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SMEs & IS innovations adoption: A review & assessment of previous research
Academia. Revista Latinoamericana de Administración, núm. 39, junio, 2007, pp. 47-70
Consejo Latinoamericano de Escuelas de Administración
Bogotá, Organismo Internacional

Available in: http://www.redalyc.org/articulo.oa?id=71603904
ABSTRACT

Information Systems (IS) innovations adoption scholars have recently expressed their concern 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 IS adoption research community well. Also, they argue that we still lack a unifying theory or even a small assemblage of sub-theories that complement each other in the IS innovations adoption research. From an IS perspective, this paper critically reviews the IS innovations adoption research in general, and in SMEs (Small to Medium-sized Enterprises) context in particular. From reviewing the literature, it can be argued that theories employed to study IS innovations adoption enriched the literature with many contributions that explained IS acceptance from different perspectives. Contrary to the call for more unifying model, the authors argue IS innovations are highly differentiated technologies for which there should not be a single adoption model.

Key words: SMEs, IS, IT, innovations, adoption, acceptance.

RESUMEN

Los académicos que estudian la adopción de innovaciones en sistemas de información (IS) han expresado recientemente su preocupación por la preeminencia alcanzada por algunas teorías, lo que ha llevado a un alto grado de imposición,
conformidad y falta de innovación. Esta situación no es benéfica para la comunidad académica preocupada con el tema de adopción de innovaciones en sistemas de información (IS). Asimismo argumentan que aun se carece de una teoría unificadora o aun de un pequeño conjunto de sub-teorías que se complementen. Desde una perspectiva de SI, este artículo revisa críticamente la investigación en adopción de innovaciones en sistemas de información (IS) en general, y en particular aplicada al contexto de las Pymes (pequeña y mediana empresa). De esta revisión, se puede argumentar que las teorías empleadas para estudiar las innovaciones en IS enriquecieron la literatura con muchas contribuciones que explican la aceptación de los SI desde diferentes perspectivas. Contrariamente al llamado por un modelo unificador, los autores proponen que las innovaciones en SI son tecnologías altamente diferenciadas para las cuales no debe haber un único modelo de adopción.

Palabras clave: Pymes, SI, TI, innovación, adopción, aceptación.

1. INTRODUCTION

The authors attempt to put together most theories used in the IS innovations adoption research in small business context. It starts with highlighting the importance of IS innovations adoption in SMEs by drawing attention to the differences in researching SMEs compared to large firms. Before reviewing the IS innovations adoption research, innovation diffusion process will be uncovered to help us understand how IS innovations were researched. Then, IS innovations adoption research will be reviewed generally. Particular focus will be given to reviewing the research streams and domains of SMEs’ IS innovations adoption research. After that, theoretical models used to examine SMEs adoption of IS innovations will be critically reviewed. Finally, criticism of the IS innovations and diffusion research is highlighted with concluding remarks on future research opportunities.

2. SMES ADOPTION OF IS INNOVATIONS

Attention of IS vendors has moved recently to SMEs offering them a vast range of solutions, which were formerly adopted by large firms only (Ramdani & Kawalek, 2007b). Most small firms still under-utilise the potential value of IS innovations by only restricting them to administrative tasks (Brock, 2000). The UK Department of Trade and Industry (DTI) literature claims that IS adoption and implementation is crucial to the survival and growth of the economy in general, and small business sector in particular (Martin & Matlay, 2001). SMEs are considered as major economic players and a potent source of national, regional and local economic growth (Taylor & Murphy, 2004). Without a better understanding of the complex processes and the differentiating factors that affect IS adoption level, the drive of IS adoption and development will not successfully contribute to SMEs’ competitiveness (Martin & Matlay, 2001).
The European Commission (EC) defines small businesses based on the number of employees, annual turnover, annual balance sheet total and level of autonomy (EC, 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 & Docherty, 2004). The DTI (2004) categorises SMEs into: micro-firms with fewer than 10 employees; small-firms with 10-49 employees; and medium-sized firms with 50-249 employees. Story (1994) argues that the number of employees is considered to be an appropriate measure of SMEs because of the differences in organisational structures that occur with size. Using number of employees as a measure, the EC and DTI definitions are compatible.

