Information Technology Usage in SMEs in a Developing Economy

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Information technologies are widely regarded as being capable of providing considerable strategic and operational value to organizations. Their implementation and development has been explored in a wide range of contexts. Studies have been made of large and small-scale organizations, in the public and private sectors, and in different regions of the world. Much of this research has identified the consider-able challenges associated with successful technology deployment. What has received comparatively minimal attention to date is the adoption of information technology businesses in developing economies. Arguably, these businesses are in greater need of such technologies in order to capitalize upon the benefits they may bring. However, organizations in these regions are faced with potentially unique difficulties and constraints.

This study reports the use of information technologies among small and medium-sized enterprises (SMEs) in a developing economy. A survey of 161 companies was undertaken in Lagos, Nigeria. It found that a variety of information technologies had been employed and that they had delivered considerable operational improvements. However, a lack of training and awareness is inhibiting their further use and development. Furthermore, a lack of infrastructure to supply consistent power and Internet services also inhibits their effectiveness. The issue of corruption was also identified as a considerable problem that affects user confidence. While this is a perennial problem that surrounds the use of information technologies in many countries, it appears markedly important in this economy. Consequently, it threatens to be a significant inhibitor to the uptake of technologies.

The role of SMEs in developing countries is an important one, contributing to economic growth and thereby job creation and poverty alleviation (Adekunle and Tella, 2008; Paul *et al.*, 2008; Jones *et al.*, 2014). SMEs are of particular significance to the economic development of Nigeria since they account for around 97% of privately owned businesses (Ihua, 2009). They have been recognized as the backbone of the economy, employing approximately 50% of the work force and providing more than 50% of Nigeria's industrial output (Adekunle and Tella, 2008). They play a significant role in enhancing the quality of human resources, generating employment, building a culture of entrepreneurship, supporting large- scale industries, and encouraging the creation of new business opportunities (Harindranath *et al.*, 2008).

SMEs serve many different roles within supply chains, as suppliers, distributors, producers, and customers (Hong and Jeong, 2006; Koh *et al.*, 2007). The influence of globalization on SMEs has compelled many of them to adopt information communication technology (ICT) solutions in order to survive among increasingly competitive supply networks (Hsin and Anastasia, 2008; Ongori and Migiro, 2010; Stavrulaki and Davis, 2010; Olise *et al.*, 2014). There has been a vast increase in the application and adoption of ICT in organizations for the storing, processing, distributing, and information exchange within the firm and along their supply chains (Apulu *et al.*, 2011; Olise *et al.*, 2014; Agboh, 2015). Firms utilize ICT for many purposes, including enhancing efficiency and cost reduction, and providing an enhanced service to their customers (Ashrafi and Murtaza, 2008; Apulu *et al.*, 2011; Harrison and van Hoek, 2011).

This article is structured as follows: the first section introduces the importance of ICT in SMEs for the management of supply chain activities. Following that, the article explores the role of ICT in SMEs, along with the benefits and barriers of ICT adoption. Next, the research hypotheses are presented, along with the methodology adopted for the study. Finally, analysis and discussions are presented, before conclusions and recommendations for future research are stated.

The role of ICT in SME supply chains

Supply chain management (SCM) comprises a set of approaches and practices to efficiently incorporate manufacturers, distributors, customers, and suppliers, to improve the long-term performance of the individual firms and the supply chain as a whole (Koh *et al.*, 2007). The main objective of effective SCM is to generate a source of competitive advantage for organizations to distinguish themselves from competitors by operating at a lower cost, thus at greater profit, and this can be aided by the adoption of ICT (Christopher, 2011).

Today's ICT solutions are broadly seen to encompass a wide range of '*software, hardware, telecommunication and information management techniques and applications that are used to create, produce, analyse, process, package, distribute, receive, retrieve, store and interpret information*' (Barba-Sanchez *et al.*, 2007, p. 105). The emergence of ICT has helped organizations achieve greater coordination and collaboration among supply chain partners and automate the supply chain process (Hsin and Anastasia, 2008). With advances in, and increasing availability of, ICT, manufacturers, their suppliers, and their distributors can be linked together into a seamlessly integrated organization (Stavrulaki and Davis, 2010; Ajayi and Olayungbo, 2014). The ability of SMEs to offer products and assemble goods at low prices within the quality standards stipulated by larger enterprises has helped increase the overall competition of the supply chain (Thakkar *et al.*, 2009).

