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Review

Information and communication technologies within small and medium enterprises in developing economies

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With the realization of the benefits associated with the adoption of information and communication technologies (ICTs), many small and medium enterprises (SMEs) in developing economies are beginning to embrace the use of ICT. This process has, however, been marred with numerous challenges, characterizing the process as slow paced adoption and use of poor quality ICTs that are outdated, ineffective and inefficient. This is partly attributed to the fact that most developing economies are not well positioned to provide conducive environments for their SMEs to thrive, even in their efforts to embrace ICT. Notwithstanding the many challenges, SMEs in developing economies are slowly but steadily starting to embrace the use of ICTs. Therefore, the objective in this article is to review literature on ICT usage within SMEs in developing economies. The authors concluded that by strategically positioning their ICT, SMEs can tap into the enormous potential advantages offered by ICT to gain a competitive advantage. The authors further submit that SMEs can make use of their flexibility and relatively small size to their advantage, because these are perfect conditions for the diffusion and application of ICT.

Key words: Information and communication technologies, small and medium enterprises, developing economies.

INTRODUCTION

The use of information and communication technologies (ICTs) within small and medium enterprises (SMEs) has been a popular research area for quite some time now (Burges, 2002). This has been buoyed by the growing realization that firms who invest in ICTs are more productive and that ICT adoption is important for economic growth (Morrell and Ezingeard, 2002; Acs, 1992; Boddy et al., 2002; Agbeibor, 2006). From this perspective, ICT is, and increasingly will be, an integral component of organizations.

Many big firms have successfully been able to invest in ICT and reap the benefits that accrue from such an investment (D'Atri and Sacca, 2009; Sircar and Choi, 2009). SMEs, however, have had a completely different story (Dhillon et al., 2009), particularly those in the developing economies (Puppim de Oliveira, 2008). Many large firms operate under favorable environments (Worthington and Britton, 2009), earning them many success stories with their ICT investment initiatives. With the challenges faced by SMEs, there have been more failures than success in their efforts to embrace the use of ICT (Kyobe, 2004; Parker and Castelman, 2007). This situation is even more pronounced for SMEs in developing economies that have to operate under harsh business environments (Agbeibor, 2006; Duncombe, 2005).

Notwithstanding the many challenges, SMEs in developing economies are slowly but steadily beginning to embrace the use of ICTs (Kapurubandara, 2009; Duncombe, 2005; Kyobe, 2004). This they do with the hope that such an investment in ICT will translate into better services through enhanced business processes and eventually increase productivity. Whether this hope does translate into a reality for SMEs in developing economies has been a subject of interest to researchers (Ayyagari et al., 2007; Dhillon et al., 2009; Caldeira and

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Ward, 2002), with some studies suggesting that there is no significant relationship between investment in ICT and improved productivity being realized by SMEs in developing economies (Matambalya and Wolf, 2001).

The primary objective of this study is to highlight ICT usage within SMEs in developing economies. Methodologically, an analysis of literature and discussions was carried out focusing mainly on ICTs within SMEs in developing economies. The remainder of this paper is structured as follows: presentation of the usage of ICT within SMEs in general, and thereafter the focus is placed on this usage in developing economies. We then present particular challenges SMEs have to face in developing economies in their efforts to adopt the use of ICTs and also the possible contributors to ICT success within SMEs. The overall conclusions and recommendations for future research directions in this area are then made.

THE ROLE OF ICT IN SMEs COMPETITIVENESS

There have been an increasing amount of new opportunities as well as increased competition on the markets due to market and business globalization (Burges, 2002; D'Atri and Sacca, 2009). The market and business globalization factors have a major impact on SMEs and their operations (Bannock, 2005). SMEs need to look at their internal processes and seek solutions to be able to sustain their growth and improve their competitiveness. SMEs are faced with several challenges in trying to remain relevant and competitive, and the situation is even more deplorable for SMEs in developing economies (Puppim de Oliveira, 2008).

