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Digital Financial Inclusion and Commercial Banks Soundness in Nigeria

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Abstract

This dissertation investigated the relationship between digital financial inclusion and commercial banks soundness in Nigeria. Two multiple regression models were formulated to examine the effects of the independent variables on the dependent variables. Commercial banks soundness was measured by capital adequacy indicator and asset quality indicator. While financial technology was proxied by digital mobile money payment, digital Payment Service, digital Retail agents and digital backend server. Cross sectional data were sourced from financial statement and annual report of 14 quoted commercial banks in Nigeria while time series data were sourced from Central Bank of Nigeria Statistical Bulletin from 2015-2024. Panel data Ordinary least method was used. R-square, adjusted R-square, Durbin-Watson, F-statistics and probability, regression coefficient were used to analyzes the relationship financial technology and banking system soundness. Model one found that that 33 percent of the total variations in the capital adequacy ratio are accounted for, by the explanatory variables while the remainder is attributed to variable that is influenced by other factors not included in the regression model. The t-statistics shows that digital mobile money payment have negative effect on commercial banks capital adequacy, digital payment statistic have positive effect, digital retail agents have positive effect while digital backed serve have negative effect on commercial banks capital adequacy ratio over the periods covered in this study. Model two found that 52.6 percent of the total variations in the assets quality are accounted for, by the explanatory variables while the remainder is attributed to variable that is influenced by other factors not included in the regression model. The t-statistics shows that digital mobile money payment have negative effect on commercial banks assets quality indicator, digital payment statistic have positive effect, digital retail agents have positive effect while digital backed serve have negative effect on commercial banks assets quality indicator. The study concludes that digital financial inclusion does not explained significant variation in commercial bank soundness. We recommend that effort from the Central Bank of Nigeria should be strengthened to enhance digital financial inclusion in Nigeria.

Keywords: *Digital Mobile Money Payment, Financial Inclusion, Digital Payment Service, Commercial Banks, Soundness, Nigeria*

INTRODUCTION

Commercial banks play a critical role in the operation of an economy as they play an intermediary role of channeling funds from surplus economic units (savers) to deficit economic units (borrowers) for investment (Njoki & Nyamute, 2023; Akani, 2024). Besides mobilization of idle funds lying in the hands of economic units, commercial banks also play a vital role in overall wellbeing and socioeconomic development of a country through promotion of savings culture, forex trading, government lending, and public lending (Banda 2021). Nyathi & Petegumbo (2024) alludes that from independence all various sectors of the economy have been supported by the vibrant financial sector for growth and production. Abdullahi, (2020) posited that commercial banks promote trade both within and outside the nation through the bills of exchange acceptance and discounting. Digital financial inclusion is commonly measured by the use of mobile money accounts and the financial transactions using mobile phones. The determinants of the use of mobile money as a financial inclusion instrument include social, cultural, technological, economic, and psychological factors. The goal

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of financial services made available via digital means is to contribute to the reduction in poverty and deliver on the recognized benefits of financial inclusion in developing countries. Financial inclusion means the sustainable provision of affordable financial services that bring the poor into the formal economy. An inclusive system includes a range of financial services that provide opportunities for accessing and moving funds, growing capital, and reducing risk. Such services may be provided by banks and other traditional financial services organizations, or by non-bank providers.

Digital financial inclusion involves bringing unbanked adults into the formal financial sector by offering financial services to unbanked adults using devices that have a digital interface such as a mobile phone or other digital devices. Digital financial inclusion involves offering digital financial services to the financially excluded and underserved populations, and using a mobile phone or other digital devices to increase access to digital financial services (Ozili, 2018; Akani & Rogers-Banigo, 2023). Digital financial inclusion involves providing access to affordable formal financial services to the excluded population using existing digital technologies (Ozili, 2021b). Digital financial inclusion is the sustainable provision of affordable digital financial services that bring the poor into the formal financial sector of the economy. According to Akani (2019) bank soundness is important as bank failure can undermine public confidence in the system, force a sudden contraction in money supply, curtail savings and investment, and induce a collapse of the payment system and results in severe dislocation of the real sector (Toby, 2008; Akani, 2023). The main aim is to ensure banking soundness in order to prevent costly banking system crises and their associated adverse effect on the economy. It is determine by micro prudential factors such as credit expansion, capital adequacy, asset quality and macro prudential forces such as monetary, macroeconomic and international variables (Lucky, 2017; Akani, Ogolo & Sarakiri, 2022; Akani, Godwin & Lucky, 2023).

A weak banking sector not only jeopardizes the short and long-term sustainability of the economy but can be a source of financial crisis which can result in economic crisis (Vaithelingm, 2015; Akani, Amadi-Opareli & Ajinwo, 2023). A fragile banking sector places constraint on the monetary policy in the view of the lender of last resort function of Central Bank of Nigeria, for instance the banking sector crisis of 2009 resulted in injection of N620 billion into the economy. Conceptually, a sound banking system is a system where the individual banks accounting for the most of the system's transactions are solvent and meet capital adequacy requirements (Toby, 2006). Banking system can also be considered sounds if the banks are capitally adequate, can withstand monetary and macroeconomic shocks and fall in the composite rate of 1 and 2 as specified by the Federal Deposit Insurance Corporation.

According to Chimkono et al. (2016), the capital adequacy ratio of a bank is monitored by national regulators to make sure it meets statutory capital requirements and can withstand a reasonable amount of loss, and this indicates the capital of a bank, and a bank's risk-weighted credit exposures are stated as a percentage of this amount. In addition to promoting the stability and effectiveness of financial institutions worldwide, the implementation of prescribed levels of this ratio is meant to safeguard depositors, and layer one capital is measured, which allows a bank to withstand losses without having to stop operating, and layer two capital is measured in case of a winding-up (Bhowmik & Sarker, 2021, Aguguom, 2020; Akani & Lucky, 2022; Akani & Ezebunwo, 2021). The capital adequacy ratio is a metric used to assess a bank's ability to cover its liabilities, including credit and operational risk, as well as other hazards. Put simply, a bank's capital serves as a "cushion" against possible losses, safeguarding both the bank's depositors and other lenders.

In the literature, many studies on digital financial inclusion have emerged. In the year 2021 alone, many studies examined digital financial inclusion in relation to economic growth (Ahmad et al, 2021), entrepreneurship (Baker, 2021), urban-rural income gap (Ji et al, 2021), poverty reduction (Wang and Fu, 2021; Akani & Agilegbu, 2021; Akani, Uchechukwu & Ezebunwo, 2021), investment diversification (Lu et al, 2021), complex systems (Dai, 2021), research and development (Sun et al, 2021), etc. Despite the increasing number of studies on digital financial inclusion, digital financial inclusion in terms of its meaning, goal, components, instruments and regulatory issues is not generally understood. There is a diversity of views on what digital financial inclusion is among scholars and researchers in policy and academic circles. Also, those who do not know the meaning of digital financial inclusion form their own abstract meanings of digital financial inclusion. Others regard digital financial inclusion as nothing but a means of digital surveillance by the State. Still, many others continue to enroll into the digital financial system because their peers have joined the digital financial system - they have no clue about what they will find in the digital financial system when they join whether good or bad. From the above, this study examines the relationship between digital financial inclusions and commercial banks soundness in Nigeria

LITERATURE REVIEW

Digital Financial Inclusion

Digital financial inclusion is the fourth stage of the financial revolution after developing microcredit, microfinance, and financial inclusion (Ahmad, Majeed, Khan, Sohaib, & Shehzad, 2021; Akani. Azike & Nwonodi, 2022; Akani & Nanthiel, 2021) Compared to financial inclusion, digital financial inclusion places more importance on technology to broaden the accessibility to formal financial services. Initially, the term "microcredit" refers to a small loan offered by financial institutions to businesses and individuals. In the 1990s, the word "microcredit" had been replaced by "microfinance," which covers more immense scopes of financial services such as savings, mutual funds, insurance, and loans. Another significant revolution is shifting from "microfinance" to "financial inclusion". Financial inclusion is a concept that seeks to guarantee that formal financial services are accessible to all people. However, microcredit,

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microfinance, and financial inclusion initiatives are manual and field-based operations. Thus, it limits the effectiveness of helping the poor. Lately, ICT has led financial inclusion to advance to the fourth stage: digital financial inclusion. This radical innovation has the potential to transform the lives of those at the bottom of the economic ladder (Baker, 2021; Akani & Chittey, 2021). Digital financial inclusion can be defined as digital access to and use of formal financial services by excluded and underserved populations. Such services should be suited to the customers' needs and delivered responsibly, at a cost both affordable to customers and sustainable for providers. Today's providers of such financial services can be divided into four broad groupings based on the party holding the contractual relationship with the customer: (i) a full-service bank offering a "basic" or "simplified" transactional account for payments, transfers, and value storage via mobile device or payment card plus point-of-sale (POS) terminal; (ii) a limited-service niche bank offering such an account via mobile device or payment card plus POS terminal; (iii) a mobile network operator (MNO) e-money issuer; and (iv) a nonbank non-MNO e-money issuer.