The implementation of ICT solutions to support SCM by SMEs can be cost saving for an organization in several ways (Hsin and Anastasia, 2008). It can increase flexibility, reduce the occurrence of errors in paper-based activities, achieve faster response times, and lower the cost of labour (Alam and Noor, 2009). In spite of efforts being made by many organizations to use ICT solutions to support their supply chain strategy, challenges still exist that inhibit effective integration (Christopher, 2011). Much of the literature recognizes this is largely due to the fact that most of the suppliers are SMEs that have limited skills and resources. This therefore makes their integration with the rest of the supply chain problematic (Adekunle and Tella, 2008).

ICT adoption benefits and barriers

The adoption of ICT offers many benefits across a range of intra- and inter-firm business processes and transactions (Apulu and Latham, 2009). ICT is expected to provide SMEs with competitive advantage along with improved integration among supply chain trading part-ners (Bhagwat and Sharma, 2007). By contrast, it is argued that other firms can easily replicate the adoption of a particular ICT solution and therefore it does not necessarily provide a lasting competitive advantage for the adopting firm (Fasanghari *et al.*, 2008).

The benefits of ICT adoption in SMEs have been widely explored in the extant literature. They include cost reductions and improved marketing (Shiels *et al.*, 2003; Akpan-Obong, 2007; Akhavan and Jafari, 2008; Li *et al.*, 2008; Oluwatayo, 2010; Singh, 2011), more efficient and effective communications (Chibelushi and Costello, 2009; Apulu *et al.*, 2011; Singh, 2011; Pickernell *et al.*, 2013; Ajayi and Olayungbo, 2014), as well as superior procure-ment and methods of distribution (Collins *et al.*, 2010; Har-rison and Van Hoek, 2011; Ajayi and Olayungbo, 2014).

According to Fawcett *et al.* (2008) and Ihua (2009), SMEs are not a uniform or standardized set of businesses. They are in fact a highly heterogeneous collection of enterprises and vary substantially by size, sector, age, structure, and location. These characteristics can directly influence the organization's adoption of ICT (Apulu *et al.*, 2011). Nath and Standing (2010) highlight the influence of company size on the adoption of ICT and note that it is also directly related to the type of industry to which the organization belongs.

Larger organizations are usually in possession of tech-nical, human, and financial resources which can be used to aid and enhance the adoption of ICT solutions. It is often a different case with SMEs, particularly in the face of limited financial and human resources (Ashrafi and Murtaza, 2008; Jones *et al.*, 2011; Mpofu and Watkins- Mathys, 2011; Ajayi and Olayungbo, 2014). However, it has been argued that SMEs are sometimes able to exploit ICT opportunities and adopt ICT more easily than larger organizations, simply because of the flexibility advantage they possess that makes their decision-making faster (Chuang *et al.*, 2009; Awa *et al.*, 2011).

The barriers to utilization and adoption of ICT in SMEs can be broadly classified as internal and external (Jones *et al.*, 2003; Kapurubandara and Lawson, 2006; Apulu *et al.*, 2011; Awa *et al.*, 2011). Internal barriers are those that exist within an organization and can also be resolved within the organization. They typically include organizational culture, lack of resources, owner/managers' attitude' toward ICT, and the level of training of employ-ees. The external barriers are those that lie outside the immediate control of the organization. These include a lack of infrastructural facilities and limited funds from banks and other governmental bodies. It has been suggested that in order for these inhibitors to be overcome, SMEs need to work collaboratively (Kapurubandara and Lawson, 2006).

Perhaps one of the most surprising barriers to ICT adoption is the lack of knowledge of ICT solutions, how they work, their implementation and perceived benefit to the SME sector (Adenikinju, 2005; Arendt, 2008; Asharfi and Murtaza, 2008). Prior studies have demonstrated that most owner/managers of these firms, and some of the employees, could not select an ICT solution that would be appropriate for a given type of organizational problem (Apulu and Latham, 2009; Abor and Quartey, 2010). Hence, there is a need for both the owner/managers and the employees to undergo appropriate training in order to be aware of the evolving nature of ICT and identify the optimum solution for their firm (Paul *et al.*, 2008). However, many owner/managers fear that they will lose their employees to other firms after investing in training (Arendt, 2008; Jones *et al.*, 2013).

