Information Systems Innovations Adoption among SMEs in Algeria: Conceptual Framework Development

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Abstract:

Scholars in the field of Information Systems (IS) innovations' adoption and diffusion have recently expressed their concerns of the dominance that some theories attained, which has caused a high degree of enforcement, conformity, and lack of innovation that have not served the research community well. Having reviewed the IS innovations adoption and diffusion literature, this paper aims to develop a conceptual framework that can be used as a theoretical basis for studying SMEs' adoption of Enterprise Systems (ES). This will be achieved by firstly reviewing the dominant paradigm of IS innovations' adoption and its revised depiction. Secondly, TOE (Technology-Organization-Environment) framework introduced by Tornatzky and Fleischer (1990) will be adopted. Thirdly, theoretical and empirical studies of the factors that can be included within the theoretical framework will be highlighted. Besides, explanatory variables and the developed hypotheses will be outlined.

Introduction:

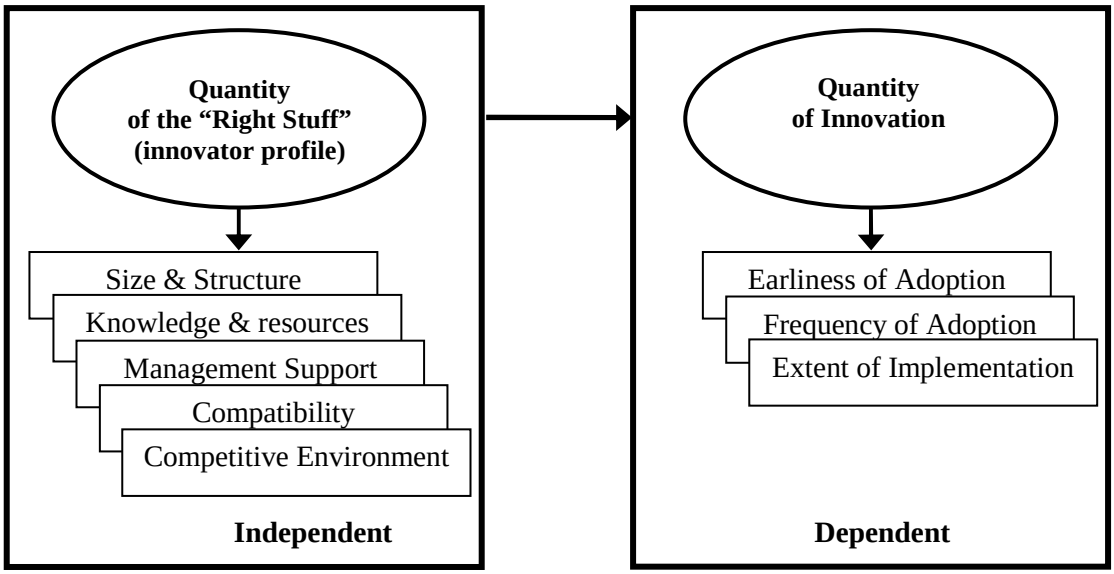
The attention of software vendors has moved recently to Small and Medium-sized Enterprises (or SMEs) offering them a vast range of ES, which were formerly only adopted by large firms (Ramdani et al., 2009). SMEs, firms with fewer than 250 employees (EC, 2003), are considered as major economic players and a potent source of national, regional and local economic growth (Taylor and Murphy, 2004), and ES provide SMEs with opportunities that are largely unexploited. ES are defined as: "*commercial software packages that enable the integration of transaction-oriented data and business processes throughout an organisation (and perhaps eventually throughout the entire interorganizational supply chain)*" (Markus and Tanis, 2000, pp. 176). These application software packages started as the support for a variety of transaction-based back office functions at which time they were called Enterprise Resource Planning (ERP) systems (Volkoff *et al.*, 2005). Since then they have evolved to include support for front-office and interorganizational activities including Customer Relationship Management (CRM), Supply Chain Management (SCM) (Volkoff *et al.*, 2005, Markus and Tanis, 2000). In our definition, ES include ERP, CRM, SCM, and e-procurement systems (Shang and Seddon, 2002).

Enterprise systems promise many benefits, but they are expensive, complex, and threaten the status quo of relations in organizations (Lorenzo et al., 2009). ERP is widely implemented by organisations in developed countries (Al-Mashari et al., 2001). However, its implementation is less prevalent in developing countries (Hawari and Heeks, 2010) especially in the small business context. Without a better understanding of the complex processes and the differentiating factors that affect IS innovations' adoption level, the drive to adopt and develop IS innovations will not successfully contribute to SMEs' competitiveness (Martin and Matlay, 2001).

Dominant Paradigm of IS Innovations

Although IS innovations adoption research tend to address the same research question: *what factors facilitate or hinder the adoption and diffusion of IT-based innovations within a population of potential adopters?* (Jeyaraj et al., 2006), it is essential to understand different factors affecting the adoption of new ARE innovations. According to Fichman (2004), a dominant research paradigm for IS innovation has emerged (Figure 1). He argues that this dominant paradigm assumed that organisations with greater quantity of the "Right Stuff" will exhibit a greater quantity of innovation.

