

Information and Communication Technology in Small and Medium Enterprises: Factors affecting the Adoption and use of ICT in Nigeria

Ladokun I.O

Department of Marketing, The polytechnic, Ibadan, Nigeria

Osunwole O.O

Department of Accountancy, Osun State Polytechnic, Iree, Nigeria

Olaoye B.O

Department of Business Administration and Management, Osun State Polytechnic, Iree, Nigeria

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Abstract

The study investigates the factors affecting ICT adoption by SMEs in Nigeria. The structured questionnaire was used to collect data from seventy (70) respondents. The method of analysis is that of correlation coefficient and multiple regressions while the method of estimation is Ordinary Least Squares (OLS) with aid of STATA software. The result indicates that infrastructure is one of the most factors that inhibit ICT adoption by SMEs in Nigeria with highest mean followed by government policies, management support, level of security, maintenance cost skills and training, and investment cost respectively. It is concluded that SMEs in Nigeria have been slow in adopting ICT as they face major constraints such as poor telecommunication infrastructure, limited ICT literacy, inability to integrate ICT into business processes, high costs of ICT equipment, incomplete government regulations for e-commerce, legal and regulatory issues, weak ICT strategies, lack of research and development, excessive reliance on foreign technology and weaknesses in ICT implementation. The study recommends that management should play an important role in guiding and completing projects relating to ICT adoption, by providing resources for the purchase of the infrastructures required for the new ICT.

Keywords: ICT, Sme, Infrastructure, Skill and Training, Security and Nigeria.

Introduction

Information and Communication Technology (ICT) has become indispensable for small and medium enterprises globally, Nigeria inclusive. ICT capability is essential to participation and engagement in modern society. The development in telecommunications has impacted enormously on the applications of ICTs and their uses. ICT can be used to find, develop, analyze and present information, as well as to model situations and solve problems. It enables

rapid access to ideas and experiences from a wide range of people, communities and cultures, and it is a powerful force for change in any society (Okwuonu, 2013). Hyvönen *et al.* (2003) advocate that the utilization of ICT is one of the key areas that modern companies develop in order to achieve strategic gains. In a similar manner, Ashrafi and Murtaza (2008) state that organizations around the globe are now utilizing ICT not just for cutting costs and improving efficiency, but also for providing better customer service. According to Spanos *et al.* (2002), buyers and sellers are able to share information and transfer goods across national borders with the use of ICT, which helps to increase access to global supply chains. Similarly Buhalis (2003), states that businesses can now interact more efficiently with the use of ICT. Sharing and disseminating information is a key role played by ICT which also assists in increasing the supply of information within organizations. The emergence of the internet has allowed small and medium-sized enterprises (SMEs) to compete effectively and efficiently in both domestic and international markets. ICT can thus play a very important role because it can help SMEs to create business opportunities and combat pressures from competition. Appropriate ICT can help SMEs cut costs by improving their internal processes, improving their product through faster communication with their customers, and better promoting and distributing their products through online presence. In fact, ICT has the potential to improve the core business of SMEs in every step of the business process.

However, despite advances in ICT and the acceptance of such technologies by large organizations, the same level of adoption is not evident among SMEs in Nigeria. Okwuonu, (2013) asserts that many SME operators are unfamiliar with operating a computer and become skeptical of the benefits and value its gives to the business and have the notion that ICT is only for larger companies even when they have the will and financial resources to integrate ICT into their core business. SME operators are often at a loss when the need arises to choose the most appropriate and cost efficient product. Most Nigerians could not participate in the International markets from the comfort of their offices and rooms due to erratic supply of electricity, dearth of adequate ICT facilities and the enabling environment that supports e-business. Low participation in internal market means low transactions and contribution to the global economy. But with the use of ICT, weak players in the economy can be empowered by providing them with information, communication and knowledge they could not access before. This enhances the competitiveness of small and medium-sized enterprises (SMEs) and can enable them establish their presence on the Internet and use it to communicate with suppliers and customers, to search for business information and to advertise their products (Okwuonu, 2013).

