TRUST OR DEPENDENCY? MAJOR INFLUENCE ON E-PROCUREMENT ADOPTION DECISIONS IN SUPPLY CHAIN RELATIONSHIPS

Nik Ab Halim Nik Abdullah[1] and Latif Al-Hakim[2]

Department of Economics and Resource Management
Faculty of Business
University of Southern Queensland, Australia
[1] *w0046738@mail.connect.usq.edu.au*
[2] *hakim@.usq.edu.au*

ABSTRACT

This paper discussed the influence of two factors, which is the level of trust and the level of dependency on the e-procurement adoption decisions between supply chain partners in a supply chain relationship. Literature related to trust theory and power theory was reviewed in search for an attributes of each factors that could have an influence on the e-procurement adoption decisions. Literature suggests that trust and dependency did play a major role in adoption decisions but none have ever tried to discover which factor is more important especially in today's competitive business environment. A theoretical framework is then developed based on prior research on trust and dependency in various e-business and e-commerce applications. Implications of both factors to supply chain partners and also the direction for future research within this area are then discussed.

KEYWORDS

E-procurement, supply chain relationships, trust, dependency, e-business, ecommerce

1. INTRODUCTION

Developments in information and communication technology, especially the Internet provide firms with new ways of doing business in an increasingly complex and competitive environment. E-business provides potential means to generate new wealth and to transform the way business is conducted in an unprecedented ways (Amit and Zott, 2001). One of the components of e-business that helps revolutionize the supply activities is e-procurement. Firms realize that the switch to e-procurement is likely to provide better returns on investment (Hawking et al., 2004). As a result, some manufacturers and suppliers implemented an e-procurement system that links their procurement activities electronically to improve efficiency. The case of Covisint (Neef, 2001), a joint e-procurement initiative being sponsored by General Motors, Ford, Daimler Chrysler and Renault-Nissan with a turnover of $250 billion and involving 60,000 suppliers provides a useful example. Vendors such as Dana Corporation which supply parts for these automobile manufacturers agree to participate in order to continue servicing these companies. Volkswagen also established its own private e-market system known as VWgroupsupply.com that integrates and provide suppliers with real time information on production plans so that suppliers can better utilize their production capacities and other resources (David et al., 2003). It is believed that cost savings and operational efficiencies can be achieved through the utilization of e-procurement (Hawking et al., 2004). E-procurement permits both manufacturer and their supplier to electronically check available inventory, negotiate price, issue and order, check the status of the order, issue an invoice and receive payment (Coyle et al., 2003).

Implementing interconnected information systems (IS) between two or more firms means that there is a high level of information sharing between partners and therefore, a high level of trust is required (Hoyt & Huq, 2000). The importance of trust in a successful supply chain relationship in the business to business (B2B) environment especially between supplier and manufacturer, is widely acknowledged in the academic literatures (Morgan and Hunt, 1994; Zineldin and Jonsson, 2000; Myhr and Spekman, 2005). Besides trust, prior research has recognized that dependency within a business to business relationship is also an influential factor on that relationship (Carmen and Jesas, 2004; Zhuang and Zhou, 2004; Svensson, 2004). Dependency between business activity in the supply chain could leads towards the necessity of cooperation and coordination between companies in order to achieve internal and in some cases mutual goals (Lambert et al., 1998). This necessity of cooperation and coordination is likely to lead to the usage of a common IT infrastructure. In procurement activities, it is expected to lead to an adoption of a common e-procurement system between both supply chain partners.