Figure 1:The dominant paradigm for IS innovations (Fichman, 2004).

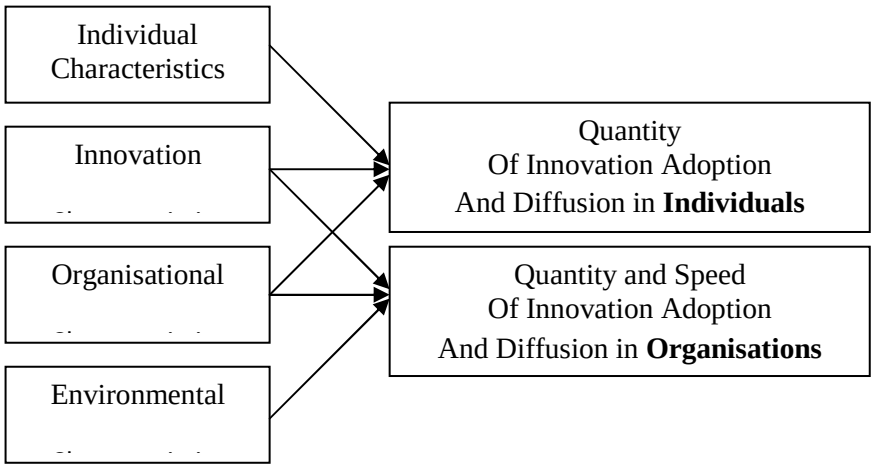


Jeyaraj et al. (2006) argue that different theories have been used to examine the organisational adoption of IS innovations. IS innovations adoption has been examined at different levels of the organisation such as the functional units (e.g. Ravichandran (2000)), and entire organizations (e.g. Premkumar et al. (1994)). Jeyaraj et al. (2006) claim that the challenge of the dominant paradigm has been the lack of integration and understanding of the linkage between *individuals* and *organisational* adoption of IS innovations. Although the unit of analysis in organizational adoption studies is the organization, an organization's decision to adopt an IS innovation is made by an individual within that organization.

The Revised Depiction of the Dominant Paradigm of IS Innovations:

This model (as illustrated in Figure 2) highlights that individual characteristics (e.g. age, gender, and computer experience), innovation characteristics (e.g. perceived usefulness, ease-of-use, and compatibility), organisational characteristics (e.g. top management support, structure, and strategy) are predictors of individual adoption of IS innovations. Additional to innovations characteristics and organisational characteristics, environmental characteristics (e.g. competition, external pressure, and customer power) are predictors of organisations adoption of IS innovations. At an aggregate level, Jeyaraj (2006) concluded that two collections of independent variables are strong predictors of both individual and organisational IS adoption: innovation characteristics and organisational characteristics.

Figure 2:Revised depiction of the dominant paradigm of IS innovations (Jeyaraj et al., 2006)

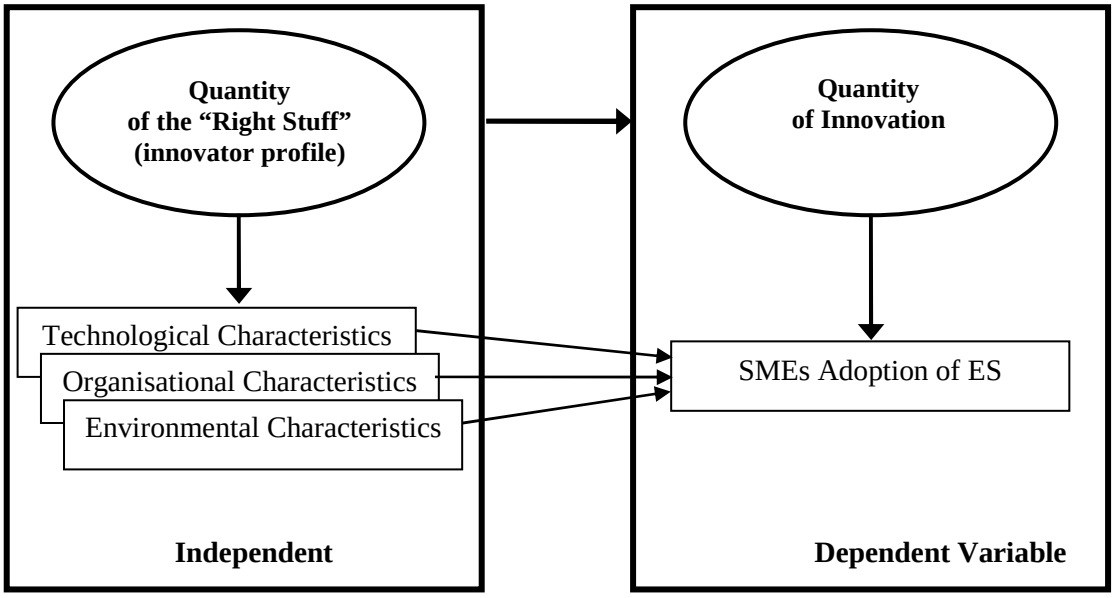


The revised depiction model seem to be consistent with Rogers' (1983) theory of innovation diffusion in organisations. Rogers identified three groups of adoption predictors: *leader characteristics* (leader's attitude towards change), *internal characteristics of the organisation* (centralisation, complexity, formalisation, interconnectedness, organisational slack and size), and *external characteristics of the organisation* (system openness). Moreover, he emphasised the importance of *innovation characteristics* (also referred to as *technological characteristics*) on potential adopters.