Digital Financial Services

Mobile Money Services Mobile money services involve the use of mobile phones for the initiation, authorisation and confirmation of the transfer of value out of a current/checking, savings, or stored value account. Some analysts believe that mobile money will become a large force in Nigeria with the introduction of Telcos into the space. This position is based on the success stories of the adoption of mobile money services in African countries where Telcos have taken the lead in the provision of the services. There are many examples of Telcos taking the lead in providing mobile money services such as Kenya, Tanzania, Uganda and Ghana. Nigeria's mobile money landscape is, however, dominated by banks, technology and financial services companies (Ozili, 2021; Akani & Lucky, 2023). The arguments in favor of a Telco-led mobile money framework are further supported by their subscriber base, available infrastructure and agent network which is far greater than that of the banks in terms of numbers and geographical spread. Ghana is often cited as an example of how a review of the system to support Telcos to apply directly for mobile money licenses has had a positive impact on the adoption of mobile money services, resulting in an increase of about 72.0 per cent in the number of mobile money users (Ozili, 2020). Although the CBN recognizes the importance of Telcos in operating the mobile money scheme given the necessity of the infrastructure they provide, the Bank needs to ensure retention of full control over monetary policy operations, minimize risks and ensure that organizations offering financial services are licensed by it.

Digital Payment Service

In October 2018, the Central Bank of Nigeria (CBN) issued the Guidelines for Licensing and Regulation of Payment Service Banks (PSBs) in Nigeria. The Guidelines require licensees to leverage on mobile and digital channels to enhance financial inclusion and stimulate economic activities at the grassroots level through the provision of financial services. The PSBs are to facilitate high-volume and low-value transactions in remittance services, micro-savings and withdrawal services in a secured technology-driven environment to further deepen financial inclusion and help in attaining the policy objective of reducing the exclusion rate to 20.0 per cent by 2020. Thus the primary targets of PSBs are individuals and small businesses without bank accounts, the underserved and the financially excluded. Two of the largest Telcos in Nigeria, MTN Nigeria and Airtel, are expected to leverage on their existing customer base, distribution and agent networks, infrastructure and geographical footprint across Nigeria to participate in the digital payments space. As such, these Telcos have set up channels for distribution as required by the Guidelines (Lu, Guo, & Zhou, 2021; Akani, 2024).

Financial Access Segments

The banked access and use financial services offered by formal financial institutions including deposit money banks, mobile money operators, microfinance banks, insurance firms, pension funds administrators and investment firms (licensed by the Securities and Exchange Commission). According to EFInA, 48.6 per cent or 48.5 million adults are banked. With most of them completing secondary or post-secondary education, they are middle-aged, middle- to high-income earners that are more educated than their under-banked and unbanked peers. The under-banked use informal financial products and services provided by cooperative societies and savings groups (Baker, 2021; Akani 2024; Akani and Lucky 2023). These include rotating savings called "Adashe" in Hausa, "Ajo" in Yoruba and "Esusu" in Igbo. According to the EFInA (2018), the under-banked are mostly found in the South-West, SouthSouth and the North-Central geo-political zones of Nigeria; and are about 14.6 per cent of the adult population (14.6 million). They are mostly middle-aged, low to middle-income women working to support their families. They are mostly educated up to secondary school level, have mobile phones and voter's cards as identification documents, they are still excluded from the formal financial system e unbanked are financially excluded without access to financial services offered by formal and informal financial service providers. They rely on family and friends for their financial services and make all their payments with cash.

Backend Server

This refers to the digital telecommunications infrastructure that stores data and electronically validates customers' details held with financial institutions before permitting digital financial transactions to take place. It is responsible for storing and organizing data, and ensuring everything on the frontend interface works well for users. The backend server communicates with the frontend. It sends and receives information to be displayed on the frontend user interface. When customers fill in their login details or want to make a digital transfer, the frontend application sends a request to the backend server, which returns information in the form of frontend code that the frontend application can interpret and display.

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Bank Soundness

The concept of banking system soundness is derived from the financial system soundness indicators with various studies on the micro and macro prudential determinants. A sound banking system is a system in which individual banks accounting for most of the system's transactions are solvent and meet capital adequacy requirements (Toby, 2006). Banking system is considered sound, if it is capitally adequate and can withstand monetary and macroeconomic shocks in its operating environment. Commercial bank soundness is maintained by sufficient capitalization which is characterized by the security level of risk assets and acted as the guarantor of bank reliability and liquidity, and also high profitability demonstrates effectiveness of credit organizations resources used (Hodachnik, 2009; Akani & Anyamaobi, 2021; Akani & Uzah, 2022). Vagizova, Klaas and Batorshina, (2013) posited that problem areas of lack of financial stability by commercial banks are the poor quality of assets and liabilities due to a considerable share of the overdue credits and demand liabilities, dependence on interbank credits that on the one hand characterizes unstable position of bank, but on the other hand shows trust in bank from other banks, the aggressive credit policy, and also poor quality of credit portfolio.

According to Lee and Chih (2013) some banks in financial instability are characterized by sufficient level of liquidity and qualitative resource base which is important because the raised funds take vital share in structure of bank resources and they provide to meet needs of the enterprises, the organizations and the population, including credit resources requirements. Relative instability banks were connected with undercapitalization, a considerable share of the interbank credits in structure of liabilities and overdue credits, poor quality of credit portfolio, and in some cases with aggressive credit policy and insufficiently stable resource base (Lee *et al.*, 2013)

Measures of Commercial Bank Soundness

With the recommendation of the IMF, Central bank of Bosnia and Herzegovina began with a compilation of selected FSI exclusively for the banking sector, primarily because the share of this sector in the overall financial system. In order to calculate those indicators aggregation and data consolidation were used. Aggregation is the summarization of data, so that the overall position of one or transaction for any group of reporting units is equal to the sum of data for all individual units within the group. Consolidation refers to the elimination of transactions between group members in order to express financial situation and performance of the group as one of the accounting subject in relation to other businesses outside the group, for statistical purposes. Consolidation of data is carried out on a group and sector level.

Financial Soundness Indicators: Profitability

To measure profitability, compiled FSI is as follows:

a) Return on average assets (ROAA) is an indicator of a set of basic indicators of financial soundness indicators and is intended to measure banks' efficiency in using its assets. This FSI provides an estimate of profit that can be used to cover losses in relation to assets. ROAA is calculated as the ratio of net income to average total assets.

b) Return on average equity (ROAE) measures the efficiency of banks in the use of capital. This FSI provides an average income that can be used to cover losses in relative to capital. ROAE is calculated as the ratio between net income and average capital.

c) Net interest income to total income is calculated as the ratio of net interest income and total income. Net interest income is the difference between total interest income and total interest expense.

d) Non-interest expenses to gross income measures the share of administrative costs in total revenue. This FSI is calculated as the ratio of non-interest expense and total revenue. The non-interest expenses include direct expense (cost value adjustments for items of the balance of risk and risk reserves for items and other off-balance sheet business and direct expenses) and operating expenses (salaries and expenses contributions, the cost of office space, other fixed assets and overheads and other operating costs).

Financial Soundness Indicators: Capital

Indicators that measure capital adequacy are:

a) Basic capital to total risk weighted is used to determine how the indicator of net capital to total risk weighted susceptible to changes in additional capital and regulatory reductions. Capital adequacy is measured by this indicator is calculated as the ratio of basic capital (Tier 1) and total risk-weighted, which consists of RWA and operational risk weighted (ORW).

b) Net capital to total risk weighted corresponding to methodology capital adequacy ratio (CAR) calculating, which is prescribed by Basel Core Principles for internationally active banks in the G10 countries, except that the calculation and analysis of capital does not include the impact of country risk and transfer risk. The capital adequacy ratio measured by this indicator is calculated as the ratio of net capital and total risk-weighted.

c) Although the prescribed CAR for internationally active banks to Basel Core Principles is 8% or more, the existing regulations in Bosnia and Herzegovina require this rate to be at least at 12%.

Financial Soundness Indicators: Liquidity

Financial soundness indicator: liquidity is:

a) Liquid assets to total assets show how the banking sector is sensitive to liquidity crisis, and how it is able to meet the expected and unexpected demand for cash.

b) Liquid assets to short-term financial obligations as an indicator that measure liquidity mismatches of

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assets and liabilities, and gives an indication of the extent to which banks can withstand the withdrawal of short-term funds, and that they do not face with liquidity problem.

c) Short-term liabilities to total liabilities are short-term measure of participation in the total obligations, and represent a measure of liquidity risk caused by an unexpected increase in the share of total short-term financial obligations. It is calculated as the ratio of short-term liabilities to total liabilities.