The number of ICT graduates has fallen sharply in many countries, despite a general increase in the requirement for skilled recruits. Businesses have also criticized universities for not adequately preparing ICT graduates for the workplace, commenting that they are lacking in relevant experience, general business knowledge, and interpersonal skills

(Doucek and Novotny, 2007; Koppi *et al.*, 2008; Miliszewska, 2008; Oxford Economics, 2009; Llorens *et al.*, 2013). If this trend continues, then one could expect ICT skills in SMEs and even larger companies to become severely depleted and ICT adoption to become even more challenging.

The adoption of ICT in SMEs may also require considerable effort from its users, who need to learn how to use the system and optimize its functionality to deliver greater value (Korpelainen and Kira, 2010). Furthermore, highly experienced employees of a firm might become entrenched with a particular software or system and then find it difficult to adopt new technology (Paul *et al.*, 2008). However, a rapid rate of adoption can be seen when an organization identifies that an innovation or new technology is meeting the needs of the customer (Alam *et al.*, 2007).

Nguyen (2008) argues that there are three main reasons for the slow rate of adoption and unsuccessful implementation of ICT in SMEs. Firstly, the management of the firms is not transparent about how and why their firms should adopt ICT initially (Chibelushi and Costello, 2009; Modimogale and Kroeze, 2011). Owner/ managers of SMEs do not understand the relationship between ICT and the firm: for example, younger owner/ managers tend to be fascinated by unique and fresh initiatives and are more willing to take risks than older owner/ managers. An older owner/manager may therefore be reluctant to take risks to try out a new technology (Chuang *et al.*, 2009). Finally, the ever-changing ICT environment requires regular updates and training to remain abreast of developments and opportunities (MacGregor and Vrazalic, 2006; Modimogale and Kroeze, 2011).

The attitude of management in an organization plays a crucial role in the adoption of ICT as in most cases in SMEs the managers are also the owners (Apulu and Latham, 2009). Support from the management of an organization, most especially top management, is essential for successful ICT implementation and adoption for SMEs (Matlay and Addis, 2003). If the management is not disposed to its adoption and utilization, then SMEs will not be able to use ICT (Akpan-Obong, 2007; Agboh, 2015). The owner/manager's weakness therefore becomes a limitation of the business as well (Modimogale and Kroeze, 2011; Faloye, 2014).

Secondly, security and reliability issues also significantly inhibit ICT adoption and range, from the fear of computer viruses to the theft of money during electronic transactions and data theft (Arendt, 2008; Scupola, 2009). The presence of hackers gaining access to people's information and the level of fraud is one of the major barriers to ICT adoption in Nigeria (Olusegun *et al.*, 2006). The majority of people do not believe that their information is safe online. For this reason, individuals and SMEs might be reluctant to perform transactions online that require the exchange of personal information (Olusegun *et al.*, 2006; Faloye, 2014). The lack of trust in supply chains can be argued not to be the fault of the organization, since customers might not be interested in using the ICT solutions offered by a firm. This can be for reasons that include the potential for data or money theft (Olusegun *et al.*, 2006). Such developments may also require a restructuring of the entire logistics and supply chain system to more effectively serve and retain customers (Arendt, 2008), and this may be the reason for a firm to shun the idea of implementing ICT solutions.

Thirdly, most SMEs do not have the capability to expand their ICT resources due to limited access to capital (Paul *et al.*, 2008; Faloye, 2014; Agboh, 2015). This is a common factor that affects the adoption of ICT in SMEs (Arendt, 2008; Mpofu and Watkins-Mathys, 2011). The majority of SMEs in Nigeria do not have access to bank loans or funding to support the development of ICT in their businesses (Olorunshola, 2003; Olusegun *et al.*, 2006). Moreover, paying back loans that have high interest rates/bank charges can be too much of a burden for the majority of typical SMEs (Abor and Quartey, 2010).

As mentioned previously, poor infrastructure can also be a problem that affects the adoption of ICT. Lack of Internet access is recognized as a barrier to the adoption of ICT in Nigerian SMEs. It cannot be claimed that Nigeria completely lacks the necessary

infrastructure, but it can be argued that the infrastructure is substandard (Oshikoya and Hussain, 2007; Achimugu *et al.*, 2009). The unstable nature of the electricity supply in Nigeria is one of the key factors affecting the adoption of ICT: information technologies work hand-in-hand with stable sources of electricity supply (Apulu and Latham, 2009). In fact, it can be argued to be the most discouraging factor of ICT adoption by SMEs in a country as a whole (Akpan- Obong, 2007).

