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## SME ADOPTION OF ENTERPRISE SYSTEMS IN THE NORTHWEST OF ENGLAND: An Environmental, Technological, and Organizational Perspective

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### Abstract

*The attention of software vendors has moved recently to SMEs (small- to medium-sized enterprises), offering them a vast range of enterprise systems (ES), which were formerly adopted by large firms only. From reviewing information technology innovation adoption literature, it can be argued that IT innovations are highly differentiated technologies for which there is not necessarily a single adoption model. Additionally, the question of why one SME adopts an ES while another does not is still understudied. This study intends to fill this gap by investigating the factors impacting SME adoption of ES. A qualitative approach was adopted in this study involving key decision makers in nine SMEs in the Northwest of England. The contribution of this study is twofold: it provides a framework that can be used as a theoretical basis for studying SME adoption of ES, and it empirically examines the impact of the factors within this framework on SME adoption of ES. The findings of this study confirm that factors impacting the adoption of ES are different from factors impacting SME adoption of other previously studied IT innovations. Contrary to large companies that are mainly affected by organizational factors, this study shows that SMEs are not only affected by environmental factors as previously established, but also affected by technological and organizational factors.*

**Keywords** SMEs, adoption, ICT, enterprise system

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## 1 INTRODUCTION

New information and communication technologies (ICT) such as enterprise systems (ES) provide small- to medium-sized enterprises (SMEs) with opportunities that are largely unexploited. Most small firms still underutilize the potential value of ICT by restricting it to administrative tasks (Brock 2000). The UK Department of Trade and Industry (DTI) literature claims that ICT adoption and implementation is crucial to the survival and growth of the economy in general, and the small-business sector in particular (Martin and Matlay 2001). Although SMEs form a substantial constituent of the global economy and ICT adoption is nowadays economically and strategically feasible for the smallest organizations (Raymond 1989; Thong et al. 1994), limited research has addressed the specifics of new ICT adoption, implementation and use in the context of small firms (Brock 2000; Shiels et al. 2003).

The SMB global model study predicts spending worldwide by SMEs on information technology and telecommunications will exceed U.S.\$1.1 trillion during 2008 (AMI-Partners 2004). Furthermore, predictions are that the global level of spending by SMEs on CRM software packages alone will double, reaching U.S.\$2 billion by 2008 (Datamonitor 2004). As a result, the attention of software vendors has moved to SMEs, offering them a vast range of ES. The question of why one SME adopts an ES while another does not is still understudied. This study intends to fill this gap by answering the following research questions:

- What framework can be used as a theoretical basis for studying SME adoption of ES?
- What is the impact of the identified factors within this theoretical framework on SME adoption of ES?

Before reviewing IT innovation adoption research, the following section gives an overview of SMEs and their ICT adoption.

## 2 SME ADOPTION OF ICT

SMEs are considered to be major economic players and a potent source of national, regional, and local economic growth (Taylor and Murphy 2004). Without a better understanding of the complex processes and the differentiating factors that affect the ICT adoption level, the drive of ICT adoption and development will not successfully contribute to SMEs' competitiveness (Martin and Matlay 2001). There were 4.3 million small business enterprises in the United Kingdom at the start of 2005 representing 99 percent of all business and accounting for more than half of the employment (58.7 percent) and turnover (51.1 percent) in the UK (SBS 2006).

The European Commission defines small businesses based on the number of employees, annual turnover, annual balance sheet total, and level of autonomy (European Commission 2003). Most definitions of SMEs emanate from the 1971 Bolton Committee Report, which defines a small firm as independent, owner-managed, and with small market share (Simpson and Docherty 2004). The DTI categorizes SMEs into micro firms with fewer than 10 employees; small firms with 10 to 49 employees; and medium

sized firms with 50 to 249 employees. Story (1994) argues that the number of employees is considered to be an appropriate measure of SMEs because of the differences in organizational structures that occur with size. Using number of employees as a measure, the European Commission and DTI definitions are compatible and therefore will be used in this study.

New ICT provides SMEs with opportunities that are largely unexploited (Brock 2000; Corso et al. 2001). It is hard nowadays to imagine SMEs operating without some use of ICT. However, SMEs differ in the level of ICT usage (Blackburn and McClure 1998). Southern and Tilley (2000) identify three categories of small firms with different attitudes to ICT.

