Determinants of ICT Adoption for Improved SME's Performance in Anambra State, Nigeria

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Abstract

Transaction over the internet has helped in linking-up SMEs to global competitiveness. In the literature of ICT, its adoption as proxied by transaction over the internet has significantly improved the performance and productivity of SMEs. However, ICT adoption by SMEs in Nigeria has been reported to be comparatively low. This study therefore examines the Determinants of ICT Adoption for Improved SME's Performance in Anambra State, Nigeria. The study provides empirical evidence on levels of awareness and adoption patterns of ICT facilities among SMEs; it evaluates factors influencing ICT adoption in the SME sector; and also assesses the impact of ICT adoption on SMEs performance. The simple percentage, mean, standard deviation, t-test statistics, and regression analysis were used to conduct the various analysis of this study. Findings reveled that there is significant difference in the levels of awareness and adoption patterns of ICT facilities among SMEs. Capital Base, Turn over, and asset value of the businesses investigated have significant influence on ICT adoption. With respect to SMEs output performance, SMEs owners capital input, Marital status and business experience of the owners of the SMEs have a positive and significant relationship with their output performance. The study recommends that agencies that regulate SMEs should formulate policies that will facilitate the adoption of ICT facilities by SMEs because of its potential in improving firms growth performance; SMEs owners should endeavour to gain registration status as that will facilitate their adoption of ICT as proxied by transaction over the internet. Thus improving their productivity and competitiveness; to raise productivity and global competiveness, SMEs owners should invest in ICT and its components because they have been proven to significantly influence organizational performance.

Keywords: Information and Communication Technology (ICT), Small and Medium Scale Enterprises(SMEs), Adoption, Employees, Capital base, Turn over, Registration status, Asset value

1. Introduction

The modern economic environment which is dominated by globalization, hyper-competition, and knowledge and information revolution has revolutionized the way business is conducted (Pavic et al., 2007).

In the literature (Adekunle and Teller,2008; Apulu and Ige, 2011; Usman,2011) Information and Communication Technology has been described as a catalyst for development in both developed and developing countries. According to Apulu and Lathman (2009) Information and Communication Technology is regarded as a driver and enabler of economic development in most countries. Accordingly, Ghobakhloo, Sabouri, Hong and Zulkifli (2011) noted that Small and medium-sized enterprises (SMEs) account for major source of employment, technological advancements, and competitive advantages for both developed and developing countries. Owing to the intensified competitive pressure and necessity for entering to global market undergone by SMEs, these businesses are incrementally employing Information Technology (IT) to take advantage of its substantial benefits. Furthermore, Information and Communication Technology has brought about changes in the way businesses are conducted amongst SME's as they play a major role in storing, retrieving, processing and disseminating information.

As cited by Ghobakhloo, et al (2011), today's technological progressions, the implementation and application of IT is a significant driving force behind many socioeconomic changes (Dierckx and Stroeken, 1999). As the utilization and commercialization of IT becomes more widespread throughout the world, the adoption of novel IT can generate new business opportunities and various benefits. Nowadays, both large organizations and small and medium-sized enterprises (SMEs) are seeking ways to reinforce their competitive position and improve their productivity (Premkumar, 2003). Accordingly, there is an increasing consciousness of the necessity to derive profit through investment in IT within SMEs. IT tools can significantly assist SMEs by supplying the required infrastructure, which is necessary for providing appropriate types of information at the right time. IT can also provide SMEs with competitiveness through integration between supply chain partners and inter-organizational functions, as well as by providing critical information (Bhagwat and Sharma,2012).

2. Statement of the Problem

The background of study highlighted a number of benefits derivable from Information and Communication Technology which affirms that Information and Communication Technology is germane to the growth and development of a business in any economy. Despite the number of identified benefits from the use of Information and Communication Technology to improve SMEs performance, a number of literature (Kuteyi,2009; Apulu and Lathman,2009) still report that the adoption level is relatively low in Africa when compared to developed countries. Ghobakhloo, Hong, Sabouri and Zulkifli (2012) also cited that prior IT literature has shown that only a small number of studies focused on the adoption and use of IT in SMEs (Grandon and Pearson, 2004). Moreover, it has been found that in spite of the exponential growth of IT within SMEs, the rate of IT adoption by these businesses has remained relatively low (MacGregor and Vrazalic, 2005), and large organizations have noticeably profited more than SMEs in both IT-enabled improved sale and costs savings (Riquelme,2002).

Previous researches in the western context have however revealed that many factors have contributed to a low or high level of Information and Communication Technology adoption for improved performance of SMEs. According to Ghobakhloo, et al (2011), in looking for reasons for such differences in IT adoption in SMEs, unique characteristics of these businesses can be highlighted. SMEs generally have limited access to market information and suffer from globalization constraint (Madrid-Guijarro, Garcia, and Auken,2009). In addition, management techniques such as financial analysis, forecasting and project management are rarely used by SMEs [Dibrell, Davis, and Craig,2008). A tendency to employ generalists rather than specialists, reliance on short-term planning, informal and dynamic strategies and decision-making process, plus an unwillingness to develop and the use of standard operating procedures are other distinctive characteristics of SMEs (Thong, Yap and Raman, 1996). However, it is the restricted resources controlled by SMEs, commonly referred to as resource poverty (Thong,Yap, Raman,1997; Welsh and White, 1981), that is the major differentiator between SMEs and large organizations. Compared with large organizations, SMEs are relatively weaker at various levels (i.e., organizational, managerial, technological, individual and environmental). Therefore, IT adoption and usage in SMEs is at a disadvantage (Al-Qirim, 2007; MacGregor and Vrazalic, 2012).

