

THE IMPORTANCE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICTS): AN INTEGRATION OF THE EXTANT LITERATURE ON ICT ADOPTION IN SMALL AND MEDIUM ENTERPRISES

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Abstract

Information and Communication Technologies (ICTs) possess the potential to contribute significantly to economic growth. Given their many benefits, small and large businesses are adopting ICTs to support their competitiveness, productivity and profitability. However, ICT adoption in small and medium enterprises (SMEs) differs from that of larger organizations because of the specific characteristics of SMEs, such as resources constraints. It is therefore important to understand the theoretical models used to explain ICT adoption in SMEs, to better appreciate the key factors that influence the adoption and use of such technologies by these businesses. This paper reviews the technology innovation literature to explore two of these theoretical models – the diffusion of innovation theory and the technology, organization and environment framework – in proposing an integrated theoretical model of ICT adoption by SMEs. This integrated model includes an overarching typology, which classifies some of the key internal and external factors that influence SMEs' ICT adoption. The integrated model provides a sound framework for future search on ICT adoption by SMEs in both developed and developing countries.

Keywords: Diffusion of Innovation (DOI) Theory, ICT Adoption, SMEs, Social Network Theory (SNT), Technology, Organization and Environment (TOE) Theory

INTRODUCTION

The proliferation and extensive use of information and communication technologies (ICTs) is changing the way people and organizations work (Barba-Sánchez, Martínez-Ruiz, & Jiménez-Zarco, 2007). ICTs are a wide range of software, hardware, telecommunications and information management techniques, applications and devices. Collectively, these are used to create, produce, analyze, process, package, distribute, receive, retrieve, store and transform information (Apulu & Latham, 2009; Porter & Millar, 1985). These technologies are increasingly being used in almost every activity and embedded in more and more things, thus facilitating ubiquitous computing (Bradley, 2010). Like their larger counterparts, small and medium enterprises (SMEs) or small firms having a workforce of up to 200 employees (Taylor, 2013), ignore such technologies to their certain demise. In fact, scholars, policy makers and business executives recognize that meaningful investment in ICTs is a competitive necessity, if firms and economies are to meet the demands of globalization (Barclay & Duggan, 2008; World Economic Forum, 2010). A firm's need to derive value from its ICT investments is critical especially for SMEs, since poor ICT investment decisions can adversely affect profitability (Love et al, 2005). Abulrub, Yin, & Williams (2012) noted that such technologies have the potential to provide a distinctive advantage for businesses to continue as or become a leading player in their industry. In the contemporary business world, executives in large and small firms rely on ICTs to support strategic thinking (Carr, 2003). Henderson & Venkatraman (1993) noted that ICTs play an important strategic role in supporting existing business strategies and shaping new ones. Stewart (2003) observed that ICTs affect how firms compete and remain a profound catalyst for the creation of strategic differentiation and competitive advantage. In other words, companies are able to differentiate their operations from competitors through their capability to exploit ICT functionality on a continuous basis (Henderson & Venkatraman, 1993).

ICTs support SMEs development by facilitating more effective integration of business processes, lower transaction and communication costs between firms, and more efficient decision making (Davis, McMaster, & Nowak, 2002). Hitt, Keats, & DeMarie (1998), for example, observed that ICTs have allowed small organizations to participate in global markets by utilizing web sites for marketing their products. Matthews (2007) noted that ICTs contribute to the growth and profitability of firms and provide a base for their transformation from a micro to a medium level. Given their importance in the economy (Litan & Rivlin, 2001), it is therefore essential that SMEs are encouraged and propelled to adopt ICTs more quickly.

There is significant consensus that ICTs have major effects on the productivity, organizational expansion, profitability and competitiveness of SMEs (Consoli, 2012; Martins & Raposo, 2005; Raymond, Bergeron, & Blili, 2005; Taylor, 2013). These effects will only be

increasingly realized when ICT is widely adopted and effectively used by SMEs (Martins & Oliveira, 2008). Although several SMEs are adopting ICT applications to support their businesses, it has been found that the rate of ICT adoption by these businesses has remained relatively low (Assinform, 2010; MacGregor & Vrazalic, 2005). Consoli (2012) observed that SMEs are not fully exploiting the potential of ICTs. Accordingly, further insight on how SMEs consider, and adopt ICTs is required.

In this regard, it is important to understand the theoretical models used to explain ICT adoption by SMEs, to better appreciate the key factors that have been found to influence the use of ICTs by SMEs in developed and developing countries, which is a primary focus of this paper. This paper contributes to the technology innovation literature by exploring two of these theoretical models – the diffusion of innovation (DOI) theory by Rogers (1995) and the technology, organization and environment (TOE) framework by Tornatzky and Fleischer (1990) – to propose an integrated theoretical model of ICT adoption in SMEs. This integrated model, proposes an overarching typology which classifies some of the key internal and external factors that influence ICT adoption in SMEs in its attempt to facilitate a better understanding of ICT adoption by SMEs, which is often lacking in developing contexts. This model can certainly be used to guide much needed further ICT research on SMEs in developing context.