- *SMEs with low-end ICT use*, where there is not a good fit between ICT and the owner-manager's concept of the business
- *Medium-level ICT users*, with more expertise, separate IT and communications systems, open access to company data (network and files servers), IT in production, e-mail, and a plan for and delegation of the management and routine upgrading of IT
- *High-end ICT users*, leading-edge and innovative IT use, ICT integrated in the business process, a full digital information and communication system, ICT as a formal responsibility with a dedicated manager

ICT is a broad term used to refer to any technology from the simple acquisition of hardware to the full implementation of an enterprise resource planning (ERP) system. This study focuses on enterprise systems (ES), which are defined as "commercial software packages that enable the integration of transaction-oriented data and business processes throughout an organization (and perhaps eventually throughout the entire interorganizational supply chain)" (Markus and Tanis 2000, p. 176). These application software packages started as the support for a variety of transaction-based back-office functions at which time they were called ERP systems (Volkoff et al. 2005). Since then, they have evolved to include support for front-office and interorganizational activities including supply chain management (SCM) and customer relationship management (CRM) (Davenport 2000; Markus and Tanis 2000; Volkoff et al. 2005).

In our definition, ES include ERP, CRM, SCM, and eProcurement software (Shang and Seddon 2002). Markus and Tanis (2000) claim that small firms can benefit technically and strategically from their investment in ES. Business and technical reasons for adopting ES in small firms are highlighted in Table 1.

SMEs differ from large companies in important ways affecting their information-seeking practices (Buonanno et al. 2005; Lang and Calantone 1997). These differences include

- Lack of (or substantially less sophisticated) information system management (Kagan et al. 1990)
- Frequent concentration of information-gathering responsibilities into one or two individuals, rather than the specialization of scanning activities among top executives (Hambrick 1981)
- Lower levels of resource available for information-gathering
- Quantity and quality of available environmental information (Pearce et al. 1982)

**Table 1. Reasons behind SME Adoption and Enterprise Systems (based on Markus and Tannis 2000)**

Business Reasons	Technical Reasons
<ul style="list-style-type: none"> <li>• Accommodate business growth</li> <li>• Acquire multilanguage and multicurrency IT support</li> <li>• Improve informal and/or inefficient business processes</li> <li>• Reduce business operating and administrative expenses</li> <li>• Reduce inventory carrying cost and stockouts</li> <li>• Eliminate delays and errors in filling customers' orders for merged businesses</li> </ul>	<ul style="list-style-type: none"> <li>• Solve Y2K and similar problem</li> <li>• Integrate application cross-functionally</li> <li>• Replace hard-to-maintain interfaces</li> <li>• Reduce software maintenance burden through outsourcing</li> <li>• Eliminate redundant data entry and concomitant errors and difficulty analyzing data</li> <li>• Improve IT architecture</li> <li>• Ease technology capacity constraints</li> <li>• Decrease computer operating costs</li> </ul>

A recent study by Buonanno et al. (2005) found that SMEs disregard financial constraints as the main cause for not adopting an ERP system, suggesting structural and organizational reasons as major ones. This pattern is partially different from what was observed in large companies where the first reason of ERP system non-adoption is organizational. Moreover, the decision process regarding the adoption of ERP systems within SMEs is still more affected by exogenous reasons than business-related factors, contrary to large companies that are more interested in managing process integration and data redundancy/inconsistency through ERP implementation. Before investigating the factors affecting SME adoption of ES, the IT innovation adoption literature will be reviewed.

### 3 IT INNOVATION ADOPTION RESEARCH

IT innovation adoption research has become increasingly popular as IT continues its relentless march into almost every aspect of organizational life (Fichman 2004), and as innovation becomes an important driver of organizational competitiveness (Hamel 1998). A recent review of the predictors, linkages, and biases in IT innovation adoption research by Jeyaraj et al. (2006) highlights that a rich but diverse body of *theoretical* and *empirical* work has accumulated on the adoption and diffusion of IT-based innovations. A large number of theories have been tested, including the theory of reasoned action (Fishbein and Ajzen 1975), the innovation diffusion theory (Rogers 1983), the social cognitive theory (Bandura 1986), the diffusion/implementation model (Kwon and Zmud 1987), the technology acceptance model (TAM) (Davis 1989), the theory of planned behavior (Ajzen 1991), perceived characteristics of innovating (Moore and Benbasat 1991), the tri-core model of IS innovations (Swanson 1994), the innovation diffusion theory for organizations (Rogers 1995), TAM2 (Venkatesh and Davis 2000), and the unified theory of acceptance and use of technology (Venkatesh et al. 2003). Empirically, qualitative (Agarwal and Prasad 1997), quantitative (Igarria and Tan 1997), and a combination of