Considering the low level of ICT adoption (Kuteyi,2009; Apulu and Lathman,2009) in Sub-Saharan Africa and Nigeria in particular and also environmental, socio-economic and demographic differences that exist in the composition of SMEs across regions.

It is therefore imperative to investigate the determinants of ICT Adoption for Improved SMEs Performance so as to gain an insight into the various factors that influence the adoption of Information and Communication Technology for improved performance of SMEs particularly in Anambra State, Nigeria which is the largest economic hub of the country after Lagos and it also houses the second largest market in West Africa in terms of SMEs. This is because if factors influencing the adoption of Information and Communication Technology are identified it will help in formulating policies that will help in addressing the challenges they may present in the region - South east Nigeria. This important linkage is found missing in the literature, thus, this study fills the gap.

3. Objectives of the Study

The aim of this research is to appraise the Determinants of ICT Adoption for Improved SMEs Performance. Specifically the study intends to:

1. Analyze ICT facilities awareness and adoption patterns among SMEs;
2. Evaluate factors influencing ICT adoption in the SME sector;
3. Assess the influence of ICT adoption on SME performance

4. Statement of Hypotheses

Ho_1 There is no significant difference between the levels of awareness and adoption patterns of ICT facilities among SMEs

Ho_2: ICT adoption is not significantly influenced by Number of employees, Capital Base, Turn over, registration status of the business and asset value of the business.

Ho_3: ICT adoption or usage is not positively associated with higher firm output

5. Significance of the Study

The empirical findings and the analysis of this study will have strong ramification for the growth and development of SMEs in Anambra State as it will provide the bases for development policy in the SMEs sector. This is because when factor that militate against the adoption of ICT are indentified it will help in formulating polices to address the challenges they may present. The diverse needs of students, academics, policy makers will be met. For students, this work will pool together and provide them with disparate strands of thought and authoritative educational material for further research projects. For academics, it will contribute to SMEs development debate, and provide further scholarly information. For policy makers and development officials, the work will argument the data base and scholarly directions for effective ICT adoption for SMEs performances development policy and action.

4. Review of Related Literature

Previous researches across different geographical, economic, political and social contexts of the developed and developing countries have provided insights and have also identified benefits derivable from the adoption and use of Information and Communication Technology to improve SMEs performance which suggested its usefulness and imperativeness for adoption. Owing to differences in socio-economic development among countries, the literature on the topic is rife, with varying literally perspectives and insightful empirical findings. To unearth the varying literally perspective on the topic, this section is therefore delineated broadly into four sections:

- Conceptual Framework;
- Theoretical literature;
- Empirical Literature; and
- Summary/Gap in Literature.

4.1 Conceptual Framework

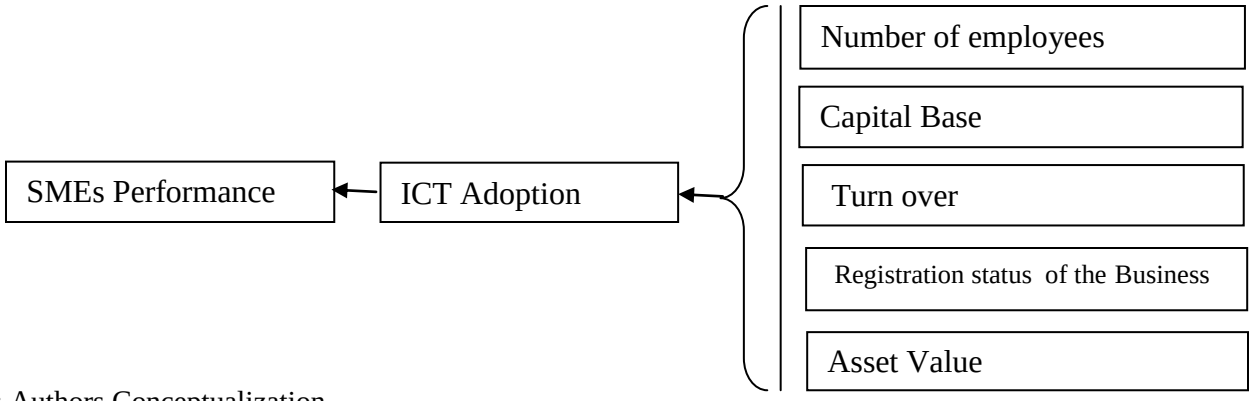
- **ICT and SMEs Defined**

ICT is defined as an umbrella term that covers all technical means for processing and communicating information. The convergence of Information Technology and Telecom Technology gave birth to ICT (Akunyili,2010). Practically speaking , ICT finds expression in digital technology and all its uses and variants, including the computer, the internet, mobile telephony, the different electronic applications (e-banking, e-governance, e-commerce, etc), digital media and broadband technology (Oluwatayo,nd).