SMEs differ from large companies in important ways affecting their information-seeking practices (Lang & Calantone, 1997; Buonanno, Faverio, Pigni, Ravarini, Sciuto & Tagliavini, 2005). These differences include:

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

New technologies provide SMEs with opportunities that are largely unexploited (Brock, 2000; Corso, Martini, Paolucci & Pellegrini, 2001). It is hard nowadays to imagine SMEs operating without some use of IS. However, SMEs differ in the level of IS usage (Blackburn & McClure, 1998). Southern and Tilley (2000) identifies three categories of small firms with different attitude to IS: SMEs with low-end IS use, medium-level IS users, and high-end IS users. Before reviewing the IS innovations adoption research, innovation diffusion process will be uncovered.

3. INNOVATION DIFFUSION PROCESS

Organisations today are facing profound technological changes. Gopalakrishnan & Damanpour (1997) argue that because innovation is one of the key means of adapting to change, researchers from many fields of study – sociology, engineering, economics, marketing and psychology – have been preoccupied with innovation research. They also argue that innovation can be understood as a process consisting of several stages. In the information systems (IS) field, theorists view that these stages progress in a sequential linear fashion (as illustrated in Figure 1). Initially, Kwon and Zmud (1987) proposed a six-phase model of IS implementation process where each stage is linked to particular stage in Lewin’s (1952) change model. Soon after, Cooper & Zmud (1990) developed a variation of the initial model, which incorporates...
some of the post adoption behaviours developed by Zmud & Apple (1992). From an innovation diffusion perspective, IS implementation is defined as an organisational effort directed toward diffusing appropriate IS within a user community (Cooper & Zmud, 1990). Each stage of the implementation process is described in Table 1.

The traditional innovation/diffusion literature provides a rich foundation for studies on IS innovations adoption (Premkumar & Roberts, 1999). Rogers, as prominent advocate of diffusion of innovation model, describes the innovation-decision process as “the process through which an individual (or other decision making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision” (Rogers, 2003, pp 168). As a result, the innovation-decision process can lead to either adoption, a decision to make a full use of an innovation as the best course of action available, or rejection, decision not to adopt an innovation.

**Figure 1**

*Innovation Process.*

<table>
<thead>
<tr>
<th>Lewin (1952)</th>
<th>Unfreezing</th>
<th>Change</th>
<th>Refreezing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kwon and Zmud (1987)</td>
<td>Initiation → Adoption → Adaptation → Acceptance → Use → Incorporation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cooper and Zmud (1990)</td>
<td>Initiation → Adoption → Adaptation → Acceptance → Routine → Infusion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rogers (2003)</td>
<td>Knowledge → Persuasion → Decision → Implementation → Confirmation</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Two different perspectives have been used to analyse IS innovations: (1) the adoption perspective and (2) the implementation, diffusion and use perspective (Kimberly, 1981; Rogers, 1995). The former focuses on the understanding of what makes an organisation responsive to change in its environment. The latter, however, questions how an innovation should be designed, implemented and marketed to enhance rapid and widespread acceptance. As a result, the innovation process is composed of two sub-processes: initiation and implementation (Rogers, 1995). The initiation process focuses on the actions and events leading up to the decision to adopt, whereas, the implementation process is concerned with the actions and events involved in putting an innovation into use.
Table 1  

<table>
<thead>
<tr>
<th>Phase</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initiation</td>
<td>Process: Scanning of organisational problems/opportunities and IT solutions</td>
</tr>
<tr>
<td></td>
<td>Product: A match is found between an IT solution and its application in the organisation</td>
</tr>
<tr>
<td>Adoption</td>
<td>Process: Getting organisational backing for the implementation of the IT application</td>
</tr>
<tr>
<td></td>
<td>Product: A decision is reached to invest resources necessary to accommodate the implementation effort</td>
</tr>
<tr>
<td>Adaptation</td>
<td>Process: The IT application is developed, installed, and maintained</td>
</tr>
<tr>
<td></td>
<td>Product: The IT application is available for use in the organisation</td>
</tr>
<tr>
<td>Acceptance</td>
<td>Process: Inducing the organisational members to commit to IT application usage</td>
</tr>
<tr>
<td></td>
<td>Product: The IT application is employed in the organisational work</td>
</tr>
<tr>
<td>Routinization</td>
<td>Process: Usage of the IT application is encouraged as a normal activity</td>
</tr>
<tr>
<td></td>
<td>Product: Adjusting the organisation’s governance systems to account for the IT application</td>
</tr>
<tr>
<td>Infusion</td>
<td>Process: Increasing the organisational effectiveness by using the IT application in a more comprehensive and integrated manner to support higher levels aspects of organisational work</td>
</tr>
<tr>
<td></td>
<td>Product: The IT application is used within the organisation to its fullest potential</td>
</tr>
</tbody>
</table>

4. IS INNOVATION ADOPTION RESEARCH

The adoption of IS innovations is one of the most widely studied areas in academia (Wolfe, 1994; Damanpour & Gopalakrishnan, 1998; Brandyberry, 2003). IS innovations adoption research has become increasingly popular as IS continues its relentless march into almost every aspect of organisational life (Fichman, 2004), and as innovation become an important driver of organisational competitiveness (Hamel, 1998).