The Focus of this Study within the Dominant Paradigm of IS Innovations

To understand why an SME adopts an ES while the other does not, this study is an investigation of the technological characteristics, organisational characteristics and environmental characteristics which impact SMEs adoption of ES (as illustrated in Figure 3).

Figure 3:Focus of this study within the dominant paradigm of IS innovation.



Technology-Organisation-Environment (TOE) Framework:

Tornatzky and Fleischer (1990) developed TOE framework to study adoption of IS innovations. This framework included three aspects of firm's context that influence the process by which it adopts and implements IS innovations: technological context, organisational context and environmental context. *Technological context* represents both the internal and external technologies relevant to the firm. This includes the existing technologies inside the firm as well as the pool of available technologies in the market. *Organisational context* is typically defined in terms of several descriptive measures: firm size; the centralisation; formalisation; and complexity of its managerial structure; the quality of its human resources; and the amount of slack resources available internally. *Environmental context* is the arena in which a firm conducts its business – its industry; competitors; access to resources; and dealing with governments (Tornatzky & Fleischer, 1990, pp 152-154).

The TOE framework has been examined by a number of empirical studies on various IS innovations. In particular, the adoption of EDI (Electronic Data Interchange) has been studied extensively in the last decade (Zhu et al., 2003). Iacovou et al.(1995) examined TOE model in seven case studies revealing the main factors for EDI adoption. Also, Kuan and Chau (2001) has empirically evaluated a perception based TOE framework using data collected from 575 firms in Hong Kong. This study confirms the usefulness of TOE framework for studying adoption of IS innovations (Kuan & Chau, 2001). Recent studies focused on the adoption of e-commerce. Lertwongsatien and Wongpinunwatana (2003) developed and empirically evaluated a TOE framework using 386 firms in Thailand. Moreover, Scupola (2003) examined Tornatzky and Fleischer model in seven small businesses located in Southern Italy. She found the model to be very useful in investigating drivers of Internet commerce adoption in SMEs. In addition, Ramdani & Kawalek (2007a) examined TOE framework of broadband adoption by SMEs in the Northwest of England. They found that different technological, organisational and environmental factors

impact the adoption of different IS innovations. Studies of other IS innovations also provided empirical support for TOE framework (Fink, 1998; Thong, 1999).

Table 1TOE frameworks of SMEs adoption of IS innovations.

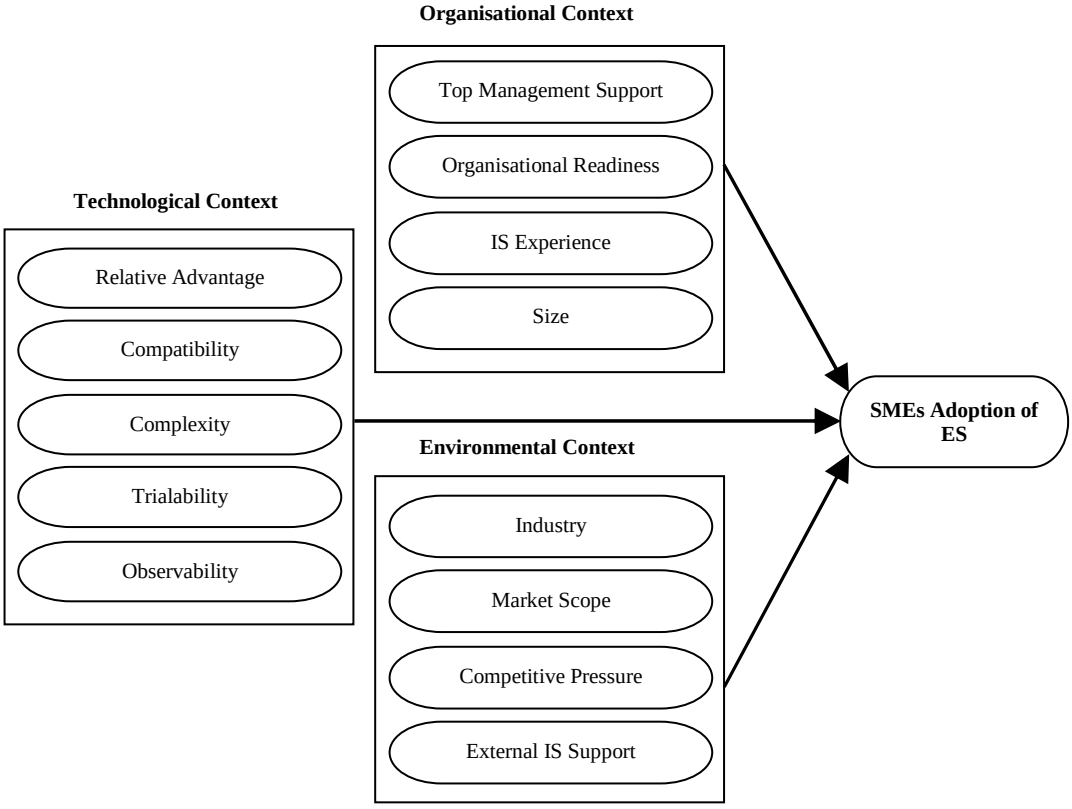
(Only factors that are shown to be significant are listed in this table)

