adoption across industries in European countries. *Industrial Management & Data Systems, 110*(9), 1337–1354.

Pathak, J., & Baldwin, A. (2008). Audit Resource Planning Success in B2B E-Commerce: Development and Testing of a Measurement Scale. *Information Systems Management, 25*(3), 230–243.

Pavlou, P. A., & Fygenson, M. (2006). Understanding and Predicting Electronic Commerce Adoption: An Extension of the Theory of Planned Behavior. *MIS Quarterly, 30*(1), 115–143.

Piotrowicz, W. & Irani, Z. (2009). Analysing B2B electronic procurement benefits – information systems perspective. In *Proceedings of European and Mediterranean Conference on Information System* (EMCIS), pp. 559–579, July 13–14, 2009, Crowne Plaza Hotel, Izmir, Turkey.

Pires, G. D., & Stanton, J. (2005). A Research Framework for the Electronic Procurement Adoption Process: Drawing From Australian Evidence. *Journal of Global Business and Technology, 1*(2), 12–20.

Porter, M. E. (1979). How Competitive Forces Shape Strategy. *Harvard Business Review, 57,* 137–145.

Porter, M. E. (1980). *Competitive Strategy: Techniques for Analyzing Industries and Companies.* New York: The Free Press.

Prescott, M. B., & Conger, S. A. (1995a). Diffusion of Innovation Theory: Borrowing, Extensions and Modifications from IT Researchers. *The DATABASE for Advances in Information Systems, 26*(2&3), 16–19.

Prescott, M. B., & Conger, S. A. (1995b). Information Technology Innovations: A Classification by IT Locus of Impact and Research Approach. *The DATABASE for Advances in Information Systems, 26*(2&3), 20–41.

Quaddus, M., & Hofmeyer, G. (2007). An investigation into the factors influencing the adoption of B2B trading exchanges in small businesses. *European Journal of Information Systems, 16*, 202–216.

Rai, A., Brown, P., & Tang, X. (2009). Organizational Assimilation of Electronic Procurement Innovations. *Journal of Management Information Systems, 26*(1), 257–296.

Ranganathan, C., Dhaliwal, S. J., & Teo, T. S. H. (2004). Assimilation and diffusion of of web technologies in supply-chain management: an examination of key drivers and performance impacts. *International Journal of Electronic Commerce, 9*(1), 127–161.

Resnick, P., & Zeckhauser, R. (2002). "Trust Among Strangers in Internet Transactions: Empirical Analysis of eBay's Reputation System," *The Economics of the Internet and E-Commerce*. Michael R. Baye (ed). Volume 11 of Advances in Applied Microeconomics. Amsterdam, Elsevier Science, 127–157.

Richards, J., & Shen, D. (2006). E-commerce adoption among Chinese consumers: An exploratory study. *Journal of International Consumer Marketing, 18*(3), 33–55.

Robertson, T. S., & Gatignon, H. (1986). Competitive Effects on Technology Diffusion. *Journal of Marketing, 50*, 1–12.

Rogers, E. M. (1983). *Diffusion of Innovations*. New York: Free Press.

Ruppel, C. P., & Howard, G. S. (1998). Facilitating Innovation Adoption and Diffusion: The Case of Tele-work. *Information Resources Management Journal, 11*(3), 5–15.

Sallas, B., Lane, S., Mathews, R., Watkins, T., & Wiley-Patton, S. (2007). An Iterative Assessment Approach to Improve Technology Adoption and Implementation Decisions by Healthcare Managers. *Information Systems Management, 24*(1), 43–57.

Segev, A., Porra, J., & Roldan, M. (1998). Internet Security and the Case of Bank of America. *Communications of the ACM, 41*(10), 81–87.

Sharma, S., & Rai, A. (2003). An assessment of the relationship between ISD leadership characteristics and IS innovation adoption in organizations. *Information and Management, 40*(1), 391–401.

Shih, C., Dedrick, J., & Kraemer, K. L. (2005). Rule of Law and the International Diffusion of E-Commerce. *Communications of the ACM, 48*(11), 57–62.

Sila, I. (2013). Factors Affecting the Adoption of B2B E-commerce technologies. *Electronic Commerce Research, 13*, 199–236.

Sila, I., & Dobni, D. (2012). Patterns of B2B e-commerce usage in SMEs. *Industrial Management & Data Systems, 122*(8), 1255–1271.

Sinha, R. K., & Chandrashekaran, M. (1992). Split Hazard Model for Analyzing the Diffusion of Innovations. *Journal of Marketing Research, 29*(2), 116–127.