The remainder of this article is organized as follows. The following section provides an extensive review of the literature on ICT Adoption by SMEs, focusing on the DOI theory and TOE framework. Both theoretical approaches are then assessed briefly in relation to their efficacy to explain factors that influence ICT adoption by SMEs, particularly at the firm level. A proposed integrated model of ICT adoption in SMEs is then presented. This is followed by discussion of the proposed integrated model. The paper ends with possible avenues for future research and concluding remarks.

THEORETICAL UNDERPINNINGS

Models of ICT Adoption

A number of theories on technology adoption have been used in ICT research. The most widely used theories include the technology acceptance model (TAM) developed by Davis (1989), the theory of planned behaviour (TPB) proposed by Ajzen, (1985 & 1991), and the unified theory of acceptance and use of technology (UTAUT) conceptualized by Venkatesh, Morris, Davis, & Davis (2003). These theories explain individuals' attitudes toward ICTs, their intentions to use, and their acceptance and adoption of ICTs (Chen, Li, & Li, 2011).

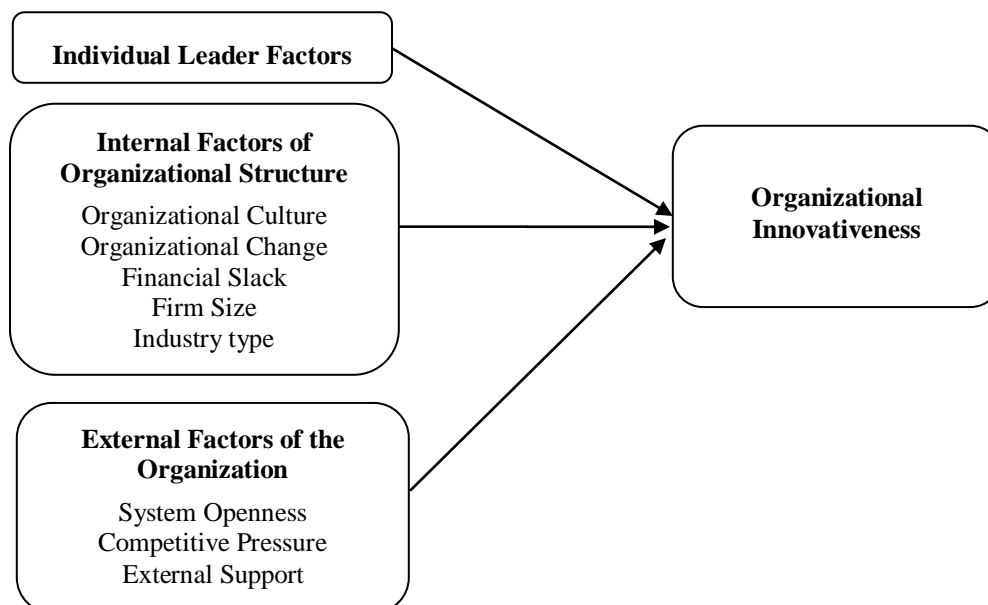
At the level of the firm, the most popular theories on ICT adoption are the DOI theory (Rogers, 1995), and the TOE framework (Tornatzky & Fleischer, 1990). These theories have

been used by themselves, in combination with each other or others to explain ICT adoption by SMEs (e.g., Ghobakhloo & S.H., 2011; Huynh, Huy, Rowe, & Truex, 2012; Martins & Oliveira, 2008; Thong, 1999). ICT adoption by SMEs differs from larger organizations because of their specific characteristics, such as resources constraints, and in many instances, limited access to technology and required skills and capabilities (Apulu & Latham, 2009; Avgerou, 2008; Ghobakhloo, Sabouri, Sai Hong, & Zulkifli, 2012; Girgin, Kurt, & Odabasi, 2011). Understanding the theoretical models that have been used to explain ICT adoption by SMEs is therefore important to enable better appreciation of the key factors that have been found to determine the adoption of ICTs by SMEs in developed and developing countries.

The Diffusion of Innovation (DOI) Theory

The Diffusion of Innovation (DOI) theory posits that individual characteristics, internal characteristics of organizational structure, and external characteristics of the organization are important antecedents to organizational innovativeness (Rogers, 1995). Based on DOI theory, at the firm level, innovativeness is related to such independent variables as individual (leader) factors, internal organizational structural factors, and external factors of the organization (Figure 1). Individual factors describe leaders' attitude towards change. Internal factors of organizational structure include the ICT knowledge and expertise of staff, organizational culture, financial slack, firm size and industry type. External factors include the extent to which the organization relates to and is affected by the external environment. Such factors include competitive pressure, as well as the availability of and access to external support.

Figure 1: Diffusion of innovations (DOI) Model, Rogers (1995)



Individual Leader Factors

The entrepreneurs or top management constitute one of the key factors in the adoption of ICT by SMEs (Barba-Sánchez, Martínez-Ruiz, & Jiménez-Zarco, 2007). A number of studies have shown that in SMEs, the role of CEOs/ entrepreneurs/top managers/owners/manager is central to the firm since their decision influences all the firm's operations (Fuller-Love, 2006; Smith, 2007). In fact, the decision to adopt ICTs in SMEs is often determined by the entrepreneur or top management (Matlay & Addis, 2003; Nguyen, 2009). Top management often provides the forward motion for the initiation of technology projects (Payton, 2000). This also relates to ICT adoption decisions from planning stage to the implementation, and post-implementation (Nguyen, 2009).