Authors	IS Innovation	Technological Context	Organisational Context	Environmental Context
Ramdani & Kawalek (2007a)	Broadband	Relative Advantage, Complexity, Trialability	Top Management Support, ICTs' Experience	Location, Competitive Pressure, External ICTs' Support, Government Pressure
Scupola (2003)	E-Commerce (EC)	EC Barriers, EC Benefits, Related Technologies	Innovation Champion, Employees' IS Knowledge	Pressure from Competitors, Buyers, and Suppliers, Role of Government, Technology Support Infrastructure
Lertwongsatien and Wongpinunwatana, (2003)	EC	Perceived Benefits, Perceived Compatibility	Size, Top management Support for E-Commerce, Existence of IT Department	Competitiveness
Kuan and Chau (2001)	EDI	Perceived Direct Benefits	Perceived Financial Cost, Perceived Technical Competence	Perceived Industry Pressure, Perceived Government Pressure
Premkumar & Roberts (1999)	Communication Technologies	Relative Advantage	Top Management Support, Size	External Support, Competitive Pressure
Thong (1999)	IS	Relative Advantage/ Compatibility, Complexity	Business Size, Employee's IS Knowledge	Competition
(Iacovou et al., 1995)	EDI	Perceived Benefits	Organisational Readiness	External Pressure

From reviewing the TOE frameworks of SMEs adoption of IS innovations, it appears that IS innovations are highly differentiated technologies for which there is not necessarily a single adoption model, and different factors impact the adoption and implementation of different IS innovations. Thus, which factors can be included in the TOE framework to study SMEs adoption of ES. Chau & Tam (1997) suggests to extend TOE framework to study other IS innovations. This

study aims to extend the TOE framework by identifying technological, organisational and environmental factors that impact SMEs adoption of ES.

Figure 4:TOE framework of SMEs adoption of enterprise systems (Ramdani & Kawalek, 2007b).



Based on the TOE framework discussed earlier, Figure 4 presents a conceptual model of SMEs adoption of ES. Previous studies on the identified thirteen factors is summarised in Table 2.

Table 2:Mapping previous research on the factors within the 'TOE framework of SMEs adoption of enterprise systems'.

Context	Attributes	Related Concepts	Previous Research
Technological	Relative Advantage: perceived usefulness of the new technology	Relative Advantage	(Ramdani & Kawalek, 2007a)
		Relative Advantage	(Lee, 2004)
		Perceived Usefulness	(Grandon & Pearson, 2004)
		Perceived Benefits	(Lertwongsatien, 2003)
		Relative Advantage	(Kendall et al., 2001)
		Relative Advantage	(Lee & Runge, 2001)
		Relative Advantage	(Mirchandani & Motwani, 2001)
		Perceived Benefits	(Mehrtens et al., 2001)
		Perceived Direct Benefits	(Kuan & Chau, 2001)
		Advantages of EC	(Raymond, 2001)
		Relative Advantage	(Premkumar & Roberts, 1999)
		Relative Advantage	(Thong, 1999)
		IT Benefits	(Fink, 1998)
		Perceived Usefulness	(Igbaria et al., 1997)
		Perceived Benefits	(Iacovou et al., 1995)
	Compatibility: organisational compatibility with beliefs and value systems and technical compatibility with task and work practices	Compatibility	(Ramdani & Kawalek, 2007a)
		Compatibility	(Grandon & Pearson, 2004)
		Compatibility	(Lee, 2004)
		Compatibility	(Premkumar, 2003)
		Perceived Compatibility	(Lertwongsatien, 2003)
		Compatibility with the Company	(Mirchandani & Motwani, 2001)
		Compatibility	(Kendall et al., 2001)
		Compatibility	(Thong, 1999)
	Complexity: level of ease of use	Complexity	(Ramdani & Kawalek, 2007a)
		Perceived Ease of Use	(Grandon & Pearson, 2004)
		Complexity	(Kendall et al., 2001)
		Complexity	(Thong, 1999)
		Perceived Ease of Use	(Igbaria et al., 1997)
	Trialability: ability to experiment before adoption	Trailability	(Ramdani & Kawalek, 2007a)
		Trailability	(Kendall et al., 2001)
	Observability: ability to observe results of an innovation	Observability	(Ramdani & Kawalek, 2007a)
		Observability	(Kendall et al., 2001)
Organisational	Top Management Support: extent of commitment and resource support from top management for an innovation	Top Management Support	(Ramdani & Kawalek, 2007a)
		Managerial Support	(Guinea et al., 2005)
		Top Management Support	(Premkumar, 2003)
		Top Management Support	(Lertwongsatien, 2003)
		Enthusiasm of the Top Manager/CEO	(Mirchandani & Motwani, 2001)

