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# FACTORS LEADING TO ELECTRONIC PROCUREMENT ADOPTION BEHAVIOR

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## Abstract

*Electronic procurement (e-procurement) is an Internet solution that facilitates corporate purchasing over the Internet. Researchers' interest in e-procurement seems to particularly on the factors that lead to adoption intention, which ultimately may result in adoption behaviour. Although a number of similar studies have been conducted before, this study intends to add new elements to enrich this research area. A model of electronic procurement adoption is proposed to identify the factors leading to e-procurement adoption behavior by business organizations. These factors fall into three categories, known as technological, organizational and environmental characteristics. The relationships between these factors and the actual adoption behaviour will provide insight to practitioners and solution providers how to implement successful e-procurement projects. The model will be justified by survey methodology with case studies as a supplementary.*

**Keywords:** Electronic procurement; innovation adoption; electronic commerce

## Introduction

More than many people's understanding, procurement is more than just the purchasing of goods and services. In an enterprise, procurement encompasses all activities involved in obtaining material and services and managing their inflow into an organization toward the end user (Gebauer and Segev 1998). Based on the purpose of the acquired goods, procurement activities are often divided into direct procurement and indirect procurement. The former encompasses all items that are part of finished products, such as raw material, components and parts when the latter concerns all items and services that are not directly part of a finished product (Gebauer and Segev 2001). The term "indirect" indicates its residual nature to include everything that is not covered by direct, production-oriented procurement.

Electronic procurement (e-procurement) can be defined as using Internet (including Intranet and Extranet) technologies and applications, such as electronic data interchange (EDI), electronic mail (e-mail) and electronic marketplace (e-marketplace), in the purchasing process (De Boer et al. 2001). This definition excludes traditional methods like ordering by telephone or by fax. Besides, it gets rid of the disadvantages of the traditional paper-based procurement method, like error-prone, expensive and resource intensive (mainly human resource) (Pedersen and Chau 2000). E-Procurement can realize two main types of benefits, namely, efficiency and effectiveness (Kalakota and Robinson 2001). Advantages from efficiency are down-to-earth and substantial, including lower procurement costs, faster cycle times, reduced maverick or unauthorized buying, more highly organized information, and tighter integration of the procurement function with key back-office systems. Benefits from enhanced effectiveness include increased control over the supply chain, proactive management of key procurement data, and higher quality purchasing decisions within organizations.

Due to its importance, enterprises that require frequent or bulk purchase spend enormous effort and time on the procurement process. Most organizations thus spend more than 30% of their income dollars on purchasing goods and services (Gebauer and Segev 1998). This is why many of them now adopt electronic procurement (e-procurement) to accomplish the task. As a limited number of research studies have been done in this area, it is still unclear what factors will lead to e-procurement adoption behavior. In response to this question, a model is proposed in this paper to identify the determinants of electronic procurement

adoption by business organizations. The volume of knowledge in this area is enriched in this way. On top of that, it is anticipated that the findings may provide implications to practitioners and solution providers on how to implement successful e-procurement projects.

## Literature Review

Factors in the proposed model are mainly adopted from the innovation diffusion research stream. Organization and environmental factors also provide inputs to the model building process. For that reason, a brief literature review in the related areas is given below to sketch out the background of this research study.

### *Diffusion of Innovation*

Innovation theories have been successfully applied to study organizations' adoption of IT innovations such as spreadsheet software and office automations (see Brancheau and Wetherbe 1990, Moore 1987). Various studies (e.g. Tornatzky and Klein 1982, Moore and Benbasat 1991) have confirmed that the three of the innovation characteristics proposed by Rogers (1985) are consistently associated with innovation adoption behavior. These attributes include:

- *Relative advantage* - the degree to which an innovation is perceived as being better than its antecedent;
- *Compatibility* - the degree to which an innovation is perceived as being consistent with the existing values, needs and past experiences of potential adopters;
- *Complexity* - the degree to which an innovation is perceived as being difficult to use.

Since then, these innovation characteristics proposed by Rogers (1985) has been widely adopted in or has provided inspiration to research studying IT adoption by individual or organizations (e.g. Iacovou et al. 1995, Beatty et al. 2001).