Deciding whether to adopt or not information technology such as e-procurement in supply chain activities is a huge decision to make. Studies show that various technological factors (Rogers, 1995), social and organizational factors (Patterson et al., 2003; Lin and Lee, 2005; Russell, 2004) and behavioural factors (Ehigie and McAndrew, 2005) could influence adoption decisions. Although implementing information technology in supply chain activities is important to firms, managers should consider all these important factors (Harrison et al., 1997). Implementation of technology infrastructure is expensive and risky. Mutsaers et al. (1998) found out that many companies have painful experiences of being forced to change and simultaneously employ or upgrade IT in their operations. Often, companies found that they ended up in a situation where IT hindered the ability to change rather than act as a supporting or enabling factors. A comprehensive evaluation of all relevant factors is required before firms decide to use any type of information technology applications in their operations. Therefore, the objective of this paper is to discuss the influence of trust and dependency on e-procurement adoption decisions between supply chain partners. Using previous research on trust and dependency in various information technology and also e-commerce adoption, a theoretical framework will be proposed. Implications of both factors to supply chain partners and also the direction for future research within this area are then discussed.


2. LITERATURE REVIEW

2.1 Information technology in the supply chain

The supply chain, which is also known as logistics network encompasses a network of many different firms that act as suppliers, manufacturers, warehouses, distribution centers and retail outlets (David et al., 2003). Recent developments in IT allow companies to modify the way their supply chains operate. IT not only strengthens operational efficiency but also enabled links with customers, suppliers and other stakeholders (Mutsaers et al., 1998). Information technology has evolved over time and creates many new opportunity for a firm to exploit (Coyle et al., 2003). In the 1990's, most firms extended their traditional businesses into a web-based business. Afterwards, the enhancement provided electronic opportunities for supply chain participants to buy and sell products and services via a firm's website. However, such exchanges did not facilitate any coordination and collaboration between buyers and sellers. Trading communities are hubs of suppliers, customers, manufacturers, distributors and wholesalers brought together via the Internet. The intelligent marketplaces are the most sophisticated and represent the extension of trading communities. These marketplaces are characterized by an improved software tools that enable members to optimize the entire network and technology that facilitate collaboration. At the same time, there is also greater collaboration and seamless integration of key supply chain processes and one of them is e-procurement (Coyle et al., 2003). Technology allows an integration of operations between two or more supply chain partners that do business with each other. As an outcome, organizational boundaries become extremely fuzzy and become less relevant (Figure 1). Firms have a direct interface with their supply chain partners to initiate production, specify product specification and change other parameters (Mukherji, 2002).

2.2 E-procurement

According to Coyle et al. (2003), procurement consists of the activities necessary to acquire goods and services consistent with user requirement. Adoption is one of the stages in Rogers (1995) innovation diffusion theory. He defines technology adoption process as the mental process through which an individual passes from first hearing about an innovation to final adoption. He suggests that key influence on the adoption of an innovation is its perceived attributes, perceived alternatives and perceived compatibility with current system. In an organizational setting, adoption decisions are made by some decision makers, who have resources and the decision rights to change behaviors, or control resources associated with development practices (Mustonen-Ollila and Lyytinen, 2003). E-procurement adoption

Figure 1: Information system interface between supply chain partners
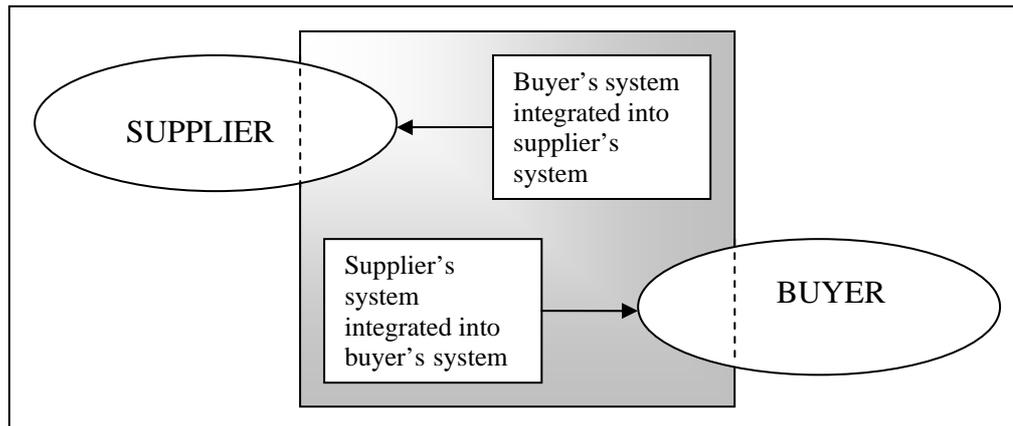
decisions therefore means applying the procurement process electronically via the connected infrastructure such as Intranet and Internet based platforms. Another definition of e-procurement as described by Sain et al. (2004) is the electronic integration and management of all procurement activities, including purchase request, authorization, ordering, delivery and payment between a purchaser and a supplier.