Prior research revealed that a number of factors such as management attitude towards ICT, IT knowledge and experience, innovativeness and desire for growth impact the process of ICT adoption in SMEs (Nov & Ye, 2008; Premkumar, 2003; Tarafdar & Vaidya, 2006; Thong & Yap, 1995). If the entrepreneur or CEO perceives that the benefits of ICT adoption outweigh its risks, then the business is more likely to adopt IT (Thong & Yap, 1995). The CEO's ICT knowledge and experience has been found to affect ICT adoption in SMEs (Drew, 2003; Lybaert, 1998). A study of small businesses by Thong (1999) found that CEOs with greater knowledge about ICTs are more likely to adopt them, as greater knowledge reduced the risk associated with ICT adoption.

Internal Factors of Organizational Structure

Numerous studies, carried out on the adoption of ICT within SMEs, have revealed a number of organizational factors that affect ICT adoption. These factors include organizational change, business size, financial slack, firm size and industry type (Love et al, 2005; De Burca, Fynes, & Marshall, 2005; Shiels, Mclvor, & O'Reilly, 2003).

Organizational Culture

Organizational culture affects SMEs adoption of ICT (Leidner & Kayworth, 2006). Jones, Jimmieson, & Griffiths (2005) found that success of ICT in organizations, as measured by user satisfaction and system usage is significantly affected by the types (human relations, open systems, internal processes, and rational goals) and dimensions (character, leadership, cohesion, emphases, and rewards) of organizational culture. As stated previously, openness to change is an important characteristic of organizational culture (Hall, Melin, & Nordqvist, 2001). In fact, ICT deployment often brings about significant change in SMEs. Therefore, SMEs which possess more adaptable organizational cultures and are quite openness to change will be more

apt and prepared to accept ICT-related changes, which often result in ICT project success (Ghobakhloo, Sabouri, Sai Hong, & Zulkifli, 2012).

Organizational Change

In recognizing the inevitability of change, Hitt, Keats, & DeMarie (1998) noted that it was important that firms develop differentiated capabilities (including those related to ICT) to proactively respond in an integrated manner to unanticipated change. Organizational change is a significant influencing factor on ICT adoption (Fried & Linss, 2005). Matthews (2007) noted that when ICT adoption is accompanied by investment in organizational change and internal capacity, its impact on growth is likely to be significant. Business growth forces SMEs to adopt novel and more effective technological solutions (Bruque & Moyano, 2007). The use of ICTs in small firms is due to many internal factors such as business expansion, down-sizing or relocation, and finding and capturing new markets which bring about change in organizations. Owners/managers may regard ICTs as essential tools to help manage changes (Southern & Tilley, 2000). This view is supported by Drew (2003) who demonstrated that industry changes, trends and opportunities for growth are some of the major driving forces pushing SMEs toward ICT.

Financial Slack

In general, most SMEs, particularly those in developing countries, suffer from lack of financial resources or insufficient financial slack (see for example, Fuller-Love, 2006, and Taylor, 2014) and such SMEs have to be cautious about their ICT investments. Apula & Latham (2009) argue that the availability of resources enhances the adoption of ICT within SMEs. Arendt (2008) noted that factors such as the cost of ICT equipment and networks software, and re-organization are barriers to ICT adoption in most SMEs. However, Dibrell, Davis, & Craig (2008), and Wu, Yeniyurt, Kim, & Cavusgil (2006) suggested that as the price of computer hardware and software has considerably declined in recent years, ICT adoption expenses were not a major factor hindering ICT adoption in SMEs. Notwithstanding, it should be noted that apart from the initial cost of computer hardware and software, other ICT implementation expenses such as the cost of external ICT expertise, user-training and development have to be undertaken by SMEs, and such costs can prove quite onerous (Nguyen, 2009).

Allocating scarce resources to a new initiative, such as ICT adoption, requires a serious commitment by SMEs (Pool, Parnell, Spillan, & Carraher, 2006). Accordingly, the importance of appropriate ICT investment in SMEs to ensure their successful adoption of such technologies cannot be over-emphasized. Folorunsho, Gabriel, Sushil, & Jeff (2006) noted that many

Nigerian SMEs struggle with the high cost to implement ICTs; hence they sometimes ignore the adoption of ICT, and instead use their resources for other purposes that would bring about fast profits. Also, in an empirical study of Singaporean small businesses, Thong (2001) found that higher levels of allocation for IS investment will enhance the possibility of successful ICT adoption in small businesses. Tan, Chong, Lin, & Eze (2009) found that high costs of ICT hardware, expensive software, and ICT security concerns are the major risks of ICT adoption perceived by Malaysian SMEs. These findings align with those from a study by Love et al (2005) who noted that security issues, uncertainty about how to evaluate potential benefits of ICT, and poor capital expenditure planning were major risks of ICT adoption in Australian SMEs.