Setting up the required infrastructure is expensive and requires significant funding (Achimugu *et al.*, 2009; Arikpo *et al.*, 2009). Some individuals have taken it upon themselves to acquire and set up the necessary infrastructure required to run the organization and to more effec-tively serve their customers (Ashrafi and Murtaza, 2008). For example, the Chairman of Globacom, Mike Adenuga, introduced a 9800-km-long cable network across the UK, Spain, Portugal, and 14 African countries in order to establish a dedicated link to the USA. This is the first initiative of its kind to be executed by an individual in Nigeria (Nkanga, 2011).

Research framework

The literature highlights the challenges that face SMEs when seeking to improve their performance through the use of ICT. From one perspective, the benefits of apposite technologies can be significant. However, the perceived and actual barriers to implementation are numerous, and not all of them lie within the sphere of control of the organization. SMEs in developing economies may also face specific problems when attempting to coordinate their activities with other inexperienced organizations within the supply chain, and when national infrastructures are not supportive of chosen technologies. The fol-lowing hypotheses have been drawn from the themes identified within the literature and form the basis of this investigation:

H1: The adoption of ICT by Nigerian SMEs will be positively related to the perceived ease of using ICT.

H2: There is a positive relationship between ICT adoption and perceived benefits in SMEs.

H3: The adoption of ICT by Nigerian SMEs will be positively related to the size of the organization.

H4: The adoption of ICT by Nigerian SMEs will vary by industrial sector.

H5: The adoption of ICT by Nigerian SMEs will be dependent on the position of the organization in the supply chain.

H6: The perceived ease of use will have a positive relationship with the perceived usefulness of ICT to Nigerian SMEs.

Methodology

The survey research strategy is a widely accepted and common approach in business and management research (Saunders *et al.*, 2007; Bryman and Bell, 2009; Panneerselvam, 2010). It is aimed at producing generalizations about a population by collecting information from samples. It is used for exploratory and descriptive research and usually associated with the deductive approach (Thomas, 2006; Saunders *et al.*, 2009). Surveys are used as they allow for the collection of a large amount of data from a large population in a highly economical way (Bryman and Bell, 2011).

This study employed a self-administered questionnaire technique with the help of three field personnel for both distributions and collections. The questionnaire was addressed to the

owner/manager of the companies surveyed, seeking their permission to take part in the study.

Details of active and registered SME businesses with the Lagos Chamber of Commerce and Industry (LCCI) were obtained and companies were chosen at random in order to obtain a representative sample. The questionnaire was developed drawing precedent from the previous studies of Onugu (2005) and Bhaskaran (2008). Although their study was based on SMEs, the questionnaire used for this study was refined to explore the importance of SCM in SMEs in accordance with the themes identified in the literature review (Ashrafi and Murtaza, 2008; Apulu *et al.*, 2011).

The survey questionnaire was divided into three sections: Section 1 focused on collecting demographic information about the company; Section 2 explored the use of ICT in the supply chain; and Section 3 focused on the benefits and barriers of ICT adoption. Questions were answered through a five-point Likert scale. Some questions included open-ended responses to elicit further detail and accommodate a wider range of responses. A pilot test was carried out on the questionnaire to refine and restructure it (Saunders *et al.*, 2007).

A total of 300 questionnaires were distributed to owner/managers of SMEs in Lagos, Nigeria. A covering letter was attached to the questionnaire stating the purpose of the study and assuring the anonymity of the respondents and their organization. Overall, 180 questionnaires were returned, of which 161 were complete, representing a response rate of 54%. This sample size is considered adequate for analysis and the response rate is similar to that of Apulu *et al.* (2011).

Analysis and discussion

Ajayi and Olayungbo (2014), Olise *et al.* (2014), and Agboh (2015) note that there is no clear definition of SMEs in Nigeria, neither is there a generally acceptable definition. However, the number of employees is usually used to characterize SMEs (Modimogale and Kroeze, 2011). For example, the Small and Medium Sized Development Agency of Nigeria (SMEDAN) defines a micro enterprise as a business employing less than 10 people and with an annual turnover of less than five million naira, a small enterprise as a business with between 10 and 49 employees and an annual turnover of 5–49 million naira, and a medium enterprise as a business with between 50 and 199 people and an annual turnover of 50–499 million naira. Meanwhile, the National Economic Reconstruction Fund (NERUND) describes a small enterprise as having an annual turnover of 10 million naira, and the Central Bank of Nigeria (CBN) defines a small-scale enter-prise for the Small and Medium Enterprise Equity Investment Scheme (SMEEIS) as having an annual turnover of 1.5 billion naira, excluding land and working capital (Olise *et al.*, 2014). Adopting the SMEDAN definitions, analysis of the survey data demonstrated that 63 organizations (39.1%) are micro enterprises employing less than 10 people, 72 organizations (44.7%) are small enterprises, and 26 organizations (26%) are medium-sized enterprises.