Financial Soundness Indicators: Asset Quality

To measure the quality of assets compiled FSI are as follows:

a) Non-performing assets (NPA) to total assets measures the asset quality of the banking sector, and the participation of non-performing assets to total assets. NPLs accounted for the largest portion of poor quality asset and therefore this indicator gives a good picture of the quality of the loan portfolio.

b) NPA less net of provisions to the equity shows the proportion of non-performing assets not covered by the provision of basic capital, and provides indications of additional provisions which could be taken to the existing NPA. It is important indicator of the ability of bank capital to absorb losses arising from non-performing loans.

c) NPLs to total loans represent an indicator of basic set of FSI. It is calculated as the ratio between the non-performing loans to total loans. This indicator is a measure of loans quality.

Theoretical Framework

Buffer Theory of Capital Adequacy

The objective of ensuring that bank capital is adequate is to withstand and absorb monetary and macro-economic shocks which bank operation is very sensitive. However, banks may prefer to hold a buffer of excess capital to reduce the profitability of falling under the legal capital requirements, especially if their capital adequacy ratio is very volatile (Ikpefan, 2013). Capital adequacy has in recent time gone beyond that of banking supervision instrument and become a monetary policy tool of achieving financial stability. Section 7 (2) of BOFIA states that any banks that fail to comply with the capital adequacy within such period as may be determined by the CBN shall be a ground for revocation of license. Section 13 states that bank shall maintain at all times capital funds unimpaired by losses in such ratio to all or any assets or to all or nay liabilities or both such assets and liabilities of the bank and all its offices in and outside Nigeria as may be specified by CBN. The revocation of some banks license in 2005 after the consolidation and recapitalization reforms were reference to these sections. The buffer theory of Calem and Rob (1996) predicts that a bank approaching the regulatory minimum capital ratio may have an incentive to boost capital and reduce risk in order to avoid the regulatory costs triggered by a breach of the capital requirement. The collapse of some Nigerian Banks has been traced to high risk taking couple with poor capitalization.

Schumpeter Theory of Innovations

According to Schumpeter (1934) chances of profits could be created by entrepreneurs who were independent. Schumpeter argued that this was particularly observed from independent inventors or from people who were in Research and Development engineering. Consequently, due to the abnormal profits, new groups of imitators would join and lower the profits as a result of the innovation. However, Schumpeter idealised that before equilibrium could be reached, there resulted into a new set of innovation that would ultimate another business cycle. Thus, at any 15 point in time, there is something new being innovated in the economy and the financial sector is not exempted. This theory has a central theme that entrepreneurship has a role in searching for new opportunities and creating utility in the economy.

Empirical Review

Shen, Hueng and Hu (2020) investigate the channels through which financial inclusion can be achieved in China. They find that the level of financial literacy and the use of digital financial products, which are advanced by popularity of the Internet, greatly increased the level of financial inclusion in China. Ozili (2021a) examines whether high levels of financial inclusion are associated with greater financial risk using a diverse global sample of 79 countries. Ozili (2021a) controlled for the use of digital financial services such as debit cards and credit cards and electronic payment channels. The study finds that the increase in the use of debit cards, credit cards and digital finance products helped to reduced risk in the financial Peterson K. Ozili Digital Financial Inclusion 7 sector of developed countries but not for transition economies and developing countries. Also, the combined use of digital finance products with increased formal account ownership improved financial sector efficiency in developing countries. The implication of the findings is that digital financial inclusion also benefits the financial system not only the excluded population.

Adiga et al. (2022) looked at the effect of fintech on Nigeria banking sector performance. The study's data sources included the CBN, data and reports from the Nigeria Deposit Insurance Corporation from various years. Using the Auto Regressive Distributed Lag method, the study examined the relationships between the fintech (the payment system, automated clearing services, and remittance services), and performance (such as ROA and ROE). According to the study's findings, financial technology significantly affects performance (ROA, ROE). Xu (2022) examined the role of fintech adoption in banking industry. The indicator of the CAMEL rating system is used in this article to analyze the role of FinTech and bank performance. The study was carried out using 45 commercial banks in Europe from 2015 to 2021. Data were collected from annual report and account of these selected banks. The findings imply that bank FinTech plays a significant role in maintaining adequate capital, top-notch assets, effective management, large income potential, and liquidity. Adopting bank FinTech often benefits banks. Aduaka and Awolusi (2020) evaluated electronic banking impact on Nigerian banking industry profitability. Primary and secondary data

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were collected through questionnaires and audited financial reports of the banks. Using multiple regression, they found that bank cards play a significant role more than other channels. This was closely followed by ATM. It also found that e-banking channels contributed to banks' profitability. Ibekwe (2021) conducted a study on financial innovation and DMBs performance in Nigeria. Using CBN data and the Augmented Dickey Fuller Test for unit roots and the OLS-regression, the study found that ATM, POS, Mobile Payment and Internet banking had positive effects on DMBs performances.

Akani (2019) examined the effects of credit expansion on commercial banks soundness in Nigeria. The objective was to ascertain the relationship between credit expansion and commercial banks soundness in Nigeria. Time series data was collected from Central Bank of Nigeria statistical bulletin and stock exchange factbook. Ordinary least square method was used as data analysis method. Model I had capital adequacy indicator was modeled as the function of bank credit to manufacturing sector, communication and transport, mining and quarrying, agricultural sector and credit to small and medium scale enterprises while model II modeled capital adequacy indicator as the function of credit to private sector, net domestic credits, medium term credits, short term credits and long term credits. From the findings, Model I found that the independent variables explained 77 percent variations on capital adequacy ratio. The beta coefficient found that all the independent variables have positive effects on bank capital adequacy except credit to manufacturing sector. Model II found that the independent variables can explain 81 percent variations on capital adequacy while the beta coefficient found that all the independent variables have positive effects except medium term credit. The study concludes that credit expansion significantly relates to commercial banks soundness in Nigeria. We therefore, recommended for a well-articulated credit policies that will strengthen commercial banks soundness in Nigeria.

Akinroluyo and Opeyemi (2021) carried out in Ekiti state on effect of mobile money adoption on the performance of micro family enterprises during covid-19 lockdown in Ekiti state. The study administered questionnaire on one hundred and fifty (150) respondents and retrieved one hundred (100) using a purposive and accidental sampling technique. The collected data were analyzed with descriptive statistics, while the hypothesis was tested with ANOVA. Findings further show that mobile money adopted by the family enterprises are significantly affecting their performance in Ekiti State Nigeria. The study also concluded that mobile money adopted are significantly influencing the performance of the selected family enterprises during Covid-19 Lockdown in Ekiti State Nigeria.

Akujor, Jane Chinyere and Eyisi, Adanma Sabina (2020) examined the effect of Electronic payment on the performance of SMEs in Nigeria. Data were collected for the study through questionnaires administered by the researchers which were analysed using tables, percentages and pearson correlation with the aid of SPSS version 22.0. The study also used survey research design. Findings from the study revealed that E-payment has a negative significant effect on Accountability of SMEs in Nigeria. Also, there is a negative significant relationship on effect of e-payment on revenue generated by SMEs in Nigeria. Thus; it is recommended that Small and Medium scale business owners in Nigeria should make use of e-payment so as to build confidence in the use of ICT tools in business. Also, Government should establish a commission on ICT sector to regulate and see the full implementation of computerized accounting system in Nigeria and develop the citizen in line with their technology knowledge. This will go a long way in aiding the use of e-payment methods by customers, improve the revenue of the SMEs and encourage the cashless policy of the government.

Azeez, Madukoma, and Yila (2022) examined the role of ICT as a tool that SMEs can deploy for the economic development of Nigeria. A questionnaire was employed and administered to a total of 175 SMEs randomly chosen from five different sectors of the Nigeria economy (educational, micro finance, transport, commerce and hospitality). Chi-square test was used to evaluate the hypothesis and the findings of the research revealed that (1) low awareness level of the benefits of ICT incorporation in the management process of most SMEs has been a major cause of its low adoption; (2) poor media transmission framework, high cost of ICT hardware, deficient government support and legislation for internet business among other factors have hindered the adoption of ICT in the management process of SMEs; (3) high cost of funds in Nigeria have also made it unprofitable for SMEs to source fund for ICT expansion and implementation. The research recommends among other measures, the investment on infrastructure and adequate incentives to promote the utilization of ICT among SMEs. Investment banks and other specialized institutions should brace up with their responsibilities and promote local industries through affordable credit schemes.