Procurement processes are costly activities for businesses, often involving slow manual business procedures and at the same time, involves problems such as error in ordering, costing and invoicing, which were time consuming and costly to trace (Hawking et al., 2004). Businesses then realised that time and cost savings can be achieved by linking with major suppliers through private networks such as electronic data interchange (EDI). Until recently, the Internet enabled global firms to even centralize their procurement and logistics systems that previously conducted in every country they operated. General Electrics for example reports that the firm has saved over $10 billion annually through its e-procurement activities (Hawking et al., 2004), while FedEx also save million of dollars by automating its procurement operations (Dalton et al., 1999). Study by Croom and Johnston (2003) found out that web-based systems for requisitioning results in few transmission errors compared to paper based methods and also enables electronic invoicing and payment. Time to conduct the process reduced from an average five days to two hours using e-procurement. Other benefits include internal customer satisfaction (Neef, 2001), speed up order cycle time (Wyld, 2002; Bland, 2003) , reduce paperwork and manual process (Wyld, 2002; Croom and Johnston, 2003; Bland, 2003).

E-procurement is not a single application but consists of many different tools. De Boer et al (2002) identify six forms of e-procurement applications as listed and explained in table 1.

Table 1: Type of e-procurement application

E-procurement application	Description
1. E-sourcing	Process of finding potential new suppliers using the Internet (B2B marketplace). Takes place during information gathering step of procurement process (De Boer et al., 2002)

2. E-tendering	Process of sending request for information, price etc. to suppliers and receiving response using internet technology. Also possible to have an initial screening process for selecting suppliers that qualify for the negotiation step. Takes place during supplier contact step of procurement process (De Boer et al., 2002)
3. E-informing	Part of e-procurement that does not involve transactions or call offs, but instead handles information about the supplier regarding quality certification, financial status or unique capabilities. Supplier data can come from third party information providers and from firm's own investigation. (De Boer et al., 2002).
4. E-reverse auction	Enables purchasing company to buy goods and services that have the lowest price or combination of the lowest price via Internet. Auction traded in real time and takes place during negotiation step of the procurement process (De Boer et al., 2002).
5. E-MRO and Web-based ERP	Focus on creating and approving purchasing requisitions, placing orders and receiving goods or service ordered using Internet based system. E-MRO deals with indirect items (maintenance, repair and operating materials) while web-based ERP deals with product related items. Takes place during fulfilment step of procurement process (De Boer et al., 2002).
6. E-collaboration	Correct and updated data regarding product versions, blueprints and sales forecasts are always available from the buying's company website or extranet, thus reducing errors before they occur and making it possible for suppliers to be in sync with the buyer. Involve collaboration tools such as virtual meeting rooms, bulletin boards and even shared knowledge management systems (De Boer et al., 2002).

