

Effect of ICT Adoption on Competitive Performance of Banks in an Emerging Economy: *The Nigerian Experience*

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ABSTRACT: The banking industry of the 21st century operates in a complex and competitive environment characterized by ever-changing economic and financial environment with information and communication technology (ICT) at the center of this change. As Information Technology is vital in banking operations today, it becomes imperative for banks to realize its impact on operational performance in order to justify capital investments. The objective of this work was to examine how the adoption of Information and Communication Technology (ICT) affects the competitive performance of banking sector using independent sample t-test. Findings from the study revealed that a positive relationship exists between ICT and banks performance in Nigeria. This implies that a marginal change in the level of the investment and adoption of ICT such as (Automated Teller Machine, Web based transactions, and Mobile payments) in the banking industry resulted in a proportionate increase in the profit level. The study thus recommends that it is imperative for bank management to intensify investment in ICT products to facilitate speed, convenience, and accurate service delivery. These will make Nigerian banks to be efficient, profitable, and competitive and to cope with the changes and challenges that are the outcome of ICT controlled globalized economy.

Keywords: ICT, Bank Performance, ATM, Mobile Payments, Branch expansion and Profitability

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I. INTRODUCTION

In recent times, Information and Communication Technology (ICT) has been accepted as one of the main driving forces behind organizational competitiveness in the present-day business environment. Presently, ICT is having dramatic influence on almost all areas of human activities and one of the areas of economic activities in which this influence is most manifested is the banking sector. The banking industry is one of the critical sectors of the economy which makes invaluable contributions to the pace of economic growth and development of nations.

Therefore, there is no gainsaying the fact that globalization has brought about intense competition in the financial services industry and this necessitates firms in this industry operate at their best. To remain competitive, firms need to be flexible to be able to respond rapidly to the fast changing market environment to which they are exposed (Emmanuel & Adebayo,2011). Actually, banking environment worldwide has become transformed over the years and the banking public has become more sophisticated in their purchase decisions. To respond to increasingly sophisticated customer and market demand therefore, banks need to put in place operational mechanisms that ensure greater customer convenience, better delivery of and increased accessibility to financial services and efficient intermediation.

Banks are not strictly about money; they are about information processing and control centers that adjust, coordinate and channel the shifting of claims on society's pool of resources. In order to perform these functions, Deposit money banks(DBMs) therefore adjust to economic and technological changes.

In reality, the banking sector has traditionally been one of the main users of technological innovations. Grainger-Smith and Oppenheim (1994) observed that the banking sector is an old time beneficiary of the offerings of Information Technology (IT) and that IT has played key roles in the development of the banking industry based on the fact that the main function of banks can be viewed not really as that of money, but that of the capture, distribution, analysis and processing of financial information. They indicated that IT can enable banks to widen the range of services offered to their customer, transform their operating systems, increase the volume of their services, operate at a higher level of efficiency and realize economics of scale. In similar vein,

Ehikhamenor (2013) noted the range of benefits that banks can derive from investing more in IT as time reduction, improved operations, increased profitability, better management - customer relationship, streaming of operations, expansion of activities, improved service, minimization of risk exposure in turbulent markets, among others.

The use of ICT is not without problems especially in the third world economies including Nigeria. These numerous difficulties have prompted diverse studies on the response of Nigerian banks to ICT adoption. In Nigeria, the adoption of ICT by Deposit Money Banks (DMBs) might have played significant roles in the transformation of their operations and improved intermediation. However, there seems to be some differences in performance among Nigerian DMBs even when they have all met the minimum required capital base stipulated by law. These differences in performance of the DMBs could be tied to diverse reasons. In this regard, Oyewo (2001) posits that inadequate infrastructure, privacy of transactions, systems/service failure and insecurity of deposits among others as the major problems associated with the use of ICT. Thus, there is need to study the overall impact of ICT adoption on performance of deposit money banks given the increasing huge investment in ICT by these banks.

