

The Effect of Electronic Banking on the Performance of Deposit Money Banks Listed in Nigeria

Ojianwuna Chukwuekwu

Department of Accounting, Babcock University, Ilishan-Remo, Nigeria

***Corresponding author**

Ojianwuna Chukwuekwu, Department of Accounting, Babcock University, Ilishan-Remo, Nigeria.

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ABSTRACT

Despite the relatively recent arrival of electronic commerce in Nigeria, its popularity is snowballing. Over the years, it has steadily risen, advancing rapidly throughout the spectrum of financial intermediation and markets. Having a high-speed telecommunications network or a computerized information system has undoubtedly allowed banks to deliver new products and services by using new channels. In this study, we aimed to determine whether electronic banking affects the performance of Nigeria's deposit money banks. We examined the audited financial statements of 10 deposit money banks listed on the Nigerian Stock Exchange in 2011–2020 to extract secondary data. As well as journals, textbooks, and the CBN Bulletin, other public resources were used for the study. The findings revealed that e-banking had a positive and significant effect on the performance of listed Deposit Money Banks in Nigeria, as measured by Automated Teller Machines (ATMs), Point of Sales (POS), Internet Banking (IB), and Mobile Banking (MB), as measured by return on equity (ROE) and return on assets (ROA) (ROA). On the other hand, e-banking does not significantly affect Earnings per Share (EPS). The study recommends that for effectiveness in electronic banking, there should be rigorous campaigns and awareness for clients to patronize e-facilities. Banks should further invest in Information technology given the disruptive trend of emerging financial solutions in Fintech.

Keywords: Diffusion of Innovation Theory, Disruptive Technologies, Electronic Channels, Financial Performance, Fintech, Financial Intermediation, Information Technology

JEL Classification: G21, L8

Introduction

Financial activities are a crucial component of productive activity in every economy. A wide range of financial instruments and an impressive network of banks make up the market. Nigeria's financial system consists of various institutions, such as banks, insurance companies, specialized banks, equity markets, finance companies, discount houses, bureaux de changes, mortgage institutions, and community banks, each of which specializes in a specific area. As a financial intermediary, it provides adequate payment services, and as the tool for implementing monetary policy, it serves as a fulcrum. Nigeria's financial system, as defined by the Ogege S, Boloupremo T [1], consists of a series of rules and regulations, as well as a collection of financial arrangements, institutions, and agents that collaborate and the rest of the world to promote economic growth and development. With the advancement of Information and Communications

Technology (ICT), business processes have changed from manual processing to electronic transactions. Since the brick-and-mortar model gave way to click and mortar ICT models, the banking sector has seen many business changes [2]. There has not been much work done on evaluating the impact of massive investments in technology on profitability. These developments have resulted in many businesses adopting electronic business (e-business) and electronic commerce (e-commerce) in order to embrace globalisation, introduce new business models, diversify business strategy, enhance competitiveness, cut costs, improve efficiency and operate profitably [3].

In an ideal world, 80% of all banking transactions would be conducted electronically without entering the banking hall. Therefore, an online and mobile banking system to fulfil the needs of all internet and mobile banking users is currently available. ATMs and POS systems would be available for all deposits and withdrawals in an ideal world, but this is not the case. Financial intermediaries would be enhanced if ATMs were available for all deposits and withdrawals. Money transfer between deficit and surplus spending units must be synchronised between financial intermediaries to provide good intermediation [4]. There are

still lapses in today's Nigerian banks' electronic banking system operations, which demonstrate Nigeria's ineptitude in this area. These lapses range from delayed transaction process time, delayed remittance time in case there was a failed transaction. A failed transaction on a POS system typically takes the banks at least 20 working days to track down. Many poor Nigerians cannot afford to wait for days or weeks for their money to be reimbursed while the banks conduct a thorough investigation of the transaction, which leaves them in fear [4].

Moreover, adoption is a problem among the citizens of this country since they are at a low rate. In the year 2012, the government announced a policy called "Cashless Policy." People still withdraw money from the banks manually every day, despite different ways to withdraw funds electronically. Nigeria implemented a cashless policy in response to corruption in the country, and electronic banking was born of that policy. However, it did not upgrade the means of operating the country. One can now quickly empty another's bank account without carrying physical cash with just a snap of the finger on a tablet or computer. In the past, thieves would steal cash from banks and people's houses by stealing big bags. In recent years, robbers have emptied people's bank accounts by making them insert their debit cards at POS systems. The banking industry has experienced hacking incidents in which large amounts of money have been stolen taken for a short period. We will examine these problems in this study and devise solutions shortly [5].