Figure 1 demonstrates that 50 respondents (31.1%) had been in existence for less than 5 years, 51 respondents (31.7%) sit within the range of 5–10 years, 23 respondents (14.3%) within the range of 11–15 years, 16 respondents (9.9%) within the range of 16–20 years, and 21 respondents (13%) had been in existence for more than 20 years. This analysis suggests that SME organizations are a vibrant section of commerce in Nigeria. Small and micro-sized enterprises form the majority of the sample surveyed. Encouragingly, around one-third of those organizations have prospered for more than 10 years.
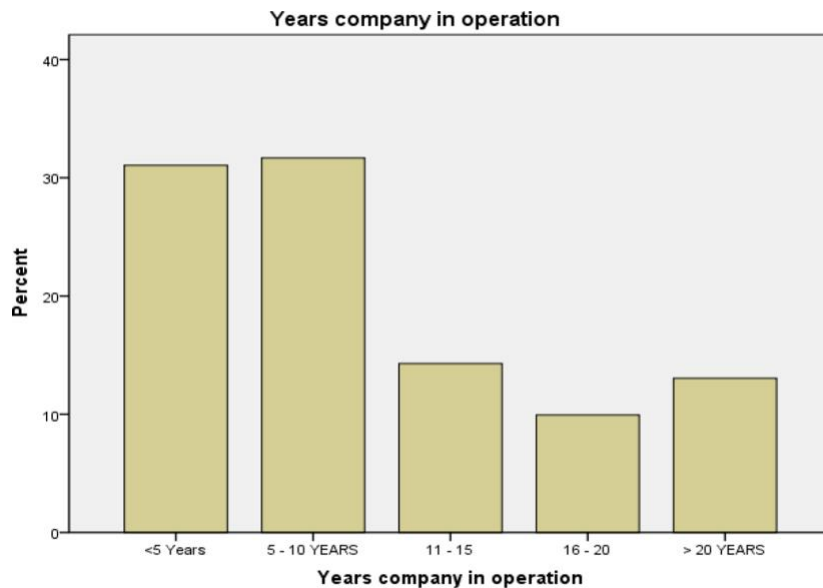
Figure 1. Age of companies.

In total, 31 organizations (19.3%) were private limited companies, 16 organizations (9.9%) were public limited companies, 27 organizations (16.8%) were partnerships, 60 organizations (37.3%) were sole proprietorships, and 26 (16.1%) were family-owned businesses. A total of 113 organizations (70.2%) identify themselves as belonging to tier 0 – that is, supplying directly to the consumer, 35 organizations (21.7%) were reported as tier 1, and 13 organizations (8.1%) were reported as tier 2. **Figure 2** depicts the range of sectors that the survey sample operated in.

Despite making an overall acceptance of Hypothesis 1 (**Table 1**), an independent sample *t*-test (**Table 2**) demonstrated that there were no relationships between ICT adoption and perceived ease of use of the following ICT tools: SMS, mobile phone, and fax. The analysis found that the difference in mean between adopters and non- adopters did not reach statistical significance for SMS, mobile phone, and fax.

Pearson's *r* and Cohen's *d* effect sizes were calculated to assess the differences between the means. Barcode scanner showed minimal significance, video conferencing showed medium-to-low effect size between the two groups. The SME owner/managers that took part in the survey were asked for the reasons why they had not adopted ICT solutions: 8.6% of respondents suggested that it was not applicable to their line of business, 7.4% respondents said it was not economical, 4.9% respondents said they were not trained to use ICT solutions, 2.4% respondents said they were not aware of their usefulness, and 1.8% noted their ignorance of the ICT tools avail-able. The above analysis suggests that Nigerian SMEs are not fully aware of the benefits ICT may bring to specific business functions and processes, or they fail to consider the ways in which ICT may be able to improve an organization's efficiency and effectiveness.