1.1 Statement of Problem

Today's business environment is very dynamic and undergone rapid changes due to technological innovation, increased awareness and increased demands from customers. To remain competitive, firms need to be flexible to be able to respond rapidly to the fast changing market environment to which they are exposed. The banking industry of the twentieth century operates in a complex and competitive environment characterized by these changing conditions and a highly volatile economic climate; at the centre of this global change curve is Information and Communication Technology (ICT) (Agboola, 2006). To respond to increasingly sophisticated customer and market demand, banks are at risk of phasing out of business if they don't put in place operational processes that ensure greater customer convenience, better delivery of and increased accessibility to financial services and products, Thereby making the Nigerian bank to be globally competitive. Given this scenario, the paper attempts a synthesis of empirical facts on the extent to which Information and Communication Technology has informed innovations in the operational modalities and service delivery modes of banks in Nigeria and the impact of this on bank performance.

1.2 Research Questions

The paper provided answers to the following questions:

- i. To what extent has internet (web) transactions impacted on branch expansion of deposit money banks in Nigeria?
- ii. What impact does mobile payments transaction has on operations and service delivery of deposit money banks Nigeria?
- iii. What influence do ATM transactions have on profitability levels of deposit money banks in Nigeria?

1.3 Research Hypothesis

H01: Internet (web) transactions have no significant impact on branch expansion of deposit money banks in Nigeria.

H02: Mobile payments transaction has no significant effect on operations and service delivery of deposit money banks in Nigeria.

H03: ATM transactions have no significant influence on profitability levels of deposit money banks in Nigeria.

II. LITERATURE REVIEW

2.1 Concept of Information and Communication Technologies (ICT)

Information and Communication Technology (ICT) is the automation of processes, controls, and information production using computers, telecommunications, software and other gadgets that ensure smooth and efficient running of activities. It is a term that largely covers the coupling of electronic technology for the information needs of a business at all levels. ICT also entails skills and processes necessary for carrying out activities in a given context. Information technology, the technology that empowers information, is a term that generally covers the harnessing of electronic technology for the information needs of a business at all levels. It refers to the automation of processes, controls, and information production using computers, telecommunication software and ancillary equipment such as Automated Teller Machines, and debit card, (Khalifa, 2000). It was defined by the Nigerian National Policy for Information Technology (2001), as computer, ancillary equipment software and firmware (hardware) and similar procedures, services (including support services) and related resources, any equipment or inter connected system or subsystem of equipment that is used in the automatic acquisition, storage, manipulation, management, movement, transmission or reception of data or information.

Today, a variety of ICT products are increasingly being used in the banking industry of the Less Developed Countries in response to increased sophistication of the customers and greater competition emanating from the increased globalization of the financial services industry. These products include Automated Teller Machines (ATMs), telephone banking, MICR cheques, Electronic Funds Transfer, Electronic Data Interchange, Electronic Home and Office Banking, Electronic Fund Transfer at Point of Sale, Electronic Letter of Credit, Electronic Card, Debit Card, Electronic Cash, Electronic Billing, Local Area Network, Wide Area Network, etc (Agboola 2006). ICT products relevant to banks can be summarized into three groups viz:

(i) **Bankers Automated Clearing Services:** which involves the use of Magnetic Ink Character Reader (MICR) for cheque processing. MICR is a system that provides for encoding of cheques and documents with characters in magnetic ink so that they can be electronically read. It is capable of encoding, reading and sorting cheques for timely clearing.

(ii) **Automated Payment Systems:** which include products such as Automatic Teller Machine - ATM (a remote cash dispenser that assists customers to have access to withdrawal outside the banking hall), Plastic Cards (microchips such as credit cards, debit cards, and store value cards that store electronic cash to use for online and off line micro payments) and Electronic Funds Transfer - EFT (an electronic tool that is used to effectively transfer the value of exchange process for goods and services, ideas or information from one bank account to another account in another bank). Electronic Letter of Credit, Electronic Cheque and Electronic Cash fall under automated payment system

(iii) **Automated Delivery Channels:** which include interactive television and the Internet. The device enables customers to carry out transactions with their banks through connection between the customer's terminals in their homes and/or offices and the bank's computer system. VSAT (Very Small Aperture Terminal) is a satellite communications system that serves home and business users. Customers with such terminals are able to contact the bank and get any form of information (e.g. on bank balances, deposits into and withdrawals from accounts) through this medium.

