KNOWLEDGE MANAGEMENT AND ENTERPRISE SYSTEMS ADOPTION BY SMES

Predicting SMEs’ adoption of enterprise systems

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Abstract
Purpose – The purpose of this paper is to develop a model that can be used to predict which small to medium-sized enterprises (SMEs) are more likely to become adopters of enterprise systems (ERP, CRM, SCM and e-procurement).

Design/methodology/approach – Direct interviews were used to collect data from a random sample of SMEs located in the Northwest of England. Using logistic regression, 102 responses were analysed.

Findings – The results reveal that the factors influencing SMEs’ adoption of enterprise systems are different from the factors influencing SMEs’ adoption of other previously studied information systems (IS) innovations. SMEs were found to be more influenced by technological and organisational factors than environmental factors. Moreover, the results indicate that firms with a greater perceived relative advantage, a greater ability to experiment with these systems before adoption, greater top management support, greater organisational readiness and a larger size are predicted to become adopters of enterprise systems.

Research limitations/implications – Although this study focused on the factors that influence SMEs’ adoption of a set of enterprise systems (i.e. ERP, CRM, SCM and e-procurement), it fails to differentiate between factors that influence each of these systems.

Practical implications – The model can be used to assist software vendors not only to develop marketing strategies that can target potential adopters, but also to develop strategies to increase the adoption of ES among SMEs.

Originality/value – The paper contributes to the continuing research in IS innovations adoption/diffusion in the small business context.

Keywords Small to medium-sized enterprises, Innovation, Information systems

Paper type Research paper

Introduction
Small and medium-sized enterprises (or SMEs) are considered as major economic players and a potent source of national, regional and local economic growth (Taylor and Murphy, 2004). SMEs differ from large companies in important ways affecting their information-seeking practices (Buonanno et al., 2005, Lang and Calantone, 1997). Thus, the adoption of information systems (IS) innovations in SMEs cannot be a miniaturised version of larger organisations. Enterprise systems (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 organization (and perhaps eventually throughout the entire interorganizational supply chain)” (Markus and Tanis, 2000, p. 176). In our definition, ES include enterprise resource planning (ERP), customer relationship management (CRM), supply chain management (SCM), and e-procurement systems (Shang and Seddon, 2002). Without a better understanding of the complex processes and the differentiating factors that affect the adoption level of IS innovations, the drive to adopt and develop IS innovations will not successfully contribute to SMEs’ competitiveness (Martin and Matlay, 2001).

The “SMB Global Model” study by AMI Partners (2004) predicts that SMEs’ spending worldwide on IT and telecommunications will exceed $ US1.1 trillion during 2008. Furthermore, it is predicted that the global level of SMEs’ spending on CRM software packages alone will double to reach $ US2 billion by 2008 (Datamonitor, 2004). As a result, the attention of software vendors has moved to the SME market, offering them a vast range of ES (Ramdani and Kawalek, 2007a). The question of why some SMEs choose to adopt ES while seemingly similar others facing the same market conditions do not is still under-studied. This study intends to fill this gap by developing a model that can be used to predict which SMEs are more likely to become adopters of ES.

**Research model**

Many theoretical models have been used to examine SMEs’ adoption of IS innovations:

- the Technology Acceptance Model (TAM) (e.g. Grandon and Pearson, 2004);
- the Theory of Planned Behaviour (TPB) (e.g. Harrison et al., 1997);
- combined TAM and TPB (e.g. Riemenschneider et al., 2003);
- TAM2 (e.g. Venkatesh, 2000);
- innovation diffusion theory (e.g. Premkumar, 2003);
- the resource-based view (e.g. Mehrtens et al., 2001);
- stage theory (e.g. Poon and Swatman, 1999); and
- the Unified Theory of Acceptance and Use of Technology (UTAUT) (e.g. Anderson and Schwager, 2004).