Therefore, this research paper intends to investigate factors affecting ICT adoption by SMEs in Nigeria with special reference to the selected SMEs in Lagos.

Literature Review

SMEs and ICT

The definition of SMEs differs from one country to another but is often based on employment, assets or a combination of both. Jutla *et al.* (2002) state that SMEs have been defined against various criteria such as the value of assets employed and the use of energy. National Council of Industries refers to SMEs as business enterprises whose total costs, excluding land, are not more than two hundred million naira (₦200, 000,000.00) (Onugu, 2005). However, the Small and Medium Sized Development Agency of Nigeria (SMEDAN) defines SMEs based on the following criteria: a micro enterprise as a business with less than 10 people with an annual turnover of less than ₦5,000,000.00, a small enterprise as a business with 10-49 people with

an annual turnover of ₦5 to 49,000.000.00; and a medium enterprise as a business with 50-199 people with an annual turnover of ₦50 to 499,000.000.00. Small and Medium Enterprise has been the vehicle that drives economic growth and development globally, especially SMEs has contributed immensely to the economic growth in developing countries, Nigeria inclusive. Small and Medium Enterprises (SMEs) occupy a place of pride in virtually every country or state. Because of their (SMEs) significant roles in the development and growth of various economies, they (SMEs) have aptly been referred to as the engine of growth and catalysts for socio-economic transformation of any country (Basil, 2005). Ongori and Migiro (2010) agree that SMEs not only help to improve the living standards of people but bring about substantial local capital formation and achieve high levels of productivity and capacity.

However, SMEs in Nigeria do not enjoy this in a substantial way due to the low state of the ICT in the country, so their success and contribution to the economy could also remain low. Even though the use of ICT robs unskilled workers of their jobs, it increases the efficiency and effectiveness with which business activities are operated. The use of digital technology in running businesses increases productivity, so a country that is not very fast in adopting these technologies will not have a fast growing economy (Okwuonu, 2013).

Use of ICT and its impact

Information and Communication Technology (ICT) play a very important role in helping SMEs to have hedged over competitors in term of accessibility to global markets. Duan *et al* (2002) ascertains that the use of ICT in many organizations has assisted in reducing transactional cost, overcome the constraints of distance and have cut across geographic boundaries thereby assisting to improve coordination of activities within organizational boundaries. In fact, ICT has the potential to improve the core business of SMEs in every step of the business process. Through the use of information technology, SMEs can gain from developing capabilities for managing information, intensive resources, enjoy reduced transaction costs, develop capacity for information gathering and dissemination of international scale and gain access to rapid flow of information (Minton, 2003). According to a study by Lymer (1997) it stresses that ICT implementation in the organization which includes SMEs has the potential to reduce costs and increase productivity level. According to them small firms might find cost-effectiveness as a motivating factor to use Internet-commerce for improving communication with trading partners and consumers. Sajuyigbe and Alabi (2012) also argue that ICTs are being used for strategic management, communication and collaboration, customers' access, managerial decision making, data management and knowledge management since it helps to provide an effective means of organizational productivity and service delivery. Ashrafi and Murtaza (2008) also agree with the assertion that information and communication technologies (ICT) have positive effect on firm performance in terms of productivity, profitability, market value and market share. In the research study of Spanos *et al* (2003) affirm that buyers and sellers are able to share information and transfer goods across national borders with the use of ICT, which helps to increase access to global supply chains. According to Chau (1995), ICT enhances the production process in organizations as monitoring technologies could be used to reduce the number of supervisors required in the process. In the same view Brynjolfsson and Hitt (2003) confirm that there is a substantial long-term productivity gain with the use of ICT in organizations. Buhalis (2003) also notes that the application of ICT in businesses causes fundamental changes that can provide powerful strategic and tactical tools for organizations if properly applied and used. This could have great impact in promoting and strengthening SMEs competitiveness. Sakai (2002) study also

stresses that the extensive use of ICT can allow micro-enterprises with ideas and technologies to remain small and profitable or generate substantial global sales by exploiting their intellectual property over the Internet.