Firm Size

According to the prior literature on ICT adoption in SMEs, firm size, defined by turnover and/or number of employees, is one of the most important determinants of ICT adoption (Fabiani, Schivardi, & Trento, 2005; Morgan, Colebourne, & Thomas, 2006; Love et al, 2005). Poon & Swatman (1999) indicated that the size of SMEs is correlated with ICT use, such that larger SMEs are more likely to adopt ICTs than smaller ones. The importance of firm size is partly because of its role as the source of a firm's capabilities (Mole, Ghobadian, O'Regan, & Liu, 2004). Another reason however is the fact that firm's resources including financial and human capital might be an approximation of firm size (Thong, 1999).

Industry Type

Prior research has identified the need to stay competitive and innovative as drivers of ICT adoption in competitive industries. For example, Pontikakis, Lin, & Demirbas (2006) investigating ICT adoption within Greek SMEs, indicated that fiercely competitive industries are often technologically intensive and SMEs operating in such industries might face intense competition. These authors found that SMEs which perceived their industries as highly competitive were much more inclined to adopt ICT solutions.

External Factors of the Organization

Competitive Pressure

For many firms, pressure to keep up with the competition by managing changes, improving customer services, and enhancing innovative abilities have forced SMEs to adopt ICTs (Mole, Ghobadian, O'Regan, & Liu, 2004; Bayo-Moriones & Lera-López, 2007). Prior literature suggests that small businesses are vulnerable to customer pressure. These firms adopted ICTs arising from customers' demands that they develop the efficiency of their operations (Nguyen,

2009; Blomquist, T. & Wilson, 2007). According to De Burca, Fynes, & Marshall (2005) clients' and suppliers' pressure to adopt ICTs is a significant factor influencing the level of ICT adoption and success. These results are consistent with those of Mole, Ghobadian, O'Regan, & Liu (2004) who indicated that customers, suppliers and larger counterpart demands are significant determinants of ICT adoption. Even in addressing the issue of IT governance, it was clear that Peterson (2004), and Agarwal & Sambamurthy (2003) alluded to the importance of competitive pressure from firms' consumers when they noted, among other things, that it was important that firms (SMEs included) manage their ICT to develop and deliver integrated ICT solutions that facilitate business responsiveness to customer demands in a timely and efficient manner.

External ICT Support – ICT Expertise, Consultants, Vendors and Government

There is a body of research that shows that the assistance and quality of external ICT expertise, consultants, and vendors are two of the most important aspects of the ICT adoption process within SMEs, particularly in developing countries (Avgerou, 2008). Their professional abilities could have positive impacts on ICT adoption processes, since most SMEs are suffering from lack of ICT experts and hiring external consultants (Nguyen, 2009; Thong, 2001; Morgan, Colebourne, & Thomas, 2006; Premkumar & Roberts, 1999). Shin (2006) found that SMEs are moving toward adoption of enterprise application software to survive in the competitive global market, and are exploring cost-effective ways to utilize the services of consultants in this regard. According to the literature, the significant positive relationships could be found between ICT adoption and government support (Ahuja, Yang, & Shankar, 2009; Tan, Chong, Lin, & Eze, 2009). Because of their size and lack of resources, SMEs are generally more dependent than other companies on external resources and supports (Sarosa & Zowghi, 2003). Indeed, government support for facilitating information transfers to SMEs has been increasing (Fink, 1998). Such transfers are being facilitated through networks such as small business associations. Public policies and macroeconomic costs (which relates to government actions) have also been found to influence ICT adoption (Cesaroni, Consoli, & Demartini, 2010; Ulrich & Chacko, 2005); such that the more ICT support provided by government to SMEs, the more likely are such SMEs to adopt ICTs.

Evaluation of the DOI Theory

The DOI theory provides an overarching framework to study ICT adoption by SMEs, because it encompasses innovations, adoption decision-making processes and the interpersonal context in which ICT adoption takes place. However, while the theory appears to provide a useful framework, it does not adequately provide a lens through which to examine the complex social