In Nigeria, this business approach is relatively new but has gained much traction. With rapid advances in financial intermediation and corporate financing, the industry has steadily gained momentum over the past few years. Due to widespread telecommunications and information technology usage in banking, this has resulted in a competitive advantage for banks [6]. Consequently, e-commerce has brought about a host of benefits, including improved efficiency, responsiveness, reliability, flexibility, and speed that enhance banking performance and add to other benefits resulting from e-commerce. E-commerce practices are yet to be firmly demonstrated as tools for promoting economic growth and sustainability. In this research, we discuss the importance of e-commerce. This technology has transformed traditional business practices into a global enterprise that breaks much new ground and is now a global phenomenon. Electronic commerce (E-commerce) is transacting business over an electronic network, mainly the internet, to buy and sell products or services. Generally, these transactions take place between businesses (B2B), consumers (B2C), or consumers (B2B). The electronic commerce channels, such as ATMs, telecommunications, social networks, internet banking, POS terminals, Mobile phones, software, and applications, and reducing crime, could also be avoided and protect us from numerous dangers. Also, it explains why it has gained greater acceptability and thus explains how information and communication technology (ICT) could be exploited and enhanced for this purpose.

Oniore J, Okoli U states that electronic commerce consists of electronic marketing, electronic learning, electronic shopping, electronic consulting, electronic conferencing, digital libraries, electronic mail, electronic forms, electronic funds transfers, and electronic banking, as well as electronic advertising [2]. In order to remain a primary contributor to economic growth

and development, a competitive and well-developed banking sector must include a robust and efficient ICT infrastructure. Since e-banking is an emerging trend in Nigeria, studies on electronic banking and its effects on deposit money banks have not been populated in the literature. Therefore, in seeking to understand this reality in literature, this study examined the impact of electronic banking on the performance of Nigerian Deposit Money Banks. We specifically examined the impact of automated teller machine transactions, point-of-sale terminal transactions, and mobile banking on the performance of deposit money banks listed in Nigeria (as measured by return on assets, equity, and earnings per share).

The following hypotheses are formulated for the study:

Ho1: Electronic banking has no significant effect on the return on assets of deposit money banks listed in Nigeria.

Ho2: There is no significant effect of electronic banking on the return on equity of deposit money banks listed in Nigeria.

Ho3: Electronic banking has no significant effect on earnings per share of deposit money banks listed in Nigeria.

Review of Related Literature

Conceptual Review

Disruptive Technology

Disruptive technologies create entirely new industries by dislodging established ones. The most significant outcome of disruptive technology is the creation of new markets and reshaping old ones [7]. Technological disruption fundamentally transforms products and services and the challenge of established business models [8]. The disruption technology of Priyanka, Davide, and Keller is defined as what causes dramatic changes in price or availability or changes the way people collect, use, and interact with information. Increasing computing power and bandwidth have accelerated their diffusion exponentially, allowing them to spread exponentially faster [9]. According to Joseph Bower and Clayton Christensen, a Harvard professor and a businessman, the term "Disruptive Technology" first appeared in 1995 in "Disruptive Technologies - Catching the Wave". Disruptive technology is generally less complicated, more accessible, or less expensive than existing ones. They explained that one of the most consistent patterns in business is the failure of leading companies to stay at the top of their industries when technologies or markets change. In order to remain at the top, therefore, they must look beyond satisfying small or emerging markets and focus on new technologies that meet the functional demands of mainstream customers.

The term disruptive technology is commonly used by Christensen in his book "The Innovator's Dilemma [10]." Christensen defines disruptive technology as a new technological innovation (product or service) that overturns an existing dominant technology. This description has brought disruptive technologies into the broader discussion about the role of technology. However, it has also changed our concept of technology insofar as it limits our view of disruptive technologies as less economically viable. Several years later, Clayton Christensen developed the concept in his book *The Innovator's Dilemma: Why Good Firms Fail with New Technologies*. Even when doing everything right, some companies fail when new, often unexpected competitors rise to the top and take over. Adapting new technology to be sustainable and disruptive is classified by Clayton. Contrary to sustainably

advancing technology, disruptive technology has a limited appeal, performance issues, and may not have practical applications. A 1962 study corroborated by that of a 2017 study suggested that companies with sustaining technologies are designed for several reasons, including their knowledge of their markets, their presence near their customers, and their ability to develop existing technology. Nevertheless, they find it challenging to take advantage of low-margin disruptive technologies on the other hand. In the context of disruptive technologies, one needs to be careful not to forget that the replacement of incumbent technologies, including the social structure at its core, also occurs [11,12].

Information Technology

IT involves automating processes, controlling data, and producing information utilising computers, telecommunications, software and ancillary equipment, such as automatic teller machines or debit cards [13]. This term is generally used to describe a business' use of technology for information needs. Communications Technology refers to the linkage of various computing hardware components and the transfer of data between them. Automated teller machines, smart cards, telephone banking, MICR, electronic fund transfers, electronic data interchange, and online banking are all part of the banking industry. When attempting to describe the difference between IT and ICT, it is challenging to find a definition that is clear and precise. ICT and IT are both about retrieving, recording and displaying information using hardware, software and networks [3]. Information technology, as defined is the basis for creating, storing, manipulating, and communicating data. Dos-Santos and Peffer defines IT as data, equipment, personnel, and methods that organise, control, and integrate operations across various domains [13]. The author of French describes information technology as a system that collects, stores, encodes, processes, analyses, transmits, receives, and prints text, audio, and video information.