From reviewing these models (Ramdani and Kawalek, 2007b), IS innovation adoption/diffusion research typically evaluates various technological, organisational, and environmental factors that facilitate or inhibit adoption/diffusion. The technology-organisation-environment (TOE) framework developed by Tornatzky and Fleischer (1990) (see Figure 1) has been tested and validated by many studies (e.g. Kuan and Chau, 2001; Premkumar and Roberts, 1999; Iacovou et al., 1995). This framework has also been claimed to be a generic theory of technology adoption/diffusion (Zhu et al., 2003) that can be used to study SMEs’ adoption of ES (Ramdani and Kawalek, 2007a). This study will use this framework to develop a model that can be used to predict which SMEs are more likely to become adopters of ES.

**Technological context**

Premkumar (2003) argues that there are very few studies that have examined the impact technological characteristics in the context of small business. Rogers’ (2003)
innovation diffusion theory for organisations will be used as a theoretical basis for studying the impact of technological factors on SMEs' adoption of ES.

“Relative advantage” is defined as “the degree to which an innovation is perceived as being better than the idea it supersedes” (Rogers, 2003, p. 229). Studies found this variable to be positively related to the adoption of IS innovations (e.g. Grandon and 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). ES provide many benefits to adopters in terms of accommodating business growth, improving business processes and reducing business operating and administrative costs (Markus and Tanis, 2000). In a highly competitive marketplace, these benefits make significant motivations for adopting these technologies.

**H1.** The greater the perceived relative advantage of ES, the more likely they will be adopted by SMEs.

Compatibility of an innovation with a 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, p. 240). Premkumar (2003) found compatibility to be an important determinant of IS innovation adoption. The adoption of new technologies can bring significant changes to the work practices of businesses and resistance to change is a normal organisational reaction (Premkumar and Roberts, 1999). Therefore, it is important, especially for small businesses, that the changes are compatible with its infrastructure, values and beliefs.

**H2.** 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, p. 257). The complexity of the
technology creates greater uncertainty for successful implementation and therefore increases the risk in the adoption decision (Premkumar and Roberts, 1999). This factor has been found to be negatively associated with the adoption of IS innovations (e.g. Grover, 1993). It has also been found to be an important determinant of the adoption of IS innovations in the context of small business (e.g. Thong, 1999).

**H3.** The lower the perceived complexity of ES, the more likely they will be adopted by SMEs.

“Trialability” is defined as “the degree to which an innovation may be experimented with on limited basis” (Rogers, 2003, p. 258). In the context of small businesses, Kendall et al. (2001) found trialability to be positively related to e-commerce adoption. The IS innovations under examination in this study are currently new to the SME market. Hence, trialability is expected to be exceptionally relevant.

**H4.** SMEs with a 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, p. 258). In the context of small business, observability 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. IS innovations that have been seen to make an impact in the industry in which an SME operates are more likely to be viewed in a favourable light.

**H5.** 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 studies in the context of small business (Premkumar, 2003). Top management support, organisational readiness, IS experience and size are considered to be factors that influence SMEs’ adoption of ES.

Jeyaraj et al. (2006) found top management support to be one of the best predictors of organisational adoption of IS innovations. Top management can stimulate change by communicating and reinforcing values through an articulated vision for the organisation (Thong, 1999). Many studies found top management support to be critical for creating a supportive climate for the adoption of new technologies (e.g. Premkumar and Roberts, 1999). In the context of small businesses, the decision-maker is very likely to be in the top management team and his/her support is vital for the adoption to take place.

**H6.** 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, p. 467). Organisational readiness, as used in previous research on electronic data interchange (EDI) adoption, measures whether a firm has sufficient IS sophistication and financial resources (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 and King,
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 to invest in an IS innovation (Chwelos et al., 2001).

**H7.** 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 take a risk to adopt them. Dholakia and 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. Kuan and Chau, 2001).

**H8.** 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 organisational adoption of IS innovations. Goode and Stevens (2000) show that business size, previously the best indicator of technology adoption, was not significantly related to IS innovation adoption. However, the typical argument is that larger firms have a greater need, resources, skills and experience and the ability to survive failures than smaller firms (Levenburg et al., 2006). It can be argued that larger firms are more likely to adopt ES.

**H9.** The larger the size of the business, the more likely ES will be adopted by SMEs.

**Environmental context**

Industry, market scope, competitive pressure and external IS support are considered to be factors that influence SMEs’ adoption of ES.