ICT is also defined as any technology that facilitates communication and assist in capturing, processing and transmitting information electronically. Some commonly used ICTs in many developing countries include Radio, television and print media. Modern ICTs such as software, internet, fax, e-mails, mobile phones etc have become available to many countries worldwide in recent years and they are effective means of communicating knowledge and information (Parliamentary Office of Science and Technology,2006; Apulu and Lathman, 2006; Kweku, 2006). However, the most rapid growth in ICT today is in mobile phone usage.

SMEs have been defined in various ways and there is no generally accepted definition of small business because the classification of business into large-scale or small-scale is a subjective and qualitative judgment. In Nigeria, there is no clear-cut definition that distinguishes a purely small-scale enterprise from a medium-scale enterprise. The Central Bank Of Nigeria in its Monetary Policy Circular No. 22 of 1998, defined Small and Medium Scale Enterprise as having an annual turnover not exceeding 500,000 naira. The National Economic Reconstruction Fund (NERUND) put the ceiling for small-scale industries at 10 million naira. Section 37b(2) of the Companies and Allied Matters Decree of 1990 defines a small company as one with: an annual turnover of not more than 2 million naira; and net asset value of not more than 1 million naira (Ekpenyong and Nyong, 1992). The According to Akomea-Bonsu and Sampong (2012), Bolton committee in 1971 formulated an economic definition. With regards to the economic definition a firm is regarded as small if it has relatively small share of their market place, managed by owners or part owners in a personalized way and not through the medium of a formalized management structure; is independent in the sense of not forming part of a large enterprise. With the establishment of Small and Medium Enterprises Equity Investment scheme (SMEEIS) by the CBN in 1999, the bankers committee in 2006 defined Small and Medium Enterprise as any enterprise with a maximum asset base of ₦1.5billion (excluding land and working capital), and with no lower or upper limit of staff. However, according to Kalanje (2002), the definition of SMEs is based on an enterprise's number of employees, the level of assets, sales turnover of the said enterprise or a combination of these criteria in most countries. Despite the varying perspectives in the above definitions researchers are in agreement in indicating that Small and Medium Scale Enterprises (SMEs) are defined in terms of size or market share; capital base; numbers of employees; turnover and asset value among others. Arguably these characteristics of the small and medium scale enterprise affect the level of adoption of ICT in the sector. Accordingly, Akomea-Bonsu and Sampong (2012), Taylor and Murphy (2004), Martin and Matlay 2001 agree and acknowledge that there are many factors that make SMEs different, such as turnover, industry, number of employees and format of business. These factors need to be studied in more detail to establish how they influence the adoption process. Taking a cue from the above definition of SMEs we develop a conceptual model which shall be tested to establish how they influence the adoption process.

Figure 1: A Schematic Diagram of the Conceptual Framework



Source: Authors Conceptualization

4.2 Theoretical Literature

Theoretical literature (Mpofu, Milne and Watkins-Mathys, nd; Mutua and Wasike, 2009) explaining ICT adoption in SMEs suggested several existing theories and different approaches that help to explain and advance the understanding of ICT adoption in small businesses. Prominent among the theories are the 'innovation-decision process framework' and 'technology acceptance model' which deals with the factors affecting the diffusion of innovations and predicting the attitude of potential users towards a new technology by focusing on individual perceptions respectively.

Among the theories, this study is built on the 'technology acceptance model' which has been described to stem from the theory of reasoned action and aims at predicting the attitude of potential users towards a new technology by focusing on individual perceptions in evaluating costs and benefits.

Relating this to our conceptual framework on the number of employees, capital base, market share/turnover, registration status of the business and asset base influence the ICT adoption process, it is arguable to state that adopting a technology may inform the decision of the adopter to cutdown the number of employees in the organization in an attempt to minimize cost. Again considering the capital and the market share/turnover of an organization if they are small will inhibit adoption and so does asset value. Accordingly, Ghobakhloo et al (2012) identified that limited financial resources compel SMEs to be cautious about their investment and capital spending and that financial resources are one of the most crucial resources which are known as the key SMEs performance requirements and are the critical success factors. While this study is restricted to conceptualized model, it is not ignorant of the many factors not captured in the model for example Ghobakhloo et al (2012) noted among others that due to the SMEs' unique characteristics, their financial resources, technical and managerial resources, information resources accessibility, internal and external expertise, market accessibility and in-house IT knowledge and experience can hinder or simplify the adoption of IT in SMEs, and positively or negatively affect this process as well.