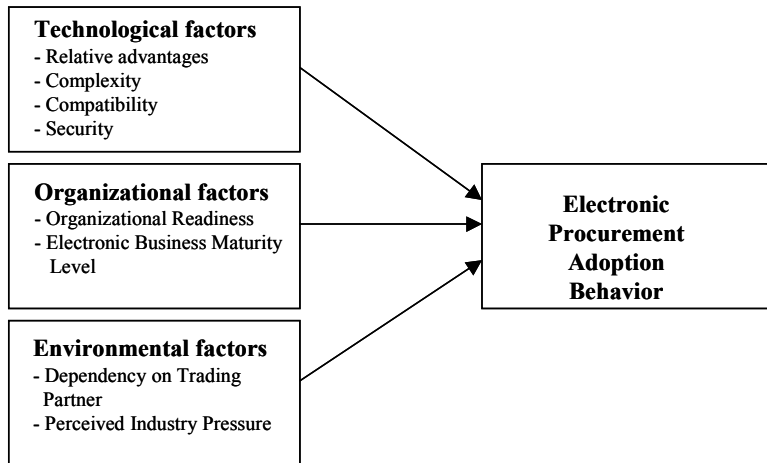
### *Organizational Factors and Environmental Factors*

Behavior of an organization is more than a summation of the behavior of individuals in that organization. Only the factors influencing individual adoption behavior are not enough to explain the complex situation in business organizations. Therefore, unique organization characteristics are taken into consideration in addition to technological characteristics in various research studies. The most common organization characteristics have been studied include size, age, structure, competition, etc (e.g. Rogers 1995, Runge and Lee 2001, Thong 1999). Some researchers studied top management support (e.g. DeLone 1988) when other studied organization readiness to innovation adoption (e.g. Iacovou et al., 1995). All these factors have been identified as possible determinants of organizational adoption of an innovation.

No business operates alone. It must interact with other external parties, like suppliers, customers and business partners. The interaction takes in various forms, such as seeking for information and doing transactions. During these business processes, the actions of the company and those of the external parties influence each other. Yet, in some cases, the company is affected by the actions of external parties that it does not directly interact with. They may include competitors, industry leaders and the government. In some cases, the influences (either pressure or support) exerted by its business partners and/or its competitors may cause a business to adopt a technology where the decision has nothing to do with the technology and organization per se (Kuan and Chau 2001). Regarding to this, previous studies have validated external pressure to adopt IT as one of the determinants of IT adoption behavior (e.g. Thong and Yap 1995, Iacovou et al. 1995, Chwelos et al. 2001).

## Research Model

The research model is illustrated in Fig 1. It describes the antecedent factors that are likely to impact the adoption behavior of e-procurement by business organizations. These factors fall into three main categories, known as technological, organizational and environmental factors.



**Figure 1. Electronic Procurement Adoption Model**

### **Technological Factors**

The reasons why organizations pursue some activities rather than others are suggested to be a consequence of how these activities come to be valued within the organizations (Sebora et al. 1994). As mentioned before, advantages from the use of e-procurement may include reducing purchasing cycle time and cost, eliminating administrative errors and better management of supplier’s information and pricing information. In other words, these benefits provide efficiency and effectiveness to the adopters. Efficiency ensures limited resources required while effectiveness allows a holistic view and control over the whole process. Different enterprises may perceive different types of benefits with different significance.

Compatibility is another facilitator to innovation adoption (Rogers 1985). It includes organizational compatibility and technical compatibility. Organizations are more likely to adopt a technology if they perceive that it is consistent with their culture, values, and preferred work practices (Beatty et al. 2001). Similarly in technological level, incompatibility of an innovation with a firm’s existing hardware, software, networking telecommunications architecture, or existing IS infrastructure may inhibit adoption (Beatty et al. 2001). The new system should fit well with the existing ones so that minimum investment in hardware and software is required.

Nobody prefers sophisticated software and applications. A computer application perceived to be easier to use than another is more likely to be accepted by end users (Rogers 1985). The same principle also applies to e-procurement adoption. Hence, the perceived complexity of electronic procurement has influence to the willingness of a company to adopt it.

As implied in its name, electronic procurement is doing purchasing in an Internet-based environment. Due to the open nature of the Internet, security is one of the main concerns of business organizations. Computer viruses and hacker attacks may cause immense losses. As a result, the lower the security risk they have to perceive, the higher the likelihood business organizations switch to electronic procurement.

Thus, the hypotheses for this group of factors are as follows:

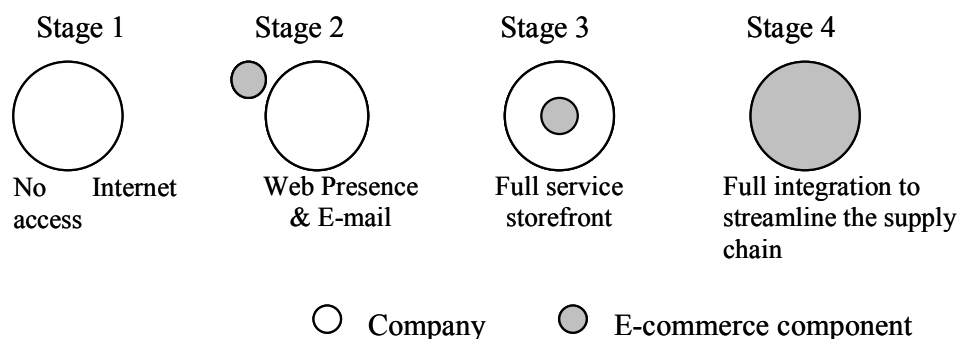
- H1: Business organizations that perceive more relative advantages from electronic procurement are more likely to adopt it.*
- H2a: Business organizations that perceive a greater organizational compatibility with electronic procurement are more likely to adopt it.*
- H2b: Business organizations that perceive a greater technical compatibility with electronic procurement are more likely to adopt it.*
- H3: Business organizations that perceive a lower level of complexity in conducting electronic procurement are more likely to adopt it.*
- H4: Business organizations that perceive a lower security risk from e-procurement are more likely to adopt it.*

### **Organizational Factors**

Any investment in technology involves resources. In this regard, organizational readiness refers to the availability of the required organizational resources, in terms of financial and technological resources, for adoption of IT innovation (Iacovou et al. 1995,

Chwelos et al. 2001). Financial readiness concerns whether the financial resources available is sufficient to pay the installation costs and ongoing expenses during usage. Technological readiness of a company refers to the technology know-how possessed by that company to deal with IT innovations.

Most business organizations follow a typical and evolutionary four steps model towards electronic business (e-biz) suggested in Fig 2. In stage 1, the business organization does not have any Internet access, but it is interested to get connected to the Internet. Its desire to cultivate for competitive advantages from electronic commerce directs it to stage 2, where it starts to utilize the Internet as a channel to communicate with outside parties and has established its web presence. Later, the web presence changes from an on-line catalog of products and services to a full service storefront in stage 3. Customers start to shop in the on-line store. This business channel has successfully integrated with the second half of the supply chain, where processes from receiving order to delivering products and services are automated inside the company. Finally in stage 4, the firm provides full integration with trading partners that streamline the supply chain, from procurement to sales. In this context, implementation of electronic procurement just completed the first half of step 4. Only when it has successfully integrated the storefront with the existing back office systems, a business organization is considered to have achieved full electronic commerce.



**Figure 2. The Four Steps to Electronic Business**

These stages can be periods in a company's development history, or temporary phases in an e-biz project. The prototype suggests a company's potential and ability to implement electronic procurement. The higher the stage it is positioning, the more likely it will implement e-procurement. When the prerequisites for electronic business (such as financial resources and technical know-how) are mature, the firm can speed up their project to run full e-biz.

These factors lead to the following hypotheses:

- H5a: Business organizations that possess higher financial readiness to electronic procurement are more likely to adopt it.*
- H5b: Business organizations that possess higher technical readiness to electronic procurement are more likely to adopt it.*
- H6: Business organizations that possess higher electronic business maturity level are more likely to adopt electronic procurement.*

### **Environmental Factors**

If a firm has only one or a few suppliers, it has higher dependency on its supplier. In other words, its supplier possesses higher power in this dyadic buyer-supplier relationship with this particular customer. The firm has to change to e-procurement when its main supplier requires it to do so. This is especially the case when the firm is a relatively small one that the supplier can be so aggressive to influence the decision of its customer. Kirby and Turner (1993) have confirmed this proposition in their study where they found that dependency of a small business customer on its suppliers has an effect on its decisions.

To most companies, the most common source of pressure or motivation to adopt electronic procurement comes from trading partners who have already adopted it. As an e-procurement system is an inter-organizational system based on the Internet, the

importance of inter-organization relationship is apparent. This conjecture has been supported by empirical studies that pressure from trading partners plays a critical role in IT and electronic commerce adoption (e.g. Iacovou et al. 1995 and Chwelos et al. 2001).

Consequently, the following hypotheses are generated:

- H7: *Business organizations that have higher dependency on suppliers who have already adopted electronic procurement are more likely to adopt it.*
- H8: *Business organizations that perceive greater industry pressure to electronic procurement adoption are more likely to adopt it.*

## Conclusion

Based on theories from the innovation literature, this paper has developed a model of electronic procurement adoption. Due to the limited number of research has been done in the related field; findings from this study will help us to identify the determinants of electronic procurement adoption behavior. The proposed model will be tested via a survey. The questionnaire aims to capture the information reflecting the perceptions and practice of companies in adopting electronic commerce as well as electronic procurement. It also intends to identify the internal or external factors affecting the adoption behavior and the degree of influence. In order to drill down deeper, the study will be supplemented by case study methodology. The introduction of the case study will add a richer and more detailed refinement beyond what is possible with the survey (Yin 1994). It is anticipated that personal interviews with top management in these companies will obtain information for in-depth understanding of the adoption process.

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