2.2 Theoretical Framework: Diffusion Theory of Innovation

The diffusion and adoption of technological innovations has been explained within several theoretical frameworks. One popular theory is the Diffusion of Innovations (DoI) theory. An innovation was defined by Denning (2004) as a transformation of practice in a community. It essentially is an idea, practice or object that is perceived to be new by a person or adopting entity. Innovation is transmitted through diffusion and adoption. Diffusion entails communicating or spreading of the news of the innovation to the group for which it is intended. Adoption however, is the commitment to and continued use of the innovation (Rogers, 1995).

Rogers' diffusion of innovation theory postulate that diffusion of innovation occur as potential users become aware of the innovation, judge its relative value and make a decision based on their judgment, implement or reject the innovation, and seek confirmation of the adoption or rejection decision (Rogers, 1995). The theory consists of three components: 'the innovation decision process, characteristics of an innovation and adopter characteristics (Bates, Manuel & Oppenheim, 2007).

The 'innovation decision process' categorizes the steps an individual takes from awareness of an innovation, through the formulation of an attitude to the innovation, on to the decision as to whether to implement, into five viz: knowledge, persuasion, decision, implementation and confirmation. The characteristics of an innovation have an impact on the likelihood of acceptance and adoption, and also on the rate at which this process develops. These innovation characteristics can also be classified into five criteria: compatibility, complexity, observability, relative advantage and trialability. The socio-economic characteristics of adopters also fall under three headings: socio-economic (social status, social mobility, level of education etc.), personality values (attitude to change, risk and science, empathy, intelligence, outlook and degree of fatalism, level of aspiration etc.) and communication behaviour (degree of contact with change agents, degree of exposure to mass media communications, degree of opinion leadership, inter-connectedness in social networks, cosmopolitan outlook, degree of social participation, tendency to seek information about innovation, and consequently a greater degree of knowledge about innovation)

Other models of diffusion and adoption also exist. The Technology Acceptance Model (TAM) is similar to the diffusion of innovation theory but it places more emphasis on psychological predispositions and social influences such as beliefs, attitudes and intentions. Marcus's theoretical model of adoption highlights the importance of innovative behaviour and the phenomenon of others modeling themselves on this. Communication channels are a vital component in spreading this modeling behaviour to other potential adopters. The range of influential factors in the take-up of innovations include: the associated 'costs' (personal and institutional), the availability of necessary 'resources' (money, equipment, training, time, prior experience and relevant skills) and the 'value' of the innovation (Bates, Manuel and Oppenheim, 2007).

However, this paper is hinged on Rogers' (1995) diffusion of innovation theory. According to this theory, innovation occurs when potential users become aware of the innovation, judge its relative value and

make a decision based on their judgment, implement or reject the innovation, and seek confirmation of the adoption or rejection decision. The theory contains three basic components which are: 'the innovation decision process, characteristics of an innovation and adopter characteristics.

2.3 Empirical Literature

Various studies have been carried out on the impact of ICT on bank performance with mixed results found. For example, Agboola and Salawu (2009) using 24 banks and 1200 bank customers studied various Information and Communication Technology (ICT) in use in Nigerian banks and how they could be utilized for optimal performance on business transactions in the banking industry. The selected transactions for the study are deposit, withdrawal, enquiries, reference letters, opening and closing of accounts, funds transfer, special bills, loans and overdraft. They found that the design of ICT in the banking system has not been adequately focused on deposit and withdrawal which are activities that directly impact on customer services. According to them products such as ATM, Electronic Data Interchange, Electronic Home and Office Banking and Telephone Banking that could have hastened these activities were the least fully adopted technologies. The rate of adoption of ATM was 16.7%, Electronic Home and Office Banking was 16.7% and Telephone Banking was 20.8%.

Agboola (2006) found that in all the banks he studied, the rate of ICT adoption was high while the technologies were adequately spread between banks' headquarters and branches. Aghaunor and Fotoh (2006) however found some variation between old and new generation banks in the rate of adoption of automated devices; new generation banks are more pro automation than the old generation banks.