According to Forman and Goldfarb (2006) in Mpofu et al (nd), Technology Adoption Model (TAM) has proven to be a robust model that is frequently used to study user acceptance of ICT. It is widely viewed as an information system theory which helps to understand the adoption and use of internet (Gibbs et al., 2007; Davis 1989). The theory helps to understand how adopters come to accept or reject the use of ICT in their small businesses. Although it has been criticised on various grounds: as less comprehensive compared to the diffusion approach which has more innovation characteristics, including time as an essential element of the theory; and for not accounting for the influence and personal control factors on behaviour, including the lack of consideration to other factors such as external influences from the environmental attributes, suppliers, customers and competitors (Manueli et al.,2007; Rogers, 1995; Gibbs et al., 2007; Van Akkeren and Cavaye, 1999)

4.3. Related Empirical Literature

A number of related empirical and theoretical literatures have probed into the subject of ICT adoption and challenges in relation to SMEs with varying opinions and divergent views.

Mutua and Wasike (2009) reviewed literature on ICT adoption and its impacts on firms in both developing and developed countries and analyses the determinants of ICT adoption and their impact on firm's performance. By use of an additional survey on ICT service providers, they unearth and provided challenges facing ICT providers in Kenya and how these challenges can be dealt with. Their study provided empirical evidence both on the factors that determine adoption of ICT (landline or internet connection) and the impact of proxies for ICT adoption on output of SMEs. Findings show that the main determinants of adoption of ICT are the size of the firm as indicated by firm employment, formal registration, and if a manager has some internet training. Registration or formalization of firms is also correlated with higher probability of adopting ICT. As predicted, the study finds that ICT tends to augment both capital and labour thus raising productivity of firms. Thus, the analysis shows that the ICT adoption as proxied by access to internet or a landline is significantly correlated with higher SMEs output. The study shows that adoption and use of ICT is a key factor to helping enterprises to raise their productivity and competitiveness.

Ghobakhloo (2011) analyzed reasons that persuade small and medium enterprises (SMEs) to adopt information technology (IT), as well as which factor and how it affects the level of IT sophistication in SMEs entrepreneurial segment. Drawing on the technology-organization-environment view of the firm, the study hypothesizes that technological, organizational and environmental factors can be viewed as the reasons for IT sophistication within SMEs. The proposed research model and hypotheses were tested using survey data from a sample of 121 Iranian manufacturing SMEs. Findings showed that external pressure, information processing needs, IT-enabled innovativeness and performance and competitive pressure are the key drivers of IT sophistication within SMEs. The findings offer valuable insights to executives and consultants on why SMEs move toward IT adoption. Likewise, the results of the study could serve as a benchmarking measure of reasons persuading SMEs to adopt sophisticated IT.

Ghobakhloo et al (2012) conducted a research which was aimed at providing a better and clearer understanding of IT adoption within SMEs by reviewing and analyzing current IT literature. In their research, the review of literature includes theories, perspectives, empirical research and case studies related to IT adoption, in particular within SMEs from various databases such as Business Premier, Science Direct, JStor, Emerald Insight and Springer Link. The proposed model of effective IT adoption is believed to provide managers, vendors, consultants and governments with a practical synopsis of the IT adoption process in SMEs, which will in turn assist them to be successful with IT institutionalization within these businesses.

Nandan (nd) analyzed and contrasted the internal and external issues affecting the process of IT adoption in SMEs to provide clearer understanding of this process by reviewing IT adoption literature, which includes more than 20 years of empirical research and case studies from a variety of databases with high concentration on certain SME-related issues. Proposed integrated framework demonstrates the process of IT adoption in SMEs through reviewing exiting perspectives in the literature. This study was designed to assist different parties involved with adoption process including managers, vendors, consultants, and governments to achieve a practical synopsis of the IT adoption process in SMEs, which is believed to assist them with successful adoption.

Alam and Noor (2009) examines the relationship between ICT adoption and its five factors which are perceived benefits, perceived cost, ICT knowledge, external pressure and government support. The results of this study show that three factors examined are significantly important to the adoption of ICT where as perceived cost and external pressures are found to be insignificant in determining its adoption. This study provides a greater understanding of SME's perception about ICT adoption in their service business.

4.4 Summary/Gap in Literature

The empirical literature have provided insights and have also identified various factors that influence ICT adoption for improved SMEs performance from various stand point and with varying literally perspectives and insightful empirical findings. This study fills a gap by appraising the determinants of ICT adoption for improved SMEs performance which is an important linkage that is found missing in the literature in this part of world especially in Anambra state, Nigeria.

5. Research Methodology

5.1Research Design

This work is descriptive. It is concerned with the collection of data for the purpose of ascertaining the determinants of ICT adoption for improved SME's performance in Anambra State. It involved sampling by using structured questionnaire to generate data that will be analyzed so as to gain insight into the topic under study.

5.2 Area of Study

The study was executed in Awka, Nnewi, Ekwulobia and Onitsha all in Anambra State. Nnewi plays a leading role as a centre for the manufacturing of cars, assembly and distribution of motorbikes and spare-parts in Nigeria and as such other economic activities take place in the area. It is the second largest economic hub of Anambra state after Onitsha and one of the largest in West Africa. The inhabitants are predominantly traders who are into various kinds of economic activities and manufacturers of auto and auto spare parts.

Awka is in Anambra central senatorial zone and it also houses the state capital. Again, it is one of the hubs of economic activities in the state. The area is surrounded by the following communities: Okpuno, Amawbia, Isiagu, Ezinato, Mbaukwu, Nibo, Nise and Umuawulu. The major occupation of the inhabitants of the area is farming. Although they have other occupational engagements like: trading (especially in Awka municipal), craft, teaching in schools and colleges, civil service etc. the area has a good number of SMEs.