A number of studies have shown that firms that invest in ICTs are more productive (Bannock, 2005; Katz and Green, 2010; Dhillon et al., 2009; D'Atri and Sacca, 2009). SMEs need to determine how they can *"take best advantage of IT in order to support its operations, add value to its products and services, and gain competitive edge in the market place"* (Stylianou and Kumar, 2000: 99). Delivering quality products or services is a strategic necessity and is linked to an organization's ICT resources and capabilities (Ray et al., 2005).

It is a commonly held view that ICTs can play a fundamental role in helping SMEs increase efficiency, effectiveness and competitiveness (Levy and Powell, 2005; Caruso and Marchiori, 2003). In order to yield a considerable competitive advantage from ICT investment, SMEs need to link their ICT to their business strategy (Levy and Powell, 2005). That is to say that ICT needs to fit with the SMEs objective of gaining a competitive advantage. SMEs may gain a competitive advantage by taking advantage of the opportunities offered by ICT through its three basic roles (Laudon and Laudon, 2009): automation, information and transformation. When the human effort is substituted by ICT, the ICT are considered to have automated a task or process. When the human effort is supplemented by ICT, ICT are considered to have informed a task or process. And when the ICT restructures, the ICT transforms a set of tasks or processes.

According to Porter's competitive forces model (Laudon and Laudon, 2009), the success or failure of a business depends on its ability to respond to its external environment. The external environmental factors are (Laudon and Laudon, 2009):

1) Competitors: These are other firms who are in the same business or same market and compete against the firm by producing similar or substitute products or services.
2) New market entrants: These are new enterprises that join in a particular market or business by producing similar or substitute products or services.
3) Substitute products and services: Within a market there are similar or substitute products or services being offered by competitors, and customers can switch to them owing to their better quality or low price.
4) Customer**:** These are potential buyers in a given market. With abundance of information at their disposal, customers can make more informed decisions on the choice of product or service they want to buy.
5) Suppliers: These are entities that supply goods or services to the organization.

A number of studies have shown that effective and efficient ICTs allow SMEs to respond positively to the external factors (Ayyagari et al., 2007; Dhillon et al., 2009; Katz and Green, 2010; Baschab and Piot, 2007). SMEs can use ICTs to respond to external factors, thereby gaining a competitive advantage in one of the following four ways (D'Atri and Sacca, 2009; Dhillon et al., 2009): low-cost leadership, product differentiation, focus on market niche, and strengthening customer and supplier intimacy.

1) Low-cost leadership: SMEs can use ICT to lower their operational costs, thereby lowering the prices of their products or services. This will make it challenging for their perennial competitors and new market entrants to match their prices. The lowered operational cost will enable SMEs to not only stick to the local market, but also expand regionally and internationally. The funds saved as a result of ICT usage could be used to address other, more pressing areas of their business.
2) Product differentiation: SMEs can take advantage of the ICT ability to create products or services that are so different that they create barriers for their competitors.
3) Focus on market niche: By focusing on a narrow market segment rather than a larger general market, SMEs can use ICT to gather specific data about its customers, and hence, be able to meet the unique needs of its customers.
4) Strengthening customer and supplier intimacy: Supply chain management (SCM) systems can be used to

strengthen supplier intimacy. On the other hand, customer relationship management (CRM) systems can be used to improve customer relationship. SMEs can, therefore, make use of such systems to better its relationship with suppliers and customers.

By strategically positioning their ICTs, SMEs can tap into the enormous potential advantages offered by these systems to gain a competitive advantage. SMEs can use their flexibility and relatively small size (Katz and Green, 2010) to their advantage, because these are perfect conditions for the diffusion and application of ICTs (Datta, 2007). With their flexibility and small size, SMEs will not need complex structures to facilitate the diffusion and application of ICTs (Datta, 2007), and can easily change to accommodate the requirements of the new ICTs solutions.