Bakare, Madukoma, and Musa (2022) examined the influence of ICT use on SMEs performance in the North Central geo political zone of Nigeria. The study adopted a survey research design. The population of the study comprises 651 owners of mini-rice milling SMEs. The sample size for this study will consist of 248 rice milling SME owners drawn from the four selected states. Simple random sampling technique was used to select the sample for the study. The study found that ICT use had significant influence on SMEs performance in North Central geo-political zone, Nigeria. The study also reveals that the level SMEs performance in North Central geo-political zone, Nigeria is average. The study also found that the level of ICT use of SMEs in North Central geo-political zone, Nigeria is low. The study recommended that: SMEs in North Central geopolitical zone, Nigeria should do more in order to attain higher level of performance. SMEs in North Central geo-political zone, Nigeria should engage in the ICT use that enhances business processes, this in turn will enhance their business performance

Dermaku et al., (2023) examined the relationship between fintech developments and the performance of Kosovo's banks

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49 observations that were recorded at regular intervals of three months. The source of data is secondary data. Net profit of the selected banks was used as proxy for performance while ATMs, POS, and e-payments were used as the proxy for fintech. The methodology used in the study is based on the OLS approach and diagnostic tests for assessing heteroscedasticity, specification error, autocorrelation, and multicollinearity. The findings indicate that the net profit of the banks is regulated by the unpredictability of ATMs and electronic payments. ATM payments negatively affect bank net profit, whereas e-payments positively affect bank net profit. In addition, a rise in ATM payments reduces bank net profit by 0.30%. While a rise in e-payments by 1percent rise in bank net profit by 0.10%. The POS payments negatively affect bank net profit. Diyaolu, and Oso (2023) aimed to propose a conceptual model for assessing the influential factors of ICT use among the SMEs. a survey was conducted in Oyo South Senatorial district of Oyo State, Nigeria. A total number of Seventy-three (73) SMEs operators were randomly selected as the sample size. The descriptive statistics which includes frequency counts and percentages were used to describe the sample and to assess ICT use. Regression analysis was used to assess the relationship and influence of technology, organization and environment characteristics on use of ICT. The findings revealed that ICT use has significant positive relationship with the constructs of the TOE Framework. The TOE Constructs also have joint influence on the use of ICT by the SMEs.

Effiom and Edet (2020) employs autoregressive distributed lag methodology on quarterly data of financial innovation measures. Our findings indicate that financial innovation has a positive and significant effect on SMEs' productivity in Nigeria. In particular, of the seven financial innovation instruments used (Automated Teller Machine, Point of Sales, Web or Internet Banking, Cheques, Nigeria Inter-bank Settlement System Electronic Fund Transfer, Nigeria Inter-Bank Settlement System Instant Payment, and Mobile Money Operations), all but one turned out in both the short run and long run as significant predictors of SMEs' performance in Nigeria. Furthermore, the Toda-Yamamoto causality test reveals unidirectional causation running from financial innovation instruments to SMEs' performance. These results have implications for SMEs' growth and the current cashless policy of the Central Bank of Nigeria.

Emmanuel, Dibua, Onyegbuna and Friday (2024) examined the role of Information and Communication Technology (ICT) in the growth and development of Small and Medium Enterprises (SMEs) in Anambra State, Nigeria. The importance of information and technology in modern business management cannot be overstated, as they serve as critical resources for organizations to gain a competitive edge. The study emphasizes the benefits of ICT adoption for SMEs, which include enhanced productivity, effectiveness, efficiency, and customer satisfaction. However, it also highlights the challenges faced by SMEs in Anambra State in effectively utilizing ICT, such as inadequate infrastructure, management information system constraints, and limited resources. The primary objective of the study is to evaluate the extent to which ICT contributes to the growth and success of SMEs in Anambra State. The research employs a stratified random sampling approach, collecting data from SMEs across various sectors, including pharmaceutical, manufacturing, textile, telecommunications, and others. The findings provide insights into the factors that influence ICT adoption and ownership patterns among SMEs in the region, as well as the moderating effects of different business categories on technology utilization. The study concludes with recommendations for policy makers and SME owners to enhance the effective integration of ICT for the growth and development of the SME sector in Anambra State.

Gaol et al. (2022) used the digital finance index from Peking University to measure digital finance and the number of new enterprise registrations to measure entrepreneurship in 284 Chinese districts from 2011 to 2019. The authors used FE and IV models for analysis and revealed that digital finance significantly promotes entrepreneurship by usage depth, coverage breadth and digitalization level. Zhang and Pang (2023) found the same results that digital finance promotes urban entrepreneurship (sum of new private enterprises) and household entrepreneurship (new self-employed households) in China. Sun and You (2023) used the China Regional Innovation and Entrepreneurship Index data to examine the impact of digital finance on innovation and entrepreneurial activities in 41 districts from 2011 to 2020. The author conducted their analysis using multiple regression methods and established that digital finance significantly increases innovation and entrepreneurial activities in Chinese districts. Zhang and Pang (2023) found the same results that digital finance promotes urban entrepreneurship (sum of new private enterprises) and household entrepreneurship (new self-employed households) in China. Sun and You (2023) used the China Regional Innovation and Entrepreneurship Index data to examine the impact of digital finance on innovation and entrepreneurial activities in 41 districts from 2011 to 2020. The author conducted their analysis using multiple regression methods and established that digital finance significantly increases innovation and entrepreneurial activities in Chinese districts.

Goddy (2020) discusses the impact of Information Communication Technology (ICT) on Small and medium scale enterprises (SMEs) in Nigeria. Today we live in an information society in which more people must manage more information, this in turn requires more technological support, which both demands and creates more information. Electronic technology and information are mutually reinforcing phenomena, and one of the key aspects of living in the information society is the growing level of interactions we have with this complex and increasingly electronic environment. The general consequence is that we deal with large volumes of information, new forms and aggregations of information, and new tools for working with information. These new tools we use to manage information at corporate, governmental and societal levels are tools we must learn to use, pay for and maintain. These new tools are impactful in

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the running of small and medium enterprises if applied purposefully. The primary tool of the information society is the computer. Microprocessors are used to improve the performance of other technologies, and computers are increasingly used to control and integrate other kinds of information technology (e.g. TV, radio, telephones).

Godwin (2024) empirically examined the relationship between financial technology (FinTech - proxied by Internet Banking and Mobile Payment) innovation and business growth (proxied by productivity and operational efficiency) of Small and MediumScale Enterprises (SMEs) in Port Harcourt. The study was underpinned by the theory of Technology Acceptance Model (TAM) and the Diffusion of Innovation Theory (DIT). The study adopted a cross-sectional research design and the population was the 1016 registered SMEs in Port Harcourt with a sample size of 287. Spearman's Rank Correlation and Partial Correlation were used to test the five hypotheses that guided the study. The findings showed a positive and significant relationship exists between financial technology innovation and business growth. Based on these findings, the research concluded that financial technology innovation is a business solution and a formidable management strategy that SMEs can deploy to improve their business growth. It recommends therefore that SMEs who want to improve their business growth should invest more in FinTech innovations such as Internet banking and mobile payment, as these digital solutions have a significant impact in improving productivity and operational efficiency (business growth).

Hajja (2023) intends to investigate the effects of ICT adoption on the performance of Technology based SMEs in Maiduguri Metropolitan Area, Borno State, Nigeria. The study adopted a descriptive and causal research designs that is made up descriptive research techniques. The population of the study is made up 1,595 ICT based businesses out of which a sample of 350 respondents was selected using convenience sampling technique. Primary data was collected using an instrument made up of 5 point Likert scale with both open and closed-ended questions. The data collected from 335 respondents were analysed using both descriptive and inferential statistics with the aid of SPSS version 24. Descriptive statistics (mean and standard deviations) were used to describe the characteristics and research questions of the study variables. Multiple linear regressions was used to assess the relationships between independent and dependent variables of the study using a P-value

Harrison (2024) was to investigate how information and communication technology (ICT) contributes to the growth of entrepreneurship in Nigeria. When it comes to the broad acceptance of social media and digital apps, ICT plays a crucial role in the day-to-day operations of entrepreneurial endeavours. A desk research strategy was used, and literature on the effects of ICT on the growth of entrepreneurship was examined. According to the report, there is a plethora of potential for youth empowerment, employability, and general employment when ICT is applied to business growth. A lack of proper entrepreneurship orientation, inconsistent power supplies, inadequate ICT infrastructure, a lack of skilled technicians and technologists, poor access to financing, and poor marketing abilities were among the difficult factors that the study also uncovered. These were obstacles that any aspiring business owner had to overcome to ensure the sustainability of an existing venture. The report suggested, among other things, that given the critical role that ICT plays in the creation of entrepreneurial possibilities, the government and other stakeholders should create an environment that is supportive of the development of ICT infrastructure to support the growth of entrepreneurship. Furthermore, training facilities in ICT should be provided by relevant government agencies and networth stakeholders to increase the efficiency of the country's entrepreneurs, enabling them to acquire relevant technical and technological skills needed to expand output, maintain existing customers, gain access to wider markets, and improve their entrepreneurial activities generally, particularly in terms of the development of new products for solving societal problems in the country

Heman and Anna (2023) examined the impact of the cashless economy on small business operators in Borno state Nigeria. In order to gather information from across Borno state in Nigeria, the researcher uses mixed method approach that includes; surveys, interviews, observations, and focus group discussions. Research questions were designed to evaluate the perceived impact of the transition to a cashless economy on the performance of small business operators, the major challenges faced by small business operators in adapting to the cashless economy, the extent to which government policies and initiatives have supported the growth of small business operators, and the opportunities of the cashless economy for small business operators. Data was collected through a survey questionnaire distributed to a sample of small business operators across Borno state, and analyzed using descriptive statistics and hypotheses testing. The results show that the transition to cashless economy has a perceived impact on the performance of small business operators. However, Significant challenges were identified which include; high transaction costs, restricted access to digital infrastructure, network outages, lack of client bank accounts, and low customer awareness, Low levels of financial education and support for the acquisition and maintenance of electronic payment devices. In order to usher in fully, the cashless policy, it is recommended that government should strategize and intensify efforts to address the challenges faced by small business operators in adapting to a cashless economy.