**Table 2. Theoretical Models Used to Examine SME Adoption of IT Innovations**

Theory	Sources
Technology Acceptance Model (TAM)	Grandon and Pearson (2004) Igbaria et al. (1997)
Theory of Planned Behavior (TPB)	Harrison et al. (1997)
Combined TAM and TPB	Riemenschneider et al. (2003)
TAM2	Venkatesh and Davis (2000)
Innovation Diffusion Theory (IDT)	Cragg and King (1993) Iacovou et al. (1995) Mehrtens et al. (2001) Scupola (2003) Thong et al. (1994)
Resource-Based Theory	Braun (2002) Caldeira and Ward (2003) Chau (2001) Feeny and Willcocks (1998) Grewal (2001) Iacovou et al. (1995) Mata et al. (1995) Mehrtens et al. (2001) Scupola (2003) Thong (2001)
Stage Theory	Daniel et al. (2002) DTI (2001) Levy et al. (2002) Poon and Swatman (1997) Prananto et al. (2003) Rao et al. (2003)
Unified Theory of Acceptance and Use of Technology (UTAUT)	Anderson and Schwager (2003)

both methods (Thong and Yap 1995) have been used. Theories used to examine IT innovation adoption research in a small business context are highlighted in Table 2.

According to Fichman (2004), a dominant research paradigm for IT innovation has emerged. He argues that this dominant paradigm assumes that organizations with a greater quantity of the “right stuff” will exhibit a greater quantity of IT innovation. Although IT innovation adoption research tends 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 impacting the adoption of new IT innovations. Jeyaraj et al. (2006) argue that different theories have been used to examine the organizational adoption of IT innovations. Table 2 highlights the main theories used to examine SME adoption of IT innovations. In order to state the factors impacting the adoption of different IT innovations, the technology–organization–environment frameworks will be reviewed.

## 4 THE TECHNOLOGY–ORGANIZATION–ENVIRONMENT (TOE) FRAMEWORK

Tornatzky and Fleischer (1990) developed the technology–organization–environment (TOE) framework to study adoption of IT innovations. This framework included three aspects of a firm’s context that influence the process by which it adopts and implements IT innovations: technological, organizational, and environmental. The TOE framework can be used to study organizational adoption of IT innovations. These innovations are classified into three types: Type I innovations are confined to the technical tasks; Type II innovations support business administration; and Type III innovations are embedded in the core of the business (Swanson 1994). Taking this typology into consideration, ES can be categorized as Type III innovations because they are embedded in a firm’s core business processes. Shang and Seddon claim “ES... can be used by firms as their primary engine for integrating data, processes and information technology, in real time, across internal and external value chain” (2002, p. 272).

The TOE framework has been examined by a number of empirical studies on various IT innovations (as illustrated in Table 3). From reviewing these empirical studies, it is not clear which factors to include in the TOE framework to study SME adoption of ES. Within the three contexts, it seems that different factors impact the adoption and imple-

**Table 3. TOE Frameworks of SME Adoption of IT Innovations** (Only factors that are shown to be significant are listed in this table)

Authors	ICTs Innovation	Technological Context	Organizational Context	Environmental Context
Lertwongsatien and Wongpinunwatana 2003	Electronic commerce	Technology factors (perceived benefits, perceived compatibility)	Organizational factors (size, top management support for e-commerce, existence of it department)	Organizational environment (competitiveness)
Scupola 2003	Electronic commerce	Electronic commerce barriers, electronic commerce benefits, related technologies	Employees’ is knowledge	Pressure from competitors, buyers, and suppliers; role of government; technology support infrastructure
Kuan and Chau 2001	EDI (electronic data interchange)	Perceived direct benefits	Perceived financial cost, perceived technical competence	Perceived industry pressure, perceived government pressure
Thong 1999	IS (information systems)	IS characteristics (relative advantage/compatibility, complexity)	Organizational characteristics (business size, employee’s is knowledge)	Environmental characteristics (competition)
Fink 1998	IT (information technology)	IT benefits	Organizational culture, in-house IT expertise and resources, IT implementation and selection	External environment, outside support, external resources
Iacovou et al. 1995	EDI	Perceived benefits	Organizational readiness	External pressure

mentation of different IT innovations. In addition, different factors impact the same studied IT innovation (e.g., e-commerce). Thus, extending the TOE framework to study other IT innovations has been suggested (Chau and Tam 1997). As a result, this study investigates the TOE factors that impact SME adoption of ES.