Furthermore, Onugu (2005) affirms that ICT enables organizations to decrease costs, increase organizational capabilities and also, assist to shape inter-organizational coordination. Therefore, the use of ICT can help to lower coordination cost and increase outsourcing in organizations. According to OECD (2004) discovers that ICT is able to improve information and knowledge management inside the firm and increase the speed and reliability of transactions for both business-to-business (B2B) and business-to-consumer (B2C) transactions. Lauder and Westall (1997) have given their experts opinion that ICT impacts include cheaper and faster communications, better customer and supplier relations, more effective and efficient marketing, product and service development and better access to information and training.

Empirical Studies of The Factors Affecting Ict Adoption In Smes

Previous studies identify factors affecting adoption of ICT in SMEs, for instance, Adebayo, Balogun and Kareem, (2013) discover that cost, funds, infrastructure, skills and training, management support and government support attitude are the main factors that affecting ICT adoption in Nigeria by SMEs. The study of Sajuyigbe and Alabi, (2012) also confirm that infrastructural, cost of acquisition, lack of finance, skills, management and government support are the main challenges of ICT adoption by SMEs in Nigeria. Pinsonneault and Kraemer (1993) in their study have categorized internal and external barriers that impede adoption of ICT by SMEs in developing countries. The internal barriers include; owner manager characteristics, cost and return on investment, and external barriers include; infrastructure, social, cultural, political, legal and regulatory. Factors such as owner/manager characteristics, the role of top management, firm characteristics, costs and return on investment, lack of adequate telecommunication infrastructures such as poor internet connectivity, lack of fixed telephone lines for end-users, dial-up access and the underdeveloped state of the Internet Service Providers (ISPs) have been identified by Kapurubandara and Lawson (2006) as problems that hinder SMEs' adoption of ICT in a developing country. While Chau (1995) argues that the owner's lack of knowledge of ICT technology and perceived benefits is a major barrier to the adoption of ICT. The lack of knowledge on how to use the technology and the low computer literacy are other contributing factors for not adopting ICT (Knol and Stroeken 2001). Duan *et al*, (2002) also identify lack of ICT skills and knowledge in SMEs as one of the major challenges faced by all European countries, particularly in the UK, Poland and Portugal.

According to Cloete *et al* (2002) finding in a study of SMEs in South Africa they discover that ICT adoption is significantly influenced by lack of access to computer software, other hardware, and telecommunication at a reasonable cost; security concerns and unclear benefits from ICT. A similar study in China by Kunda and Brooks (2000) confirm that limited diffusion of computers, high cost of internet access and a lack of online payment processes are the major factors that directly inhibit ICT adoption by SMEs. Similarly, a survey conducted by Lal (2007) on globalisation and the adoption of ICT in Nigerian SMEs discovers that poor physical infrastructure is a major factor inhibiting ICT diffusion. Arendt (2008) agrees with previous researchers that cost of ICT equipment and networks, software, and re-organisation are barriers to ICT adoption in most SMEs. Okwuonu, (2013) concludes that poor communications infrastructure leads to limited access and higher costs. Many SMEs operating

in Nigeria still experience this, as they still use outdated equipment and state owned monopolies, which often lead to expensive charges and limited coverage, especially in the rural areas. This discourages SMEs from adopting even the basic ICT application.

Research Questions

- i. Does infrastructure predict ICT adoption by SMEs in Nigeria?
- ii. Do Skills and Training predict ICT adoption by SMEs in Nigeria?
- iii. Does Investment cost predict ICT adoption by SMEs in Nigeria?
- iv. Does Maintenance cost predict ICT adoption by SMEs in Nigeria?
- v. Does Management support predict ICT adoption by SMEs in Nigeria?
- vi. Do Government policies predict ICT adoption by SMEs in Nigeria?
- vii. Does Level of security predict ICT adoption by SMEs in Nigeria?