It is widely accepted in ICT literature that organizations do go through a series of stages in their utilization of ICTs (Galliers et al., 2003). A few studies have indicated that SMEs do follow a similar path as large firms (Levy and Powell, 2005; Poon and Swatman, 1999).

EVOLUTION OF ICT USAGE WITHIN SMEs

SMEs have scarce resources at their disposal (Katz and Green, 2010) and because of this, they cautiously venture into ICT investment. Many SMEs initially use ICTs primarily to automate their simple and single existing processes (Dhillon et al., 2009). This can be attributed to the fact that automation requires less financial resources and less restructuring. In this phase of ICT usage, matters relating to ICT within the enterprise are left to specialists, and managers are hardly involved (Ayyagari et al., 2007; Dhillon et al., 2009).

With positive benefits trickling to them after initial venture into the use of ICT, most SMEs owners/ managers start gaining more confidence in the technology and are more willing to further invest in it (Bannock, 2005; Duncombe and Molla, 2009). As a result, the SMEs management begins to explore other possibilities that can be offered by ICTs (Caruso and Marchiori, 2003; Dhillon et al., 2009). It is at this stage that ICT roles of information and transformation are explored (Caruso and Marchiori, 2003; Dhillon et al., 2009), the strategic significance of ICT begins to be more appreciated, and the use of ICT to upgrade quality, improve customer service, and also enhance integration with suppliers becomes the order of the day (Laudon and Laudon, 2009; Duncombe and Molla, 2009; Dhillon et al., 2009). These roles in ICT usage have further leveraged the competitiveness of SMEs who have deployed the use of ICT. Most SMEs now are beginning to view ICT as strategic tools that they can use to gain competitive advantage, and more SMEs management are becoming ore directly involved with ICTs because of the abilities of these technologies to enable them to fulfill their duties efficiently and effectively (Megginson et al., 2008).

The present usage of ICTs within SMEs can be summarized as follows (Ayyagari et al., 2007; Dhillon et al., 2009):

1) Redesigning of business processes to have more streamlined processes and also to do away with redundant processes
2) Cutting down cost by significantly reducing information processing costs and improving reliability
3) Providing timely and quality information for better decision making
4) Improving quality of their products and services
5) Increase revenue
6) Enable SMEs to survive in the highly competitive market, specially now in the face of globalization.

How fast an SME is able to move from basic usage of ICT like, automation, to more advanced usage like, transformation of the business process, also largely depend on the growth stage of the SME (D'Atri and Sacca, 2009; Churchill and Lewis, 1983). According to Churchill and Lewis (1983), SMEs do go through a series of growth stages in the following order: existence, survival, success, take-off, and resource maturity. During the transition from one stage to the other, there are different challenges that SMEs will need to overcome to have a successful growth transition (Katz and Green, 2010). During the existence stage, there are no organizational structures and the focus is on obtaining customers (Katz and Green, 2010). As such, they seldom have formal systems and rarely invest in ICTs. As the business progress, however, the organizational structures become more evident, and it's from this stage that most SMEs will start to consider employing the use of ICTs for their basic operations (Katz and Green, 2010; D'Atri and Sacca, 2009). This use of ICTs becomes more pronounced as the SMEs attain resource maturity (Katz and Green, 2010; D'Atri and Sacca, 2009).

To conclude from the preceding discussions, because of the challenges surrounding them and limited resources, SMEs are always skeptical about investing in ICT, and so the more stable they are, the more comfortable and willing they will be to invest in ICTs.

Notwithstanding several drawbacks along their way, many SMEs are beginning to embrace the use of ICTs to take advantage of the enormous benefits that are associated with the use of such systems (Dhillon et al., 2009; Kashangaki, 2008). The same cannot be said for SMEs in developing economies because of the additional challenges they face as a result of the poor prevailing environment in their countries (Beck et al., 2003; Duncombe and Molla, 2009).