It has been argued that the industry in which the firm operates influences the adoption of IS innovations (Levenburg et al., 2006). Service industries, which rely on the processing of information, depend on IS innovations (Goode and Stevens, 2000). Retail industries, which rely on the transfer of goods, may have a greater dependence on point-of-sale systems (Premkumar and King, 1994). Manufacturing industry rely more on ERP systems. It has been shown that usage of IS innovations varies not only across sectors (i.e. across Standard Industrial Classification codes), but also within constituent sub-sectors.

**H10.** The industry sector influences the adoption of ES by SMEs.

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

H11. 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 organisational adoption of IS innovations. Competition in the adopter’s industry is generally perceived to positively influence the adoption of IS innovations (Gatignon and Robertson, 1989). This is argued to be even more evident if the innovation directly affects the competition (Kuan and Chau, 2001). Premkumar and Ramamurthy (1995) claim that it can become a strategic necessity to adopt new technologies to compete in the market place.

H12. The greater the competitive pressure, the more likely ES will be adopted by SMEs.

External IS support refers to the availability of support for implementing and using IS innovations (Premkumar and Roberts, 1999). External IS support has not only been found to be an important determinant of IS success (e.g. Delone, 1988), but also to be positively related to IS innovation adoption (e.g. Premkumar and Roberts, 1999). With the popularity of outsourcing and the growth of third-party support, firms are more willing to adopt new IS innovations if they feel there is adequate vendor or third-party support.

H13. The greater the external IS support for ES, the more likely they will be adopted by SMEs.

The research method
The following section details the research method used to test the hypotheses including measurement, data collection and sampling.

Measurement
Measures are presented in Table I. Most of the measures were obtained from previous research, and their validity and reliability have been demonstrated.

Data collection
Using the FAME (Financial Analysis Made Easy) database, a random sample of 300 SMEs was chosen in the Northwest of England. Firms with fewer than 250 employees were considered to be SMEs. This study used direct interviews to collect information from the owner/manager or the IS manager in the company. Although interviewer-administered surveys are expensive and time consuming, it was preferred because it allowed us to gain a fairly good response rate. Because the questions about ES are of a contemporary nature, this technique was useful because it enabled the interviewer to correct any ambiguities and unfold any issues raised by respondents.

In conducting the interviews, letters were sent to all firms in our sample frame followed by calls to invite them to participate in the study. Firms with positive responses were asked to provide a date for the researcher to visit the company site and conduct the interview. The respondents were informed that their participation was voluntary and the
information they provided was confidential. A total of 110 firms participated in this study with interviews lasting for an average of one hour. Firms that had already adopted ES (eight firms) were excluded, because this study focuses on the pre-adoption phase of the ES adoption/diffusion process. Forty-three firms had gone out of business and could no longer be reached. The study ended up with 102 usable responses, which means the response rate achieved in this study was about 40 per cent. Compared to the response rate standard of 60 per cent suggested by Curran and Blackburn (2001), this study’s response rate is not high but falls in line with – and even better in some cases – than previous studies (e.g. Grandon and Pearson, 2004, Thong et al., 1996, Premkumar and Potter, 1995).

**Sample characteristics**

The characteristics of the sample are shown in Table II. The sample included firms of varying sizes and from several industry sectors.

**Validity and reliability**

The validity and reliability of the constructs were tested to ensure that the measurements were accurate. Validity refers to how accurately the construct reflects