As an attempt to map IS innovations, Swanson (1994) borrowed an organisational innovation model from Daft (1982) and put forward three types of IS innovations: 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). This categorisation of different types of IS innovations highlights to some extent that IS innovations are highly differentiated technologies. Having this in mind, many theories have been employed to explain the adoption of different IS innovations. The next section reviews IS innovations adoption research in general, and in small business context in particular.

Technology adoption research, or more broadly acceptance research, has been studied for well over two decades (Venkatesh, Davis & Morris, 2007), and has been described as one
of the most mature areas in IS literature (Venkatesh, Morris, Davis & Davis, 2003; Jaspersen, Carter & Zmud, 2005). A recent review of the predictors, linkages and biases in IS innovations adoption research by Jeyaraj, Rottman & Lacity (2006) highlights that a rich but diverse body of theoretical and empirical work has accumulated on the adoption and diffusion of IS-based innovations. A large number of theories have been tested, including Theory of Reasoned Action (Fishbein & Ajzen, 1975), Innovation Diffusion Theory (Rogers, 1983), Social Cognitive Theory (Bandura, 1986), Diffusion/Implementation Model (Kwon & Zmud, 1987), Technology Acceptance Model (TAM) (Davis, 1989), Theory of Planned Behaviour (Ajzen, 1991), Perceived Characteristics of Innovating (Moore & Benbasat, 1991), Tri-Core Model of IS Innovations (Swanson, 1994), Innovation Diffusion Theory for Organisations (Rogers, 1995), TAM2 (Venkatesh & Davis, 2000), and Unified Theory of Acceptance and Use of Technology (Venkatesh et al., 2003). Empirically, qualitative (Agarwal & Prasad, 1997), quantitative (Igbaria & Tan, 1997) and combination of both methods (Thong, Yap & Raman, 1994) have been used.

Venkatesh et al. (2007) summarises the major milestones and key citations in technology adoption research (Table 2). They emphasise the significant influence of TAM on the IS field. Moreover, they report that beyond replication and generalisation, much of the progress to date has centered around competing models with techno-centric predictors. However, Venkatesh et al. (2007) suggest that research challenging the basic tenets of intention theories has been somewhat limited. Although much of the research on interventions is tied to training, research on the determinants and interventions is now starting to emerge.

**Table 2**

*Summary of Progress of Technology Adoption Research (Venkatesh et al., 2007).*

<table>
<thead>
<tr>
<th>Major Areas of Progress</th>
<th>Representative Examples and Key Cites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influential Models</td>
<td>Technology Acceptance Model: Davis (1989); Davis, Bagozzi &amp; Warshaw (1989)</td>
</tr>
<tr>
<td></td>
<td>Technologies: Email - Karahanna &amp; Straub (1999); Calculator - Mathieson (1991);</td>
</tr>
<tr>
<td></td>
<td>Spreadsheet - Mathieson (1991); Venkatesh &amp; Davis (1996); Organisational Systems</td>
</tr>
<tr>
<td></td>
<td>- Venkatesh et al. (2003)</td>
</tr>
<tr>
<td></td>
<td>Choice: Szajna (1994)</td>
</tr>
<tr>
<td></td>
<td>Intention: Davis (1989); Mathieson (1991)</td>
</tr>
<tr>
<td></td>
<td>Self-reported use: Davis (1989)</td>
</tr>
</tbody>
</table>

(Continued...)
5. SMES’ IS INNOVATION ADOPTION: RESEARCH STREAMS AND DOMAINS

Attewell (1992) suggests that most innovation/diffusion research in IS conforms to one of the two distinctive styles: ‘adopter studies’ and ‘macro diffusion studies’. The former addresses understanding differences in adopter innovativeness, whereas the latter deals with characterising the rate and pattern of technology adoption among potential adopters. According to Brock (2000), there are various research streams influencing research concerning IS adoption in small firms ranging from computer science, behavioural science, decision science, organisational science, social science and management science to economic and political science. He classified the key research streams that have developed over time to four main groups:
• **Adoption Research**: research interested in the determinants of organisational adoption of IS [for example: Thong and Yap (1995); Fink (1998)].