Electronic Banking and its Revolution in Nigeria

As defined by Okoro, electronic banking is the process of conducting banking transactions using electronic devices [14]. Many electronic devices are used, including computer systems, GSM (Global System for Mobile Communications) telephones, teller machines (ATM), ATMs, Internet facilities, OCR (Optical Character Recognition), and smart cards. E-banking is about using the infrastructure of the digital age to create opportunities, both local and global. The use of e-banking reduces transaction costs dramatically and eliminates the time and distance barriers, as well. Online banking provides local, global, and immediate opportunities [15]. The deregulation of Nigeria's banking sector in 1986 led to the development of e-banking. Computerisation and better banking services resulted from this deregulation. Customers' sophistication posed a challenge for the company as they had to compete with new products. Therefore, it is hardly surprising that the new generation of merchant and commercial banks have realised the advantages associated with processing techniques. New generation banks were introduced to Nigeria's banking system as a result of bank licensing liberalisation. Based on the chair-and-armchair approach to banking, old-generation banks were considered a weak point that a new generation could exploit. These new banks discovered that the evolving technology at the global level could be applied to a more

significant advantage in the Nigerian financial landscape [16]. Some of them, who usually would have been reluctant to move from one bank to another that was yet to find its footing, were very quickly able to determine that there were differences in the products and systems of the two banks (old and new generation). Despite the extra-personalised services and the attendant personalised marketing, the customers did not hesitate to pay for the extra values. Due to the gaps in the service delivery of their original banks, they demonstrated their willingness to switch banks, regardless of their old ties. Access to e-banking is granted to its users by the bank only after they have verified their identity. Currently, personal identification numbers (PINs) are widely used for identification purposes. Usually, this involves a set of codes that the person only knows with the account or anyone else who wishes to access the account. Permission to perform financial transactions is immediately granted by the banks once this PIN is quoted [17].

Nigerian Financial System

There are many financial intermediaries in the economy that are part of the financial system. Economic agents are classified into surplus spending units and deficit spending units, according to this theory. Individuals, groups and organisations operating within an economy with excess funds are surplus spending units. These entities provide surplus funds to the economy. A deficit spending unit needs borrowed funds to conduct its operations because they lack funds. Essentially, they are the recipients of excess funds from the financial system. By supporting economic growth and development, financial intermediation, capital formation, and payments system management, the financial system enables economic growth and development. A fund intermediary lends to firms using units, and the firms, in turn, lend to intermediaries. Instead of holding claims against the firm, the saver holds deposits against the intermediary [16].

Individuals benefit from these institutions because they reduce costs, negotiate transactions, offer information, diversify and increase liquidity. Financial market (money and capital markets); financial institutions (financial institutions and agencies which regulate financial market activities); and development finance institutions (Urban Development Bank, Nigerian Agricultural and Rural Cooperative Bank); etc. It also offers financial instruments (e.g., treasury bills, treasury certificates, central bank certificates). Many changes have taken place in Nigeria's Financial System, including ownership structures, financial instruments, the establishment of institutions, and regulatory and supervisory frameworks. In addition to the persons and bodies that make up the economy, the Nigerian Financial Systems are characterised by inter-relationships. Commercial banks are the most relevant financial institutions in Nigeria to encourage and mobilise savings and channel savings into productive investment units [3].

The Concept of Electronic Commerce

A bank's website allows customers to access their accounts, information about its products and services, and conduct business with the bank without submitting letters, taxes, original signatures, or telephone confirmations [18]. Using e-commerce, manufacturers can create order forms or create services and send them electronically, such as faxes, emails, or even smart cards. The process of electronic commerce can

also refer to the execution of commercial transactions with the aid of leading technologies. Websites are home to thousands of businesses. Examples of commercial channels include (i) news, e-mails, e-libraries, the Internet, e-education, and so on; and (ii) e-references and (ii) the internet, where one can surf the net and feel relieved that business activities can now be done electronically, shop online, access news, get business updates, and so on. Internet use has become an integral part of their daily lives [19]. People become more comfortable with online interactions, and trust grows with visited sites. The importance of trust is attributed to the fact that customers rely on the promises made by an organization. Greenhalgh, Robert, Macfarlane, Bate and Kyriakidou argue that clients have a right to trust that their data will not be passed on to others or hacked [20]. Online environments are prone to fraud because they offer numerous opportunities. Hence trust is a crucial driver for the success of e-commerce. Customer satisfaction is the measure of success in the electronic banking era. For a bank to meet customers' needs profitably, it has to enhance its ability by being accurate, reliable, convenient, affordable, personalised, reducing the amount of time that customers will spend searching, and enhancing privacy. Commercial documents may be sent electronically between business organisations. Considering the value of information technology to human existence, high quality of life, and a high standard of living, e-commerce cannot be successful without it. E-commerce has a significant advantage over "brick and mortar" stores and mail-orders catalogues, thereby sweeping away the traditional media advertisers/agencies and middlemen. It will also significantly ease international and local operations and increase accessibility for all businesses. There will be an extensive database of products and services on all provider websites. These can be viewed at actual pricing, built into order over several days, e-mailed, compared, and purchased at the best prices [20].