		CEO Support	(Thong, 2001)
		Top Management Support	(Premkumar & Roberts, 1999)
		Top Management Support	(Thong et al., 1996)
		Managerial Enthusiasm	(Cragg & King, 1993)
		CEO Support	(Yap et al., 1992)
	Organisational Readiness: financial and technological resources	Organisational Readiness	(Ramdani & Kawalek, 2007a)
		Financial Constraints	(Buonanno et al., 2005)
		Organisational Readiness	(Grandon & Pearson, 2004)
		Financial Slacks	(Lee, 2004)
		Adequate IS Investment	(Thong, 2001)
		Organisational Readiness	(Mehrtens et al., 2001)
		Perceived Financial Cost	(Kuan & Chau, 2001)
		Organisational Readiness	(Iacovou et al., 1995)
		Inadequate Resources	(Cragg & King, 1993)
		Financial Resources	(Yap et al., 1992)
	IS Experience: prior IS experience	ICTs' Experience	(Ramdani & Kawalek, 2007a)
		Computer Self-Efficacy	(Lee, 2004)
		Existence of IT Department	(Lertwongsatien, 2003)
		Prior Technology Use	(Dholakia & Kshetri, 2002)
		Knowledge of Computers	(Mirchandani & Motwani, 2001)
		Perceived Technical Competence	(Kuan & Chau, 2001)
		Knowledge and Sills about the Technology	(Chau, 2001)
		User's IS Knowledge	(Thong, 2001)
		Internal IT Support	(Chau, 2001)
		Employee's IS Knowledge	(Thong, 1999)
		Inhouse IT Expertise	(Fink, 1998)
		EDP Experience	(Lai, 1994)
		CBIS Experience	(Yap et al., 1992)
		Computer Literacy	(Montazemi, 1988)
		Proportion of Information Workers	(Yap & Walsham, 1986)
	Size: firm size in terms of number of employees	Size	(Ramdani & Kawalek, 2007a)
		Firm Size	(Levenburg et al., 2006)
		Relative Size	(Arbore & Ordanini, 2006)
		Company Size	(Buonanno et al., 2005)
		Size	(Premkumar, 2003)
		Size	(Lertwongsatien, 2003)
		Organisational Size	(Premkumar & Roberts, 1999)
		Business Size	(Thong, 1999)
		Business Size	(Thong & Yap, 1995)

		Size of Organisation	(Yap & Walsham, 1986)
		Firm Size	(Delone, 1981)
Environmental	Industry: industry/Sector in which firm is a member	Industry	(Ramdani & Kawalek, 2007a)
		Industry Sector	(Levenburg et al., 2006)
		Business Industry	(Goode & Stevens, 2000)
	Market Scope: how wide is the market area	Market Scope	(Ramdani & Kawalek, 2007a)
		Market Scope	(Levenburg et al., 2006)
		Expansion of Market Reach	(Daniel & Grimshaw, 2002)
	Competitive Pressure: pressure of losing customers to competitors if the new technologies are not adopted	Competitive Pressure	(Ramdani & Kawalek, 2007a)
		External Pressure	(Grandon & Pearson, 2004)
		Competitive Advantage	(Premkumar, 2003)
		Competitiveness	(Lertwongsatien, 2003)
		Perceived Competitive Pressure	(Dholakia & Kshetri, 2002)
		Competitive Pressure	(Daniel & Grimshaw, 2002)
		Supplier Pressure	(Daniel & Grimshaw, 2002)
		Perceived Industry Pressure	(Kuan & Chau, 2001)
		External Pressure	(Mehrtens et al., 2001)
		Competitive Pressure	(Premkumar & Roberts, 1999)
		External Environment	(Fink, 1998)
		External Pressure	(Iacovou et al., 1995)
	External IS Support: extent of having vendor's technical support before and after adoption	External ICTs' Support	(Ramdani & Kawalek, 2007a)
		Outsourcing	(Arbore & Ordanini, 2006)
		External IS Expertise	(Guinea et al., 2005)
		Technology Support Infrastructure	(Scupola, 2003)
		External Experts	(Thong, 2001)
		Vendor Support	(Palvia & Palvia, 1999)
		Outside Support	(Fink, 1998)
		External IS Expertise	(Thong et al., 1996)
		Vendor Support	(Yap et al., 1992)
		Consultant Effectiveness	(Yap et al., 1992)

Outcome Measures of IS Innovation Adoption Research:

According to Lee (2004), different approaches have been used for outcome measures in IS innovations adoption: adoption decision (Thong, 1999), degree of adoption (Cragg & King, 1993; Julien & Raymond, 1994; Iacovou et al., 1995; Premkumar & Roberts, 1999; Thong, 1999), system use (Igbaria et al., 1998), satisfaction (Palvia & Palvia, 1999) and intention to adopt (Harrison et al., 1997). Jeyaraj et al. (2006) indicates most dependent variables used in IS innovations adoption research in the following table.