Onitsha plays a leading role as a centre for the importation, manufacturing, distribution, sales/services of all sorts of goods and services in Nigeria and as such other economic activities take place in the area. It is the largest economic hub of Anambra state and the largest in West Africa. The inhabitants are predominantly traders who are into various kinds of economic activities like importation, manufacturing, distribution, sales/services of various kinds of goods and services.

Ekwulobia is in Anambra south senatorial zone. Again, it is one of the hubs of economic activities in the state. The major occupation of the inhabitants of the area is trading. Although they have other occupational engagements like: food processing (especially in Ekwulobia town), craft, teaching in schools and colleges, civil service etc. the area also has a good number of SMEs.

5.3 Population of the Study and Sample Size

The population of the study consists of SMEs in Anambra state. There are no records on the population of SMEs in Anambra state. However, the researcher used judgmental sampling to purposively select ten (10) SMEs each from the four economic hubs of the state (Awka, Nnewi, Ekwulobia and Onitsha) across major economic subsector. This was to enable the researcher reduce bias in sample selection from the population of the study. Two (2) SMEs each were selected from across the economic sub-sectors. Since the number is relatively small, the researcher adopted the forty (40) selected SMEs as a sample size for the study (see Table 5.1 & Table 5.2).

Table 5.1: Distribution of Firms by City (Economic Hubs of the State)

City name	Freq.	Percentage (%)	Cumulative (%)
Awka	**10**	**25**	**25**
Nnewi	**10**	**25**	**50**
Ekwulobia	**10**	**25**	**75**
Onitsha	**10**	**25**	**100**
Total	**40**	**100**	

Source: Field survey November 2013.

Table 5.2: Distribution of Firms by Sub-Sector (Economic Areas of Operation)

Sector code	No selected	Percentage (%)	Cumulative (%)
Food/beverages	**2**	**5**	**5**
Garments/textiles	**2**	**5**	**10**
Car parts and engineering	**2**	**5**	**15**
Machinery and equipment	**2**	**5**	**20**
Chemicals	**2**	**5**	**25**
Electronics	**2**	**5**	**30**
Stationeries	**2**	**5**	**35**
Wood, and wood products	**2**	**5**	**40**
Metal and metal products	**2**	**5**	**45**
Other manufacturing	**2**	**5**	**50**
Health /hospital	**2**	**5**	**55**
Fast food/ eateries	**2**	**5**	**60**
Movie	**2**	**5**	**65**
Repair of motor vehicle	**2**	**5**	**70**
information technology	**2**	**5**	**75**
Construction	**2**	**5**	**80**
Transport	**2**	**5**	**85**
Hotels and restaurant	**2**	**5**	**90**
Education/training	**2**	**5**	**95**
Supermarkets	**2**	**5**	**100**
Total	**40**	**100**	

Source: Field survey November 2013

5.4 Questionnaire Design, Testing, and Distribution

The questionnaire was designed based on review of previous studies (for example Alam and Noor, 2009; Morteza et al., 2012; Ramayah, 2009; Rowe et al., 2005; Taylor and Owusu,2012). The first section of the questionnaire contained general information about the sample unit. It included six background questions. The second section was designed to collect information about the determinants of ICT adoption for improved SMEs performance in Anambra state.

All items related to determinants of ICT adoption for improved SMEs performance in Anambra state were derived from literature and initial pilot survey of five SMEs owners; hence, pools of 40 SMEs were finally generated. The responses to scale items measuring determinants of ICT adoption for improved SMEs performance in Anambra state were measured using a four-point likert-type scale anchored by strongly agree (4), Agree (3), Disagree (2), and Strongly Disagree (1) respectively. Two trained research assistants were used for the administration of the questionnaire. They assisted the respondents to complete the questionnaire through an interactive process; thus making sure the questionnaire was completed on the spot. Since purposive sampling technique was adopted, 40 copies of the questionnaire was produced and distributed. 100% return rate was recorded. Also this was because the researcher and research assistants had to administer the questionnaire directly, thereby getting instant response. Above all, the quality of rapport established between the researcher/research assistants and the respondents also enhanced the response rate.

5.5 Analysis

The simple percentage, mean, standard deviation, t-test statistics, and regression analysis were used to conduct the various analysis of the study. Descriptive statistics like frequencies, percentages, mean and standard deviation were used to elicit information on the demographic profile of the respondents. t-test statistics was used to compare the mean difference between the level of awareness and adoption patterns of ICT facilities among SMEs. The regression analysis was used to evaluate factors influencing ICT adoption choices in the SME sector and assess the influence of ICT adoption on SMEs performance.