Concept of Deposit Money Bank Performance

In the financial and banking sectors, bank's profitability serves as the primary criterion of constancy and reliability. Profitability is the difference between expenses and revenues during a fixed period, commonly a financial year. Banks need income to grow and expand, and this is essential for them. Planning and managing profits in such a challenging economic environment are more challenging. Three alternatives represent profitability. Return on assets is the most important ratio. This ratio demonstrates the ability to produce profits from a bank's assets. A bank's efficiency with invested capital is measured by return on investment (ROI). Profitability is also determined by the earning per share (EPS). Tobin Q and Net profit margin are both factors that affect bank profitability, according to another scholar [7].

Theoretical Considerations

This study examined how the evolution of e-commerce on Nigeria's Banking Financial System would impact performance. Although many theories are pertinent to the study, the focus was on the Technology Acceptance Model (TAM) and the Diffusion of Innovation (DOI) Theory, given their importance to the overall direction of the study.

Technology Acceptance Model (TAM)

Davis proposed the TAM as relevant to explain how users' intentions towards a new system or technology can affect their

acceptance level [21]. Perceived usefulness and perceived ease of use are the two pillars of TAM. The perceived usefulness of a technology or information system refers to the degree to which we believe it will improve our performance. Perceived ease of use indicates how easy an individual learns how to operate or use new technology or information system. Perceived ease of use plays a more important role in perceived usefulness than perceived ease of use per se. Exogenous variables, including the environment, also influence induced perceptions of usefulness and ease of use. Thus, TAM is based on both essential perceptive factors as perceived usefulness and perceived ease of use. The method has been widely employed in computer science research. By analysing the variables relevant to a successful website, Liu and Arnett examined the TAM theory. A study of the empirical data found out that TAM can be applied to examine new information technology behaviour and accept intention and explain online user behaviour issues [22].

Disruptive Innovation Theory

Christensen's disruptive innovation theory described innovation-driven growth in 1995. Christensen describes disruptive innovation as a process in which a product or service becomes very successful at the bottom level of a market that has reached a relatively mature status before relentlessly moving up those levels [5]. By creating a new market and value network, a dominating firm and a leading alliance are eventually disrupted, along with already established market and value networks. Entrepreneurs and outsiders develop disruptive innovations [23]. As a result, established markets get discouraged from pursuing these innovations in their first age because they are not financially lucrative. Furthermore, they require resources that could be diverted from sustaining innovations for their development. As Christensen points out, investing in disruptive technology involves a higher level of risk than developing other evolutionary forms of innovation [24]. Disruptive business environments have some characteristics. Establishments tend to have lower gross margins and smaller markets.

They also do not appear as attractive as existing solutions because they look simple compared to disruptive innovators. Consumers are unattracted to the lower tiers of the market because the gross margins are reduced. Furthermore, Christensen identifies low-end disruption, which targets those who do not value high-end performance as much. In "low-end disruption," new features are introduced faster than customers can adopt them. The new-market disruptions usually target customers whose needs were not being met by incumbents [12]. These characteristics are also evident in the banking sector. Traditional commercial banks did not engage in innovations at the start because the risk was too high. Mobile phone companies, like Safaricom and Airtel, have pioneered this new market threatening traditional banking. As a result, existing banks have had to adapt to the new trend in the industry to meet customer expectations.

Diffusion of Innovation Theory

E. M. Rogers developed the diffusion of Innovation theory in 1983. The theory came about as a result of explaining how an idea can gain momentum in time and spread through a specific population. Adoption of a new idea, behaviour, or product within society is known as diffusion. A new idea is perceived as new by another person or organization [24]. Innovation diffusion occurs

over time due to transmission among members of a social system through particular channels. It asserts that individuals tend to adopt habits and behaviours that they did not possess previously to change their behaviour. An individual might start buying new products, for instance, or adopt a new behaviour. The theory also holds that people adopt ideas, behaviours, and products because they perceive them as new. Stoneman describes five steps that potential adopters go through that drive the diffusion process, and it is this framework is described as the Innovation-Decision Process (IDP) [25]. During the first stage, innovators are involved. This group is interested in being the first to test out any new innovations.

New ideas interest them and they are venturesome. They are also represented by opinion leaders in the second stage. Due to their awareness of the need for change, they feel very comfortable adopting the innovation. Early majority - people who neither lead nor follow but adopt new ideas before the majority - is the next stage. They remain sceptical of change and will adopt innovations that they perceive to benefit most people. An individual described as a laggard is very skeptical and conservative, making disruptions in the fifth stage the most difficult to cope with. Statistical appeals fear appeals, and pressure from people in other adopter groups are effective ways to appeal to this population [25]. Through the diffusion of innovation theory, digitised banking has been widely adopted around the world. The adoption process of these children differs for different sections of society. According to Greenhalgh et al., several factors can influence innovation adoption. Relative advantage describes how well an innovation compares to its predecessors [20]. A concern of compatibility is to align the idea with the needs and values of the potential adopters. Fourth, the innovation must be tested, while the last factor concerns the innovation's ability to provide tangible results. All these factors play a critical role in explaining the adoption of innovation in the banking industry in the world.