## 5 THEORETICAL FRAMEWORK

From reviewing the IT innovation adoption literature, it can be argued that IT innovations are highly differentiated technologies for which there is not necessarily a single adoption model. Based on the TOE framework discussed earlier, Figure 1 presents a conceptual model of SME adoption of ES.

### 5.1 Technological Context

Premkumar (2003) argues that there are very few studies that have examined the impact of technological characteristics. Rogers' innovation diffusion theory for organizations will be used as a theoretical basis for studying the impact of technological factors. Earlier

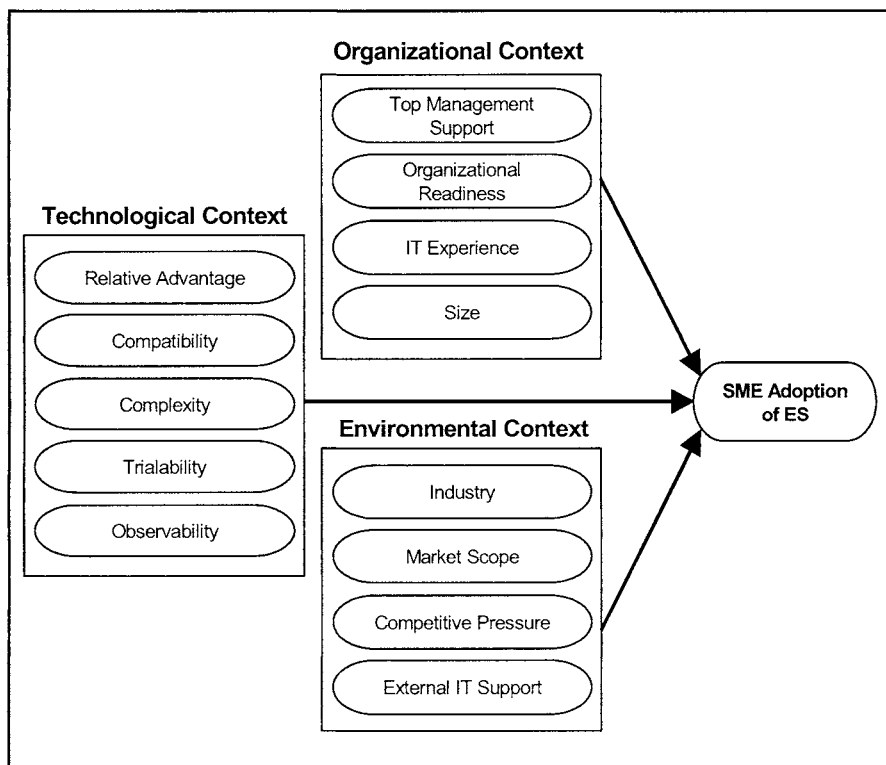


Figure 1. TOE Framework of SME Adoption of Enterprise Systems

studies, such as Igarria et al. (1997), used TAM to examine the impact of *relative advantage* and *complexity* on IT adoption and usage. 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. *Relative advantage*, *compatibility*, and *complexity* have been examined in previous studies, and have been shown to be significant. As an extension, this study intends to examine all five technological characteristics.

## 5.2 Organizational Context

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

## 5.3 Environmental Context

IT 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 IT innovation 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 the adoption of IT innovations (Raymond 2001). On the other hand, evidence from the Levy et al. (2001) study shows that the sector has little influence on ICT adoption. Studies have also examined the impact of *market scope* (Daniel and Grimshaw 2002; Levenburg et al. 2006). In addition, the impact of *competitive pressure* has been examined (Daniel and Grimshaw 2002; Premkumar and Roberts 1999). Finally, recent studies (Guinea et al. 2005; Thong 2001) indicate that *external IT support* is a significant factor in the adoption of IT innovations.

# 6 METHOD

To empirically examine the impact of TOE factors on SME adoption of ES, case studies are a useful approach because of the contemporary nature of ES. This approach is considered to be particularly appropriate when the boundaries of the research are not clear, there is a need to investigate the issue within a real-life context, or the views from a



number of sources need to be examined (Yin 1994). Additionally, case study research provides a means to review theory and practice iteratively (Levy and Powell 2003).