Model specification

The empirical model used for this study was mathematically expressed as follows:

$$\text{LngICTA} = f(X_1, X_2, \dots, X_7)$$

The linear form is given as follows:

$$\text{Lng ICTA} = \alpha + \beta_1 x_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_7 X_7 + \epsilon_1$$

Where:

ICTA = ICT Adoption

X1 = Infrastructure

X2 = Skills and training

X3 = Investment cost

X4 = Maintenance cost

X5 = Management support

X6 = Government policies

X7 = Level of security

ϵ_1 = Error term

Methodology

This study is empirical in nature and is based on sample data which was obtained by means of a survey instrument distributed to 70 SMEs in Lagos, Nigeria . The sample includes SMEs from industry sectors as follow in table 1 below:

Industry (sector)	Respondents
1. Manufacturing	15
2. Real estate	12
3. Education	14
4. Construction	05
5. Transport	11
6. Wholesale / Retailer	13
Total	70

The instrument used in this study is self -designed questionnaire and it was subjected to a test and re-test process in order to establish the reliability of the instrument. Also to ascertain the validities of the instrument, face and content validities were ensured. The instrument was given to professionals for scrutiny and evaluation. The method of analysis is that of correlation coefficient and multiple regressions while the method of estimation is Ordinary

Least Squares (OLS) with aid of STATA software version 11. The findings of this study are used as means of generalization for the Nigerian SMEs.

Table 2

Coefficient Alpha Values and ICT Adoption

Independent variables	Coefficient Alpha	Items
Infrastructure	0.81	5
Skills and Training	0.78	4
Investment cost	0.83	6
Maintenance cost	0.77	5
Management support	0.90	4
Government policies	0.78	4
Level of security	0.82	5

Analysis of Data and Results Interpretation

Table 3

Means, standard deviations and correlations for all variables

Variable	Mean	SD	1	2	3	4	5	6	7	8
ICT Adoption	4.471	0.716	1.000							
Infrastructure	4.586	0.712	0.946**	1.000						
Skills and training	4.343	0.699	0.500**	0.516**	1.000					
Investment cost	4.328	0.675	0.325**	0.243**	0.060	1.000				
Maintenance cost	4.371	0.725	0.677**	0.722**	0.815**	0.025	1.000			
Government policies	4.500	0.653	0.834**	0.367**	0.438**	-0.008	0.562**	1.000		
Management support	4.471	0.716	0.790**	0.740**	0.770**	0.195	0.731**	0.212	1.000	
Level of security	4.428	0.753	0.699**	0.595**	0.531**	0.158	0.528**	0.478**	0.465**	1.00

Note **P<.01 *P<.05

It can be deduced from the table 3 above that all independent variables (infrastructure, skills and training, investment cost, maintenance cost, government policies, management support and level of security) have positive significant relationship with ICT adoption by SMEs in Nigeria. From this result, infrastructure has highest mean of 4.586 and $r = 0.946$ respectively. This indicates that infrastructure predicts ICT adoption by SMEs, this means that the slow level of ICT adoption in Nigeria by SMEs is as a result of infrastructure decay such as lack of constant electricity supply and poor communication infrastructure. This result conform to Adebayo, Balogun and Kareem, (2013); Sajuyigbe and Alabi, (2012); Kapurubandara and Lawson (2006); Lal (2007) and Okwuonu, (2013) findings who agree that poor infrastructure is a major factor that affecting ICT adoption by SMEs in Nigeria. The study also reveals that government policies; management support; level of security; maintenance cost; skills and training and

investment cost predict ICT Adoption by SMEs with ($r = 0.834, 0.790, 0.699, 0.675, 0.500$ and 0.325) respectively. This indicates that government's role pricing structure and uncertain taxation rules inhibit ICT adoption by SMEs and this support Asrafi and Murtaza (2008) who note that some of the ICT adoption challenges in developing countries include legal and regulatory issues, weak ICT strategies, lack of research and development, excessive reliance on foreign technology and on-going weaknesses in ICT implementation. Furthermore, inability of management to perceived benefits of ICT adoption, maintenance cost, lack of skills and training as well as investment costs also inhibit ICT adoption by SMEs in Nigeria. And this also in line with Grover, (1993) who asserts that customer willingness to use internet technology and conduct online transactions in Nigeria is further hindered by security concerns, high illiteracy rates, lack of rigorous systems and restrictions in global markets.