Ibekwe (2021) studied the performance of banks and financial innovation in Nigeria. Secondary sources were employed to gather the information using CBN data. ROA was used to evaluate performance and ATM, POS, mobile banking, and online banking were used to measure financial innovation. The collected data were examined using unit roots and the OLS-regression. The results demonstrated that ATM, POS, and internet banking have a favorable impact on Nigerian banks. Aduaka and Awolusi (2020) looked at the relationship between e-banking (Fintech) on profitability of banks in

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Nigeria. To achieve the objectives of the study, both secondary and primary data were adopted. The primary data involves surveys while secondary data involves banks' audited financial records. The data collected were subjected to some pre-estimation test. However, the hypotheses were tested using multiple regression and the results revealed that ebanking have significant eefct on bank profitability.

Ighoroje and Okoroyibo (2020) investigated the cashless policy and the performance of Nigerian deposit money banks. The research was descriptive and used an ex post facto design. Secondary data were used, and the main sources of data collection were the CBN data browser website and The Global Economy.com. The Augmented Dicker Fuller and Philip Perron Checks for Unit Roots, as well as the Autoregressive Distributed Lags (ARDL) for coefficient analysis and co-integration, were also used. ATMs, POS machines, mobile banking, and Internet banking were used as proxies for cashless policies, while ROE was used as a measure of bank performance. The study found that both ATMs and Internet Banking had a positive and significant ROE. POS had a positive but insignificant effect on return on equity, whereas mobile had no effect. Banking (MB) had a statistically significant negative effect on ROE. The study concluded that the cashless policy had a positive impact on the performance of Nigerian deposit money banks. According to the study, the government should provide continuous electricity supply and adequate contact links, while banks should be able to fund shortfalls through back-up plans to power backup generators in the event of a power outage.

Kifordu (2024) this study looks at how Fintech has affected the expansion of SMEs in Nigeria from a management standpoint. The survey, desk research design, and ex post facto research design were all used in the study. The Google form used to collect the main data had eighteen questions on age, gender, and Fintech solutions. The secondary data came from the Central Bank of Nigeria Statistical Bulletin for the year 2022. From 2009 to 2021, all financial banks in Nigeria provided their understudied financial technology characteristics, which were all taken into account in this study. In particular, the Automated Teller Machine (Volumes), Mobile Banking Services (Volumes), Internet Banking Services (Volumes), Point of Sale (Volumes), and SME Growth Rate as determined by SME Contribution to GDP numbers were chosen. As the study concludes, Fintech solutions give small and medium-sized enterprises (SMEs) an improved tool for monitoring and organizing financial data, which helps them, make better financial decisions and enhances their overall financial performance and contribution to the Nigerian economy. However, there are still issues facing the sector. Therefore, the report suggests that Nigeria should develop a policy to promote SMEs to utilize Fintech and that her agencies instruct SMEs on how to make the most of this Fintech solution.

Nwankwo, Eze and Kanyangale (2022) examined the effect of channels for the cashless economy on entrepreneurship development in Anambra State, Nigeria. This descriptive study explores internet banking services, automated teller machines and crowd funding as the explanatory/independent variables, while the dependent variable was entrepreneurship development. The study population was 3,574 owner-managers of manufacturing small and medium enterprises in Anambra State, Nigeria. A sample of three hundred and four (344) owner-managers was selected using a simple random sampling technique. Data collected through structured questionnaires were analyzed using correlation analysis and multiple regression analysis. Results show that internet banking services, automated teller machine services, and crowdfunding positively affect entrepreneurship development. The study concluded that channels for a cashless economy have a significant and positive effect on entrepreneurship development. The study recommends that an integrated and intensive campaign is critical to sensitize the citizenry on the benefits of various channels for the cashless economy on business performance and survival as well as customer satisfaction. Additionally, the campaign should be reinforced by adequate security mechanisms, user-friendly service, and reliable ATMs, with affordable fees and features that allow customers to make deposits. Implications of study and areas for future research are highlighted.

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Obi (2023) examined the impact of the cashless policy of the government on the performance of small-scale enterprises in Southeast – Nigeria. It explored the availability of required e-payment facilities, the effectiveness of e-payment administration, and the impact of cashless policy on the performance of SMEs in the region. Descriptive survey design and researcher's designed questionnaire were adopted to generate data from 500 respondents that were randomly chosen from five states in southeast Nigeria, while statistics of

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percentages, and SPSS tools were used to analysis the data. Results of the analysis reveal inadequate supply of e-payment facilities and lack of IT skills for managing e-payment transactions among majority of the respondents. In addition, it revealed the ineffectiveness of e-payment system in the management of SMEs with significant negative impact on the performances of SMEs in southeast Nigeria. Among others, the paper recommends awareness creation and sensitization about the cashless economy, and adequate provision or the modernization of e-payment facilities to ensure the effectiveness of the policy.

Ogunmuyiwa and Amida (2022) examined the impact of electronic payment systems on entrepreneurial activities in rural areas of Ogun State, Nigeria. Survey research design method was employed in the study. Three hundred and eighty-five (385) respondents who are owners of micro and small enterprises were sampled. Purposive sampling technique was employed to administer the questionnaire to the respondents. The data were analysed using the Ordinary Least Square (OLS) regression technique. The findings revealed that electronic payment system via automated teller machine (β = .148; t = 2.587; P = .010), point of sales systems (β = .173; t = 3.461; P =.000) and mobile banking (β = .170; t = 2.949; P = .003) significantly drive entrepreneurial activities in rural areas. The findings further establish that point of sales system is the most significant measure of electronic payment system driving entrepreneurial activities in rural areas. The study recommends that micro and small enterprises' owners should leverage more on the point of sales system in driving their activities while also taking advantage of automated teller machines and mobile banking platforms.

Okoye et al. (2024) worked on Accelerating SME growth in the African context: Harnessing Fintech, AI, and cybersecurity for economic prosperity. Here they looked at Africa's economic environment which is changing quickly and small and medium-sized enterprises (SMEs) are becoming more widely acknowledged as important forces behind sustainable development. This analysis investigates how utilizing cybersecurity, artificial intelligence (AI), and financial technology (Fintech) might boost SME growth in Africa and eventually lead to economic success. Fintech has been more well-known recently because to its potential to completely transform the financial services industry. Fintech offers SMEs in Africa a huge chance to get over long-standing development constraints by improving access to money, facilitating smooth transactions, and automating financial procedures. This potential is further enhanced by the integration of AI technology, which gives SMEs access to data-driven insights for operational effectiveness, well-informed decision-making and customized consumer experiences. However, strong cybersecurity measures are required as Fintech and AI become more widely used in the African SME sector. The threat of cyberattacks increases as digital change quickens. A systematic strategy to cybersecurity that includes strong data protection, threat intelligence, and resilient infrastructure is needed to address these issues.

The assessment emphasizes the significance of adopting a comprehensive strategy that leverages the convergence of Fintech, AI, and cybersecurity to drive economic growth. Together, legislators, financial institutions, and tech companies need to build an atmosphere that is conducive to innovation, promotes digital literacy, and protects digital ecosystems. African SMEs can successfully negotiate the challenges of the contemporary business environment, encourage innovation, and make a substantial contribution to economic growth and job creation by adopting this technology trifecta. The strategic use of Fintech, AI, and cybersecurity becomes apparent as a critical factor in enabling SMEs to reach their maximum potential and advancing the continent toward long-term economic development as Africa takes its place in the global economy assess the review's conjecture. The review uncovered that Pay Stack (beta = 0.705), Branch (beta = 0.602) Piggy Vest (beta = 0.602) , Mines (beta = 0.235) Net Plus (-0.227) emphatically affect the presentation of Store Cash Banks at 5% level. Further, guideline of computerized development in the financial business have critical connection to the exhibition of banks in Nigeria at 5% level (F = 532.13, R = 0.96 R * 2 = 0.922 p = 0 < 0.05). In their analysis of Fintech and its potential benefits for financial administration.