The case studies employed here all examine SMEs located in the Northwest of England. The chosen firms satisfy both of DTI and European Commission definitions of an SME. This a convenient rather than a random sample of SMEs that were selected from manufacturing, retail/wholesale, and services industry sectors because they have greater dependence on IT innovations (Goode and Stevens 2000). The major method of data collection was through face-to-face semi-structured interviews, lasting between one to two hours, with personnel who had been key decision makers regarding IT innovation adoption in the firm (managing director or IT manager). At least two interviews were conducted for each SME. Key personnel were contacted by phone to arrange for an interview. Most interviews were conducted at the firm’s site. The interview questions were formulated to gather information on the factors that impact the adoption of ES within the three contexts of Tornatzky and Fleischer’s model. The questions covered the firm’s background, the level of ICT sophistication and use in the firm, and the impact of TOE factors on ES adoption. Interview were transcribed and reports were sent to the interviewees subsequently for validation and refinement. Moreover, information was gathered from secondary sources such as internal company documentation and firm websites.

To overcome the pro-adoption bias (Rogers 2003), this study focuses on both adopters and non-adopters of ES. Using Rogers’ (2003) adopter categorization on the basis of innovativeness, nine cases have been categorized into three main groups based on the extent to which an SME is relatively earlier to adopt an ES than others (Table 4). First, *early adopters* are firms that have already adopted and implemented ES. Second, *prospectors* are firms that have not adopted ES yet, but intend to adopt at least one of these systems in the next 3 years. Finally, *laggards* are firms that have not adopted ES and do not intend to adopt them in the future. Table 4 briefly describes the investigated SMEs.

**Table 4. Description of SMEs Investigated**

Classification	Firms	Industry	Type of Business	Market Scope	Number of Employees
Early Adopters (Already adopted ES)	F1	Manufacturing	Manufacturer of feeders and controls	International	42
	F2	Manufacturing	Manufacturer and supplier of air filters	National	40
	F3	Retail/Wholesale	Retailer of domestic appliances	Local	15
Prospectors (Intend to adopt ES in next 3 years)	F4	Service	IT and management services consultancy	International	200
	F5	Manufacturing	Food manufacturing	Local	12
	F6	Retail/Wholesale	Retailer of PCs and components	Regional	124
Laggards (Do not intend to adopt ES)	F7	Manufacturing	Manufacturer of paints and powder coatings	International	160
	F8	Service	Change management consultancy	International	5

## 7 EMPIRICAL FINDINGS

An iterative, cyclical model of data analysis was adopted consisting of three components: data reduction, data display (within-case analysis; cross-case analysis), and conclusion drawing/verification (Miles and Huberman 1994). To ensure the robustness of the analysis, data reduction was performed by both authors independently inspecting the interview notes and transcripts. The analysis of the empirical findings is structured around the three contexts outlined in the TOE framework of SME adoption of ES. Relative advantage, compatibility, complexity, trialability, observability, top management support, organizational readiness, IT experience, size, industry, market scope, competitive pressure, and external IT support are factors that impact SME adoption of ES.

### 7.1 Technological Context

This study found that not only relative advantage, compatibility, and complexity, but also trialability and observability are factors impacting SME adoption of ES.

#### 7.1.1 Relative Advantage

On the one hand, findings indicate that laggards seem to be unaware of the benefits of adopting ES. On the other hand, both firms F1 and F2 were aware of the benefits before adopting an ES. F3 claims that benefits that were the initial motive to the adoption of an ES were very limiting, because other benefits, such as quick customer response rate, were not initially stated. Prospectors expressed their concerns with regard to which of the available ES could deliver their business needs.

#### 7.1.2 Compatibility

Firms intending to adopt ES seem to have compatible working styles to those firms who have already adopted ES, whereas firms that do not intend to adopt ES appear to be comfortable with traditional IT systems in place. F7 designed a system internally to take care of the bill-of-materials. F8 expressed its comfort with producing the quotes manually, because of its limited customer base.

#### 7.1.3 Complexity

It has been found that prospectors emphasize the need for systems that are easy-to-use by employees. F5 expressed that systems are too advanced for employees to use. F7 and F9 seem to be deterred from adopting these technologies because ES are perceived to be complex systems for complex organizations. Early adopters of ES have expressed that they are comfortable with the complexity level of the adopted systems.