Table 3:Dependent variables used (Adapted from Jeyaraj et al., 2006).

Dependent variable	Definition
PERCEIVED SYSTEM USE	The amount of use of an innovation by a person or organization. This is a self-report of the frequency of use by the individual or organization.
INTENTION TO USE	A person's or organization's intention to use or adopt an innovation in the future. This is usually measured using forward-looking statements that capture the intent of the person or organization.
ADOPTION	Whether a person or an organization is an adopter or a non-adopter of an innovation. This is usually measured as a binary variable based on self-assessment.
DIFFUSION	The extent to which a person or an organization exploits an innovation. This is usually measured as a percentage of available features used, possible sites adopted, or possible applications.
RATE OF ADOPTION	The diffusion curve over time. This is usually measured as the percentage of adopters in a population.
OUTCOMES	The success of the innovation. This is typically measured as perceived satisfaction or benefits.
ACTUAL SYSTEM USE	The amount of actual use of an innovation by an individual or organization. This is an objective measure typically obtained from logs.
TIME OF ADOPTION	A person's or organization's time of adoption. This is typically measured by an absolute (e.g., 2000) or relative (e.g., 2 years ago) year of adoption.

As stated earlier, the dependent variable used in this study is SMEs adoption of ES, which can be defined as "*whether an SME is an adopter or non-adopter of ES*".

Explanatory Variables & Hypothesis Development:

Technological Context:

Premkumar (2003) argues that there are very few studies that have examined the impact technological characteristics. Rogers' innovation diffusion theory for organisations will be used as a theoretical basis for studying the impact of technological factors. In small business context, Kendall et al. (2001) examined all of the five attributes and concluded that relative advantage, compatibility and trailability are the factors affecting the adoption of e-commerce. Grandon and Pearson (2004) examined the impact of *perceived usefulness* (relative advantage) and *perceived ease-of-use* (complexity) and included *compatibility* as a significant factor. Earlier studies such as Igbaria et al. (1997) used TAM to examine the impact of relative advantage and complexity on IS innovations adoption and usage. Relative advantage, compatibility and complexity, trailability and observability have been examined in previous studies and have been shown to be significant (Table 2). This study intends to examine all of the five technological characteristics proposed by Rogers (2003).

Relative Advantage is defined as "*the degree to which an innovation is perceived as being better than the idea it supersedes*" (Rogers, 2003, pp. 229). Studies have found it to be a significant

variable, positively related to the adoption of IS innovations (e.g. Kuan & Chau, 2001; Grandon & Pearson, 2004). When an IS innovation is perceived to offer relative advantage over the firm's current practice, it is more likely to be adopted (Lee et al., 2004). This view has support in small business research (Cragg & King, 1993; Thong, 1999), as well as in the innovation diffusion literature (Tornatzky & Fleischer, 1990; Moore & Benbasat, 1991). Premkumar & Roberts (1999) argues that a rational adoption decision in an organisation would involve evaluating the advantages of the new technology. ES provide many benefits to adopters in terms of accommodating business growth, improve business processes and reduce business operating and administrative costs (Markus & Tanis, 2000). In a highly competitive marketplace, these benefits make significant motivations for adopting these technologies.

Hypothesis 1. *The greater the perceived relative advantage of ES, the more likely they will be adopted by SMEs.*

The innovation *compatibility* with the business is defined as "*the degree to which an innovation is perceived as consistent with the existing values, past experiences, and needs of potential adopters*" (Rogers, 2003, pp. 240). Premkumar (2003) in his meta-analysis found it to be an important determinant of IS innovations adoption. The adoption of new technologies can bring in significant changes to the work practices of businesses and resistance to change in a normal organisational reaction (Premkumar & Roberts, 1999). Therefore, it is important, especially for small businesses, that the changes are compatible with its values and belief systems.

Hypothesis 2. *The greater the perceived compatibility of ES with current infrastructure, values and beliefs, the more likely they will be adopted by SMEs.*

Complexity is defined as "*the degree to which an innovation is perceived as relatively difficult to understand and use*" (Rogers, 2003, pp. 257). It has been found to be an important determinant in IS innovations adoption in small businesses context (e.g. Thong, 1999; Lertwongsatien & Wongpinunwatana, 2003). The complexity of the technology creates greater uncertainty for successful implementation and therefore increases the risk in the adoption decision (Premkumar & Roberts, 1999). Hence, it is negatively associated with adoption of IS innovations (Cooper & Zmud, 1990; Grover, 1993). The implementation of ES is perceived by many small business owners/mangers as a complex task that can only be dealt with by large firms. The expectation is that when the technology is difficult to adopt, it is less likely to be adopted than technologies that are easier to adopt.

Hypothesis 3. *The lower the perceived complexity of ES, the more likely they will be adopted by SMEs.*

Trailability is defined as "*the degree to which an innovation may be experimented with on limited basis*" (Rogers, 2003, pp. 258). In small business context, Kendall et al. (2001) found trailability to be positively related to e-commerce adoption. The IS innovations under examination

in this study are currently new to the SME market. Therefore, trailability is expected to be exceptionally relevant.