5.6. The Empirical Model

In this study we propose two multiple econometric models, one, to assess the determinants of ICT adoption using qualitative models. The second is on the analyses of ICT effects on firm output using a production function. Also, our models includes the integration of factors conceptualized from the unique characteristics of SMEs explored in the literature as major determinants of ICT adoption choices in the SME sector. According to Mutua and Wasike (2009), adoption of ICT is a qualitative variable which takes discrete values, and specifically it is a binary variable since we can have two outcomes, either a firm has adopted ICT in its operations or not. The problem is to determine the factors that influence the probability of a firm adopting ICT in its operations. This problem can be analyzed using discrete choice models, primarily the probit, logit or their ordered variants if choice is considered some natural ranking. In line with Mutua and Wasike (2009) and given the specifics characteristics of SMEs, we include the following in our model: number of employees, capital base, turnover, type of business, and asset value.

Thus, the Model 1 is:

$$\mathbf{ICTA_i = \alpha + \beta X_i + e_i} \text{ .....1}$$

Where **ICTA** represent Information and Communication Technology Adoption and it is proxied by transaction over the internet; $\mathbf{X_i}$ are the observable variables representing factors affecting Information and Communication Technology Adoption, $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$ are parameters to be estimated, and $\mathbf{e_i}$ is a random error term with a mean of zero. Expanding the RHS of equation 1 in line with our theoretical postulation in its functional form, we have:

$$\mathbf{ICTA_i = } f\mathbf{(NEP, CAB, TOV, RES, ASV)}\text{…….2}$$

Mathematically, the model is specified as:

$$\mathbf{ICTA_i = \alpha + \beta_1 NEP + \beta_2 CAB + \beta_3 TOV + \beta_4 RES + \beta_5 ASV}\text{……...3}$$

To account for random effect and to defuse omitted explanatory variables that have impact on the regressand, equation 3 is refigured to include the random error term. Thus the econometric model is:

$$\mathbf{ln\ ICTA_i = \alpha + \beta_1 NEP + \beta_2 CAB + \beta_3 TOV + \beta_4 RES + \beta_5 ASV + e}\text{…….4}$$

The included variables **NEP, CAB, TOV, RES,** and **ASV** represent number of employees, capital base, turn over, registration status of the business and asset value respectively, $\beta_1 - \beta_5$ are the slope coefficients of the regressors, α represents the vertical intercept, ε the stochastic residual term, which is normally distributed with a mean value of zero, and **ln** refers to natural log.

To estimate the second model, that is, the influence of ICT adoption on firm output performance we use a production function as adopted from Mutua and Wasike (2009). In our model we assume that firms are competitive and combine labour and capital to produce a nearly homogenous output or service over time.

Subject to the law of diminishing marginal productivity and the firms technology is represented by a production function, and w, is the price of labour r, the rental price of capital, then the problem of the SME can theoretically be expressed as:

$$\underset{K,L}{Max}\Pi = pf(K,L,) - w(L) - rK \quad \text{.....(5)}$$

The above production function may also be generalized for more factors of production, that is, we may write $Q = f(x_i),\ i = 1,2,...n$ where x is a set of inputs. ICT is a type of technology which may augment either labour or capital or both. In our analysis, labour is defined as the number of workers employed in a firm; while capital is measured by the log of amount spend on capital by the firm. We may assume ICT augments both capital and labour which means that we can explicitly model it. If we assume the SMEs technology can be represented using a Cobb-Douglas production function, then we can have:

$$Q = ATK^{\alpha}L^{1-\alpha} \quad \text{.....(6)}$$

Where A represents total factor productivity or a residual, and $T = T^{(\alpha+1-\alpha)}$ is an exogenous ICT index for technology. We could also model ICT as a dummy as shown below. Further, to obtain the estimates of the impact of ICT adoption on SME output, we will estimate the following log-linear model which includes capital, labour, ICT technology, and other control variables:

$$LnQ^{E} = \alpha + \beta_1 K + \beta_2 L + \beta_3 T + \sum_{j=4}^{m} \beta_j X_j + \varepsilon \quad \text{.....(7)}$$

Where Q^{E} is SME output as proxied by the organizations turnover and X_j is a set of control variables such as registration status of the firm, organizations asset, age of the owner of the business, educational qualification of the owner, and business experience (registration status of the business, organizations asset, educational qualification of the owner, and business experience are added from the literature), among others, to help explain variation in output and ε is a random error term. This model can be estimated using the OLS method. This analysis presupposes that SMEs which have adopted ICT are more efficient and productive. Hence, the average enterprise output of such enterprises is expected to be higher, which means that we expect that $\beta_3 > 0$ (Mutua and Wasike,2009) .

6. Discussion of Empirical Findings

6.1 Demographic Profile and Business Characteristics

With respect to the gender of the respondents as shown in table 6.1 in the appendix, 80%(32) of the respondents are males while 20%(8) are females thus, suggesting the enterprising nature of the males from the state in developing the SMEs sector. The marital status shows that majority of them 72.5%(29) are married, 25%(10) are single while 2.5%(1) are divorced. Owner/CEOs, Managers, Supervisors or the Operational staff of the selected firms responded to the questionnaires administered. As shown in table 1, 50%(20) of the respondents are Owner/CEOs of the selected firms, 20%(8) are managers of the selected firms, another 20%(8) are supervisors, while 10%(4) are operational staff. With respect to the registration status of the businesses, majority 57.5%(23) of the businesses are not registered. 32%(13) are registered as limited liability firm. Only four is registered as an enterprise. About 65%(26) of the respondents do not adopt e-commerce or transact business over the internet while only about 35%(14) do which is relatively low. With respect to age, respondents have a mean age of 42years. On the average respondents have stayed about 10years in business. The least educated has a minimum of 12years of education which translates into secondary school education while the most educated has a maximum of 16years of education which translates into tertiary education. As evidenced in table 4.1, SMEs selected has an average number of 10 workers in the firms. With respect to capital base they have an average of about 1.9million naira as capital base. The average turnover of the SMEs is about 1.6million naira while they have 2.3million naira asset value on the average.