#### 7.1.4 Trialability

Although this factor has not yet been examined in the small business context, this study has found that the relationship between trialability and the adoption of ES is strong. Both

F1 and F2 had the opportunity to try the system before fully implementing it. Both expressed that having the system on a trial basis contributed to their final decision of adopting ES. The availability of ES on a trial basis would show its performance and would resolve any problems before committing to a full implementation (F2). F5 seem to be willing to try an ES as long as it did not disrupt its daily productivity. All of the firms intending to adopt an ES perceive trialability as a crucial phase before full implementation.

### **7.1.5 Observability**

It has been found that early adopters agree that ES are adopted by many firms in the industry in which they operate. However, laggards are unaware of any firms that adopted such systems. Prospectors seem to have mixed views of the visibility of ES in their industries. On the one hand, F4 seems to be willing to adopt an ERP system even though firms in the same industry have not yet adopted such systems. On the other hand, F5 and F6 have observed other firms implementing ES and have been advised to adopt similar ES.

## **7.2 Organizational Context**

In addition to the technological characteristics mentioned earlier, this study found that top management support, organizational readiness, IT experience, and size are also factors impacting SME adoption of ES.

### **7.2.1 Top Management Support**

It has been found that early adopters have a strong managerial commitment to adopting new technologies. This commitment has been characterized by inviting software companies on-site to demonstrate how the technology can help them manage their operations. However, it was found that laggards and prospectors have less enthusiastic top management compared to early adopters.

### **7.2.2 Organizational Readiness**

This study found that the overall organizational readiness of SMEs is not high enough for the adoption ES. Investing major organizational resources seems to have a strong influence on the adoption of ES (F5 and F6). Companies with very limited resources (F8 and F9) are not intending to adopt ES. F4 has the resources to adopt an ES, but the main reason of not adopting it yet is not being aware of its potential. All three adopting firms appeared to be technologically and financially ready to adopt ES.

### **7.2.3 IT Experience**

According to the classification scheme developed by Southern and Tilley (2000), early adopters can be categorized as high-end ICT users. These firms have integrated ICT in their business process. However, laggards seem to be on the low end of ICT use. F7 has

been operating in the industry for 76 years with a minimal use of ICT and has been doing well without the need for adopting an ES. Prospectors can be categorized as medium-level ICT users. These firms had implemented at least one software application (i.e., accounts). Either they have not found an ES that has all the functions they need (F4 and F6) or they could not commit to any vendor (F5).

#### **7.2.4 Size**

On the one hand, only larger firms were able to adopt ES, as they are more likely to have the necessary resources, skills, knowledge, and experience (Damanpour 1996; Montazemi 1988). Many new technologies are less expensive, require less support infrastructure, and offer firms a way to compete with larger firms (Goode and Stevens 2000). Although the adoption of ES does not strongly depend on company size (F7 is a large non-adopting firm), it has been found that micro-firms are unlikely to adopt ES (F8 and F9). Both F8 and F9 expressed that the need to adopt these systems was not apparent to them since the workload is manageable with the existing systems. Furthermore, F9 expressed that ES are not needed at this stage because it only deals with 10 invoices a week and one or two purchase orders a day.

### **7.3 Environmental Context**

In addition to technological characteristics and organizational characteristics, this study found that industry, market scope, competitive pressure, and external IT support are factors impacting SME adoption of ES.

#### **7.3.1 Industry**

Although Levy et al. (2001) claim that the evidence shows that the sector has a little influence on ICT adoption, the industry of which the SME is a member has been found to be a factor impacting the adoption of IT innovations (Levenburg et al. 2006; Raymond 2001; Yap 1990). Because it has been shown that the industry is a significant factor in the adoption of new IT innovations (Goode and Stevens 2000), this study concentrated on the three industries that make more use of ICT. It has been found that manufacturing and retail/wholesale firms are more likely to adopt ES than firms in the service sector. It has been noted that service industry make use of different systems than manufacturing and retail industries (Premkumar and King 1994; Reich and Benbasat 1990). Although service industries are reliant on information and can be more prolific in the adoption of information systems (Goode and Stevens 2000), this has not been the case in adopting ES.

#### **7.3.2 Market Scope**

With the availability of ICT, smaller firms are able to reach broader markets. It was harder for SMEs to reach broader markets with their limited resources (Levenburg and Klein 2006). Because SMEs are now operating internationally, there is a clear need for SMEs to adopt ES in order to reduce costs and accommodate their business growth.