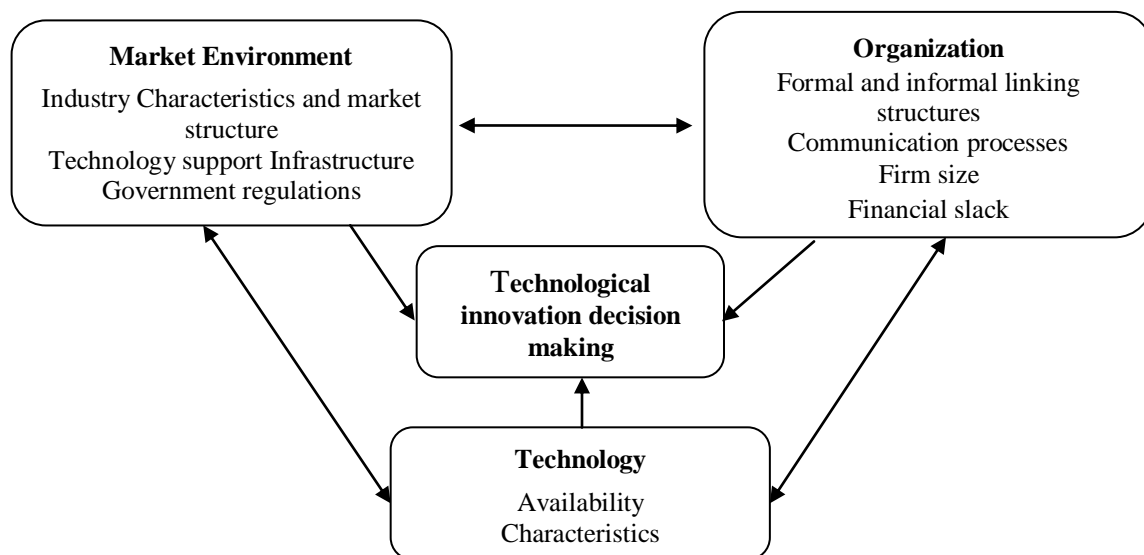
and relational dimensions (Dyerson & Spinelli, 2001), such as family and business networks, which affect the adoption of ICTs by SMEs. In this regard, Walsham & Sahay (2006) noted that the process of ICT adoption and use in developing countries is a complex phenomenon which usually involves actors at various levels. It is therefore important to study the interaction of these different actors on the process of ICT implementation and use. Moreover, contextual differences between developed and developing countries, such as unequal access to ICTs in developed versus developing countries (the digital divide); the unequal access of ICTs within countries (the domestic digital divide); and even the difference in geographic location of a country can have an impact on the adoption of ICTs by SMEs (Cayla, Cohen, & Guigon, 2005; Golding, Donaldson, Tennant, & Black, 2008). In other words, being located in a deep rural area in a developing country, for example, can affect SMEs ability to access and adopt ICTs (Apulu & Latham, 2009).

Moreover, knowing about ICTs does not necessarily result in adoption (Parker & Castleman, 2009). ICT adoption often requires some practical understanding or know-how of ICTs to support the innovation-decision process. However Rogers (1995) does not consider how such know-how is acquired. Accordingly, other theories should be combined with the DOI theory to form an integrated theoretical framework, to better understand ICT adoption by SMEs.

The Technology, Organization, and Environment (TOE) Framework

Tornatzky & Fleischer (1990) developed the Technology, Organization and Environment (TOE) framework. The framework identifies three aspects of an enterprise's context that influence the process by which it adopts and implements a technological innovation: technological context, organizational context, and environmental context, as Figure 2 illustrates.

Figure 2: Technology, organization, and environment framework, adopted from Tornatzky & Fleischer (1990)



Technological Context

Technology Availability/ Readiness

Technology readiness refers to a firm ensuring that it has the technology infrastructure and IT human resources necessary to exploit ICTs (Hong & Zhu, 2006; Pan & Jang, 2008; Zhu & Kraemer, 2005). A firm's ability to integrate technology to deal with business demands has been found to improve customer service and the conduct of business in general (Barua, Konana, Whinston, & Yin, 2004; Zhu, Dong, Xu, & Kraemer, 2006).

ICT Characteristics

The process of ICT adoption within SMEs depends on characteristics of ICT itself which consist of the type, process compatibility, user friendliness, popularity and quality of software available in market, the costs of ICTs, and perceived impacts and benefits of ICTs on organization (Cesaroni, Consoli, & Sentuti, 2011; Premkumar, 2003; Salmeron & Bueno, 2006). Shin's 2006 study of adoption of enterprise application software reveals that user-friendly and relatively long-experienced enterprise applications are more effective in SMEs, than hard-to-understand and brand-new applications. It is necessary that SMEs consider the appropriate application for their business when deciding whether or not to implement new ICT (Nguyen, 2009). Poor ICT investment decisions can negatively affect profitability (Ghobakhloo, Sabouri, Sai Hong, & Zulkifli, 2012).

Organizational Context

Lee & Xia (2006) have noted that firm size is one of the most commonly studied determinants of ICT adoption. Although research has shown that large firms are more likely to undertake innovation, it should be noted that ICT adoption often requires close collaboration and coordination which can be easily achieved in small firms (Oliveira & Martins, 2010). Moreover, empirical studies have consistently found that perceived benefits have a significant impact in IT adoption (Beatty, Shim, & Jones, 2001; Lin & Lin, 2008). For example, in their study of 286 US firms that have adopted corporate websites, Beatty, Shim, & Jones (2001) found that firms that were early adopters of ICTs placed more emphasis on perceived benefits and compatibility of the web with existing technology and organizational norms than did later adopters.

Environmental Context

Competitive pressure refers to the degree of pressure felt by the firm from competitors within the industry. Porter & Millar (1985) noted that competitive pressure was an innovation-diffusion driver. They suggested that, by using a new innovation, firms might be able to alter the rules of

competition, affect the industry structure, and leverage new ways to outperform rivals, thus changing the competitive landscape. This analysis can be extended to ICT adoption. Empirical evidence suggests that competitive pressure is a powerful driver of ICT adoption and diffusion (Al-Qirim, 2007; Battisti, Hollenstein, Stoneman, & Woerter, 2007; Grandon & Pearson, 2004).