Okoye, Okere, Ogechukwu-Onyema, Udeoba and Adegbite (2024) examined the role of fintech on the performance of deposit money banks and SMEs in Nigeria. The study employed ex-post facto research design in the work. The data generated from the secondary data were presented and analyzed using quantitative method. The method of analysis used in this study was the Auto-regressive distributed lag technique (ARDL) method. The study found that financial technology has a significant impact on the performance of deposit money bank in Nigeria. This is evident from the F calculated value of 1234.17, which is greater than the F critical value of 3.11. The study found out that financial technology has a significant impact on the performance of small and medium enterprises in Nigeria. The study recommends that Deposit money banks should be encouraged to do more in getting their customers to increase the use of fintech products. In addition, SMEs should be encouraged to adopt fintech as this has been shown to serve as an instrument for business development.

Olaniyi (2022) examined the impact of Financial Innovation (FI) on the growth of Small and Medium Scale Enterprises (SMEs): Evidence from the North-Central States, Nigeria. The purpose is to investigate how impactful the components of FI namely: Process Innovation (PrssI), Product Innovation (PrdtI), and Institutional Innovation (InsI) on the Opening up of New Markets (ONM). Data for the study were obtained primarily from responses to a questionnaire administered to 251 respondents made up of employees and owners of 10 SMEs each in Jos, Lokoja, and Lafia in the Plateau, Kogi, and the Nasarawa States respectively – North-Central States, Nigeria. Reliability of the measuring instrument was carried out using Cronbach's Alpha with each construct having an Alpha coefficient greater than 0.6. The Correlation Matrix

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result indicated that all the explanatory variables are positively associated with their coefficients less than 0.7 implying the absence of multicollinearity. Further, the regression results revealed that all the explanatory variables impact ONM. The combined impact of the explanatory variables stood at 56 percent approximately indicated by the coefficient of determination (R2) result. The study concluded by recommending the implementation of FI for SMEs in Nigeria as it can trigger their global competitiveness.

Olukorede, Oladejo and Ahmadu (2023) investigated the effect of cashless policy on patronage using responses obtained from 410 customers of Stanbic IBTC Plc branch domiciled at Katsina town-Nigeria. To achieve the stated objective, authors used descriptive statistics and multiple regression techniques. The major findings reveal that ATM transaction has significant negative effect on patronage; POS transaction has no significant effect on patronage; web transaction has positive and significant effect on patronage and mobile banking has negative but significant effect on patronage in Stanbic IBTC bank Plc, Katsina. Authors conclude that if deposit money banks in Nigeria can make cashless policy channels well functional and secured, it will enhance and improved bank patronage. It is recommended by the authors that the management of Stanbic IBTC Plc, Katsina needs to ensure that the ATMs are functional 24/7, and loaded with mints to attract patronage. Author also recommends that DMBs should deploy information technology (IT) solutions that will make transactions on POS and other cashless channels more safe and secured. It is also recommended that banks especially Stanbic IBTC Plc should provide incentive for using internet banking platform for transactions; and should deploy mobile banking solution that is all phone enabled.

Oluwaseun (2023) overall objective of the study is to determine the significant effect of FinTech on the growth of small and medium enterprises (SMEs) in Rivers State. The general objectives that guided this study were to determine how mobile money influenced the growth of SMEs in Rivers State, to establish how digital lending impacted the growth of SMEs in Rivers State and to measure how online banking has affected the growth of SMEs in Rivers State. Some of the theories used in the study included; Theory of acceptance of technology, Unified theory of acceptance and use of technology, Theory and technology of diffusion innovation, Theory of organization and the environment. The study used a descriptive illustrative design to achieve the goals. Rivers State according to the 2018 Business Register. Stratified random sampling was applied and the formula of Krejcie and Morgan (1997) was used to arrive at the sample size of 105 SMEs. The study used primary data obtained through a self-administered questionnaire. Using forty questionnaires to ensure the validity and reliability of the data, a pilot test was carried out.

The data collected was analyzed using version 25 of the Social Science Statistical Package (SPSS) software. Quantitative information was analyzed using inferential and descriptive statistics. The normality test was performed to check for abnormal values. The study also performed thetest model specification to determine if the linear regression analysis best fits the data. The coefficient was used to analyze the relationship between the variables. Pearson's correlation was performed to establish a linear relationship between the study variables. Regression analysis was conducted to establish the nature of the relationship to which the study refers, as there was a positive significance of the effect of FinTech on SME growth. The study attributed 16% of SME growth to mobile money, digital loans and online banking. The study recommends that financial institutions take advantage of the increased use of mobile money services to form partnerships with mobile phone service providers and provide flexible financial services to operators. The study also suggests that a comparative study be carried out to examine other variables and their effect on the growth of SMEs that are not covered by this study.

Ploypailin and Pongsutti (2020) examined innovation and firm performance. Analysis of data obtained from 29 countries on the moderating and mediating roles of firm size and small and medium enterprise finance showed a positive and negative impact of FI on the performance of firms. This finding suggests that FI is creativity that thrives under certain conditions. Robertson and Frank (2020) investigated Mobile Money as a Sustainable Alternative for SMEs in Less Developed Financial Markets. The researchers elected to use a mixed-method approach, which necessitated the usage of a survey questionnaire and structured in-depth interviews. Representatives of 12 SMEs were interviewed during the qualitative phase to corroborate the 285 SMEs surveyed in the quantitative part of the study. Descriptive and inferential statistics were adopted to analyse the quantitative data using the Statistical Packages for Social Sciences version 26 (SPSS version 26). These findings validate the role that mobile money plays in promoting the inclusive finance agenda for SMEs, mainly in the context of emerging economies where the majority of people and businesses do not have access to banking services and therefore may be of interest to policymakers and different stakeholders.

Sanga and Aziakono (2024) examined whether FinTech developments heterogeneously contribute to the growth of digital finance for SMEs and entrepreneurship in 47 African countries from 2013 to 2020. The paper uses a novel method of moment’s quantile regression, which deals with heterogeneity and endogeneity in diverse conditions for asymmetric and nonlinear models.

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The empirical results reveal that the rise of FinTech companies offering services in Africa heterogeneously increases digital finance for SMEs and entrepreneurship in

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their different stages of growth. FinTech developments have a strong and positive impact in countries with higher levels of digital finance than those with lower levels.

FinTech developments and digital finance positively and significantly influence entrepreneurship in Africa, particularly in the nascent and transitional development stages of entrepreneurship. Institutional quality has a considerable positive moderating effect when used as a control rather than an interaction variable. The results suggest the need to promote FinTech developments in Africa: to provide a wide range of alternative digital finance schemes to SMEs and to promote entrepreneurship, especially in countries where entrepreneurship is in the nascent and transitional development stages. The results also underscore the need to promote FinTech development through supportive regulations and institutional quality to reduce risks related to FinTech and digital financing schemes. The empirical results reveal that the rise of FinTech companies offering services in Africa heterogeneously increases digital finance for SMEs and entrepreneurship in their different stages of growth.

According Agwor and Akani (2020) and Akani (2023), FinTech developments have a strong and positive impact in countries with higher levels of digital finance than those with lower levels. FinTech developments and digital finance positively and significantly influence entrepreneurship in Africa, particularly in the nascent and transitional development stages of entrepreneurship. Institutional quality has a considerable positive moderating effect when used as a control rather than an interaction variable. The results suggest the need to promote FinTech developments in Africa: to provide a wide range of alternative digital finance schemes to SMEs and to promote entrepreneurship, especially in countries where entrepreneurship is in the nascent and transitional development stages. The results also underscore the need to promote FinTech development through supportive regulations and institutional quality to reduce risks related to FinTech and digital financing schemes.

Tri, Agus and Weni (2024) study is to identified and analyze prevalent patterns, obstacles and infuences that impact the adoption of ICT in SMEs in developing nations. In addition, this study aims to provide recommendations on the most efective methods to optimize the utilization of ICT in these contexts. This review is conducted using a sample of 25 publications that have been published and are available in the Scopus database. The selection process focuses on works that have received significant citations and have been published between 2014 and 2023. The PRISMA statement form was utilized to elucidate the comprehensive procedure of selecting and accepting pertinent publications. This research makes two distinct contributions. The writers begin by doing a thorough literature analysis to examine the progress of ICT in the past decade. They next emphasize noteworthy research discoveries in this feld. Furthermore, the authors give a comprehensive analysis of the ICT literature by quantifying yearly publications and identifying SMEs that primarily utilize ICT, academic journals that publish pertinent articles, and ICT-related publications across various felds and areas in developing nations. The study also discloses the papers, journals, and authors that have received the highest number of citations. The author's final argument in the paper is that, despite the extensive research conducted in the feld of ICT, there is a necessity to customize strategies and policies that can support SMEs in the ICT sector, particularly in developing countries.