Hypothesis 2 shows an overall acceptance, as represented in **Table 1**. However, the result of the independent sample *t*-test for the ICT subcategories represented in **Table 2** shows that there is no significant difference between the adoption of ICT tools and current trends/ technology, automation of records, improved marketing, efficiency/speed, communication, and information storage. While competitive advantage showed a medium significant difference with Cohen's *d* value of 0.635 and Pearson's *r* value of 0.30, global reach and reduced cost/ efficiency showed low and medium-to-low, respectively, with Cohen's *d* value of 0.397 and 0.496, respectively, and Pearson's *r* value of 0.195 and 0.240, respectively.

This is in contrast with the main body of literature that examines ICT adoption in many contexts.
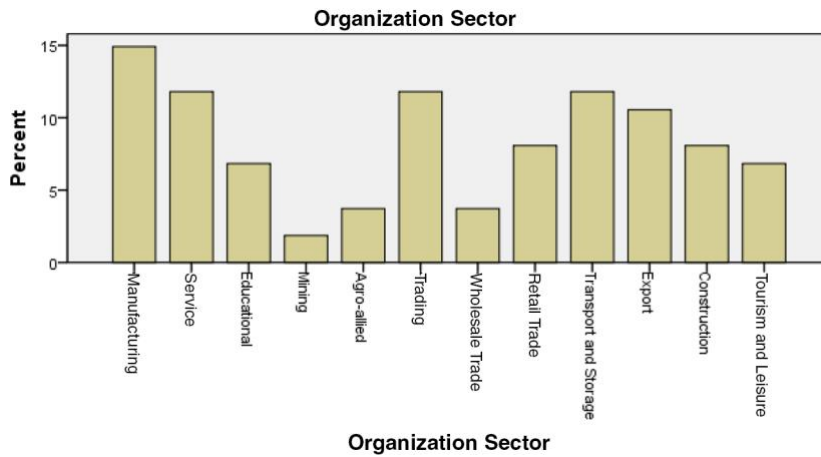

Figure 2. Sectors of commerce.

Table 1. Summary of hypotheses

Hypothesis	Variables	Test	Result
Hypothesis 1	The adoption of ICT by Nigeria SMEs will be positively related to the perceived ease of using ICT.	t-test	Accepted
Hypothesis 2	There is a positive relationship between ICT adoption and perceived benefits in SMEs.	t-test	Accepted
Hypothesis 3	The adoption of ICT by Nigeria SMEs will be positively related to the size of the organization.	Pearson χ^2 ($p = 0.002$)	Accepted Cramer's $d = 0.227$ vs. $p = 0.002$
Hypothesis 4	The adoption of ICT by Nigeria SMEs will vary by industrial sector.	Pearson χ^2 ($p = 0.121$)	Rejected
Hypothesis 5	The adoption of ICT by Nigeria SMEs will be dependent on the position of the organization in the supply chain.	Pearson χ^2 ($p = 0.335$)	Rejected
Hypothesis 6	The perceived ease of use will have a positive effect on the perceived usefulness of ICT to Nigeria SMEs.	Pearson correlation	Accepted

Overall, 65% of the respondents identified that the lack of electricity supply was one of the main factors limiting the utilization and adoption of ICT, and was a notable barrier to its usability. There are unstable and limited power allocation networks in Nigeria, hence power shedding is a regular occurrence (Olatokun, 2008). The lack of infrastructure and the high cost of equipment were also identified by many of the respondents as other factors affecting the adoption of ICT.

For this study, in the context of a developing economy, it is encouraging to find that attitudes toward ICT adoption in SMEs are similar. Although requiring further investigation, along with the analysis of Hypothesis 1, it suggests that Nigerian SMEs' understanding of ICT is well developed. It is worth mentioning that most SME owner/ managers had received ICT training privately (43.5%), followed by owner/managers who had received training from friends (18%) and from government (17.4%).

In accord with much of the literature, Hypothesis 3 finds a strong relationship between the size of the company and the adoption of ICT. From our sample, of the respondents that were micro-scale enterprises, 74% had adopted some form of ICT, while 94% of small-scale enterprises and 92% of medium-sized enterprises had adopted information technologies. Although there does not appear to be a linear relationship between size and adoption, the analysis does suggest that smaller firms find it particularly difficult to adopt ICT.