6.2. Test of Hypothesis One on Between the Level of Awareness and Adoption Patterns of ICT Facilities among Smes

Ho_1: There is no significant difference between the level of awareness and adoption patterns of ICT facilities among SMEs.

Hypothesis one states that there is no significant difference between the levels of awareness and adoption patterns of ICT facilities among SMEs. To test the hypothesis the t-test statistics was employed. Table 6.2 in the appendix is a summary of the t-test values on the mean differences between the levels of awareness and adoption patterns of ICT facilities among SMEs. The result of the test shows that with the exception of mobile phone which was not significant, desktop and laptop are significant 0.002 and 0.005 respectively, all the t-calculated values were significant at 0.000 significant level. This implies that there is a significant difference between the levels of awareness and adoption patterns of ICT facilities among SMEs**.** Hence, the need to investigate and ascertain factors that influence ICT adoption for improved SMEs performance. If factors that influence its adoption are identified it will help in formulating policies to improve its adoption level.

6.3. Regression Results on Test of Hypothesis Two on Factors that Influence ICT Adoption for Improved Performance among Smes

Ho_2:ICT adoption is not significantly influenced by Number of employees, Capital Base, Turn over, registration status of the business and asset value of the business.

Dependent Variable: Transaction over the Internet

In other to evaluate factors influencing ICT adoption choices in the SME sector the result of the first proposed regression model as specified in the methodology was called. Table 6.3 showed the precision of the model. In general the joint effect of the explanatory variable in the model account for 89.7% of the variations in the factors that influence ICT adoption for improved performance among SMEs.

Three coefficients (capital base, turnover and asset value) are significant at 5%, 1% and 10% respectively. The implication here is that as SMEs adopt and transact over the internet, it increases the SMEs turnover. Thus, the higher the turnover of a firm the higher the capital base and asset value as a result of the multiplier effect.

6.4 Test of Hypothesis Three

Ho_3: ICT adoption is not positively associated with higher firm output.

Dependent Variable: Organization Turnover

In other to evaluate impact of ICT adoption on firm output performance we use a production function. In our model we assume that firms are competitive and combine labour and capital to produce a nearly homogenous output or service over time. Further, to obtain the estimates of the impact of ICT adoption on SME output, a log-linear model which includes capital, labour, ICT technology, and other control variables were analyzed and presented in table6.4. Table 6.4 showed the precision of the model. In general the joint effect of the explanatory variable in the model account for 94.8% of the variations in the factors that influence SMEs output performance.
Three coefficients (capital base, marital status and business experience) are significant at 5%, 1% and 1% respectively. The implication here is that as SMEs capital input increases it also increases the output performance. Thus the positive relationship between the capital base and the dependent variable. Business experience of the owners of the SMEs also counts as it has a positive and significant relationship with the dependent variable.

7. Conclusion and Recommendation

This study highlighted a number of benefits derivable from Information and Communication Technology which affirms that Information and Communication Technology is germane to the growth and development of a business in any economy. Although, in Nigeria, there is no clear-cut definition that distinguishes a purely small-scale enterprise from a medium-scale enterprise. The National Economic Reconstruction Fund (NERUND) put the ceiling for small-scale industries at 10 million naira. Section 37b(2) of the Companies and Allied Matters Decree of 1990 defines a small company as one with: an annual turnover of not more than 2 million naira; and net asset value of not more than 1 million naira (Ekpenyong and Nyong, 1992).

In the present study, with reference to hypothesis one, it was discovered that there is a significant difference between the levels of awareness and adoption patterns of ICT facilities among SMEs**.** Hence, the need to investigate and ascertain factors that influence ICT adoption for improved SMEs performance.

If factors that influence its adoption are identified it will help in formulating policies to improve its adoption level. It was also discovered that ICT adoption is significantly influenced by Capital Base, Turn over, and asset value of the businesses investigated. With respect to SMEs output performance, as SMEs capital input increases it also increases the output performance. Thus the positive relationship between the capital base and the dependent variable. Marital status and business experience of the owners of the SMEs also counts as they have a positive and significant relationship with the dependent variable.