2.3 Trust and e-procurement adoption

Trust is the willingness to rely on an exchange partner in whom one has confidence (Dwyer et al., 1987). Prior studies on trust in business and management mostly concentrate on the role of trust on organizational behaviour and inter-organizational relationships. For example, trust has been related to a firm's competitive advantage (Ba and Pavlou, 2002), an important factor in leadership (Mayer and Davis, 1999), effective decision making (Zand, 1972), managerial effectiveness (McAllister, 1995) and could also increases satisfaction within the relationship (Anderson and Weitz, 1989). It is only recently that the roles of trust in organizational technology implementation get the attention among the researchers. (Mukherjee and Nath, 2003) looks at the importance of trust in online banking, (Ratnasingam, 2001) study the relationship between inter-organizational trust on EDI adoption while (Ba and Pavlou, 2002) study the effect of trust building technology in electronic markets. (Bahmanziari et al., 2003) study the important of trust in software vendor on technology adoption. In the context of supply chain relationship, effective supply chain planning based on shared information and trust between and among partners is an essential element for successful supply chain relationships (Kwon and Suh, 2005). Trust is a multidimensional concept that has been discovered to contain various dimensions that make up the construct (Corazzini, 1977). There has been wide range of research conducted in various discipline to determine the dimension of trust.

Trust is one of the key factors for successful supply chain relationship (Morgan and Hunt, 1994; Zineldin and Jonsson, 2000; Svensson, 2001). There is no previous effort to study the relationship between trust and e-procurement technology adoption. Some previous research examines the relationship between trust and other construct such as relationship between trust and joint collaboration (Ryan et al., 2004), trust and co-operation (Young and Wilkinson, 1989), and also trust and commitment (Zineldin and Jonsson, 2000). One of the studies that looks at the relationship between trust and technology adoption is by Ratnasingam (2001), where she identify a positive relationship between trust and EDI adoption. Therefore, it is assumed that there is also a positive relationship between trust and e-procurement technology adoption in supply chain relationship. There are plenty of dimensions identified by previous researchers that will help measure the level of trust. Swan et al (Swan and Trawick, 1987) grouped all these various dimensions of trust into five groups which is dependability/reliability, honesty, competence, buyer/seller orientation and friendliness.

2.4 Dependency and e-procurement adoption

Power has been defined in various ways but all definitions essentially contain the idea of the control, influence or direction of one party's behaviour by another (Cartwright, 1959). The concept of power rarely interest supply chain scholars. It is not until recently that power is gaining more attention in supply chain relationship especially with (Cox et al., 2004) suggestion that power should be at the centre of any study of buyer-seller relationships. In terms of source of power, there are two basic viewpoints that still used in many power studies until today. The first viewpoint by French and Raven (1959) states that source of power over a target is composed of the power bases the source holds over the target. In total, six type of power bases have been identified, which is reward power, coercive power, legitimate power, referent power, expert power and information power. Second viewpoint by Emerson (1962) states that in a channel dyad, channel member A's power over B is derived from B's dependency on A. He argues that power differentials derive from the relative dependencies of actors on one another for the resources of value they obtain through social exchange. Since then, almost all channel behaviour studies have supported the following causal relationship, which is the more dependent a channel member is on another members, the higher it perceives the other member's power (Brown et al., 1983; Bachmann, 1999; Zhuang and Zhou, 2004). Hammrkvist and Mattsson (cited in Svensson, 2001) respectively identify five and two additional dimensions that makes up the dimension of dependency which is:

I. *Technical dependence*: The instance when two companies use compatible equipment and adapt their mutual business activities to each other in a technical sense (Hammarkvist et al., 1982).
II. *Time dependence*: The instance when two companies have a time-based need or synchronization of their mutual business activities (Hammarkvist et al., 1982)
III. *Knowledge dependence*: Interaction process between two companies, learning from each other's strengths and weaknesses. Create knowledge about each other's ability to solve problems (Hammarkvist et al., 1982).
IV. *Social dependence*: Interaction between two companies which is often base on personal relationships. Social atmosphere and personal chemistry between executives affect business activities between them (Hammarkvist et al., 1982).
V. *Economic/judicial dependence*: Formal dependence that exist such as written agreements. These strengthen the dependence between the business activities of two companies (Hammarkvist et al., 1982).
VI. *Market dependence*: Company's image and status that may positively influence another company's image, status and improve goodwill of the other company in marketplace (Mattsson, 2000)
VII. *IT dependence*: Two companies may invest in a common IT standard, where the hardware and software to communicate between the two companies must be compatible (Mattsson, 2000)