The TOE framework provides a useful analytical framework that is often used for studying the adoption and assimilation of different types of ICT innovation. The TOE framework has a solid theoretical basis, consistent empirical support, and the potential of application to ICT adoption domains. Indeed, a number of studies (e.g., Martins & Oliveira, 2008; Mehrtens, Cragg, & Mills, 2001; Premkumar & Roberts, 1999; Thong, 1999), have used the TOE framework to assess a range of ICT adoption by SMEs. Table 1 provides a summary of studies of ICT adoption factors in SMEs.

Table 1: Summary of ICT Adoption Factors in SMEs Using the TOE Framework

Influencing Factors	ICT Adoption	SME Size	Authors
Technology context, organizational context, environmental context	E-commerce adoption	926 SMEs (n/a)	Huynh et al (2012)
External pressure, perceived benefits, organizational readiness	EDI adoption practices	7 SMEs (n<200)	Iacovou et al (1995)
Technology, organization, environment	EDI adoption	575 SMEs (n<100)	Kuan & Chau (2001)
Technology context, organizational context, environmental context	Internet, web site and e-commerce adoption	3155 small firms	Martins & Oliveira (2008)
Perceived benefits, organizational readiness, external pressure	Internet adoption	7 SMEs (n<200)	Mehrtens et al (2001)
Relative advantage, top management support, organizational size, external competitive pressures	Online data access, e-mail, and the Internet	78 SMEs (n<90)	Premkumar & Roberts (1999)
CEO characteristics, IS characteristics, organizational characteristics, environmental characteristics	IS adoption	166 SMEs (n<100)	Thong (1999)

Source: adopted from Grandon & Pearson (2004)

Based on the TOE framework, the primary factors that influence ICT adoption are: technological context (technology readiness and technology integration); organizational context (firm size, expected benefits and obstacles of e-business and improved products and services or internal processes); and environmental context (internet penetration and competitive pressure).