Even though laggards are operating internationally, they still have no plans to adopt ES. All of the firms intending to adopt ES have expressed their intentions for market expansion.

### **7.3.3 Competitive Pressure**

The use of IT innovations to respond to competitors, provide enhanced customer service, and improve relationship with suppliers were driving the uptake by smaller businesses compared to their larger counterparts (Daniel and Grimshaw 2002). Early adopters expressed that one of the main reasons for adopting ES is competitive pressure. F3 argues that if an SME is willing to continue operating, it has to be up-to-date with IT market offerings. Also, F1 stressed that if direct competitors are faster in adopting ES, they have a better chance to increase their market share. Firms not intending to adopt ES seem to have less pressure although operating internationally. One reason for this could be the business niche that these SMEs serve.

### **7.3.4 External IT Support**

Driven by the need for lower costs, faster implementation, easier-to-use applications and effective use of scarce resources, internal information system development is increasingly moving to an external development and provision model: outsourcing (Ward and Peppard 2002). Lockett et al. (2006) emphasize that the provision of hosted applications by ASPs (application service providers), on a rented basis is viewed as being of particular relevance to SMEs. None of the early adopters has a hosted ES, but they still seek IT support from the leasing vendors. F4 is considering adopting a hosted ES. However, F5 expressed their concern with hosted ES and stated that it would only invest in client/server in-house ES.

## **8 DISCUSSION OF FINDINGS**

This study has shown that the TOE framework can be used as a theoretical basis for understanding the factors impacting SME adoption of new IT innovations. The application of this framework has contributed to the discussion of the impact of technological, organizational and environmental factors on SME adoption of ES. Previous studies have focused on factors affecting other IT innovations (see Table 5). This study has shown that factors impacting the adoption of ES are different from factors impacting SME adoption of other, previously studied IT innovations such as e-commerce and EDI. Relative advantage, compatibility, complexity, trialability, observability, top management support, organizational readiness, IT experience, size, industry, market scope, competitive pressure, and external IT support are found to be factors impacting SME adoption of ES.

With regard to the technological context, this study has found that relative advantage, compatibility complexity, trialability, and observability impact SME adoption of ES. Relative advantage and compatibility have been shown to impact previously studied IT innovations (Table 5). This study has highlighted the need for SMEs to be aware of the relative advantage of ES, and the need for these systems to be compatible

**Table 5. Different Factors Impacting the Adoption of Different IT Innovations**

Factors	Studies of the Factors Impacting Different IT Innovations				
	IT	IS	EDI	E-Commerce	ES
Relative Advantage	Fink 1998	Thong 1999	Iacovou et al. 1995; Kuan and Chau 2001	Lertwongsatien & Wongpinunqatana 2003; Scupola 2003	<i>Current study</i>
Compatibility		Thong 1999		Lertwongsatien & Wongpinunqatana 2003	<i>Current study</i>
Complexity		Thong 1999			<i>Current study</i>
Trailability					<i>Current study</i>
Observability					<i>Current study</i>
Top Management Support				Lertwongsatien & Wongpinunqatana 2003	<i>Current study</i>
Organizational Readiness	Fink 1998		Iacovou et al. 1995; Kuan and Chau 2001		<i>Current study</i>
IT Experience		Thong 1999		Lertwongsatien & Wongpinunqatana 2003; Scupola 2003	<i>Current study</i>
Size		Thong 1999		Lertwongsatien & Wongpinunqatana 2003	<i>Current study</i>
Organizational Culture	Fink 1998				
IT Implem. and Selection	Fink 1998				
Location				Scupola 2003	
Industry					<i>Current study</i>
Market Scope					<i>Current study</i>
Competitive Pressure		Thong 1999	Kuan and Chau 2001	Lertwongsatien & Wongpinunqatana 2003; Scupola 2003	<i>Current study</i>
External IT Support	Fink 1998				<i>Current study</i>
Government Pressure			Kuan and Chau 2001	Scupola 2003	
External Environment	Fink 1998		Iacovou et al. 1995		
External Resources	Fink 1998				

with their existing IT systems. Although complexity does not seem to matter in studying information technology, EDI, and e-commerce, this study emphasizes the need for these new technologies to be easy-to-use. One misconception SMEs have about ES is that these technologies are created for complex organizations. It seems that SMEs are not only unaware of the relative advantage of these technologies, but they seem to be unaware of the complexity level of these systems. Unlike previously studied IT innovations, it has been found that SME adoption of ES is highly dependent on whether it is

possible for an SME to adopt an ES on a trial basis and observe its adoption by other firms in the same industry. This might be due to the high risk involved in implementing such technologies. Adopting an ES might affect not only the day to day operations of a small business, it may cause a total breakdown that an SME cannot afford. Most of the non-adopting SMEs are comfortable with their existing IT systems. Prospective adopters appear to be willing to adopt ES as long as they have the opportunity to try these systems out before committing to fully implementing them.