ADOPTION OF ICT WITHIN SMEs IN DEVELOPING ECONOMIES

Three definitions of ICT adoption can be identified in the

literature (Sharma and Bhagwat, 2006; Russell and Hoag, 2004; Rogers, 1995; Thong, 1999; Laudon and Laudon, 2009). The variations stem from the varied use of the term within the stages of ICT adoption. In this paper, the use of ICT adoption will be applied to describe a three-stage process:

1) First, the decision making stage, when information about the desired ICT is collected, evaluated, and the decision to adopt ICT is made
2) Second, the implementation stage, when the ICT components are installed
3) Third, the evaluation stage, when the ICT that was implemented is evaluated.

With the realization of the benefits associated with the adoption of ICTs, many SMEs in developing economies are beginning to embrace the use of ICTs (Kyobe, 2004; Duncombe and Molla, 2009; Matambalya and Wolf, 2001). This process has, however, been marred with many challenges (Matambalya and Wolf, 2001; Macharia, 2009), characterizing the process as slow paced adoption and use of poor quality ICTs that are outdated, ineffective and inefficient. This is partly attributed to the fact that most developing economies are not well positioned to provide conducive environments for their SMEs to thrive, even in their efforts to embrace the use of ICT (Duncombe, 2005; Kew and Stredwick, 2005; Sanford, 2003).

SMEs in developing economies have limited financial resources and because of this, most of their capital investment is directed towards their core business functions (Agbeibor, 2006; Beck et al., 2003). Investing in ICT solutions is often considered secondary, and most of them do not see the immediate impact of such systems to their business (Caldeira and Ward, 2002; Dhillon et al., 2009). As such, they do not give much priority to such an investment.

There are different options that SMEs can use to adopt ICT solutions, and they can be categorized as follows (Avison snd Fitzgerald, 2006; Chesher and Skok, 2002; Dutta and Evrard, 1999; Turban and Volonino, 2010; Laudon and Laudon, 2009):

1) Internal development: In this case, SMEs can develop ICTs from scratch using their in-house resources
2) External development: This is where SMEs make use of software development companies to develop their ICTs
3) Use commercial-off-the-shelf (COTS) solutions: COTS are ready-made ICT products that are available for sale. In this case SMEs can obtain COTS with or without modifications. The modifications can be done by the software producer on request by the SME, or the SME may opt to do own modification using their in-house expertise or external expertise. Common COTS applications include packages like office suite, image processing, internet access application, and communication application
4) Application service provider: This is when the application deployment and management are carried out by vendor through internet or private network, like the cloud computing technology
5) SMEs could also make use of any combination of the aforementioned options.

Being constrained by limited resources, harsh business environment, coupled with competing demands, ICT investments by SMEs in developing economies are normally done with a lot of caution and suspicion (Kapurubandara, 2008). Most of these SMEs lack internal skills necessary to develop ICT solutions (Ayyagari et al., 2007; Burges, 2002). As a result, most of them rarely develop their ICT solutions internally (Caruso and Marchiori, 2003; Dhillon et al., 2009). Instead, most of them make use of COTS solutions, which are readily available and comparatively affordable (Dhillon et al., 2009). Moreover, most COTS solutions are widely used and have traditionally gained acceptance in many organizations (Laudon and Laudon, 2009; Boddy et al., 2002; Dhillon et al., 2009). This does offer some assurance to the management of the SMEs on the reliability of such technologies.

The introduction of ICTs in SMEs is normally considered the start of a transition that is full of risks and of uncertain final results (Caruso and Marchiori, 2003). More often, during the process new issues emerge on top of those that are already there and possibly management complexity does increase to new levels (Megginson et al., 2008). With SMEs in developing economies having insufficient managerial and technical skills, lack of funds to obtain such skills, coupled with the fact that the prevailing environment in their countries is not conducive for their operation (Agbeibor, 2006; Austin, 1990; Beck et al., 2003; Kapurubandara, 2008), these SMEs often do not implement ICT in an optimal way (Tyler and Shah, 2006; Caruso and Marchiori, 2003).