Dependency is expected to influence firm's decisions either to adopt e-procurement or not in their operation. Industrial marketing literature makes it clear that the supplier of a technological innovation can exercise a direct influence on the diffusion process of particular technological innovation (Frambach, 1993). Furthermore, previous study clearly indicates that dependency is needed in maintaining the relationship in order to achieve desired goal (Frazier, 1983). Therefore, dependency is hypothesized as having a direct influence too in technology adoption decisions. Current cases of Covisint and VWgroupsupply.com as discussed earlier give some indication that companies might be forced to use e-procurement because they are too dependent on their supply chain partners.
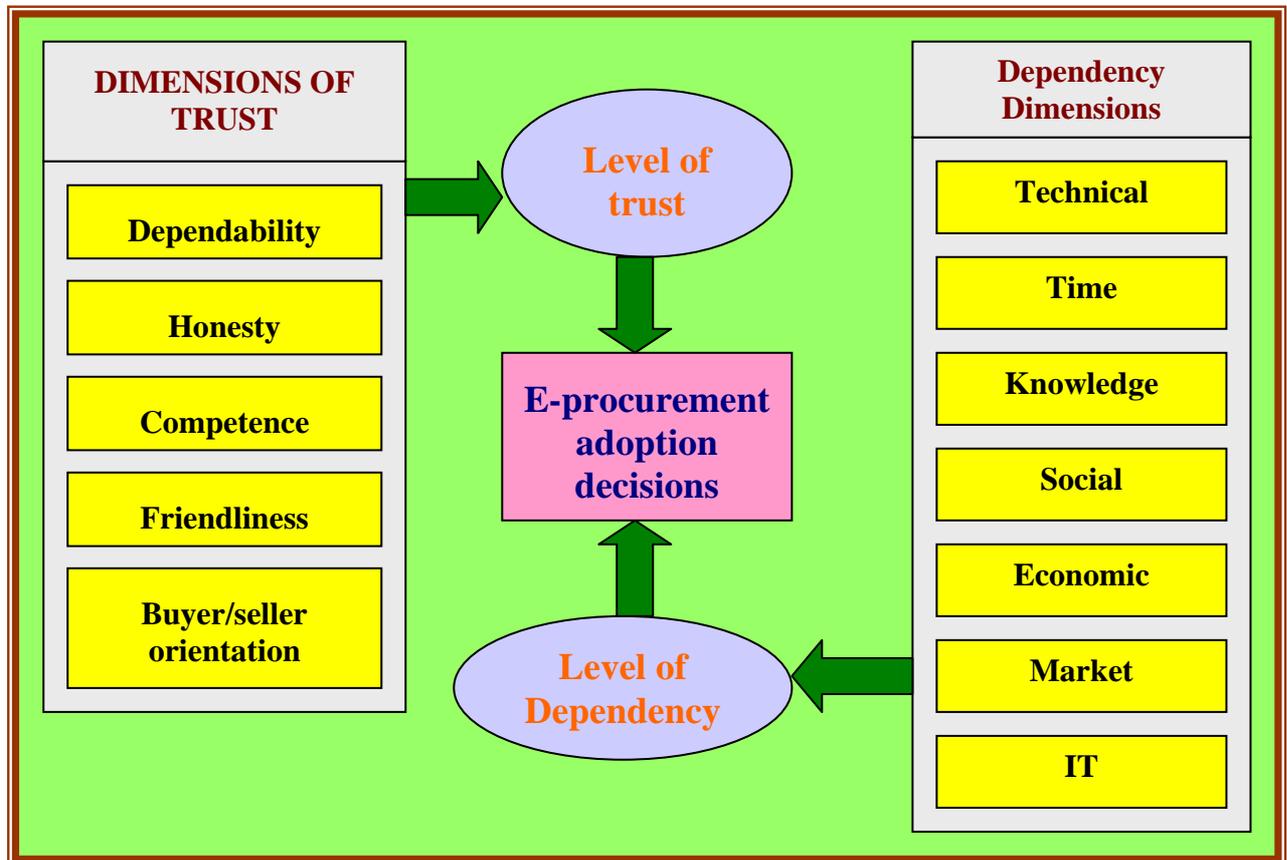
2.6 Theoretical framework