Table 2. Analysis of *t*-tests by ICT subcategories

Hypothesis	ICT subcategory	*t*-Value	Sig. (*p*)	Effect Size		Result
				(*d*)	(*r*)	
1	Computer	−3.385	0.003	1.5	0.603	High
1	Barcode scanner	−2.100	0.037	0.33	0.16	Low
1	File sharing	−4.286	0.000	0.66	0.32	Medium
1	Data storage	−3.541	0.001	0.55	0.27	Medium
1	SMS	−1.504	0.293			Not significant
1	Website	−6.041	0.000	0.095	0.43	High
1	Internet connection	−2.955	0.008	1.3	0.55	High
1	E-mail	−3.179	0.005	1.38	0.57	High
1	Video conferencing	−2.541	0.012	0.40	0.198	Medium–low
1	Mobile phone	−1.707	0.103			Not significant
1	Fax	−0.971	0.333			Not significant
2	Competitive advantage	−3.760	0.000	0.635	0.30	Medium
2	Global reach	−2.353	0.020	0.397	0.195	Low
2	Current trend/technology	−3.324	0.764			Not significant
2	Automation of records	−0.546	0.586			Not significant
2	Customer satisfaction	−4.885	0.000	0.828	0.382	High
2	Improved marketing	−1.496	0.137			Not significant
2	Increased profit	−20.413	0.000	3.460	0.86	Very high
2	Efficiency/speed	−1.063	0.289			Not significant
2	Communication	−0.642	0.522			Not significant
2	Information storage	−1.082	0.281			Not significant
2	Reduced costs/efficiency	−2.930	0.004	0.496	0.240	Medium–low

There is a perspective that believes older organizations (over 20 years) may be more willing and able to adopt ICT solutions compared with newer organizations (5–10 years) as their financial positions become secure, their awareness of the market improves, and their employees' skills increase. However, the study demonstrated that new organizations (34%) seem to have adopted ICT solutions to a greater degree than old ones (14.9%). There may be several reasons for this, ranging from increased ICT awareness of younger managers to increasing competition between organizations as newer ones enter the market.

The sample that was surveyed encompassed a broad range of industry sectors (**Figure 2**), but no relation was found between this and the adoption of ICT for Hypothesis 4. The Manufacturing sector was found to have the highest figure for ICT adoption (17.0%), followed by Transport and Storage (12.1%) then Trading (11.3%).

No statistical relationship was found between the adoption of ICT and an organization's position in the supply chain for Hypothesis 5. However, in the sample 97% of tier 0 companies had adopted some form of ICT compared with 31% of tier 1 suppliers and 13% of tier 2 suppliers. This is compelling evidence that there is in fact some association between the adoption of ICT and the position of a company in a supply chain that is worthy

of further investigation. Responses to open-ended questions indicated that tier 0 firms adopted and utilized ICT extensively for communication with end users.

The strong relationship found for Hypothesis 6, similar to that for Hypothesis 2, confirms much of the existing literature. The perceived ease of use of ICT solutions will have a positive effect on the usefulness of ICT to Nigerian SMEs. The poor service provided by Internet service providers (ISPs) was seen as a major concern by many respondents. This is characterized by slow Internet speed due to low bandwidth and high subscription costs. Thus, ISPs need to enhance the quality of services they provide to customers, especially regarding bandwidth, as this will assist SMEs to effectively utilize and adopt ICT solutions.

Corruption – an issue of special concern

Many of the findings of this study concur with the perspectives of ICT adoption that are widely discussed in the literature. Some factors seem to be unique to Nigeria and are of value to improving our knowledge of ICT adoption in developing economies. The majority of these issues may be addressed by the organizations themselves. Other issues, such as the provision of affordable and reliable power supplies and telecommunications, require attention at a national level. Corruption was highlighted by 53% of the respondents as one of the factors limiting the successful utilization and adoption of ICT: many of these offered accounts of the difficulties it presents in response to the open-ended survey questions. In Africa it is a problem of routine deviation from established standards and norms by public officials and parties with whom they interact (Ayobami, 2011). Bribery, private gain, and non- existent workers, also known as 'ghost workers,' are some of the different types of corruption that are prevalent. Corruption is therefore a potentially significant inhibitor of ICT adoption: it may influence adoption and improvement initiatives at the level of the organization as well as at the national level. Furthermore, it is a social issue and is therefore a challenging problem to address. Endemic corruption in Nigeria is a social problem that has attracted the interest of several scholars (Smith, 2007). However, its effect on e-commerce usage has attracted minimal attention.