With regard to the organizational context, this study found that top management support, IT experience, organizational readiness and size impact SME adoption of ES. Non of the previously studied IT innovations has emphasized the importance of top management support apart from the e-commerce study (Lertwongsatien and Wongpinunwatana 2003). Without top management commitment and support, SMEs will not adopt ES. Academic and industry literature cannot overemphasize the importance of adopting ES. However, it is not possible for top management of an SME to support the adoption of ES unless they observe the relative advantage of adopting such technologies, which can be achieved by allowing SMEs to test these systems. Investing organizational resources to adopt ES might be one of the difficult decisions taken by top management of an SME. It has been shown that IT and EDI were technologies that needed organizations to be ready technologically and financially before adopting them. In the case of ES adoption, SMEs still consider their organizational readiness as an important factor in deciding whether to adopt ES. Having relevant IT experience is perceived by SMEs to be an important factor in helping them decide which system to adopt from the wide range of available ES. Size has been shown to be a significant factor in adopting IS and e-commerce. In the case of ES adoption, micro-firms were found to be unwilling to adopt ES. This might be because they are not technologically and financially ready to adopt such systems. Also, it might be because they do not need these systems at this early stage of their business growth.

With regard to the environmental context, this study found that industry, market scope, competitive pressure, and external IT support impact SME adoption of ES. Unlike previously studied IT innovations, this study has shown the importance of industry and market scope in SME adoption of ES. It has been found that the manufacturing and retail/wholesale industries are more likely to adopt ES than firms in the service sector. This might be because ES are more relevant to the manufacturing and retail/wholesale industries. Firms in the service sector do not seem to need such systems because of the nature of their business operations. Also, it has been found that the wider the market area in which an SME operates, the more likely it is to adopt an ES to support its business operations. Like other previously studied IT innovations, competitive pressure is shown to be an important factor. Finally, external IT support can prove to be the most challenging factor for vendors, since SMEs intending to adopt ES are willing to adopt hosted ES.

## **9 CONCLUSIONS AND LIMITATIONS**

IT innovations are highly differentiated technologies for which there is not a single adoption model. Contrary to large companies that are mainly affected by organizational factors, this study shows that SMEs are not only affected by environmental factors as

previously established, but also affected by technological and organizational factors. This study also confirms that factors impacting the adoption of ES are different from factors impacting SME adoption of other previously studied IT innovations. Using the TOE framework as a theoretical basis, the major contribution of this study is highlighting these factors, which are relative advantage, compatibility, complexity, trialability, observability, top management support, organizational readiness, IT experience, size, industry, market scope, competitive pressure, and external IT support.

The main implications for this study are twofold.

- Software vendors can increase ES rate of adoption among SMEs by offering trial periods before full implementation of ES. This would create awareness and demonstrate what an ES can do for an SME. Also, an SME will be able to assess an ES compatibility with its existing systems and examine the ES complexity level. Once these systems are adopted, their visibility in different sectors will increase.
- Because of the heterogeneity of SMEs, software vendors should not only consider segmenting SME market according to size, but also consider the industry sector. Targeting specific industries will help ES vendors understand further what SMEs need and increase the take-up of industry-specific ES.

The key limitations of this study are as follows. First, the study focused on a limited geographical area, which makes it difficult to generalize the results to other UK regions. Second, although the small number of the investigated cases has drawn a good picture of the factors impacting SME adoption of ES, a survey with a large sample would help generalize the results in the region. Third, this study focused only on adoption. To gain a holistic understanding of ES, the implementation process and the impact of ES adoption on firm performance should also be examined. With the recent popularity of hosted software applications (Lockett et al. 2006), future studies could empirically examine further the factors impacting the adoption of these technologies and how they differ from the findings presented in this study. Finally, because factors impacting adoption of ES are different from factors impacting SME adoption of previously studied IT innovations, future research could examine factors impacting the adoption of new IT innovations.

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