A survey by InterMac Consulting Limited (2007) revealed that ATM services by banks and non-bank financial institutions was the most popular e-business platform in Nigeria. With over 96% awareness level among customers, they submitted that ATM services ranked better than not only all other forms of modern banking services but also some traditional bank services such as current account. Corroborating the above, Olatokun and Igbinedon (2009) in their study observed that there has been increased deployment of ATMs by banks in Nigeria; while only one bank had the ATM in 1998 this had increased to 14 in 2004. Between January 2005 and March 2006 debit card transaction in Nigeria banks increased by 93% with over 23 banks (92%) issuing such cards. The number of ATM transactions increased from 1,065, 972 in 2004 to 14,448,615 between January 2005 to March 2006.

Chineke, Ewuiekpaefe and Chete (2006) examined the adoption of Internet banking in Nigeria. Using a sample of 12 banks, they collected data on the e-banking practices of the selected banks based on a model consisting of 36 items relating to e-banking. From the result, they concluded that even though internet banking is widely available in Nigeria, it is only being offered at the basic level of interaction. The banks had mainly information sites and very little internet transactional services. In a related development Dabwor (2010) analyzed the challenges of financial intermediation in the twenty first century in the Nigerian banking sector, using expository approach; the study identified high level of fraud in the banking sector owing to poor IT infrastructure and weak IT security which make bank customers vulnerable to internet hackers and cyber theft as a some of the major setbacks to the deployment of ICT in Nigeria's banking sector.

Aghaunor and Fotoh (2006) examined the factors affecting e-commerce adoption in Nigeria banks. Using a survey of eighty customers of four 'adopting' and four 'non-adopting' banks, discriminant function analysis and t-test of independence of means, they concluded that all but one of the nine factors they identified were significant in explaining the adoption of e-commerce in Nigeria. The significant factors are top management support, perceived benefits, market e-readiness, supporting industries e-readiness, IT capability, and perceived compatibility. The non-significant factor is government e-readiness.

Also, Chiemeka, Ewuiekpaefe and Chete (2006) in their study on the adoption of internet banking concluded that security concerns and inadequate operational facilities (especially power and proper telecommunications facilities) are the major factors inhibiting internet banking in Nigeria. Okunoye, Bada and Frolick (2007) carried out an exploratory case study to investigate the phenomenon of dynamism of information technology and how it affects service delivery in Nigerian banks using 7 banks based on track record in IT based service delivery and e-banking awards. Data was gathered through semi-structured interviews, on-site observations and surveys. They found that banks were driven by customers' needs, availability of the technology and competition to adopt a new technology and apply to service provision. In a study conducted by Osabuohen (2008) on the capacity of ICT to enhance the operations of Nigerian banks in the context of ongoing reforms of the banking sector. Using a sample of 180 banks staff from 3 banks in Lagos metropolis and the multiple regression analysis frameworks, he examined the factors determining the rate at which ICT is used in banks and the impact of ICT on operations of the banks. He found that the main variables that explain the rate of ICT use by bank staff were their age, educational status, extent of computer literacy, and the type of IT facility involved. Madueme (2010) evaluated the impact of ICT on banking efficiency in Nigeria using a survey of 13 banks. Based on the CAMEL rating and a transcendental logarithmic function of the banks, she concluded that the efficiency values obtained through the CAMEL rating system were higher during post adoption era than before adoption and estimated that a 1% increase in ICT capital on average leads to 0.9185 Naira increase in

bank output post ICT adoption era. This agrees with her earlier finding in her 2009 study in which she concluded that information technology has impact on operational efficiency in the studied banks (Madueme, 2009). Agboola (2001) using 6 banks studied the impact of computer automation on banking services in Lagos and concluded that electronic banking has tremendously improved the services of the banks to their customers. As a follow up, Agboola (2006) evaluated the response of Nigerian banks to the adoption of ICT. Sampling 36 out of the 89 banks that were then in existence, he evaluated the nature and degree of adoption of innovative technologies, the degree of utilization of the identified technologies and the impact of the adoption of IT devices on banks operations using both structural analyses and the impact analysis model. The findings revealed that ICTs impacted positively on all the criteria that formed the basis of evaluation namely; competitive strength, market segmentation, improved revenue, proper forecasting and modernization for global impact, and time saving, error rate reduction, management decisions and speed of transaction for local impact.