Empirical Review

Michael et al., investigated electronic payment systems and performance indicators of deposit money banks in Nigeria [7]. The findings revealed that there has been a very modest move away from cash. Payments are now being automated and absolute volumes of cash transactions have declined. The result of the study revealed that electronic banking is capable of broadening the customer relationship, retaining customer's loyalty and enabling banks to gain commanding height of market share if their inherent problems such as, ineffectiveness of telecommunications services, epileptic supply of power, high cost, fear of fraudulent practices and lack of facilities necessary for their operation were taken care of. Mugagbe, Agboola examined the financial performance of Kenya's listed commercial banks according to their use of electronic banking [19]. A panel data analysis technique was used to analyse the data. Kenya's 11 listed commercial banks were the targets of the study. Archived CBK reports and annual reports of banks were used as secondary sources. Data collection sheets were used, and tables and explanations were used to present the findings. Listed Kenyan commercial banks' financial performance was strongly associated with mobile banking, agency banking, ATM banking, and online banking. There was a strong correlation between commercial banks' financial performance and m-banking's.

Banks' financial performance and agency banking are positively correlated. Commercial banks' financial performance and agency banking together showed a strong positive correlation. It was found that online banking performance and financial performance of commercial banks correlated weakly.

Mugagbe examined the effect of internet banking on the operational performance of several commercial banks in Nakuru County, Kenya [19]. The bank-Focused theory was applied, as well as The Multidimensional Model. This study adopted a cross-sectional research design and incorporated the Technology Acceptance Model (TAM). There were 56 participants from commercial banks in the study. Due to the relatively low number of banks, the study adopted a census methodology. Information was collected using a structured questionnaire. The Cronbach's alpha coefficient (0.7) was used to determine the validity of the research instruments in Uasin Gishu County. Data were analysed using correlation and regression analysis. The study established that internet banking has a significant positive effect on the operational performance of commercial banks.

Mahboub studied the economic growth of electronic banking, customer satisfaction [26]. Statistical parametric tests through the SPSS statistical package will test the hypotheses based on a Pair Sample t-test. The study rejects both null hypotheses, meaning that e-banking grew both Nigeria's economy and the satisfaction of its customers. Following this study, the authors recommend developing legislation concerning e-banking that adequately protects both operators of the system and consumers. Also, it recommended that banks charge low or no fees for e-banking services to motivate their customers to take advantage of e-banking services. The effect of electronic banking in the Nigerian banking industry and financial institutions was examined by Babatunde and Ogbeide [12]. Access bank was used as the case study in the study that employed both primary and secondary data. Electronic banking increased the bank's productivity and efficiency, enhancing its productivity and effectiveness.

In a case study of commercial banks in Nigeria, Taiwo and Agwu assessed the effects of e-banking adoption on organisational performance. First Bank, Ecobank, U.B.A., GTB, and UBA was chosen purposely to administer questionnaires to their staff. Using the STATistical Package for Social Sciences (SPSS), Pearson correlation was used to analyse the results. In contrast to traditional banking, banks' operational efficiency in Nigeria has improved since the adoption of electronic banking. This improvement was noticed in the strength of banks, revenue and capital bases, and customers' loyalty.

Nigerian commercial banks' performance and electronic banking were compared by Greenhalgh et al., [20]. It became necessary to conduct this study because of the increased adoption of electronic banking, which has reshaped banking services in Nigeria and overseas. POS transactions were used as an indicator of electronic banking, while customer deposits were used as an indicator of commercial banking. Data were analysed using Engle-Granger cointegration models. The study results indicate that POS does not cointegrate with savings or time deposits but does with demand deposits. We recommend that monetary authorities and commercial banks engage in an

all-inclusive education campaign to inform the banking public about the advantages, convenience, and importance of using e-banking channels to transact.

In Nigeria, Aker & Mbiti carried out a study on mobile phone usage [27]. The study was a descriptive research design conducted in 2010. Mobile phones were found to reduce price dispersion in grain markets in the country since they were used for financial transactions. The ease of conducting business over mobile phones resulted in prices changing less from region to region as a result. However, Okoro also examined the dissemination of innovation theory when looking at the adoption of mobile banking [14]. The study was based on a literature review carried out in 2012. Banks need to focus on understanding their customers' behaviour and designing easy-to-use mobile banking systems that satisfy their needs and expectations. According to the study, mobile banking adoption is negatively impacted by complexity. Mobile banking adoption is positively affected by relative advantage, on the other hand. The compatibility of mobile banking affects its adoption positively, while the observability of mobile banking has a positive impact. Adoption of mobile banking is negatively affected by perceived risk, while trying out innovations positively affects adoption. As a result of the study, banks should communicate information highlighting mobile banking as having an advantage and more practical than other banking channels like using ATMs or having a physical presence at their banks [14].

Akhisar, Tunay and Tunay examined the impact of mobile banking on the performance of Kenyan business banks in 2015 [4]. According to the study, banks that embraced m-money services had a significantly enhanced customer reach, which helped them sustain their financial health. Based on DeYoung and Rice's study entitled "Impact of E-Banking on the Profitability of Banks in Ghana [28]," banks' profitability has dramatically improved in Ghana since the advent of electronic banking and the increase in customers resulting in from effective and efficient service.