• **Implementation Research**: research interested in the post-adoption processes [for example: Cooper and Zmud (1990); Saga and Zmud (1994)].

• **Strategic Management Research**: research interested in the potential strategic value of IS for organisations [for example: Sethi and King (1994); Elliot and Melhuish (1995)].

• **Impact Research**: research interested in the various effects of an IS on the operations of individuals, work groups or the whole organisation [for example: Delone and McLean (1992); Hitt and Brynjolfsson (1996)].

Furthermore, Southern and Tilley (2000) identifies three alternative research perspectives:

• **Technological**: this type of work has arguably dominated the field and has generally used an IS perspective, and mainly concerned with examining factors leading to IS success within a firm [for example: Naylor and Williams (1994); Cragg and King (1993); Raymond and Pare (1992)].

• **Organisational**: work in this category is concerned with understanding the small firm’s strategic approach to using IS and the capabilities and structures of SMEs to use the technology [for example: Doherty and King (1998); Swatz and Boaden (1997); Thong and Yap (1995)].

• **Small Firms**: this approach aims to develop an understanding of the domain from the perspective of the owner/manager of a small firm [for example: Blackburn and McClure (1998); Fuller (1996); Fuller and Southern (1999)].

Another classification of research in IS implementation in SMEs has been introduced by Premkumar (2003). The five major domains in his framework are individual, task, innovation/technology, organisation and environment. He explains that the domains can be considered as different layers of the environment that influences the design and use of information technology. He argues that the core of the framework includes individuals and task because the primary purpose of IS in an organisation is to enable people to complete work-related tasks. At the next layer, technology domain provides the tools and information to aid the individual in his or her task. Technology is implemented in an organisation, which is presented as a different layer. The overarching layer represents the external environment. The following discusses in detail the theories used to examine IS innovations adoption research in SMEs (Table 3).
### Table 3

<table>
<thead>
<tr>
<th>Theory</th>
<th>Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology Acceptance Model (TAM)</td>
<td>Grandon and Pearson (2004); Igbaria, Zinatelli, Cragg &amp; Cavaye (1997)</td>
</tr>
<tr>
<td>Theory of Planned Behaviour (TPB)</td>
<td>Harrison, Mykytyn &amp; Riemenchneider (1997)</td>
</tr>
<tr>
<td>Combined TAM and TPB</td>
<td>Riemenchneider, Harrison &amp; Mykytyn (2003)</td>
</tr>
<tr>
<td>TAM2</td>
<td>Venkatesh and Davis (2000)</td>
</tr>
<tr>
<td>Innovation Diffusion Theory (IDT)</td>
<td>Grandon &amp; Pearson (2004); Lee (2004); Lertwongsatien and Wongpinunwatana (2003); Premkumar (2003); Scupola (2003); Kuan &amp; Chau (2001); Lee &amp; Runge (2001); Mehrten, Cragg &amp; Mills (2001); Mirchandani &amp; Motwani (2001); Raymond (2001); Iacovou, Benbasat &amp; Dexter (1995); Premkumar &amp; Roberts (1999); Thong (1999); Fink (1998); Cragg and King (1993)</td>
</tr>
<tr>
<td>Resource-Based View (RBV)</td>
<td>Caldeira and Ward (2003); Scupola (2003); Mehrten et al. (2001); Chau (2001); Thong (2001); Iacovou et al. (1995)</td>
</tr>
</tbody>
</table>

Venkatesh et al. (2007) argues that much of the research on technology adoption prior to TAM examined user satisfaction and attitudes. Theory of Reasoned Action (TRA), which was drawn from social psychology, argues that attitude toward behaviour and subjective norm are the two main factors impacting behavioural intention (Fishbein & Ajzen, 1975). The core constructs of this theory are defined as follows:

<table>
<thead>
<tr>
<th>Core Construct</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude towards behaviour</td>
<td>“represents a person’s general feeling of favourableness or unfavourableness towards some stimulus object” (Fishbein &amp; Ajzen, 1975, 216)</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>“the person’s perception that most people who are important to him think he should or should not perform the behaviour in question” (Fishbein &amp; Ajzen, 1975, 302)</td>
</tr>
</tbody>
</table>

Davis et al. (1989) applied TRA to individuals acceptance of technology and they found that the variance explained was largely consistent with studies that had employed TRA in the context of other behaviours. While it can argue that TRA application in the IS context has advanced knowledge by specifying two essential determinants of IS innovations adoption, TRA partially explains the determinants of adoption behaviour, because it only highlights the overarching determinants.
6. TECHNOLOGY ACCEPTANCE MODEL (TAM)

Technology adoption has gained prominence with introduction of TAM (Davis, 1989; Davis et al., 1989), which argues that the intention to adopt or use new IS is determined by perceived usefulness and perceived ease of use. The final conceptualisation of TAM excluded the attitude construct in order to better explain intention parsimoniously (Venkatesh et al., 2003). The objective of TAM is:

“to provide an explanation of the determinants of computer acceptance that is general capable of explaining user behaviour across the board range of end-user computing technologies and user population, while at the same time being both parsimonious and theoretically justified” (Davis, 1989, 985).