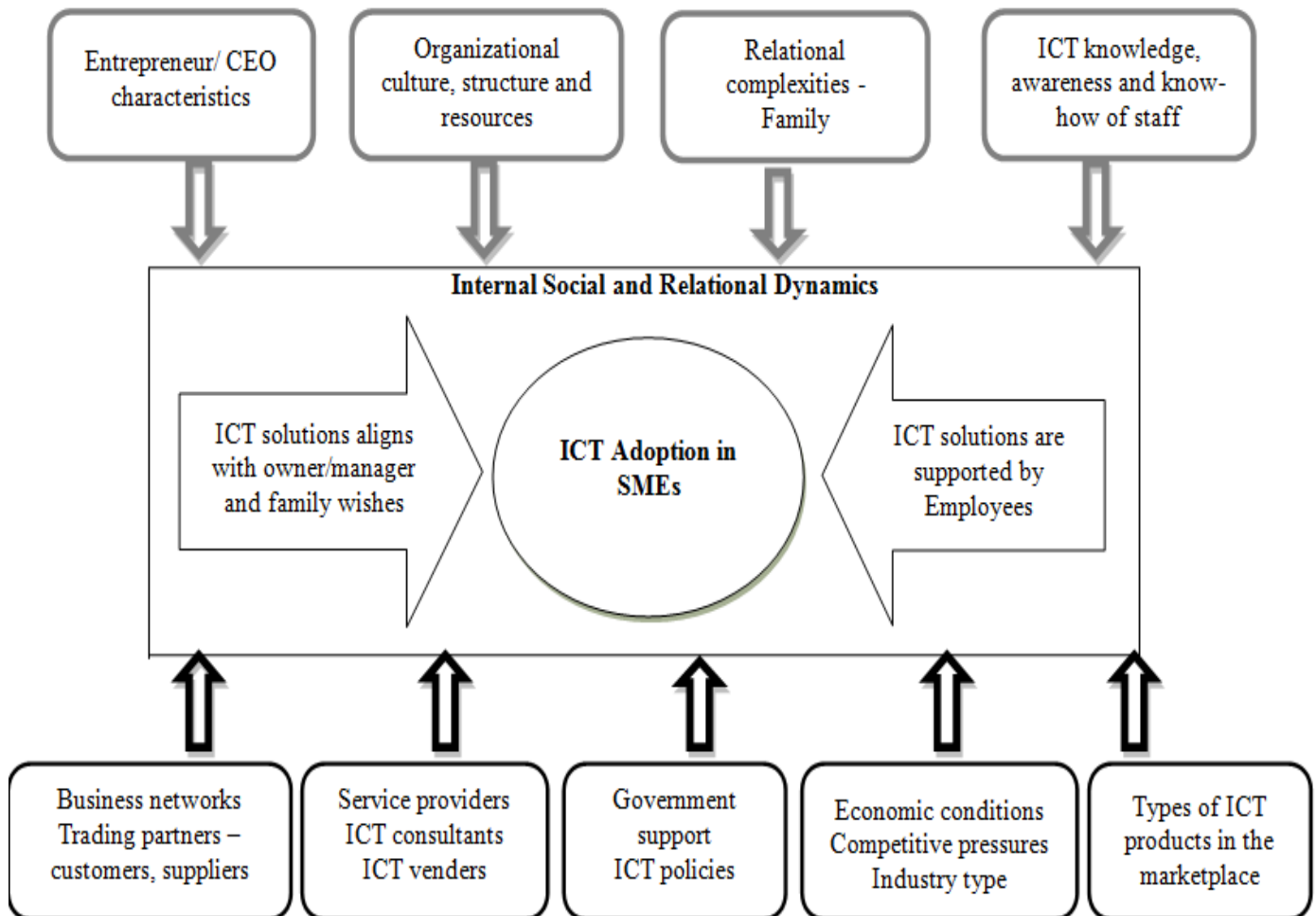
Evaluation of the TOE Framework

Moreover, the TOE framework is consistent with the DOI theory, in which Rogers (1995) emphasized individual characteristics, and both the internal and external characteristics of the firm, as drivers for organizational innovativeness. As the TOE framework includes the environment context (not included in the DOI theory), it becomes better able to explain intra-firm innovation adoption; therefore, we consider this model to be more complete.

Integrated Model of ICT Adoption in SMEs

Based on insights gained from review of the literature, including such studies as Thong (1999); Chong, Ooi, Lin, & Raman (2009); and Wang, Wang, & Yang (2010), the following integrated theoretical model of factors influencing ICT adoption decisions in SMEs is proposed as shown in Figure 3.

Figure 3: Integrated Model of Factors Influencing ICT Adoption Decisions in SMEs, Taylor (2014)



DISCUSSION

Integrative Model Incorporating the DOI Theory and TOE Framework

This model attempts to integrate the key elements of the DOI theoretical model and the TOE framework. Close examination of upper section of the model, reveals some of the major internal factors influencing ICT adoption decisions by SME namely entrepreneur/ CEO characteristics; organizational culture, structure and resources; relational complexities (e.g. family involvement in the SMEs operation); and ICT awareness, knowledge, and know-how of staff. The lower section of the model provides some of the key external factors influencing the adoption of ICTs by SMEs. Such factors include business networks, trading partners, industry type; service providers, ICT consultants and vendors; government support and policies; economic and competitive pressures; and the types of ICT products in the marketplace. These internal and external factors are widely incorporated in the DOI theory and the TOE framework. In effect, the integrated framework in Figure 3, reflects the internal and external dynamism, as well as indicates the relational complexity between actions that may influence the adoption of ICTs by SMEs.

These internal and external factors influence the SME's owner/manager and/or family's wishes regarding the specific ICT solutions to adoption. This indicates that employees influence on the success of ICT adoption is important. It suggests that they should be engaged in the process of adopting appropriate ICT solutions (see Caroli & van Reenen, 2001). While such engagement may not necessarily include their involvement in the actual ICT purchase decision, it is important employees be provided with the requisite sensitization and training to enable their transition and effective use of the ICTs solution an SME adopts.

Social Actors

Given the peculiarities of SMEs, particularly those operating in developing countries, government support and business networks are important vehicles to help resource constrained SMEs to adopt ICTs (Avgerou, 2008). The model recognizes this, as well as the complexities that are often associated with operating SMEs with strong family ownership structures (Consoli, 2012; Dyerson & Spinelli, 2001). Often the decision to adopt ICT is influenced not only by the entrepreneur or CEO, but also by family members who have invested in the particular SME. In essence, and particularly from a developing country perspective, the proposed integrated model of factors affecting ICT adoption by SMEs recognizes the actors at various levels such as the entrepreneur/owner-manager, family members, customers, employees, customer and suppliers, government officials, ICT consultants and vendors, business partners and so on. The model

also considers the interaction of these different actors on the process of ICT adoption (Walsham & Sahay, 2006).

ICT Policies

The model appropriately incorporates the issue of ICT policy, since effective ICT policy initiatives have facilitated ICT adoption and growth. Important policy instruments have included support networks, which provide training and consultancy, and network opportunities for SMEs. Matthews (2007) noted that in Africa, for example, strategic training initiatives are being facilitated to provide support and mentoring in ICTs, and are assisting in reducing the brain drain. Matthews (2007) noted that in response to ICT infrastructure inadequacies, such as bandwidth constraints, some developing countries are exploring the provision of free or subsidized Internet access for SMEs, which may also impact the ability of SMEs to invest in ICT. According to the World Economic Forum (2010), governments around the world are recognizing the importance of ICTs to their economic development. In this regard, Tanzania has provided tax relief on hardware to SMEs; the Venezuelan Government has a provided national government grant scheme; the Governments of Ghana and India have established donor schemes to promote ICT adoption; and the Philippine and Canadian Governments have provided training in website development for SMEs (Matthews, 2007).