The national growth of e-commerce is held back by lack of public awareness about how to use the technologies. There has been a rapid growth in electronic cash- transfer services such as Western Union, MoneyGram, and Travelex in recent years. Electronic banking is one area of e-commerce that has proven successful in Nigeria. Virtually all banks in Nigeria offer online, real-time banking services. Banks that cannot offer these services are increasingly losing their customers. Even though the Nigerian government has taken progressive steps in recent years to aid online buying and selling, many challenges still remain. Among these, some forms of corruption appear to be widespread:

'Yahoo Yahoo' Syndrome. Many young Nigerians attribute this to a lack of employment and tangible jobs. Therefore, they involve themselves in what is known as 'yahoo yahoo.' This is a type of online fraud where typically young men attempt to acquire people's banking details in order to purchase goods online without the owner's consent. The perpetrators of this crime spend long hours in cyber cafés surfing the net, with the aid of specialized software, to hack people's accounts.

'Phishing.' Online job applications are often fraught with danger, as fraudulent websites redirect applicants to unsecure 'phishing' web pages (Chaffey and White, 2010). Applications for vacancies in the military, for example, require the purchase of a 'pin' number to access the service, and this has normally been under-taken through a bank. However, this is increasingly being offered directly through the website, opening up the opportunity for personal banking details to be acquired, often without fear of discovery and hardly any prosecutions.

Conclusion

SMEs are known to be the backbone of the economy in developed and developing countries. Nigeria in particular has advanced immensely through the numerous benefits that ICT provides. Cost reduction, increased flexibility, error reduction, faster response time, and lower cost of labour are some of the benefits that are reported. In spite of this, challenges still exist that inhibit effective integration.

This study contributes to our understanding of an under-researched field. The successful adoption of ICT in developing economies is an essential component of their ability to make a significant contribution and is necessary for their continued growth. The general findings are concomitant with those of other studies in both developed and developing economies. However, the study was confined to businesses in Lagos, Nigeria and though the specific findings are indicative of the issues that may pervade other countries and regions, further study is required to confirm the generalizability of this study's conclusions.

In terms of implications for business practice, there is a need for both managers and employees to undergo continual training in order to be aware of the changing nature of ICTs and to find the most suitable solution for their organization. However, it is encouraging to note that the current level of understanding of ICT among Nigerian SMEs is reasonably well developed. The lack of security and reliability, trust, and access to capital are some of the factors responsible for the slow adoption of ICT within the SME sector in Nigeria.

ICT adoption in developing economies appears to present additional challenges to those that are experienced in the majority of system implementations and developments, and are discussed widely in the literature. Firstly, the national infrastructure may be inadequate to foster confidence and utilization of ICT by existing organizations, and perhaps even more importantly it may also be inadequate to encourage further development of ICT for the betterment of the economy. This may be a particular issue that impedes the adoption of ICT throughout supply chains and networks, and inhibits its uptake among micro-sized businesses. Secondly, corruption is a perennial problem in some areas and does not seem to be an easy issue to resolve. Nevertheless, ignoring the problem is unacceptable given its reported magnitude.

There would appear to be a need for both SMEs and government institutions to cooperate in addressing these pressing problems. Organizations ought to ensure the readiness of their employees for the change that is brought about through ICT solutions. This should not just be restricted to their employees, but should recognize the multiplicative effect of appropriate ICT adoption through-out the supply chain. Infrastructure development needs to take place to complement the development of SME- based commerce. The cost of these undertakings should be considered in light of the considerable importance of SMEs to the economy.

Despite these local and national challenges, this study finds that ICT adoption in Nigeria is encouragingly wide-spread among companies of different sizes and in different economies. Business managers appear well versed in ICT and look upon it as a source of competitive advantage and a means of achieving improvements in efficiency and effectiveness. Emerging and developing economies are often overlooked in research projects, but are a significant part of global economic development. They present unique challenges that require resolution before they result in inefficient or ineffective ICT policies and systems being introduced, with irrevocable design flaws or limitations. Future research should take account of the significant effect that larger-scale issues, such as corruption and infrastructure development, can have upon ICT adoption and effectiveness. Research could also explore the geospatial relationship between power and informatics infra-structures and the prevalence of ICT adoption.

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