<table>
<thead>
<tr>
<th>Core Construct</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived usefulness</td>
<td>“the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989, 320)</td>
</tr>
<tr>
<td>Perceived ease-of-use</td>
<td>“the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989, 320)</td>
</tr>
</tbody>
</table>

It has been widely applied to a diverse set of technologies and users (Venkatesh et al., 2003). In the small business context, Igbaria et al. (1997) uses the TAM as a theoretical basis for examining the key factors affecting personal computing acceptance in small firms. Their finding indicate that perceived ease of use is the dominant factor in explaining perceived usefulness and system usage, and perceived usefulness has a strong effect on system usage. Inspired by the TAM, Grandon & Pearson (2004) identifies perceived usefulness and perceived ease of use as one of the factors that influence electronic commerce adoption. Compared to TRA, TAM explains specific determinants of IS innovations adoption behaviour. However, perceived usefulness and ease-of-use are not the only factors influencing IS innovations adoption. Referring to TAM, Bagozzi (2007) argues that it is unreasonable to expect that one model, and one so simple, would explain decisions and behaviour fully across a wide range of technologies, adoption situations, and differences in decision making and decision makers.

7. THEORY OF PLANNED BEHAVIOUR (TPB)

Ajzen (1985; 1991) introduces and summarises the early findings related to Theory of Planned Behaviour (TPB). This theory has emerged by adding the construct of perceived behavioural control to TRA. It has been successfully applied to the understanding of individual acceptance of many different technologies (Mathieson, 1991; Taylor & Todd, 1995b; Harrison et al., 1997). The core constructs of this theory are defined as follows:
According to Venkatesh et al. (2007), it is interesting to note that the trajectory of TPB is remarkably similar to TAM. Harrison et al. (1997) uses TPB to explain and predict small business executives’ decisions to adopt IS. Their results indicate strong support for a decision process based on attitude (perceived positive and negative consequences for the firm), subjective norm (social expectations), and perceived control (resources to overcome obstacles) regarding IS adoption. TPB can be argued not to be specific to IS usage and is less parsimonious than TAM. Also, TPB requires unique operationalisations in every different situation in which it can be applied (Mathieson, Peacock & Chin, 2001).

8. COMBINED TAM AND TPB

By combining TAM and TPB, Riemenschneider et al. (2003) study of IS adoption in small business suggest that a “collected” model representing the underlying categories of cognitions from TAM and TPB provide a better fit than either the TAM or the TPB alone. Compared to TPB, behavioural intention is influenced by one additional determinant in the combined TAM and TPB (perceived usefulness). The core constructs of this theory are defined as follows:

<table>
<thead>
<tr>
<th>Core Construct</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude towards behaviour</td>
<td>Adapted from TRA/TPB</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>Adapted from TRA/TPB</td>
</tr>
<tr>
<td>Perceived behavioural control</td>
<td>Adapted from TRA/TPB</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>Adapted from TAM</td>
</tr>
</tbody>
</table>

A related model is the Decomposed Theory of Planned Behaviour (DTPB), which is identical to TPB in terms of predicting intentions. In contrast to TPB, DTPB is similar to TAM in decomposing attitude, subjective norm, and perceived behavioural control into its underlying belief structure within technology adoption context (Venkatesh et al., 2003). DTPB is an attempt to further explain and decompose the core constructs. Nonetheless, this model has only extended by one additional determinant that influence the behavioural intention compared to TRA.
9. TECHNOLOGY ACCEPTANCE MODEL 2 (TAM2)

Venkatesh & Davis (2000) proposes TAM2 as a theoretical extension of TAM from four longitudinal field studies. They found that both social influence processes (subjective norm, voluntariness, and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability, and perceived ease of use) significantly influence user acceptance. The core constructs of this theory are defined as follows:

<table>
<thead>
<tr>
<th>Core Construct</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived usefulness</td>
<td>Adapted from TAM</td>
</tr>
<tr>
<td>Perceived ease-of-use</td>
<td>Adapted from TAM</td>
</tr>
<tr>
<td>Subjective norm</td>
<td>Adapted from TRA/TPB.</td>
</tr>
</tbody>
</table>

10. INNOVATION DIFFUSION THEORY (IDT)

IDT (Rogers, 1983) is grounded in sociology and has been used since the 1960s to study a variety of innovations from agricultural tools to organisational innovation (Tornatzky & Klein, 1982). In the IS field, Moore & Benbasat (1991) refined the innovation characteristics presented in Rogers and used them to study individual technology acceptance. The core constructs of this theory are defined as follows:

<table>
<thead>
<tr>
<th>Core Construct</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relative advantage</td>
<td>The degree to which using an innovation is perceived as being better than its precursor (Adapted from Moore and Benbasat, 1991).</td>
</tr>
<tr>
<td>Compatibility</td>
<td>The degree to which using an innovation is perceived as being consistent with the existing values, needs and past experiences of potential adopters (Adapted from Moore and Benbasat, 1991).</td>
</tr>
<tr>
<td>Ease of use</td>
<td>The degree to which using an innovation is perceived as being easy to use (Adapted from Moore and Benbasat, 1991).</td>
</tr>
<tr>
<td>Result demonstrability</td>
<td>“the tangibility of the result of using the innovation, including their observability and communicability” (Moore &amp; Benbasat, 1991, 203)</td>
</tr>
<tr>
<td>Image</td>
<td>“the degree to which use of an innovation is perceived to enhance one’s image or status in one’s social system” (Moore &amp; Benbasat, 1991, 195)</td>
</tr>
<tr>
<td>Visibility</td>
<td>The degree to which one can see others using the innovation (Adapted from Moore and Benbasat, 1991).</td>
</tr>
<tr>
<td>Voluntariness of use</td>
<td>“the degree to which use of an innovation is perceived as being voluntary, or of free will” (Moore &amp; Benbasat, 1991, 195)</td>
</tr>
</tbody>
</table>
Although the identified characteristics further our understanding of the determinants of IS usage, an innovation attribute trailability (Rogers, 1983) was excluded. Furthermore, the characteristics identified here focus on IS usage rather than intention to adopt IS innovations. In the small business context, IDT has been tested by many authors. Amongst the most common investigated characteristics that promote the adoption of IS innovations is relative advantage (Cragg & King, 1993; Iacovou et al., 1995; Fink, 1998; Thong, 1999; Raymond, 2001; Scupola, 2003; Grandon & Pearson, 2004; Lee, 2004). Moreover, compatibility was also found to be a significant factor (Thong, 1999; Mirchandani & Motwani, 2001; Lertwongsatien & Wongpinunwatana, 2003; Premkumar, 2003; Grandon & Pearson, 2004). Finally, complexity was found to be a determinant of IS innovations adoption in small business context (Thong, 1999; Grandon & Pearson, 2004).

Other individual, organisational and environmental factors can influence the adoption of IS innovations (see a comprehensive review by Jeyaraj et al., 2006). TOE (Technology-O rganisation-Environment) framework developed by Tornatzky & Fleischer (1990) has been applied to study many IS innovations such as broadband (Ramdani & Kawalek, 2007a), e-commerce (Scupola, 2003), EDI (Kuan & Chau, 2001), and communication technologies (Premkumar & Roberts, 1999). The criticism facing researchers using this model is picking and choosing from a list of attributes that have been empirically tested on other IS innovations.

11. RESOURCE BASED VIEW (RBV)

The fundamental principle of the RBV of the firm is the exploitation of core competencies to gain competitive advantage. In the economic literature, Penrose (1959) provides the most detailed exposition of RBV:

“a firm is more than an administrative unit; it is also a collection of productive resources the disposal of which between different users and over time is determined by administrative decision. When we regard the function of the private business firm from this point of view, the size of the firm is best gauged by some measure of the productive resources it employs” (Penrose, 1959, 24).

The RBV has been used or partly used with combination of other theories to explain factors impacting IS innovations adoption in SMEs. Iacovou et al. (1995, 467) defines the organisational readiness as “the availability of the needed organisational resources for adoption” . They found this factor to influence EDI adoption. Chau (2001) argues that one of the main inhibitors of EDI adoption among SMEs is not possessing sufficient knowledge and skills about the technology. Mehrtens et al. (2001) found that Internet adoption by small firms is influenced by organisational readiness (financial and technological resources). Thong (2001) examines resource constraints on IS implementation in Singaporean small firms. His results show that small businesses with successful IS tend to have adequate IS investment, high users’ IS knowledge, high user involvement, and high CEO support. Caldeira and Ward (2003)
identify two factors that determined the relative success in the adoption and use of IS in selected manufacturing SMEs: management perspectives and attitudes towards IS adoption and use; and development of internal IS competences.