E-banking was studied through various channels, including the internet and ATM, and its impact on bank profits [29]. In the case study of Margin, Return on Asset (ROA), and Return on Equity (ROE), three profitability variables are evaluated through the financial statements. The study is quantitative. There was also the self-administration of structured questionnaires to certain Agricultural Development Bank branches used as a case study [30]. In terms of performance indicators such as ROE and ROA with a suitable level of significance of 5% using standardised statistical methods, there was a significant difference in performance pre and post the adoption of electronic banking.

Methodology

Introduction

The methods used in this study are presented in this section. Researchers forge inferences from statistics analysing the data by using the area to draw inferences about generalisation. The purpose of this section is to describe the method used for testing the research hypotheses precisely.

Research Design

The study explored an ex-post-facto research design, using extracted figures from the financial statements of selected banks

in Nigeria for the time frame under consideration. It attempts to examine the impact of electronic banking on the performance of banks in Nigeria using three widely used proxies, i.e., return on assets (ROA), return on equity (ROE) and earnings per share (EPS), for measuring bank performance. Besides, the various e-banking services provided by banks in Nigeria, such as Internet Banking, ATM, Point of Sale, and Mobile Banking, are used to measure e-banking.

Study Population and Sample Size

The study population consisted of all the 14 duly listed registered deposit money banks with the Central Bank of Nigeria as of December 31, 2020 calendar year. The sample size of this study was purposively drawn from the study population and 10 deposit money banks were selected because they represented the banks that have fully published their financial statement at the time when this study was being conducted, covering the period of 2011-2020 being the period under review which gives a realistic trend analysis of the activities of the listed banks' financial performance appraisal.

Sources of Data

The audited financial statements deposit money banks quoted on the Nigerian Stock Exchange (NSE) were utilised for the period under review. Besides, the study made use of the Nigerian Stock Exchange Fact Book, National Bureau of Statistics istics and the Central Bank of Nigeria bulleting

Variables Measurement

Dependent Variables

In the study, return on assets, equity, and earnings per share represent the dependent variables. Using shareholders' funds effectively determines how well the management of banks performs. The effectiveness of shareholder funds determines the profitability of the investment. Specifically:

$$ROE = \frac{\text{Net profit after tax}}{\text{Total Equity capital}}$$

Return on Assets

Returns on total assets divided by income. It is a measure of the bank's ability to generate revenue through the use of assets at its disposal. Additionally, the income created by the company shows effective use of the company's resources. The formula is given as:

$$ROA = \frac{\text{Net profit after tax}}{\text{Total Assets}}$$

Earnings per Share (EPS)

This ratio indicates the profit earned on each outstanding ordinary share, usually expressed in kobo. It is given as:

$$EPS = \frac{\text{Net profit after tax}}{\text{Number of Shares}}$$

Independent Variables

The independent variable is Electronic Banking (EB), measured by the various e-banking services offered by the banks in Nigeria, including ATM, PoS, Web (Internet), and Mobile Banking. The apriori expectATIOn is a positive sign for these variables as e-banking is capable of reducing operating costs.

Model Specification

The modified version of the econometric model of Miyajima was adopted for this study.

The model used in testing the hypotheses of this study is given as:

$$\text{Perf} = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

$$\text{ROA} = \alpha + \beta_1 \text{ATM} + \beta_2 \text{IB} + \beta_3 \text{POS} + \beta_4 \text{MB} + e \dots \dots \dots \text{equation 1}$$

$$\text{ROE} = \alpha + \beta_1 \text{ATM} + \beta_2 \text{IB} + \beta_3 \text{POS} + \beta_4 \text{MB} + e \dots \dots \dots \text{equation 2}$$

$$\text{EPS} = \alpha + \beta_1 \text{ATM} + \beta_2 \text{IB} + \beta_3 \text{POS} + \beta_4 \text{MB} + e \dots \dots \dots \text{equation 3}$$

Where,

- Perf** = Bank Performance
- ATM** = Automated Teller Machine as an independent variable
- IB** = Internet Banking
- POS** = Point of Sales
- MB** = Mobile Banking
- ROA** = Return on Asset
- ROE** = Return on Equity
- EPS** = Earnings per Share
- α = Constant
- $\beta_1 - \beta_4$ = Coefficient of the independent variable

Data Analysis Techniques

The data collected determines the type of tool to be adopted for analysis. This study uses multiple regression techniques as a tool of analysis. ROA also measures electronic banking which is the independent variable and bank performance which is the dependent variable, ROE and EPS of Nigerian deposit money banks listed on the Nigerian Stock Exchange (NSE), as of December 31, 2020. Therefore, the study has four independent variables and one dependent variable.

A Priori Expectation

It is expected that Automated Teller Machine (ATM), Internet Banking (IB), Point of Sale (POS) and Mobile Banking (MB) will have a positive effect on Returns on Assets (ROA), Returns on Equity (ROE) and Earnings per share (EPS).