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<table>
<thead>
<tr>
<th>Concept</th>
<th>Operational measure</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variable</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 = Decision to adopt ES</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0 = Decision to reject ES</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Independent variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative advantage (RA)</td>
<td>Multi-items</td>
<td>Moore and Benbasat (1991)</td>
</tr>
<tr>
<td>Compatibility (CM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complexity (CX)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trialability (TR)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observability (OB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top management support (TMS)</td>
<td>Multi-items</td>
<td>Yap et al. (1994)</td>
</tr>
<tr>
<td>IS experience (ISE)</td>
<td>1 = Low IS users</td>
<td>Southern and Tilley (2000)</td>
</tr>
<tr>
<td></td>
<td>2 = Medium IS users</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 = High IS users</td>
<td></td>
</tr>
<tr>
<td>1 = 0-9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 = 10-49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 = 50-249</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>1 = Manufacturing</td>
<td>Goode and Stevens (2000)</td>
</tr>
<tr>
<td></td>
<td>2 = Retail/wholesale</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 = Services</td>
<td></td>
</tr>
<tr>
<td>Market scope (MS)</td>
<td>1 = Local</td>
<td>Buonanno et al. (2005)</td>
</tr>
<tr>
<td></td>
<td>2 = Regional</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 = National</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 = International</td>
<td></td>
</tr>
<tr>
<td>Competitive pressure (CP)</td>
<td>Multi-items</td>
<td>Premkumar and Roberts (1999)</td>
</tr>
<tr>
<td>External IS support (EISS)</td>
<td>Multi-items</td>
<td>Yap et al. (1994)</td>
</tr>
</tbody>
</table>

Table I. Operationalisation of key variables
what it intends to measure, and reliability refers to the consistency of the results obtained. According to Ghauri and Grønhaug (2002), several criteria can be used to judge construct validity:

- face validity;
- convergent validity; and
- divergent validity.

Face validity was ensured by consulting experts in the field and pilot testing the questionnaires with SMEs’ owners/mangers before carrying out the main study. This ensured that any ambiguities in measurements were corrected, as well as the correct capture of the concepts used in this study. Moreover, construct validity is ensured by taking into account the usage principle (Babbie, 2007). The operational measures used in this study were taken from previous work in the field that was published in reputable academic journals. The reliability of the construct was assessed using Cronbach’s $\alpha$. The results (see Table III) indicate that all of the variables have values greater than the cut-off value of 0.7 suggested by Nunnally (1978). Reliability was also ensured by using face-to-face interviews, in which the interviewer ensures that each respondent answers the same questions.

**Results**

Because the research model uses a dichotomous dependent variable and a mixture of continuous and dichotomous independent variables, the logit model was used to

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Number of firms</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of employees</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 10</td>
<td>35</td>
<td>34.3</td>
</tr>
<tr>
<td>10-49</td>
<td>34</td>
<td>33.3</td>
</tr>
<tr>
<td>50-249</td>
<td>33</td>
<td>32.4</td>
</tr>
<tr>
<td>Industry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>30</td>
<td>29.4</td>
</tr>
<tr>
<td>Retail and wholesale</td>
<td>35</td>
<td>34.3</td>
</tr>
<tr>
<td>Real estate services</td>
<td>37</td>
<td>36.3</td>
</tr>
</tbody>
</table>

Table II. Sample characteristics ($n = 102$)

<table>
<thead>
<tr>
<th>Construct</th>
<th>Number of items</th>
<th>Cronbach’s $\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative advantage</td>
<td>5</td>
<td>0.95</td>
</tr>
<tr>
<td>Compatibility</td>
<td>3</td>
<td>0.92</td>
</tr>
<tr>
<td>Complexity</td>
<td>4</td>
<td>0.72</td>
</tr>
<tr>
<td>Trialability</td>
<td>2</td>
<td>0.75</td>
</tr>
<tr>
<td>Observability</td>
<td>2</td>
<td>0.80</td>
</tr>
<tr>
<td>Top management support</td>
<td>4</td>
<td>0.83</td>
</tr>
<tr>
<td>Organisational readiness</td>
<td>2</td>
<td>0.84</td>
</tr>
<tr>
<td>Competitive pressure</td>
<td>2</td>
<td>0.73</td>
</tr>
<tr>
<td>External IS support</td>
<td>5</td>
<td>0.88</td>
</tr>
</tbody>
</table>

Table III. Reliability analysis
validate the research model empirically. Similar models have been developed in the literature to study the adoption of IS innovations, for example:

- communication technologies (Premkumar, 2003);
- electronic business (Zhu et al., 2003);
- EDI (Kuan and Chau, 2001); and
- open systems (Chau and Tam, 1997).