In a study to determine the factors influencing customers' choice of banks in Nigeria, Maiyaki and Mokhtar (2010) examined the effects of availability of electronic banking facilities among other factors. Based on a survey of 407 banks customers in 33 private and public organizations in Kano in the Northern part of the country, they found that the availability of electronic banking facilities such as ATM, online banking and telephone banking do not have significant influence on customers bank choice decision. This result was rationalized on the ground that ICTs have become widely diffused in the Nigerian banking sector, that is all firms in the industry have embraced the ICT ideology (in contrast to Agboola 2001) thereby rendering it ineffective as a competitive tool from the perspective of the customers.

2.4 Research Gap

From the reviewed empirical literatures, it could be observed that most inferential statistics utilized by various scholars relied on CAMEL ratings and multiple regression without comparing independent groups. Our study however adopted independent-sample t-test that enabled us compare different (independent) groups; and also conducted the effect size statistics that provides an indication of the magnitude of the differences between the groups (and not just whether the difference could have occurred by chance). More so, most of the previous studies relied the use of ATM transactions, IT capability, perceived compatibility and IT security to proxy ICT adoption and neglected other core banking ICT related variables such as Internet (web) transactions and mobile payments transaction. In addition, the use of branch expansion (which is a very important proxy for bank performance) was not given much attention by previous studies. Filling these gaps is the major justification for this paper.

III. RESEARCH METHODOLOGY

3.1 Research Design

The descriptive design was adopted in carrying out the study. Descriptive study aims at describing or defining a subject often by creating a profile of a group of problems, people or events through the collection of data and tabulation of the frequencies on research variables or their interaction. The purposive population of the study is 896 staff of Zenith Bank, Diamond, UBA and GT-Bank Plc located in FCT, Abuja. Smith (1984) sample technique was used to estimate a sample of 171 staff. A self-administered questionnaire of 175 was used in gathering the data, out of which 171 was properly filled and returned. A five point Likert scale of agree to disagree (that is, Agreed, Disagree, Undecided, Strongly Agreed and Strongly Disagreed) was used to measure the extent to which the various respondents agreed or disagreed with the issues raised.

3.2 Techniques of Data Analysis

Both descriptive and inferential statistics was used to analyze the data collected from the field. The descriptive statistics was used for the analysis of the socio-demographic variables, while independent T- test statistical tool was used to test the hypotheses that were generated from the objectives and research questions of the study.

The independent sample t-test is given by:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}}$$

Where;

\bar{X}	=	Mean
S_1^2	=	Variance
N	=	Sample

The justification for the use of independent sample t-test is because it measures the relationships existing between two or more variables. It is simple to compute without errors and it helps to illustrate the directional outcome and strength of the variable. It further shows a precise quantitative measurement of the degree of relationship between dependent and independent variables.

4.2 Statistical Test of Hypothesis

In line with the statistical research, the three hypotheses formulated in this paper were tested with the aid of independent sample *t-statistics*. The level of significance for the study is 5%, for a two-tailed test and it is suggested that we shall go with the null hypothesis if the critical t-value of ±1.96 is greater than the estimated value from our analysis, else it will be rejected.

4.2.1 Hypotheses One: H01: Internet (web) transactions has no significant impact on branch expansion of deposit money banks

Table 2: Independent Sample T- Test for Internet (web) transactions and *branch expansion of deposit money banks*

Independent Samples Test					
Variable		Levene's Test for Equality of Variances		t-test for Equality of Means	
		F-test	Sig.	T-test	Sig. (2-tailed)
Internet (web) transactions					
	Equal variances assumed	32.14	0.000	8.71	0.000
	Equal variances not assumed			7.106	0.002

Source: Authors Computation, SPSS 24

The calculated t-value for Internet (web) transactions in Table 2 is 8.71 and the critical value is 1.96 under 95% confidence levels. Since the estimated value is less than the critical value (8.71 > 1.96), we therefore reject the first null hypothesis (H01). We conclude that Internet (web) transactions has a significant impact on branch expansion of deposit money banks