Data Presentation, Analysis and Results

This section covers the presentation and the analysis of the data collected from the selected banks in the course of the research work. The hypotheses formulated are tested in this section to discover the association between the variable. The aim is to find out whether electronic banking has an impact on bank performance in Nigeria.

Testing of Hypothesis

Ho1: Electronic Banking has no significant effect on Return on Asset of listed Deposit Money in Nigeria.

Table 1: The results of the regression analysis to test hypothesis one is shown in the table 2 below

ANOVA	df	SS	MS	F	Significance F
Regression	4	4.448052	1.112013	35.02878	0.000752
Residual	5	0.158728	0.031746		
Total	9	4.60678			

	Coefficients	t Stat	P-value
Intercept	-38.8176	-3.59129531	0.015687
ATM	2.530167	4.18781346	0.00859
POS	-0.76496	-2.396563699	0.061883
INTERNET	-0.32115	-5.784254105	0.002174
MOBILE	0.568221	2.424840871	0.05976
	Adjusted R² Square	0.93798027	

Dependent Variable: ROA. Source: Researcher’s Work (2021)

From the regression result in Table 1, it was discovered that Mobile Banking (MB), Internet Banking (IB), and Automated Teller Machine (ATM) have a significant influence on the Return on Assets of Deposit Money Bank in Nigeria, while Point of Sales (POS) has slightly no significant effect on Return on Asset of Deposit Money Bank in Nigeria at 5 per cent level of significance (MB: $\rho(0.05) = 0.05$; IB: $\rho(0.002) < 0.05$; POS: $\rho(0.06) > 0.05$; ATM: $\rho(0.008) < 0.05$).

The signs of the t-test and that of the coefficient revealed that Mobile Banking and ATM have a positive effect on Return on Asset, while Internet Banking (IB) and POS have a negative effect (MB: t-test=2.4; IB: t-test=-5.7; POS: t-test=-5.78; ATM: t-test=4.18).

The results of the analysis show that a naira increase in Mobile Banking (MB) leads to a 0.56-naira increase in ROA; a naira increase in Internet Banking (IB) leads to a 0.32-naira decrease in ROA, and a naira increase in POS leads to a 0.76-naira decrease in ROA based on the coefficients of the individual independent variables. In contrast, a naira increase in ATM leads to a 2.53 naira increase in ROA.

The model explaining 93% of the variation in ROA with an adjusted R2 of 0.93 indicates that other factors than the changes in Independent Variables (MB, IB, POS and ATM) are most likely to account for the remaining 7%.

Conclusively, the result of the F-stAMistic with Sig- F value of 0.0007, which is less than the chosen significance level of 5 per cent showed that Electronic Banking (MB, IB, POS, and ATM) significantly affects the Return on Asset of the listed Deposit Money Banks in Nigeria. Therefore, the study rejects the null hypothesis, which sTATES that “Electronic Banking has no significant effect on the Return on Asset of the listed Money Deposit Bank in Nigeria”.

Testing of Hypothesis Two

Ho2: Electronic Banking has no significant effect on Return on Equity of listed Deposit Money Banks in Nigeria.

Table 2: The results of the regression analysis to test hypothesis two is shown in the table 3 below

ANOVA	df	SS	MS	F	Significance F
Regression	4	1.237736	0.309434	59.19247	0.000212092
Residual	5	0.026138	0.005228		
Total	9	1.263874			

	Coefficients	Standard Error	t STAT	P-value
Intercept	-17.405	4.386172	-3.96815	0.010656
ATM	1.13102	0.245172	4.613177	0.005771
POS	-0.30756	0.129526	-2.37452	0.063595
INTERNET	-0.18858	0.02253	-8.36993	0.000399
MOBILE	0.249374	0.095092	2.622456	0.046958
	Adjusted R² Square	0.979319178		

Dependent Variable: ROE Source: Researcher’s Work (2021)

From the regression result in the Table 2, it was discovered that Mobile Banking (MB), Internet Banking (IB) and Automated Teller Machine (ATM) have significant influence on the Return on Equity of Deposit Money Banks in Nigeria, while Point of Sales (POS) has slightly no significant effect on Return on Equity of Deposit Money Bank in Nigeria at 5 per cent level of significance (MB: $\rho(0.04) < 0.05$; IB: $\rho(0.0002) < 0.05$; POS: $\rho(0.06) > 0.05$; ATM: $\rho(0.005) < 0.05$).

The signs of the t-test and that of the coefficient revealed that Mobile Banking and ATM have positive effect on Return on Equity, while Internet Banking (IB) and POS have a negative effect (MB: t-test=2.6; IB: t-test=-8.3; POS: t-test=-2.3; ATM: t-test=4.6).

Based on the coefficients of the individual independent variables, the results of the analysis show that a naira increase in Mobile Banking (MB) leads to 0.24 naira increase in ROE; a naira increase in Internet Banking (IB) leads to 0.18 naira decrease in ROE, a naira increase in POS leads to 0.30 naira decrease in ROE. In comparison, a naira increase in ATM leads to 1.13 naira increase in ROE.