These findings are clear indication of the influence of the characteristics (size or market share; capital base; numbers of employees; turnover and asset value among others) of SMEs in ICT adoption for improved performance. This is in line with the previous findings in the literature that the characteristics of the small and medium scale enterprise affect the level of adoption of ICT in the sector. Accordingly, Akomea-Bonsu and Sampong (2012), Taylor and Murphy (2004), Martin and Matlay (2001) agree and acknowledge that there are many factors that make SMEs different, such as turnover, industry, number of employees and format of business.
Based on the analysis and findings of this study, the researchers therefore recommend that:

- Agencies that regulate SMEs should formulate policies that will facilitate the adoption of ICT facilities by SMEs because of its potential in improving firms growth performance.
- SMEs owners should endeavour to gain registration status as that will facilitate their adoption of ICT as proxied by transaction over the internet. Thus improving their productivity and competitiveness.
- To raise productivity and global competiveness, SMEs owners should invest in ICT and its components because they have been proven to significantly influence organizational performance.

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Appendix

Table 6.1: Distribution According to the Demographic Profile and Business Characteristics of SME's Owners

Variables	Options	Frequency	Percentage(%)	Cumulative(%)
Gender	**Male**	**32**	**80**	**80**
	Female	**8**	**20**	**100**
	Total	**40**	**100**	
Marital status	**Married**	**29**	**72.5**	**72.5**
	Single	**10**	**25.0**	**97.5**
	Divorced	**1**	**2.5**	**100**
	Total	**40**	**100**	
Resp. position	**Owner,CEO**	**20**	**50**	**50**
	Manager	**8**	**20**	**70**
	Supervisor	**8**	**20**	**70**
	Operational staff	**4**	**10**	**100**
	Total	**40**	**100**	
Registration status	**Limited**	**13**	**32.5**	**32.5**
	Enterprise	**4**	**10**	**42.5**
	Not registered	**23**	**57**	**100**
	Total	**40**	**100**	
ICT adoption	**Yes**	**26**	**65**	**65**
	No	**14**	**35**	**100**
	Total	**40**	**100**	
	Minimum	**Maximum**	**Mean**	**Standard deviation**
Age	**25**	**56**	**41**	**8.808**
Business experience	**1**	**26**	**10.48**	**8.688**
Edu. Qualification	**12**	**16**	**13.5**	**1.961**
Numbers of employee	**3**	**66**	**9.98**	**14.043**
Capital base	**550000**	**3.E7**	**1.9E7**	**4170235.651**
Organization turnover	**1050000**	**5050000**	**1.60E6**	**1011472.651**
Asset value	**1050000**	**7050000**	**2.30E6**	**2059997.511**

Source: Field survey, 2013.

Table 6.2: The Level of Awareness and Adoption Patterns of ICT Facilities among SMEs

Awareness	Adoption	Mean diff	Std. Dev	Std. Error	t-value	Df	Sig. level
Desktop	Desktop	0.300	0.564	0.089	3.365	39	**0.002**
Laptop	Laptop	0.225	0.480	0.076	2.966	39	**0.005**
Internet stick	Internet stick	1.425	1.010	0.160	8.924	39	**0.000**
Fax	Fax	1.700	0.853	0.135	12.599	39	**0.000**
Land Line	Land Line	2.950	0.221	0.035	84.529	39	**0.000**
Mobile phone	Mobile phone	0.050	0.221	0.035	1.433	39	**0.000**
CD-ROM	CD-Rom	1.400	0.955	0.151	9.268	39	**0.000**
Institutional cybercafé	Institutional cybercafé	1.050	1.037	0.164	6.407	39	**0.000**
Email address	Email address	0.275	0.452	0.071	3.846	39	**0.000**
Institutional website	Institutional website	2.400	0.744	0.118	20.396	39	**0.000**
Cash tilling machine	Cash tilling machine	1.500	0.716	0.113	13.248	39	**0.000**
Printer	Printer	1.100	1.128	0.178	6.169	39	**0.000**
Scanner	Scanner	1.050	1.061	0.168	6.259	39	**0.000**
photocopier	photocopier	2.775	0.480	0.076	36.585	39	**0.000**

Source: Computation from field survey, 2013

Table6.3. Regression Results

	Coefficients	Standard error	t- statistics	Level of sig.
(Constants)	1.476	0.077	19.132	0.000
NEP	0.003	0.004	0.905	0.372
CAB	2.850E-8	0.000	2.601	0.014
TOV	-3.567E-7	0.000	-5.395	0.000
RES	-0.039	0.031	-1.239	0.224
ASV	-7.932E-8	0.000	-2.372	0.024
R	0.947			
R^2	0.897			
Adj. R^2	0.882			
F-statistic	59.372			0.000

Source: Computation from field survey, 2013

6.4 Regression Results

	Coefficients	Standard error	t- statistics	Level of sig.
(Constants)	-17539.409	441609.045	-0.040	0.969
CAB	0.042	0.019	2.244	0.032
NEP	-874.655	6473.440	-0.135	0.893
ICTA	73952.486	198019.868	0.373	0.711
ASV	0.006	0.071	0.091	0.928
RES	-111915.461	66894.398	-1.673	0.104
EDUQ	-5961.103	41944.098	-0.142	0.888
MARISTAT	1.024E6	232750.631	4.399	0.000
BIZEXP	50434.606	13520.999	3.730	0.001
R	**0.974**			
R^2	**0.948**			
Adj. R^2	**0.935**			
F-statistic	**71.193**			0.000

Source: Computation from field survey, 2013