Hypothesis 4. *SMEs with greater ability to experiment with ES before adoption are more likely to adopt them.*

Observability is defined as "*the degree to which the results of an innovation are visible to others*" (Rogers, 2003, pp. 258). This is the only attribute out of the five technological characteristics that has not been found to be positively related to the adoption of IS innovations in small business context. IS innovations that have been seen to make an impact in the industry in which an SME operates is more likely to be viewed in a favourable light.

Hypothesis 5. *The greater the observability of ES in the industry in which an SME operates, the more likely they will be adopted.*

Organisational Context:

The characteristics in the organisational context seem to be the primary focus of many SMEs studies (Premkumar, 2003). *Top management support* has been found to be one of the best predictors of IS innovations adoption by organisations (Jeyaraj et al., 2006). This factor has also been studied in the small business context (Premkumar, 2003; Guinea et al., 2005). Furthermore, *organisational readiness* has been shown as an significant organisational factor that impacts the adoption of IS innovations (Iacovou et al., 1995; Mehrtens et al., 2001). Relevant *IS experience* variable have been examined in many studies (Lertwongsatien & Wongpinunwatana, 2003; Lee, 2004). Finally, empirical evidence on the impact of *size* shows mixed results (Damanpour, 1996; Fink, 1998; Goode & Stevens, 2000; Lertwongsatien & Wongpinunwatana, 2003; Levenburg et al., 2006). Goode and Stevens (2000) study shows that business size, previously the best indicator of technology adoption, was not significantly related to Web adoption.

Jeyaraj et al. (2006) claims that *top management support* stands as the main linkage between individual and organisational IS innovations adoption. They have this variable as one of the best predictors of IS innovations adoption by organisations. Top management can stimulate change by communicating and reinforcing values through an articulated vision for the organisation (Thong, 1999). Moreover, top management can provide adequate resources and capabilities for adoption of new technologies (Rai & Patnayakuni, 1996). Many studies have found top management support to be critical for creating a supportive climate for the adoption of new technologies (e.g. Grover & Goslar, 1993; Premkumar & Roberts, 1999). Top management support is argued to be more critical for communication technologies since the use of these technologies requires the cooperation of the trading partners (Premkumar & Ramamurthy, 1995). In SMEs, the decision-maker is very likely to be in the top management team and therefore should have his/her support to adopt new technology (Premkumar & Roberts, 1999).

Hypothesis 6. *The greater the top management support for ES, the more likely they will be adopted by SMEs.*

Organisational readiness is defined as "*the availability of the needed organisational resources for adoption*" (Iacovou et al., 1995, pp. 467). Kwon & Zmud (1987) asserts that successful IS implementation when sufficient organisational resources (sufficient developer and user time, sufficient funding, sufficient technical skills …etc) are directed, first toward motivation, then toward sustaining the implementation effort. Organisational readiness, as used in previous research on EDI adoption, measures whether a firm has sufficient IS sophistication and financial resources (e.g. Swatman & Swatman, 1991, 1992; Iacovou et al., 1995). Indeed, economic costs and lack of technical knowledge are identified as two of the most important factors that hinder IS growth in small organisations (Cragg & King, 1993). IS sophistication assesses whether a firm is technologically ready to undertake the adoption of an IS innovation, while financial resources express an organisation's capital available for IS investment (Chwelos et al., 2001).

Hypothesis 7. *The greater the financial and technological resources, the more likely ES will be adopted by SMEs.*

Firms that do not have much *IS experience* may be unaware of new technologies or may not want to risk the adoption of new technologies. Dholakia & Kshetri (2002) suggest that technologies already existing in an organisation influence the future adoption of a new technology. They argue that the incremental cost and knowledge required to adopt the Internet, for example, will be much smaller if a firm already owns a computer and a telephone. Moreover, other studies have found that prior IS experience influence the adoption of new technologies (e.g. Fink, 1998; Kuan & Chau, 2001; Lertwongsatien & Wongpinunwatana, 2003).

Hypothesis 8. *The greater the IS expertise available in the organisation, the more likely ES will be adopted by SMEs.*

Organisational *size* has been identified by Jeyaraj et al. (2006) as one of the best predictors of IS innovations adoption by organisations. On the one hand, the typical argument is that larger firms have a greater need, resources, skills and experience and the ability to survive failures than smaller firms (Montazemi, 1988; Yap, 1990; Levenburg et al., 2006). On the other hand, it has been argued that the information revolution favours small firm because their size allows flexibility and agility in competing with larger firms (Grover & Teng, 1992; Jambekar & Pelc, 2002). Small firms "*can begin with virtual office space, electronic mail, 'boundary-less culture' and electronically bring into play all necessary value chains to deliver innovative products or services*" (Jambekar & Pelc, 2002: 135). Empirical evidence shows mixed results. Fink (1998) supports the view that firm size is only a crude indicator and nowadays even micro-firms can utilise IS innovations. Goode and Stevens (2000) study shows that business size, previously the best indicator of technology adoption, was not significantly related to IS innovations adoption.