The model has a coefficient of multiple determination (Adj. R2) of 0.97(97%) evidenced that only 97% variation in ROE could be

	Coefficients	Standard Error	t STAT	P-value
Constant	-3.25032	28.14992	-0.11546	0.912570779
ATM	0.470454	1.573482	0.298989	0.776976519
POS	-0.43721	0.831284	-0.52594	0.621412297
INTERNET	-0.37103	0.144595	-2.566	0.050278831
MOBILE	0.597974	0.610286	0.979826	0.372170906
	Adjusted R² Square	0.538952168		

Dependent Variable: EPS Source: Researcher’s Work (2021)

From the regression result in the Table 3, it was discovered that on Internet Banking (IB), has a slightly significant influence on the Earnings Per Share Deposit Money Bank in Nigeria, while Point of Sales (POS), Mobile banking and ATM have no significant effect on Earnings Per Share of Deposit Money Bank in Nigeria at 5 per cent level of significance (MB: $\rho(0.3) > 0.05$; IB: $\rho(0.05) = 0.05$; POS: $\rho(0.62) > 0.05$; ATM: $\rho(0.77) > 0.05$).

The signs of the t-test and that of the coefficient revealed that Mobile Banking and ATM have a positive effect on Return on Equity, while Internet Banking (IB) and POS have a negative effect (MB: t-test=0.97; IB: t-test=-2.56; POS: t-test=-0.52; ATM: t-test=0.29).

explained by the changes in independent variables (MB, IB, POS and ATM), this implies that the remaining 3% changes in ROE can be justified by other factors that are not captured in this model.

Conclusively, the result of the F-Statics with Sig- F value of 0.0002 which is less than the chosen significance level of 5 percent, showed that Electronic Banking (MB, IB, POS, and ATM) significantly affect the Return on Equity of the listed Deposit Money Bank in Nigeria. Therefore, the study rejects the null hypothesis, which states that “Electronic Banking has no significant effect on the Return on Equity of the listed Money Deposit Bank in Nigeria”.

Testing of Hypothesis Three

There is no significant effect of Electronic Banking and on Earnings Per Share of listed Deposit Money Banks in Nigeria

Table 4: The results of the regression analysis to test hypothesis three is shown in the table 4 below

ANOVA	df	SS	MS	F	Significance F
Regression	4	3.12661	0.781652	3.630187788	0.094951
Residual	5	1.076601	0.21532		
Total	9	4.20321			

Based on the coefficients of the individual independent variables, the results of the analysis show that a naira increase in Mobile Banking (MB) leads to 0.59 naira increase in ROE; a naira increase in Internet Banking (IB) leads to 0.37 naira decrease in ROE, a naira increase in POS leads to 0.43 naira decrease in ROA, while a naira increase in ATM leads to 0.47 naira increase in EPS.

The model having a coefficient of multiple determination (Adj. R2) of 0.53(53%) evidenced that only 53% variation in EPS could be explained by the changes in independent variables (MB, IB, POS and ATM), this implies that the remaining 47% changes in ROA can be justified by other factors that are not captured in this model.

Therefore, the F-Statistics with Sig-F value of 0.09, greater than the 5 percent significance level, revealed that Nigerian Deposit Money Banks (MB, IB, POS, and ATM) does not significantly affect its earnings per share. Therefore, the study accepts the null hypothesis, which states that “Electronic Banking has no significant effect on the Return on Asset of the listed Money Deposit Bank in Nigeria”.

Robustness Check

The findings of the study generally show that the electronic product innovations of listed deposit money banks in Nigeria supports financial performance of banks [31]. This corroborates Michael who opined that today’s deposit money banks are strategically positioning themselves for the future by changing their cultures and embracing technological innovations in order to deliver new innovative products and services which are considered as their top priority [7]. This confirms that electronic payment has positive effect on Nigerian bank performance. That is, if the banks decide to expand the coverage through an electronic payment option, then the banks are expected to earn more profit in return.

Conclusion and Recommendations

The liberalisation of the Nigerian banking sector has brought about a positive change and healthy competition in the Nigerian banking industry through a computerised and improved banking service delivery. This study sought to determine the effect of electronic banking on deposit money banks performance in Nigeria from 2011 to 2020. The results of the study show that Electronic Banking (MB, IB, POS, and ATM) positively and significantly affect the Return on Asset (ROA) and Return on Equity (ROE) of the listed Deposit Money Bank in Nigeria. However, electronic banking has no significant effect on Earnings Per Share (EPS) of listed Deposit Money Banks in Nigeria. The adoption of electronic banking in Nigeria has increased the efficiency and effectiveness of the banking industry. It has improved the performance of workers by making their performance more effective and efficient. Electronic banking has made banking transactions easier by bringing services closer to its customers hence improving banking industry performance. The study recommends that the management of banks which are slow in innovation adoption should move in and adopt various innovations in their operations to shore up their profitability. In addition, policymakers should also review policies related to promoting innovation adoption and transfer of technology. Government should encourage the adoption of innovations that will improve the profitability of organisations.

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