Table 4

Multiple Regression Analysis Table Showing Independent Variables And Ict Adoption

Variable	β	t	sig.	R^2	P	F
Infrastructure	0.714	11.396	p<.01			
Skills and training	0.088	1.255	Pns			
Investment cost	0.083	2.406	P<.05			
Maintenance cost	0.150	2.293	P<.05	0.932	P<.01	135.619
Government policies	0.004	0.102	Pns			
Management support	0.222	3.787	P<.01			
Level of security	0.139	3.320	P<.05			

Table 4 shows that that the predictors variables (infrastructure, skills and training, investment cost, maintenance cost, government policies, management support and level of security) were significant joint predictors of ICT adoption by SMEs in Nigeria ($F(7, 62) = 135.619$; $R^2 = 0.932$; $P < .01$). The predictor variables jointly explained 93.2% variance of ICT adoption by SMEs. Infrastructure ($\beta = 0.714$; $t = 11.396$; $P < .01$); investment cost ($\beta = 0.083$; $t = 2.406$; $P < .05$); maintenance cost ($\beta = 0.150$; $t = 2.293$; $P < .05$); management support ($\beta = 0.222$; $t = 3.787$; $P < .01$) and level of security ($\beta = 0.139$ $t = 3.320$; $P < .05$) were significantly independent predictor of ICT adoption by SMEs in Nigeria. This implies that if there is good communication infrastructure, affordable investment cost and maintenance cost, high level of management support and security will influence positively the adoption of ICT in SMEs positively. This means that major factors affecting ICT adoption by SMEs in Nigeria are poor infrastructure, high cost of investment and maintenance, low level of management support and insecurity of fact information. Moreover, government policies, skills and training also predict ICT adoption by SMEs in Nigeria but insignificant with ($\beta = 0.004$; $t = 0.102$; Pns and $\beta = 0.088$; $t = 1.255$; P ns) respectively. These results are in line with Adebayo, Balogun and Kareem, (2013); Asrafi and Murtaza (2008) Chau and Turner (2001); Kapurubandara and Lawson (2006); Lal (2007) ; Okwuonu, (2013) and Sajuyigbe and Alabi, (2012) who identify that infrastructure, lack of skills and training, finance , government policies, management support and level of security are barriers to ICT adoption in most SMEs.

Conclusion and Recommendations

The study investigates the factors affecting ICT adoption by SMEs in Nigeria. The study reveals that infrastructure, skills and training, investment cost, maintenance cost, government

policies, management support and level of security are the factors that affecting ICT adoption by SMEs

The result indicates that infrastructure is one of the most factors that inhibit ICT adoption by SMEs in Nigeria with highest mean followed by government policies, management support, level of security, maintenance cost skills and training, and investment cost respectively. It can be concluded that SMEs in Nigeria have been slow in adopting ICT as they face major constraints such as poor telecommunication infrastructure, limited ICT literacy, inability to integrate ICT into business processes, high costs of ICT equipment, incomplete government regulations for e-commerce, legal and regulatory issues, weak ICT strategies, lack of research and development, excessive reliance on foreign technology, weaknesses in ICT implementation and a poor understanding of the dynamics of the knowledge economy.

Based on these findings, the study recommends that management should play an important role in guiding and completing projects relating to ICT adoption, by providing resources for the purchase of the infrastructures required for the new ICT. Frontline employees are the ones who will use ICT on a daily basis. It is therefore more important to concentrate their training on the actual skills required than on the strategic benefits of ICT. Government should provide enabling environment for SMEs to integrate ICT into their operations in order for them to access global markets.

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