Based on the TOE framework of SMEs’ adoption of ES, the logit model is specified as follows:

\[
\ln \left( \frac{P_i}{1 - P_i} \right) = \beta_0 + \beta_1 \cdot RA_i + \beta_2 \cdot CM_i + \beta_3 \cdot CX_i + \beta_4 \cdot TR_i + \beta_5 \cdot OB_i + \beta_6 \cdot TMS_i + \beta_7 \cdot IR_i + \beta_8 \cdot ISE_i + \beta_9 \cdot Size_i + \beta_{10} \cdot Industry_i + \beta_{11} \cdot MS_i + \beta_{12} \cdot CP_i + \beta_{13} \cdot EISS_i + \epsilon_i
\]

Logit analysis is a preferred technique because it does not assume equal variance-covariance matrices across groups and multivariate normality of the variables (Hair et al., 1998). Moreover, the output from the analysis is very similar to regression and is therefore easier to draw inferences. Logit uses a binomial probability function for the dichotomous dependent variable and estimates whether it is one way or the other using an odds ratio. Unlike regression, where we try to minimise the squared deviations, in logit we maximise the likelihood of a firm adopting IS innovations (Premkumar, 2003).

Table IV illustrates the logit analysis results, which indicate that the goodness of fit of the overall model is very good. The model $R^2$ is 43 per cent, which means that 43 per cent of the variation in the dependent variable is explained by the model. Nagelkerke $R^2$ and Cox and Snell $R^2$ are also measures of the goodness of fit. Hair et al. (1998) argues that the Cox and Snell $R^2$ is reported less frequently because it cannot reach the maximum value of 1. The current model Nagelkerke $R^2$ is 0.59, which is fairly high, suggesting a good fit for the model. This value is in line with previous work (e.g. Premkumar, 2003). The predictive power of the model is very good, with an overall accuracy of 81.4 percent.

As a test of robustness of the results, the model was tested on a sample of 92 observations, dropping ten observations arbitrarily (Hair et al., 1998). The coefficients and their statistical significance remained almost unaffected by this action, and only marginal changes occurred in the values of some coefficients, but they were not strong enough to alter the results presented in the model with the full sample size. In addition, only marginal changes in the coefficients and their statistical significance occurred when the model was also restricted to only the statistically significant variables.

**Discussion**

Among the independent variables relative advantage, trialability, top management support, organisational readiness and size have been found to be significant determinants of SMEs’ adoption of ES. Surprisingly, environmental factors have been found to be insignificant. While this result contradicts the findings of a recent study by Buonanno et al. (2005) emphasising that the decision process regarding the adoption of ERP systems within SMEs is more affected by exogenous reasons than business-related factors, it is consistent with the findings of a study by Lee (2004) suggesting that SMEs decisions are based on internally important factors.
The most significant variable, which is constantly found to be critical in IS innovation adoption, is top management support. In SMEs, the primary decision maker is the owner/manager of the business, and his or her support is key in the adoption of new IS innovations. This consistent with prior studies (e.g. Premkumar, 2003, Premkumar and Roberts, 1999). Firms are argued to adopt technology only if they perceive a need for the technology to overcome a perceived performance gap or exploit a business opportunity (Premkumar and Roberts, 1999). Relative advantage has been found to be a significant factor influencing SMEs’ adoption of ES. This is consistent with results from previous research that have found relative advantage to be a significant variable in the adoption of other IS innovations (e.g. Kuan and Chau, 2001, Iacovou et al., 1995).

Trialability has been found to be another significant technological factor influencing SMEs’ adoption of ES. Unlike other IS innovations, ES seem to be technologies that SMEs would like to experiment with before adoption. The availability of ES on a trial basis can assist SMEs in their decision to adopt these systems. This means that SMEs will be able to assess the performance of ES and will be able to resolve any problems before committing to fully implementing these systems (Ramdani and Kawalek, 2007a). The results indicate that size still plays an important role, and larger firms in
the small business category have a greater propensity to adopt ES. This is consistent with previous studies that have found size to be a critical factor in the adoption of IS innovations (e.g. Premkumar and Roberts, 1999, Thong, 1999). Another significant organisational factor is organisational readiness, suggesting that without sufficient technological and financial resources, SMEs will not be able to adopt ES. This is consistent with previous studies (e.g. Iacovou et al., 1995).

