

Determinants of e-business diffusion: A test of the technology diffusion perspective

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Abstract

Based on the technology diffusion theory and the technology–organization–environment (TOE) framework, this study develops a research model to study the determinants of e-business diffusion. The research model examines the influence of technological context (IS infrastructure and IS expertise), organizational context (organizational compatibility and expected benefits of e-business) and environmental context (competitive pressure and trading partner readiness) on e-business diffusion. E-business diffusion is characterized by two dimensions: internal integration and external diffusion. Data gathered from 163 IS executives in large Taiwanese firms were employed to test the relationships between the research model constructs using a structural equation modeling (SEM) approach. Among the TOE factors, the results reveal that IS infrastructure, IS expertise, expected benefits of e-business, and competitive pressure are important factors shaping e-business diffusion. Implications for practice and research are discussed.

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1. Introduction

Electronic business (e-business), or the use of Internet-based technologies to conduct business, is recognized as an important area for information technology (IT) innovation and investment (Sauer, 2000). Firms are increasingly attempting to incorporate e-business into their existing information systems (IS) applications and business processes, and build Internet-based technologies for transacting business with trading partners (Kowtha and Choon, 2001; Moodley, 2003; Yang et al., 2005; Teo et al., 2006). Developing e-business capability is an important undertaking because it is not only rapidly changing the way that companies buy, sell, and deal with customers, but also becoming a more integral part of its business strategies (Abu-Musa, 2004). E-business diffusion becomes a significant research topic because it enables the firm to execute electronic transactions along value chain activities (includ-

ing sales, customer services, procurement, information sharing and coordination with trading partners) (Straub and Waston, 2001; Zhu and Kraemer, 2002).

E-business is different from previous traditional technological innovation, such as management IS and electronic data interchange (EDI), which were used to improve the efficiency of IS functions and supports batch exchange of structured procurement documents (Moore and Benbasat, 1991; Iacovou et al., 1995). In contrast, e-business represents a new way to integrate Internet-based technologies with core business potentially affecting the whole business (Zhu, 2004). Hence, successful e-business diffusion is considered as one of the most significant IT innovation in contemporary organizations. On the other hand, drawing upon the technology diffusion perspective and the context of Web technologies, most studies focused on Web technologies have differentiated internal integration and external diffusion, concentrating on the permeation of the diffusion process in extended firm value chain (Rogers, 1995; Gonsalves et al., 1999; Ranganathan et al., 2004; Zhu and Kraemer, 2005). Since this study is primarily concerned with e-business diffusion, it is an Internet-based

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IS used by a firm to integrate internal business activities, processes, and IS and conducting business transactions with trading partners. Hence, to conform to the practice in academic research, this study uses the terms “internal integration” and “external diffusion” to represent the e-business diffusion.

Early research on e-business emphasized how companies derived competitive advantage, and primarily focused on case studies of a small sample of organizations (Martinsons, 2002; Ihlstrom and Nilsson, 2003). Some IS studies have examined the influences on Internet-based IS acceptance, adoption and use primarily based on research on technology acceptance model (Carayannis and Turner, 2006; Cheng et al., 2006) and innovation adoption theory (Kendall et al., 2001; Oh et al., 2003; Russell and Hoag, 2004). These studies indicated that perceived innovation characteristics (perceived usefulness, ease of use, and compatibility) may influence decisions regarding Internet-based IS acceptance, adoption and use. There have been some empirical studies (Zhu et al., 2003; Xu et al., 2004; Zhu and Kraemer, 2005; Bayo-Moriones and Lera-Lopez, 2007) that have examined the factors influencing e-business adoption and value creation, primarily based on the technology–organization–environment (TOE) framework. They have primarily assessed technology adoption and performance, yet have not examined technology diffusion processes. To the best of our knowledge, very limited empirical research has been performed to evaluate the technological, organizational, and environmental contexts that influence the use of e-business within and outside the firm. This study fills this gap; the objectives of this study are as follows:

- (1) To identify a comprehensive set of determinants of e-business diffusion based on the TOE framework.
- (2) To examine the influence of technological, organizational, and environmental contexts on e-business diffusion in terms of both internal integration and external diffusion.
- (3) To provide valuable guidelines to policy-makers and practitioners in implementing e-business and accelerating e-business development.

2. Theoretical background

The two main areas of research that serve as theoretical foundations for this study are technology diffusion perspective and the contexts of e-business diffusion. Key research on these areas is briefly reviewed below.

2.1. Technology diffusion perspective

According to the innovation diffusion literature (Rogers, 1995), the diffusion of technological innovation generally refers to the spread of use of new methods, processes, or

production systems. IS researchers have proposed the e-business as an organization-wide “technological innovation” (Kendall et al., 2001; Jackson and Harris, 2003; Lin and Lee, 2005), which offers firms opportunities to establish interactive relationships with business partners (such as suppliers, logistics providers, wholesalers, distributors, service providers, and end customers), improve operating efficiency and extend their reach, all at a very low cost (Ash and Burn, 2003). E-business thus significantly impacts business process change, diffusion innovation, and even business transformation.

Prior technology diffusion research suggests that IT diffusion can define as an organizational effort to diffuse an appropriate IT within an organizational community (Kwon and Zmud, 1987). Furthermore, in interorganizational settings, several studies argued that IT diffusion have differentiated internal integration and external diffusion, which encompasses a range of internal organizational activities as well as interorganizational processes that stretch beyond firm boundaries (Cooper and Zmud, 1990; Fichman and Kemerer, 1997; Ramamurthy et al., 1999; Ranganathan et al., 2004). Since e-business refers to the use of Internet-based applications for computing and communications to manage intra- and interorganizational business processes, it was necessary to view e-business diffusion from both internal and external perspectives. Therefore, based on the above theoretical considerations and literature review, this study specifies internal integration and external diffusion as two dimensions of e-business diffusion. The discussion in this study operationally defines internal integration as the extent to which e-business is integrated with key internal organizational activities and IS applications. Meanwhile, external diffusion refers to the extent to which the firm integrates its trading partners and transactions with them through e-business systems.

2.2. The contexts of e-business diffusion

A theoretical model for e-business diffusion needs to consider factors that influence the propensity to adopt, implement, and diffuse the technological innovation, which is rooted in the specific technological, organizational, and environmental contexts of the firm. The TOE framework serves as an important theoretical perspective for studying contextual factors (Tornatzky and Fleischer, 1990). The TOE framework identifies three aspects that may influence organizational usage of technological innovation: (1) technological context includes both internal and external technologies used by the firm; (2) organizational context refers to descriptive characteristics of the organization, including firm size and scope, complexity of firm managerial structure, and quality and degree of its human resources; and (3) environmental context refers to the firm industry and its dealings with trading partners, competitors and government (Tornatzky and Fleischer, 1990).

The TOE framework has consistent empirical support in the IS domain. For example, empirical studies using the

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