Son, J., & Benbasat, I. (2007). Organizational Buyers' Adoption and Use of B2B Electronic Marketplaces: Efficiency- and Legitimacy-oriented Perspectives. *Journal of Management Information Systems, 24*(1), 55–99.

SPSS Window Base 7.5, (1996). SPSS Inc., Chicago, IL.

Stewart, J. (2007). Local Experts in the Domestication of Information and Communication Technologies. *Information, Communication & Society, 10*(4), 547–569.

Sutton, S., Khazanchi, D., Hampton, C., & Arnold, V. (2008). Risk Analysis in Extended Enterprise Environments: Identification of Critical Risk Factors in B2B E-Commerce Relationships. *Journal of the Association of Information Systems, 9*(3/4), 151–174.

Swanson, E. B. (1994). Information Systems Innovation among Organizations. *Management Science, 40*(9), 1069–1092.

Tan, J., Tyler, K., & Manica, A. (2007). Business-to-business adoption of eCommerce in China. *Information and Management, 44*, 322–351.

Templeton, G. F., Lewis, B. R., & Snyder, C. A. (2002). Development of a Measure for the Organizational Learning Construct. *Journal of Management Information Systems, 19*(2), 175–218.

Teo, S. H. T., & Kee-hung, L. (2009). Usage and Performance Impact of Electronic Procurement. *Journal of Business Logistics, 30*(2), 125–139.

Teo, S. H. T., & Ranganathan, C. (2004). Adopters and non-adopters of business-to-business electronic commerce in Singapore. *Information and Management, 42*(1), 89–102.

Teo, H. H., Wei, K. K., & Benbasat, I. (2003). Predicting Intention to Adopt Interorganizational Linkages: An Institutional Perspective. *MIS Quarterly, 27*(1), 19–49.

Thatcher, S. M. B., Foster, W., & Zhu, L. (2006). B2B E-Commerce Adoption Decisions in Taiwan: The Interaction of Cultural and Other Institutional Factors. *Electronic Commerce Research and Applications, 5*, 92–104.

Thaw, Y. Y., Mahmood, A. K., & Dominic, P. D. D. (2009). A Study on the Factors That Influence the Consumers' Trust on E-commerce Adoption. *International Journal of Computer Science and Information Security, 4*(1&2), 153–159.

Thong, J. (1999). An Integrated Model of Information Systems Adoption in Small Businesses. *Journal of Management Information Systems, 15*(4), 187–214.

To, M. L., & Ngai, E. W. T. (2006). Predicting the organizational adoption of B2C e-commerce: an empirical study. *Industrial Management and Data Systems, 106*(8), 1133–1147.

Tornatzky, L. G., & Fleischer, M. (1990). *The Processes of Technological Innovation*. Lexington: Lexington Books.

Venkatesh, V., & Bala, H. (2012). Adoption and Impacts of Inter-organizational Business Process Standards: Role of Partnering Synergy. *Information Systems Research, 23*(4), 1131–1157.

Warrts, E., Van Everdingen, Y. M., & Hillegersberg, J. (2002). The Dynamics of Factors Affecting the Adoption of Innovations. *The Journal of Product Innovation Management, 19*, 412–23.

White, A., Daniel, E., Ward, J., & Wilson, H. (2007). The adoption of consortium B2B e-marketplaces: An exploratory study. *Journal of Strategic Information Systems, 16*(1), 71–103.

Wigand, R. T., Steinfield, C. W., & Markus, M. L. (2005). Information Technology Standards Choices and Industry Structure Outcomes: The Case of the U.S. Home Mortgage Industry. *Journal of Management Information Systems, 22*(2), 165–192.

Wright, P. (1974). The Harassed Decision Maker: Time Pressures, Distractions, and the Use of Evidence. *Journal of Applied Psychology, 59*, 555–561.

Yin, D., Bond, S., & Zhang, H. (2014). Anxious or Angry? Effects of Discrete Emotions on the Perceived Helpfulness of Online Reviews. *MIS Quarterly, 38*(2), 539–560.

Yu, C.-S. (2007). What drives enterprises to trading via B2B e-marketplaces? *Journal of Electronic Commerce Research, 8*(1), 84–100.

Zhang, C., & Dhaliwal, J. (2009). An investigation of resource-based and institutional theoretic factors in technology adoption for operations and supply chain management. *International Journal of Production Economics, 120*, 252–269.

Zhu, Y., Li, Y., Wang, W., & Chen, J. (2010). What leads to post-implementation success of ERP? An empirical study of the Chinese retail industry. *International Journal of Information Management, 30*, 265–276.

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