The remaining technological variables (compatibility, complexity and observability) have been found to be insignificant attributes in SMEs’ adoption of ES. The insignificance of compatibility, as established previously by Grandon and Pearson (2004), might be because SMEs do not worry about integrating their applications because they do not have so many. A recent study by Karahanna et al. (2006) suggests revisiting the compatibility construct. Complexity has also been found to be insignificant. This is in line with previous studies (e.g. Kendall et al., 2001), indicating that SMEs do not worry about how easy these systems are to operate, since ES are becoming easier to adopt, implement and use. The insignificance of observability might be due to the way in which ES develop in certain industries (Kendall et al., 2001). Alternatively, observability may have been operationalised inadequately, since Moore and Benbasat (1991) divided observability into two constructs:

1. visibility; and
2. result demonstrability.

The influence of the organisational readiness variable may have lessened the influence of IS experience, which has been found to be insignificant. This finding is in line with previous studies (e.g. Kuan and Chau, 2001, Iacovou et al., 1995).

Surprisingly, none of the environmental characteristics seem to influence SMEs’ adoption of ES. This study is in line with previously studied TOE frameworks (e.g. Kuan and Chau, 2001, Thong, 1999), which had shown industry and market scope to be insignificant. With regard to industry, this study shows that this variable has no influence on ES adoption. This may be because all of the chosen industry sectors make more use of IS innovations than other sectors, which makes it difficult to differentiate between adopters and non-adopters. Market scope has also been found to be insignificant in SMEs’ adoption of ES, which could be because of the limited number of investigated SMEs – hence the need for more research to determine the reasons behind this result. Competitive pressure turned out to be insignificant. This is inline with the findings of Premkumar and Roberts (1999), who concluded that competitive pressure is less influential in making adoption decisions in small businesses. Lee (2004) argues that small businesses are concerned with other aspects of technology than its contribution to the competitive power of the firm. External IS support has been found to be insignificant. Premkumar and Roberts (1999) explained that a few variables may have had such an overwhelming influence on the adoption decision that they lessened the influence of other variables.

**Conclusion**

IS innovations are highly differentiated technologies for which there is not necessarily a single adoption model (Ramdani and Kawalek, 2007a). Contrary to what the literature states, SMEs are more influenced by technological and organisational factors than environmental factors in their adoption of ES. These findings assert further that factors influencing the adoption of ES are different from factors influencing SMEs’
adoption of other previously studied IS innovations. The major contribution of this study is statistically validating the factors influencing SMEs’ adoption of ES. Thus, it can be predicted that SMEs with a greater perceived relative advantage, a greater ability to experiment with ES before adoption, greater top management support, greater organisational readiness and a larger size are more likely to become adopters of ES. These findings have significant practical implications for software vendors. The model can be used to assist software vendors not only to develop marketing strategies that would target potential adopters, but also to develop strategies to increase the adoption of ES among SMEs.

The key limitations of this study are as follows. First, although this study focused on the factors that influence SMEs’ adoption of a set of systems (i.e. ERP, CRM, SCM and e-procurement), it fails to differentiate between factors that influence each of these systems. Second, the study focused on a limited geographical area, which makes it difficult to generalise the results to other UK regions. It would be interesting to look at the issues under consideration from a comparative perspective (e.g. regional, among countries). Third, this study focused on the pre-adoption phase of ES innovation/diffusion process. To gain a more holistic understanding, post-adoption phases should also be examined. Fourth, this study focused on three industries only. It would be interesting to see whether firms in other industry sectors are influenced by the same factors. Fifth, some variables in our empirical analysis have been assumed to pale the influence of other variables. Future research may use other techniques such as structural equation modelling (e.g. Pflugheoft et al., 2003, Riemenschneider et al., 2003) to investigate the interaction among the variables. Other IS innovations such as broadband (Ramdani and Kawalek, 2008) need to be investigated further. Finally, with the recent popularity of hosted software applications (Lockett et al., 2006), future studies could examine empirically the factors influencing the adoption of these technologies and how they differ from the findings presented in this study.

References


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