Calculating effect size or Magnitude

Effect size statistics provide an indication of the magnitude of the differences between the two variables (not just whether the relationship could have occurred by chance). Eta squared range from 0 to 1 and represents the proportion of variance in the dependent variable that is explained by the independent variable. The resulting eta squared value, which in Cohen’s (1988) terms would either be considered a small effect size or large size. Cohen classifies 0.01 as a small effect, 0.06 as a medium effect and 0.14 as a large effect. The guidelines (proposed by Cohen, 1988) for interpreting this value are: 0.01=small effect, 0.06=moderate effect, 0.14=large effect.

The formula is given as:

$$Eta_Squared = \frac{t^2}{t^2 + (N1 + N2 - 2)}$$

Replacing with the appropriate values from the example above:

$$Eta_Squared = \frac{(8.71)^2}{(8.71)^2 + (171 + 171 - 2)} = 0.1824$$

For our current result, it can be observed that the effect size of 0.1824 is relatively large. Expressed as a percentage (multiply your eta square value by 100), only 18.24 per cent of the variance in branch expansion of deposit money banks is explained by Internet (web) transactions.

4.2.2 Hypotheses Two: H02: Mobile payments transaction has no significant effect on operations and service delivery of deposit money banks.

Table 3: Independent Sample T- Test for *Mobile payments transaction* and operations and service delivery of deposit money banks.

Independent Samples Test					
Variable		Levene's Test for Equality of Variances		T-test for Equality of Means	
		F-test	Sig.	T-test	Sig. (2-tailed)
Mobile payments transaction					
	Equal variances assumed	14.221	0.000	5.23	0.0000
	Equal variances not assumed			2.89	0.0001

Source: Authors Computation, SPSS 24

From the independent sample t- test result in Table 3, it could be observed that the calculated t-value for the Mobile payments transaction is 5.23; while the critical value is 1.96. The t-value therefore falls in the rejection region and hence, we may reject the second null hypothesis (H02). The conclusion here is that mobile payments transaction has a significant effect on operations and service delivery of deposit money banks. Estimating the effect of mobile payments transaction on operations and service delivery of deposit money banks, the Eta value gave:

$$Eta_Squared = \frac{(5.23)^2}{(5.23)^2 + (171+171-2)} = 0.0744$$

It can be observed that the effect size of 0.0744 is

also moderate. Expressed as a percentage (multiply your eta square value by 100), only 7.44 per cent of the variance in service delivery of deposit money banks is explained by mobile payments transaction.

4.2.3 Hypotheses Three: H03: ATM transactions has no significant influence on profitability levels of deposit money banks

Table 4: Independent Sample T- Test for ATM transactions and profitability levels of deposit money banks

Independent Samples Test					
Variable		Levene's Test for Equality of Variances		T-test for Equality of Means	
		F-test	Sig.	T-test	Sig. (2-tailed)
ATM transactions					
	Equal variances assumed	14.524	0.000	4.87	0.0012
	Equal variances not assumed			3.421	0.0211

Source: Authors Computation, SPSS 24

Mores so, from the Independent Sample T- Test in Table 4, it could be seen that the calculated t-value for ATM transactions is 4.87 and the critical value is 1.96 under 95% confidence level. Since the t-calculated is greater than the critical value (4.87 > 1.96) it also falls in the rejection region and hence, we may reject the third null hypothesis (H03). We thus conclude that ATM transactions has a significant influence on profitability levels of deposit money banks

Estimating the effect of our current results, the Eta value gave:

$$Eta_Squared = \frac{(4.87)^2}{(4.87)^2 + (171+171-2)} = 0.065$$

It can be observed that the effect size of 0.065 is

moderate. Expressed as a percentage (multiply your eta square value by 100), only 6.50 per cent of the variance in profitability levels of deposit money banks is explained by ATM transactions.