Alignment of Proposed Integrated ICT Adoption Model and SNT

Review of the literatures indicates consistency between the proposed integrated ICT adoption model and the features of the social network theory (SNT), which posits that social context can influence the motives and behaviours of individuals (actors). Besides, SNT asserts that organizations (including SMEs) are socially constructed and are influenced by the characteristics and motives of all actors (Pitt et al, 2006). The SNT therefore complements the DOI theory and the TOE framework by providing a lens for examining the nature of relationships and the complex social structures associated with SMEs ICT adoption. This has been a major limitation of the DOI theory that was earlier identified (Parker & Castleman, 2009).

In accordance with the proposed integrated ICT adoption model, SNT considers all the social systems that an actor might participate in as part of their social network (Hoang & Antoncic, 2003). Hence, the theory makes a useful contribution to understanding SME adoption of ICTs; because it takes into account the structural, interaction and interpersonal aspects of an SME owner-manager's social network, which influences his or her decision-making. SNT, for example, takes into account the ICT knowledge exchange networks among SME owner-managers, employees, family, friends, and external parties (e.g. ICT experts). Thus, the theory

is used to explain aspects of the relationship between an SME owner/manager and an ICT solutions provider, which can influence adoption.

Moreover, like the proposed integrated model, the SNT supports the analysis of networks within teams, business units, and entire organizations. In this way, it can be applied to look at internal processes, culture and roles among SME employees and ICT consultants; which influence ICT adoption (see Beckinsale, Levy, & Powell, 2006; Martin, 2005). Shaw (2006) noted that a major benefit which SMEs can gain from their social networks is the ability to share and gain knowledge. This knowledge exchange provides access to resources that SMEs may not experience internally (Butler, Reed, & Le Grice, 2007; Gibbs, Sequeira, & White, 2007) and therefore helps them develop needed competencies.

AVENUES FOR RESEARCH

Although much work has been done in examining a number of the key factors that influence SMEs adoption of ICTs, there still exists a need to explore whether such factors influence SMEs' decision to adopt emerging technologies such as cloud computing and free and open source software (FOSS). Such research is important since SMEs are always seeking to adopt and implement cost-effective ICT solutions to move their businesses forward. Accordingly, for this and other complex new ICTs, further research should be undertaken utilizing the proposed integrated ICT adoption model to achieve a better understanding of the ICT adoption phenomenon. In addition, future research, applying the proposed integrated framework together with the SNT, should be done to understand how complex social structures and relations affect ICT adoption.

Future research should also address how network structures affect decisions concerning adoption and diffusion of ICT-enabled innovations? See Oinas-Kukkonen, Lyytinen, & Yoo (2010). To this end, SNT should be used in conjunction with the proposed integrated model to identify patterns of SME idiosyncrasy, particularly in the developing country context, as a potential way in which to formulate more successful predictive research models. Also the proposed integrated theoretical model for explaining SME ICT adoption could include the SNT as a lens for contextualizing the relational aspects which underpin SME adoption decisions. Further research along this line of inquiry should also be explored.

There furthermore exists a need to employ other research paradigms, such as qualitative, action- and ethnographic- research approaches in exploring what and how leadership and organizational factors favour the incremental or gradual introduction of ICT based solutions or innovations in SMEs to effectively facilitate their implementation; see, for e.g., Brown & Hagel (2003).

CONCLUDING REMARKS

In today's competitive business environment, technology is no longer an afterthought informing business strategy, but it is the actual cause and driver. ICTs can help SMEs to substantially reduce the cost of their business processes, and lower the cost of operations. However, for SMEs to maintain or improve their business competitiveness; they must adopt and utilize information and communications technologies to enhance their firms' selling proposition; see Tan, Chong, Lin, & Eze (2009). This requires, SMEs in developed and developing countries to weigh the costs and benefits associated with adopting ICTs, and implement those that will provide the most value. SMEs therefore have to consider the drivers, barriers and issues that might affect their successful adoption of ICT solutions, given the internal and external context in which they operate.

The innovation technology literature provides a plethora of factors influencing ICT adoption among SMEs and large firms. However, the literature makes clear that unlike large firms, SMEs are particularly challenged by resource constraints and lack of ICT know-how and skills (Irjayanti & Azis, 2012; Vega, Chiasson, & Brown, 2008). In adopting ICTs, therefore, SMEs must consider and consult a range of actors, including network partners and ICT consultants, to assist them in adopting appropriate ICTs.

Detailed review of the literature revealed that the DOI theory and the TOE framework are the most often used theoretical models to investigate ICT adoption at the firm level. Both theories were examined, and were used to inform the development of an integrated model of ICT Adoption to test factors influencing ICT adoption in SMEs. Furthermore, close scrutiny of the model suggests that it not only aligns with the DOI theory and the TOE framework, but is consistent with aspects of the social network theory (SNT). The proposed integrated model, thus, provides a useful lens to effectively examine some of the social network processes of SMEs to determine whether they influence SMEs' ICT adoption. To this end, future research will be undertaken to test the model to determine the extent to which it explains factors influencing SMEs' ICT adoption decision-making in developed and developing countries.

A final note: Alford (1998) believed that researchers needed to incorporate multiple theoretical frameworks and methodologies in order to make advances in understanding the hard problems of our time. This proposed integrated ICT adoption model should be seen as representing an important step in this direction.

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