Previous research has shown that the main obstacles to ICT adoption among SMEs in developing economies are the cost involved, skill deficiencies, poor infrastructure, government regulations, and belief that ICT adoption will not reduce cost and lead to positive gains (Kyobe, 2004; Duncombe and Molla, 2009; Matambalya and Wolf, 2001). Interestingly, some researchers claim that the anticipated gains are merely fictional and are unlikely to materialize in some cases (Matambalya and Wolf, 2001). This can rightly be true, owing to the numerous hurdles that most SMEs in developing countries have to contend with. The unfavorable environment within which SMEs in developing economies operate exerts negative effects on the implementation and use of the ICTs.

It has been noted that social context and organizational challenges are also an impediment to successful adoption within SMEs (Burges, 2002; Higgo, 2003). For example, people are always skeptical to change, and there are also political and cultural resistances to change.

Moreover, there are management complexities that are also associated with changes brought in by the adoption of ICTs within SMEs. Investigation of a sample of 70 SMEs in South Africa by Kyobe (2004), found lack of skills and knowledge as the main inhibitors to utilization of ICT resources within these enterprises.

These barriers to successful ICT adoption by SMEs in developing economies can be summarized as follows (Ayyagari et al., 2007; Duncombe and Molla, 2009; Kapurubandara, 2008):

1) High cost associated with the technology
2) Lack of sufficient time to dedicate to the implementation and maintenance of ICTs
3) Lack of requisite knowledge of ICTs, coupled with challenges in finding useful, impartial advice
4) Lack of use of external vendors and consultants
5) Short-range management perspectives
6) Poor understanding of the benefits that the adoption of ICTs can provide and how these benefits can be measured
7) Poor formal planning or control procedures.

Empirical findings have shown that despite enormous benefits associated with the use of ICTs, SMEs in developing economies still make very limited use of ICTs (Beck et al., 2003; Kapurubandara, 2009; Kapurubandara and Lawson, 2007). This is highly attributed to the numerous challenges faced by these SMEs as enumerated earlier.

It can be noted that, because of lack of internal skills within the SMEs in developing economies, most of them are unable to internally develop systems that can address their unique needs (Agbeibor, 2006; Cloete, 2003; Duncombe and Molla, 2009). And because similar situations are prevalent in their own countries, as a result of low technological penetration within developing economies (Sanford, 2003), SMEs are forced to settle for COTS solutions. Many of these solutions more often are designed and developed in more advanced countries (Stair and Reynolds, 2008; Watson, 2007), taking into account the need of their enterprises. With SMEs in developing countries operating under different conditions (Todaro and Smith, 2006), such systems end up not meeting the unique needs of these SMEs.

With more failures than success stories in the efforts to adopt ICTs, there are certain elements that SMEs can explore in order to attain success in their efforts to adopt the use of ICT solutions in their operations.

POSSIBLE CONTRIBUTORS TO ICT SUCCESS WITHIN SMEs

While it is true that many SMEs are slowly but steadily beginning to embrace the use of ICTs, there have been more failures than success in their efforts to adopt the use of ICT. The few success stories in ICT success within SMEs can be attributed to the following (Bingi et al., 2000; Burges, 2002; Boddy et al., 2002; Caldeira and Ward, 2002; Caruso and Marchiori, 2003; D'Atri and Sacca, 2009):

1) Involvement of owner/manager in the implementation of ICTs
2) Involvement of users in development and installation of the ICTs
3) Training of users
4) Selection of applications chosen for computerization
5) Use of disciplined planning methodologies in setting up applications
6) Level of IT expertise within the organization
7) Role of external environment (especially consultants and vendors).