Ugwuoke , Okonkwo and Okoronkwo (2022) assesses the role of financial innovation in output growth of small and medium scale industries (SMEs) in Nigeria using quarterly data from 2009 to 2016 as the sample period. It employs autoregressive distributed bounds testing approach (ARDL) and Granger causality test to ascertain the long run impact and the causal relationship between financial innovation variables and SMEs output growth. Evidence from the analyses reveal confirm the theoretical proposition that financial innovation contributes positively to the output growth of SMEs in Nigeria as the financial innovation variables of POS, MBK, ATM and INTB have positive and statistically significant impact on output growth of SMEs. The Granger causality test indicates that a unidirectional causal relationship runs from financial innovation variables to SMEs output in Nigeria. Based on this empirical evidence, the paper recommends that the positive impact of financial innovation variables (such as POS, MBK, INTB and ATM) on SMEs output demands that deposit money banks should not only improve but also expand the current level of financial service delivery channels in Nigeria by establishing more financial channels in both rural and urban areas.

Gaps in Literature

Several studies were carried out on financial innovations on a global perspective. A number of studies indicated positive relationship between digital financial instruments and performance of financial institutions in general (Shirley & Sushanta, 2006: Akani & Lucky, 2022; Mwangi, 2013 and Githikwa, 2009). Thus, the studies idealized that banks that adopt financial innovations were likely to better their profitability and performance. However, other studies (Nader, 2011 and Scholnick (2006) indicated negative relationships between financial innovation and performance of commercial banks. Interestingly, it is evident that the studies indicated varying findings. Thus this study will focus on the relationship between digital financial inclusion and commercial banks soundness in Nigeria.

METHODOLOGY

This study used quasi experimental research design approach for the data analysis. This approach combines theoretical consideration (a prior criterion) with the empirical observation and extract maximum information from the available data. It enables us therefore to observe the effects of explanatory variables on the dependent variables. The population of this study covers the 23 commercial banks in Nigeria. However, sample size consists of the fifteen (14) quoted commercial banks in the Nigerian stock exchange. From the population of 14 commercial banks, the researcher adopted purposive sampling methods to select the 14 quoted commercial banks

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that are in existence within the time scope of the study. The two types of data collection method are the primary and the secondary data source from published material such as Central Bank of Nigeria Statistical Bulletin and annual report which is known as secondary data. The data in this study will be sourced from the financial statement of banks and Central Bank of Nigeria Statistical Bulletin.

Model Specification

The model specified below is based is a modified model adopted from Akani and Lucky (2015)

CAR = f (DMP, DPS, DRA, DBS) (1)

AQ =f (DMP, DPS, DRA, DBS) (2)

Transforming equation 1 to econometrics form, we have:

$CAR = \alpha_o + \alpha_1 DMP + \alpha_2 DPS + \alpha_3 DRA + \alpha_4 DBS + \mu$ (3)

$AQ = \alpha_o + \alpha_1 DMP + \alpha_2 DPS + \alpha_3 DRA + \alpha_4 DBS + \mu$ (4)

Where:

CAR=Capital Adequacy Base Indicators of Bank Soundness

AQ =Asset Quality Indicators of Banking System Soundness

DMP = digital mobile money payment

DPS = digital Payment Service

DRA = digital Retail agents

DBS = digital backend server

$\alpha_0, \beta_0, \chi_0$, = Regression Intercept

μ = Error term

A-priori Expectation of the Result

The elasticity parameter also known as the a-priori expectation of the variables proposes that an increase in the independent variables digital financial inclusion will increase bank soundness, Therefore it can be mathematical stated as follows:- $\alpha_1, \alpha_2 < 0, \alpha_3 > 0$.

Data Analysis Method

The method of data analysis to be used in this study was the panel data multiple linear regressions using Ordinary Least Square (OLS) method. The study adopts the panel data method of data analyses which involve the fixed effect, the random effect and the Hausman Test. This approach, which is a quantitative technique, includes tables and the test of the hypotheses formulated by using ordinary least square regression analysis at 5% level of significance. To arrive at a result that will not lead to spurious regressions, the study will test for stationarity at different levels in the variables making up the model. Other tests that will be carried out on the model include test of Normality, Durbin Watson Test of serial correlation, test of heteroskedasticity and test of model specification so as to achieve the objectives of our study as well as answer the research question and hypotheses.

Moreover, in order to undertake a statistical evaluation of our analytical model, so as to determine the reliability of the results obtained and the coefficient of correlation (r) of the regression, the coefficient of determination (r^2), the student T-test and F-test will be employed.

ANALYSIS AND DISCUSSION OF FINDINGS

Table 1: Digital Financial Inclusion and Capital Adequacy of Quoted Commercial Banks

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DMP	0.032246	0.031753	1.015530	0.3121
DPS	0.000133	0.000227	0.585614	0.5594
DRA	0.007090	0.030921	0.229275	0.8191
DBS	-0.017450	0.011782	-1.481170	0.1415
C	-0.000708	0.009039	-0.078283	0.9377
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.584077	Mean dependent var		0.006032
Adjusted R-squared	0.514108	S.D. dependent var		0.143327
S.E. of regression	0.099907	Akaike info Criterion		-1.631016
Sum squared resid	1.068014	Schwarz Criterion		-1.203323
Log likelihood	121.7540	Hannan-Quinn Cartier.		-1.457258
F-statistic	8.347723	Durbin-Watson stat		2.020557
Prob(F-statistic)	0.000000			
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DMP	-0.034445	0.020102	-1.713533	0.0889
DPS	0.000116	0.000214	0.543339	0.5878

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DRA	0.039380	0.020319	1.938104	0.0547
DBS	-0.007118	0.006315	-1.127205	0.2617
C	0.493938	0.032007	15.43198	0.0000

Effects Specification

	S.D.	Rho
Cross-section random	0.000000	0.0000
IdiosynCARatic random	0.099588	1.0000

Weighted Statistics

R-squared	0.337700	Mean dependent var	0.471571
Adjusted R-squared	0.209187	S.D. dependent var	0.096941
S.E. of regression	0.096494	Sum squared resid	1.257008
F-statistic	4.322226	Durbin-Watson stat	2.140618
Prob(F-statistic)	0.004875		

Unweighted Statistics

R-squared	0.037700	Mean dependent var	0.471571
Sum squared resid	1.257008	Durbin-Watson stat	2.140618

Correlated Random Effects - Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	6.515910	5	0.2592

Source: E-Views output

Analysis of Results

Following the various methods of panel data analysis, the question of which is the most appropriate or suitable methods arises. Therefore, some means of selecting the most suitable method among the different approaches especially between the fixed effect model (FEM) and random effect model (REM) is needed. But when such a correlation exists, the Fixed Effects Model would be more suitable because the random effect model would be inconsistently estimated. From the table above the probability of the Hausman test is greater than 0.05, therefore, the study adopt the random effect model.

F-Test: The F-calculated value is 4.322226 from the fixed regression results while the P-value of F-statistic are 0.004875 at 5% level of significance, considering the P-value, the chosen level of significance α =0.05 [5%] is less than the P-value of F-statistic. It is concluded that the regression model is statistically significant. This means that the joint influence of the explanatory variables on the dependent variable is statistically significant.

Coefficient of Multiple Determinations (R^2): The computed coefficient of multiple determinations of 0.337700 from the fixed effect shows that 33 percent of the total variations in the capital adequacy ratio are accounted for, by the explanatory variables while the remainder is attributed to variable that is influenced by other factors not included in the regression model.

Durbin Watson statistics (DW): The computed DW is 2.140618 from the random effect results; show that at 5% level of significance with two explanatory variables and 140 observations. The value of computed DW is greater than the lower limit. Therefore, there is no evidence of positive first order serial correlation.

Regression Coefficient and T-Statistics: The t-statistics shows that digital mobile money payment have negative effect on commercial banks capital adequacy, digital payment statistic have positive effect, digital retail agents have positive effect while digital backed serve have negative effect on commercial banks capital adequacy ratio over the periods covered in this study.