12. STAGES THEORY

It is based on stages of growth theory to describe the process by which IS evolves in an organisation (Gengatharen & Standing, 2005). IS adoption is argued to progress in stages that have distinct benchmark variables. E-adoption ladder, PIT model and focus-dominance model will be reviewed as examples of stages theory.

12.1. E-Adoption Model

The ‘e-adoption’ ladder (DTI, 2001) is favoured by the UK government’s Department of Trade and Industry (DTI). Taylor and Murphy (2004) argue that when SME take-up rates of IS are viewed from purely technological perspective, engagement with technology is viewed sequential and progressive. The sequence begins with the use of e-mail and website through e-commerce, e-business and ends with ‘transformed organisations’. The ‘e-adoption’ model is problematic because it implies that all SMEs have the need to follow one linear prescribed course, with the implication that not to finish at the top of the ladder is some kind of failure (Taylor & Murphy, 2004). Moreover, Martin and Matlay (2001) criticises the implicit assumption in the adoption ladder that all firms can subscribe to linear development in IS. They argue that this model fails to distinguish between businesses of various sizes, ethnic origin, and stage of IS adoption. Also, they caution against treating increase in IS ownership as evidence of use. Foley and Ram (2002) criticised the staged and evolutionary models because they fail to acknowledge that IS may not be appropriate for every activity for some companies. Therefore, they proposed the PIT model.

12.2. PIT Model

Foley and Ram (2002) have applied PIT model to IS take-up among ethnic and non-ethnic small and micro business in the UK and the West Midlands. PIT model is argued to better accommodates the diversity of application and adoption of IS and e-business approaches amongst SMEs (Taylor & Murphy, 2004). This model is a simple matrix that has two elements: what functions IS can be used for in the firm, and what activities it can be applied to. The first element of the model examines six core areas of the business activity: Logistics and delivery; Finance; Purchasing and procurement (including the management of infrastructure and support services); Operations, processing and assembly (including process, product and services R&D); Marketing and sales; and after sales service. The second element of the matrix examines how IS are used. This is done in three stages summarised by Taylor and Murphy (2004):
• **Publicise** information on a website, such as product and contact details and other “brochureware”, plus terms and conditions or delivery schedules;
• **Interact** with customers and suppliers through automated communications systems that are more than the simple exchange of emails and, for example, verify credit cards or recognise returning customers; and
• **Transform** the way a business undertakes its activities, allowing customers to specify delivery times and places or enabling real time tracking of deliveries, for example.

Foley and Ram (2002) claim that by drawing the two dimensions together, it has been possible to create a model that allows the use of IS in business activities to be examined in greater detail. They added that this model accommodates the differential space of IS adoption and development in different parts or activities of a business. They concluded that this model is more flexible and accommodates utilisation at different rates for each business activity because it does not assume that business should strive to introduce IS into all their activities.

### 12.3. Focus-Dominance Model

This model is an analytical framework to investigate the potential for SMEs to realise value from IS capabilities (Levy et al., 2001). As described in their paper, this framework has two dimensions: strategic focus for IS adoption and customer dominance. The first dimension reflects the two main purposes of IS adoption: cost reduction and adding value. Customer dominance dimension is a key issue for SMEs.

This model identifies four main approaches to IS exploitation. The **efficiency** quadrant reflects the position of many start-up firms and those that exploit simple systems (such as Word Processing and accounting) to run their businesses more effectively. The **co-ordination** quadrant recognises the needs of growing firms to manage their customer base through the use of internal networking systems for example. Both of these quadrants are cost focused and provide SMEs with the facility to manage their work more efficiently and effectively. The **collaboration** quadrant considers the incorporation of emerging technologies in order to manage relationships with customers such as EDI (Electronic Data Interchange). The final quadrant, **innovation**, represents proactive introduction of IS by SMEs. The owners recognise that IS may provide the requisite tools (such as the Internet) that the competitive market demands. Implicit in this model is that when an SME changes its strategic context, for example by increasing its customer base and moving from efficiency to coordination quadrant, it also changes its IS strategy and develops customer database (Levy et al., 2001).