Hypothesis 9. *The larger the size of the business, the more likely ES will be adopted by SMEs.*

Environmental Context:

IS innovations do not cater for just an internal audience, but also to firm's customers, suppliers and business partner (Premkumar, 2003). Therefore, it is not surprising that

environmental characteristics are increasingly being studied in IS innovations adoption research. The literature includes mixed empirical results on the impact of *industry*. On the one hand, it has been argued that the industry in which the firm operates influences IS innovations adoption (Raymond, 2001). On the other hand, evidence from Levy et al. (2001) study show that the sector has a little influence on IS innovations adoption. Other studies have also examined the impact of *market scope* (Daniel & Grimshaw, 2002; Levenburg et al., 2006) and *competitive pressure* (Premkumar & Roberts, 1999; Daniel & Grimshaw, 2002). Finally, recent studies (Thong, 2001; Guinea et al., 2005) indicate that *external IS support* is a significant factor in the adoption of IS innovations.

It has been argued that the *industry* in which the firm operates influences the adoption of IS innovations (Yap, 1990; Raymond, 2001; Levenburg et al., 2006). Service industries, which relay on the processing of information, depend on information systems (Goode & Stevens, 2000). Retail industries, which relay on the transfer of goods, may have a greater dependence on point-of-sale systems (Premkumar & King, 1994). Manufacturing industry rely more on ERP systems. Martin and Matlay (2001) suspects that knowledge-intensive micro-firms are more likely to adopt IS innovations than similar sized manufacturing firms. Furthermore, Fallon and Moran (2000) showed that IS usage varies not only across sectors (i.e. across SIC codes) but also within constituent sub-sectors. On the other hand, evidence show that the sector has a little influence on IS innovations adoption (Levy et al., 2001). Thong and Yap (1995) could not empirically validate that firms operating in more information-intensive environment are more likely to adopt IS innovations. Similarly, it has been hypothesised that service industry would be the largest adopters of the Web followed by the retail and manufacturing industries (Goode & Stevens, 2000), but the data did not support the hypothesis (Levenburg et al., 2006).

Hypothesis 10. *The industry sector influences the adoption of ES by SMEs.*

Zhu et al. (2003) defines *market scope* as "*the horizontal extent of a firm's operations*" (pp. 254). They argue that the role of market scope as a predictor can be explained from two main perspective. First, internal coordination costs increase as firms expand their market reach due to the increased administrative complexity and information processing (Gurbaxani & Whang, 1991). Business digitisation is claimed to help reduce these costs (Shapiro & Varian, 1999). Second, external costs (search costs and inventory holding costs) would also increase with market scope (Gurbaxani & Whang, 1991). When firms expand their market reach, they incur search costs which include searching for consumers, trading partners, and distributors. They may also incur inventory holding costs as a result of not controlling demand uncertainty in different market segments (Chopra & Meindl, 2001). SMEs adopting ES are expected to decrease external costs. Arguably, firms that serve broader markets are more likely to adopt ES.

Hypothesis 11. *SMEs with greater market scope are more likely to adopt ES.*

Competitive pressure has been identified by Jeyaraj et al. (2006) as one of the best predictors of IS innovations adoption by organisations. Competition in the adopter's industry is generally

perceived to positively influence the adoption of IS innovations (Gatignon & Robertson, 1989). This is argued to be even more evident if the innovation directly affect the competition (e.g. Premkumar & Roberts, 1999; Kuan & Chau, 2001). Previous research has shown that it has become a strategic necessity to have these technologies to compete in the market place (Premkumar & Ramamurthy, 1995). Many small firms are pressurised to adopt systems such as EDI because they are economically dependent on larger firms for their survival. SMEs adopte these systems to create links with their suppliers and to reduce their operations costs and thereby be more competitive in the marketplace (Premkumar & Roberts, 1999).

Hypothesis 12. *The greater the competitive pressure, the more likely ES will be adopted SMEs.*

External IS support refers to the availability of support for implementing and using IS innovations (Premkumar & Roberts, 1999). Although some studies have not found external IS support to be important for IS success (e.g. Raymond, 1985; Delone, 1988), other studies have found that the availability of external support to be positively related to IS innovations adoption (e.g. Fink, 1998; Premkumar & Roberts, 1999). With the popularity of outsourcing and the growth in third party support, firms are more willing to adopt new IS innovations if they feel there is adequate vendor or third party support for the technology (Premkumar & Roberts, 1999).

Hypothesis 13. *The greater the external IS support for ES, the more likely they will be adopted by SMEs.*

Conclusion:

Following the dominant paradigm of IS innovations as well as its revised depiction, the main objective of this paper was to build a conceptual framework that can be used as a theoretical basis for studying SMEs adoption of ES. From reviewing the TOE frameworks that have been used in the literature to study the adoption of other IS innovations, it seems that IS innovations are highly differentiated technologies for which there is not a single adoption model. Therefore, this paper identified the factors that could be included within the TOE framework for SMEs adoption of ES. The identified factors are: relative advantage, compatibility, complexity, trialability, observability, top management support, organisational readiness, IS experience, size, industry, market scope, competitive pressure, and external IS support. By employing a specific research strategy and research method, the identified factors can be empirically tested.

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