IV. DISCUSSION OF FINDINGS

Findings from the study revealed that Internet (web) transactions have a significant impact on branch expansion of deposit money banks. Internet (web) transactions directly affects how managers decide, how they plan and what products and services are offered in the banking industry. It has continued to change the way banks and their corporate relationships are organized and expanded worldwide; and the variety of innovative devices available to enhance the speed and quality of service delivery.

More so, mobile payments transactions have a significant effect on operations and service delivery of deposit money banks. This is in agreement with Ovia (1997) who found that banking in Nigeria has increasingly depended on the deployment of Information Technology and that the IT budget for banking is by far larger than that of any other industry in Nigeria. He contended that On-line system has facilitated Internet banking in Nigeria as evidenced in some of them launching websites. He found also that banks now offer customers the flexibility of operating an account in any branch irrespective of which branch the account is domiciled. This result is also in agreement with that of Irechukwu (2010) who found that bank services have been revolutionized through the use of ICT as including account opening, customer account mandate, and transaction processing and recording. Information and Communication Technology has provided self-service facilities (automated customer service machines) from where prospective customers can complete their account opening documents direct online. It assists customers to validate their account numbers and receive instruction on when and how to receive their cheque books, credit and debit cards. ICT products in use in the banking industry include Automated Teller Machine, Smart Cards, Telephone Banking, Electronic Funds Transfer, Electronic Data Interchange, Electronic Home and Office Banking.

Lastly, it was discovered that adoption of ICT has a significant influence on profitability levels of deposit money banks. ICT was found to impact positively the speed of banking service delivery, as well as productivity and profitability. This is in agreement with Agboola (2006) whose results showed that ICTs

impacted positively on all the criteria that formed the basis of evaluation namely; competitive strength, market segmentation, improved revenue, proper forecasting and modernization for global impact, and time saving, error rate reduction, management decisions and speed of transaction for local impact. Ovia (1997) also found that the revolution in ICT has made the banking sector changed from the traditional mode of operations to presumably better ways with technological innovation that improves efficiency.

V. CONCLUSION AND RECOMMENDATIONS

Banking operations have been made better through the adoption of Information Technology. Although, advances in technology bring its own shortcomings, its positive impact cannot be overemphasized. Due to the ever-evolving ICT, security threats also constantly evolved, and as such, the need to adopt even better ICT solutions. This work proposes a network design solution to accommodate the lapses in the existing bank network. The banking institution is now greatly influenced by the strength of its Information Technology. Through networking, banking ceased to be only at the branch containing holder's information. A bank with branches nationwide seems like just in a building with internet banking, etc.

Though, the network design of any financial institution must satisfy- confidentiality, availability and redundancy which at present bank networks are in compliance with. This research has shown that advances in network design leads to reduced cost, improved security, less network delay and better maintenance. From results obtained, the existing network design offers more delay between endpoints than the proposed network assuming constant bandwidth.

Top management should establish the right roles and processes, set clear goals and relevant measures and review progress at every stage. Innovation experience and opportunities may occur through unexpected occurrence, ingenuities, process needs, industry and market changes, demographic changes, changes in perception and new knowledge. All these when properly understood and managed promote technology innovation.

Based on the findings, the following recommendations were made;

- i. Banks should incorporate ICT into their strategic plans for effective performance in payment and delivery systems. This calls for proper analysis to determine the type, nature and extent of ICT products required for effectiveness and efficiency. It is imperative for bank management to intensify investment in ICT product to facilitate speed convenience and accurate service.
- ii. More so, it is recommended that more attention has to be directed towards the use of Information and communication Technology in banking operations since the industry serve as a lubricant to the cog of the wheel of the nation's economy while appropriate policies must be put in place to ensure proper monitoring and the determination of the optimum size required to attain organizational efficiency.
- iii. Regular training should be given to the bankers from time to time to keep them abreast of the current innovations in the use of ICT. This will enhance their efficiency and quality of service delivery that will ensure customers retention and productivity, which will translate to the banks' profitability, *ceteris paribus*. This stance is essential especially in this era of reforms in the nation's financial sector where attention is no longer on the banks that have the required capital. The key issue at moment is the ability of banks to retain their current customers as well as attract potential customers. This is mainly feasible in their efficient service delivery, which depend largely, on the premium placed on the use of ICT.

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