The theoretical framework is presented in figure 2. It is based upon the theory of diffusion of innovation, theory of trust and theory of power as discussed before. The framework shows how dimensions of trust and dependency could measure the level of trust and the level of dependency between supply chain partners. Prior research has identified many dimensions of trust that could help measure the level of trust between partners. Some of these dimensions are almost identical to one another. Swan et al. (1987) then grouped all these various dimensions into five dimensions and are deem as appropriate in measuring the level of trust between supply chain partners. For dependency, work of Hammrkvist and Mattsson (cited in Svensson, 2001) where they identify five and two dimensions of dependency respectively can helps determine the level of dependency between supply chain partners. This level of trust and dependency is expected to influence the e-procurement adoption decisions between supply chain partners.

3. CONCLUSIONS AND DIRECTION FOR FUTURE RESEARCH

Rogers (1995) identified five variables that determine the rate of adoption in the context of the attributes of the technology itself (relative advantage, compatibility, complexity, trialability and observability). Many

Figure 2: Theoretical framework

DIMENSIONS OF TRUST		Dependency Dimensions
Dependability	Level of trust	Technical
Honesty		Time
Competence	E-procurement adoption decisions	Knowledge
Friendliness		Social
Buyer/seller orientation		Economic
	Level of Dependency	Market
		IT

literatures acknowledge that technology attributes itself does not necessarily encourage adoption. There is many other factors from wide range of sources that could affect adoption decisions (Eastin, 2002; Patterson et al., 2003; Harrison et al., 1997). Research on previous literature indicates that trust and dependency could play a major role in influencing e-procurement adoption decisions in supply chain relationships. The question of which factors is more important in today's competitive business environment requires further study. There is an opportunity for future research that will extend the knowledge on these two factors. Study on previous literature also shows that there are studies on the adoption of various e-commerce technology such as adoption of mobile commerce (Wu and Wang, 2003), adoption of e-commerce activities (Eastin 2002), impact of knowledge management and organizational learning on e-business adoption (Lin and Lee 2005). However, there is no evidence of any specific study on how trust and dependency could effect the adoption decisions of e-procurement technology. It is important to study e-procurement adoption to fill this gap in literature, because each e-commerce application has different characteristic from one another. Important factors that determine e-procurement technology adoption could be different from factors that influence other e-business or e-commerce adoption decisions.

There is also a link between trust and dependency in successful supply chain relationship discovered, where trust is said to have a moderating impact on the level of dependency between firms (Buchanan, 1992; (Carmen and Jesas, 2004; Zhuang and Zhou, 2004; Morgan and Hunt, 1994). Further study beyond the importance of trust and dependency in supply chain relationship is required because trust and dependency may a play different role between decisions to enter into relationship and decisions to adopt e-procurement in supply chain relationships. It is important to understand the influence of trust and dependency on e-procurement adoption because understanding in these factors will ensure effective adoption and even cultivate stronger relationships between supply chain partners that will last for a long time. Second, better

understanding on the decision process and the benefit of e-procurement technology adoption by the manufacturer will also benefit suppliers. Suppliers might get more support in utilizing new technology from the manufacturer who wants to ensure the success of their e-procurement initiative. It will also help business managers or policy makers in creating policies targeting appropriate factors that may ensure effective adoption of e-procurement in their organization. Finally, findings on e-procurement adoption could also provide educators with vital information from the industry itself, to support the theory part of the study.

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