### 13. UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY (UTAUT)

UTAUT is an attempt to produce a unifying model of IS acceptance. Venkatesh et al. (2003) integrates the determinants from TRA, TAM, motivational model (Davis, Bagozzi & Warshaw, 1992), TPB, combined TAM & TPB, model of PC utilisation (Thompson et al., 1991), DIT
and social cognitive theory (Compeau & Higgins, 1995a, 1995b). Four core determinants of intention and usage were identified: performance expectancy, effort expectancy, social influence and facilitating conditions. Anderson and Schwager (2003) tests and validates this model with wireless LAN technology in small business context. The core constructs of this theory are defined as follows:

<table>
<thead>
<tr>
<th>Core Construct</th>
<th>Definition</th>
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<tbody>
<tr>
<td>Performance Expectancy</td>
<td>“the degree to which an individual believes that using the system will help him or her to attain gains in job performance” (Venkatesh et al., 2003, 447)</td>
</tr>
<tr>
<td>Effort Expectancy</td>
<td>“the degree of ease associated with the use of the system” (Venkatesh et al., 2003, 450)</td>
</tr>
<tr>
<td>Social Influence</td>
<td>“the degree to which an individual perceives that important others believe he or she should use the system” (Venkatesh et al., 2003, 451)</td>
</tr>
<tr>
<td>Facilitating Conditions</td>
<td>“the degree to which an individual believes that an organisational and technical infrastructure exists to support use of the system” (Venkatesh et al., 2003, 453)</td>
</tr>
</tbody>
</table>

In summary, the reviewed theories proved to be very powerful theoretical tools in predicting, explaining and increasing individual and organisational acceptance of IS innovations.

14. CRITICISM OF IS INNOVATION AND DIFFUSION RESEARCH

Four major shortcoming in the diffusion research have been identified by Rogers (2003). The biases that have been inherited from diffusion research are:

- **Pro-innovation bias**: the implication of some research that innovation should be adopted/diffused by all members of a social system, that it should be adopted/diffused rapidly, and that the innovation should not be neither re-invented nor rejected.
- **Individual-blame bias**: the tendency to hold individuals responsible for their problems, rather than the system of which the individuals are part.
- **Recall problem**: it may lead to inaccuracies when respondents are asked to remember the time at which they adopted an innovation.
- **Equality**: as socio-economic gaps among the members of a social system are often widened as a result of spread of innovations.

According to Jeyaraj et al. (2006), there are known theoretical biases in the IS innovations adoption research including pro-innovation bias (all adoption is good) and the rational bias (adopters make rational decisions) (Rogers, 1995; Fichman, 2004). They also argue that there are known methodological biases including recall bias (self report are unreliable) and pro-adopter bias (non-adopters are understudied) (Rogers, 1995). Because of the mentioned biases, Jeyaraj et al. (2006) suggest the following principles for IS adoption research:
- Increase the study of outcomes as a dependent variable in both individual and organisational adoption research to overcome the pro-innovation bias.
- Increase the study of actual system use as a dependent variable in both individual and organisational adoption research to overcome the self-reporting bias.
- Increase the study of non-adopters to overcome the adopter bias in individual adoption studies.

Benbasat & Barki (2007) expressed their big concern with regard to the dominance TAM attained, which has caused a high degree of enforcement, conformity, and lack of innovation that have not served the IS adoption research community well. In addition, Lucas, Swanson & Zmud (2007) argues that we still lack a unifying theory or even a small assemblage of sub-theories that complement each other in the implementation research stream.

15. CONCLUSIONS

From a critical review of IS innovations adoption literature, it can be argued that theories used to study IS innovations adoption in small business context have served its purpose to a great extent to explain IS acceptance form different perspectives. Contrary to the call for more unifying model, the authors argue that IS innovations are highly differentiated technologies for which there should not be a single adoption model. Therefore, researchers in this area are encouraged to use the mentioned theories to explain, predict and increase individual and organisational acceptance of different IS innovations such as ASP (Application Service Provisioning), and RFID (Radio Frequency Identification). Also, researchers are encouraged to introduce new theories that could contribute further to IS innovations adoption research. For example, complexity theory can be useful in providing a framework for helping to understand IS innovations adoption from a different perspective. Inconclusive results are common in this area of research, thus the need for researchers to conduct comparative studies using the same theoretical lens. To conclude, IS innovations adoption research in SMEs seems to be still understudied, further theoretical and empirical research is needed to reach more conclusive results.

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References


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Recepción: 20/08/07
Aceptación: 27/08/07