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Table 2: Digital Financial Inclusion and Asset Quality Indicators of Quoted Commercial Banks

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DMP	-0.050902	0.081847	-0.621920	0.5355
DPS	0.004792	0.024839	0.192942	0.8474
DRA	0.017850	0.091075	0.195987	0.8450
DBS	0.093575	0.093131	1.004771	0.3176
C	-1.101903	0.099739	-11.04787	0.0000
	Effects Specification			
Cross-section fixed (dummy variables)				
R-squared	0.585237	Mean dependent var		-0.006875
Adjusted R-squared	0.504961	S.D. dependent var		0.142425
S.E. of regression	0.100209	Akaike info criterion		-1.609741
Sum squared resid	0.933882	Schwarz criterion		-1.148567
Log likelihood	109.1455	Hannan-Quinn criter.		-1.422628
F-statistic	7.290253	Durbin-Watson stat		2.164144
Prob(F-statistic)	0.000000			
DMP	0.870453	0.104528	0.674006	0.5018
DPS	-0.035929	0.081625	-0.440173	0.6607
DRA	0.010253	0.022922	0.447311	0.6556
DBS	-0.703220	0.090976	-3.035392	0.0018
C	0.085309	0.092740	0.919874	0.3597
	Effects Specification			
			S.D.	Rho
Cross-section random			0.000000	0.0000
Idiosyncratic random			0.099970	1.0000
	Weighted Statistics			
R-squared	0.552022	Mean dependent var		-0.006875
Adjusted R-squared	0.526423	S.D. dependent var		0.142425
S.E. of regression	0.098012	Sum squared resid		1.008671
F-statistic	21.56438	Durbin-Watson stat		2.082395
Prob(F-statistic)	0.000000			
	Unweighted Statistics			
R-squared	0.552022	Mean dependent var		-0.006875
Sum squared resid	1.008671	Durbin-Watson stat		2.082395
Correlated Random Effects - Hausman Test				
Equation: Untitled				
Test cross-section random effects				
Test Summary		Chi-Sq.	Chi-Sq. d.f.	Prob.

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	Statistic		
Cross-section random	7.750972	6	0.2569

Source: E-Views output

Analysis of Results

From the table above the probability of the Hausman test is greater than 0.05, therefore, the study adopt the random effect model.

F-Test: The F-calculated value is 21.56438 from the fixed regression results while the P-value of F-statistic are 0.000000 at 5% level of significance, considering the P-value, the chosen level of significance α =0.05 [5%] is less than the P-value of F-statistic. It is concluded that the regression model is statistically significant. This means that the joint influence of the explanatory variables on the dependent variable is statistically significant.

Coefficient of Multiple Determinations (R^2): The computed coefficient of multiple determinations of 0.526423 from the fixed effect shows that 52.6 percent of the total variations in the assets quality are accounted for, by the explanatory variables while the remainder is attributed to variable that is influenced by other factors not included in the regression model.

Durbin Watson statistics (DW): The computed DW is 2.082395 from the random effect results; show that at 5% level of significance with two explanatory variables and 140 observations. The value of computed DW is greater than the lower limit. Therefore, there is no evidence of positive first order serial correlation.

Regression Coefficient and T-Statistics: The t-statistics shows that digital mobile money payment have negative effect on commercial banks assets quality indicator, digital payment statistic have positive effect, digital retail agents have positive effect while digital backed serve have negative effect on commercial banks assets quality indicator over the periods covered in this study.

Discussion of Findings

Digital Financial Inclusion and Capital Adequacy

The study found that 33.7 percent of the total variations in the capital adequacy ratio are accounted for, by the explanatory variables while the remainder is attributed to variable that is influenced by other factors not included in the regression model. The t-statistics shows that digital mobile money payment have negative effect on commercial banks capital adequacy, digital payment statistic have positive effect, digital retail agents have positive effect while digital backed serve have negative effect on commercial banks capital adequacy ratio over the periods covered in this study. We expected positive relationship between financial technology and banking system soundness.

The positive relationship that exist between the financial technology variables and capital adequacy confirm our expectation and confirm relevant reforms in the financial market such as the adoption of cashless policy in 2012. The positive relationship further confirms technological innovation in the financial system such as the wide application of automated teller machine and financial inclusion. The negative relationship between financial technology variables and capital adequacy contradict our expectations and may be blamed on poor application and poor usage, for instance while these application is wide applied in the urban cities, it is nowhere to be found in the rural communities while some local government has no banking institution thereby increasing banking density and poor banking habits. Theoretically the findings is in line with technological acceptance model and empirically supported by the findings of Godwin (2024) on positive and significant relationship exists between financial technology innovation and business growth, the findings of Okoye, Okere, Ogechukwu-Onyema, Udeoba and Adegbite (2024) that financial technology has a significant impact on the performance of deposit money bank in Nigeria and the findings of Oluwaseun (2023) and Akani (2024) establish a linear relationship between the study variables, the findings of Okoye et al. (2024) that affect the presentation of Store Cash Banks at 5% level.

Digital Financial Inclusion and Assets Quality

The study found that 52.6 percent of the total variations in the assets quality are accounted for, by the explanatory variables while the remainder is attributed to variable that is influenced by other factors not included in the regression model. The t-statistics shows that digital mobile money payment have negative effect on commercial banks assets quality indicator, digital payment statistic have positive effect, digital retail agents have positive effect while digital backed serve have negative effect on commercial banks assets quality indicator over the periods covered in this study. The findings confirm the findings of Sanga and Aziakono (2024), Gaol et al. (2022) that digital finance significantly promotes entrepreneurship by usage depth, coverage breadth and digitalization level, Zhang and Pang (2023) found the same results that digital finance promotes urban entrepreneurship (sum of new private enterprises) and household entrepreneurship (new self-employed households) in China, the findings of Akinroluyo and Opeyemi (2021) and Akani (2023) that mobile money adopted by the family enterprises are significantly affecting their performance in Ekiti State Nigeria, the findings of Akujor, Jane Chinyere and Eyisi, Adanma Sabina (2020) that E-payment has a negative significant effect on Accountability of SMEs in Nigeria and the findings of Heman and Anna (2023) that the transition to cashless economy has a perceived impact on the performance of small business operators.

Conclusion

This study examined the effect of digital financial inclusion on commercial banks soundness in Nigeria. Model one found

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that that 33 percent of the total variations in the capital adequacy ratio are accounted for, by the explanatory variables while the remainder is attributed to variable that is influenced by other factors not included in the regression model. The t-statistics shows that digital mobile money payment have negative effect on commercial banks capital adequacy, digital payment statistic have positive effect, digital retail agents have positive effect while digital backed serve have negative effect on commercial banks capital adequacy ratio over the periods covered in this study. Model two found that 52.6 percent of the total variations in the assets quality are accounted for, by the explanatory variables while the remainder is attributed to variable that is influenced by other factors not included in the regression model. The t-statistics shows that digital mobile money payment have negative effect on commercial banks assets quality indicator, digital payment statistic have positive effect, digital retail agents have positive effect while digital backed serve have negative effect on commercial banks assets quality indicator over the periods covered in this study.

The probability of digital mobile money payment is 0.3121 which is higher than the critical value of 0.05, the study conclude that there is no significant relationship between digital mobile money payment and capital adequacy ratio in Nigeria. From the regression results, the probability of digital mobile money payment is 0.5018 which is higher than the critical value of 0.05, the study conclude that there is no significant relationship between digital mobile money payment and assets quality indicator in Nigeria The probability of digital Payment Service is 0.5594 which is higher than the critical value of 0.05, the study conclude that there is no significant relationship between digital Payment Service and capital adequacy indicator in Nigeria. From the regression results, the probability of digital Payment Service is 0.6607 which is higher than the critical value of 0.05, the study conclude that there is no significant relationship between digital Payment Service and assets quality indicator in Nigeria. The probability of digital Retail agents is 0.6556 which is higher than the critical value of 0.05, the study conclude that there is no significant relationship between digital Retail agents and capital adequacy indicator in Nigeria. From the regression results, the probability of digital Retail agents is 0.6556 which is higher than the critical value of 0.05, the study conclude that there is no significant relationship between digital Retail agents and commercial banks assets quality indicator in Nigeria

Recommendations

i. According to the results of the research, AMT has both positive and negative relationship with banking system soundness. As a result, the research suggests that the Central Bank of Nigeria which is the regulator should provide policy guidelines that explain how banks should use ATM. They should also cultivate an atmosphere that is hospitable and makes it simple for banks to implement ATM transactions. In addition, the management and directors of banks in Nigeria should strive toward ensuring that the banks have ATM locations located in the various states and local government of the nation.

ii. The outcomes of the research indicate that using mobile pay has a beneficial and noticeable impact on bank soundness. According to the findings of the research, the management of banks in Nigeria should prioritize expanding their use of mobile pay since doing so would contribute to an increase in some bank soundness indicators. It is the responsibility of policymakers such as the Central Bank of Nigeria to foster an environment that is favorable for banks to engage in mobile banking operations.

iii. In addition, it was discovered that using the point of sales for banking had a large and beneficial effect on bank soundness. According to the findings of the study, management and directors of commercial banks in Nigeria should take measures to ensure that customers can use point of sales without having to worry about their financial data being compromised. This will result in increased levels of bank soundness and in order to make this a reality, the government need to put effort into expanding internet access.

iv. The recommendation of the study is that bank management should review policies on mobile banking with an aim of improving the technology's effectiveness in provision of financial services. The management should also review protection policies to ensure that customers' data is safe while transacting using mobile phones in electronic fund transfer.

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