ICT adoption process could result into either ICT being accepted and used to support the operations of the SMEs, or rejected altogether. The acceptance and usage of ICT is often associated with proper framework and structures being put in place to provide a conducive environment for effective and efficient operation of the ICT solution. Hence, to be able to effectively adopt ICT, SMEs need to concentrate their efforts on the success contributors enumerated above. As noted by DeLone and McLean (2003), however, efficiency and effectiveness of an ICT are largely dependent also on the quality of the ICT being adopted. It therefore means that SMEs should not only concentrate on the above mentioned ICT success contributors, but should also equally ensure that the ICT solution they are adopting is of good quality.

A quality ICT needs to satisfy all the stakeholders (management, developers, and users) (Ozkan, 2006). For the management, the technology should add value to the business; for the developer, the development, operation and management of the ICT should be above board; and for the users, the ease of use or user friendliness. In other words, does the ICT help the user do his/her task efficiently, effectively and with minimal efforts? (Ozkan, 2006; DeLone and McLean, 2003). A high quality ICT solution will be associated with more use, more user satisfaction, and positive net benefits (DeLone and McLean, 2003). Quality, therefore, remains a critical element for any ICT solution to be considered as efficient and effective, and SMEs need to put considerable efforts in improving the quality of their ICTs to be able to realize any meaningful gain from ICT investment.

CONCLUSION

SMEs in developing economies are faced with numerous challenges that make a fair competition between them and their counterparts in developed economies challenging. It is widely accepted that SMEs do play a pivotal role in the economic growth of any country, notwithstanding

the numerous challenges that they have to contend with. It is, therefore, only fair that considerable attention be accorded to these SMEs with a view to finding ways to help them improve their competitiveness.

Social context and challenges from within the organization are a hindrance to successful ICT adoption within SMEs in developing economies. To be able to have sustained productivity and growth and remain competitive, SMEs need to re-evaluate every aspect of their strategies and pay close attention on the effective use of ICT, including better decision about their investment on such technologies, and the management of the ICT infrastructure. ICT within SMEs need to be dynamic, supporting the current business strategy, at the same time being able to respond to the changes in the market.While majority of SMEs in developing economies are making use of COTS because they are readily affordable and available, we submit that since most COTS are developed in developed economies, they are not tailored to suit the unique needs on individual SMEs in developing economies. To realize much from their ICT investments, SMEs in developing economies need to consider using custom-made ICT solutions. This study further reveals that it is how SMEs explore the ICT resource together with other resources that will determine the nature of benefits that it can derive from the use of ICT. If well implemented and used optimally, ICTs can help SMEs in developing economies solve some of the perennial problems they are facing. Due to their scarce resources and poor operating environment in their countries, SMEs in developing economies have an uphill task accessing resources required for using ICT solutions to support their enterprises.

With proper strategies, SMEs in developing economies could effectively use ICT solutions to their advantage, notwithstanding the challenges they have to contend with. The use of quality ICT will enhance the usage of the technology within SMEs, as such, ICT have the potential to help meet the needs of these SMEs. From our review of literature on this subject we propose certain future for research.

RECOMMENDATIONS

Several related areas were revealed in our literature review that could potentially be exploited to extend the current research on the subject of ICT within SMEs.

1) A number of studies have revealed that SMEs do not have capacities to effectively adopt ICTs; it would therefore be useful to look at the development of extra curricula and skills development for SMEs in developing economies. For instance, a study looking at requirements needed to create the underlying framework that can facilitate this development.

2) There is lack of a framework or model that can be used by SMEs in developing economies to evaluate the effectiveness and impact of their ICTs. It would be interesting to formulate such a framework or model within a developing economy context.

3) It would also be interesting to study the importance and influence of cultural issues in developing economies on ICT adoption within SMEs.

4) While we acknowledge the work that has been carried out on SMEs in developing economies, the literature on the subject is still scanty, and further research on ICT within SMEs in developing economies is still needed to further prove the generalizability of the few findings that exist, and possibly reveal new insights.

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