


**DIGITAL FINANCIAL SERVICES AND THE PERFORMANCE OF THE QUOTED
COMMERCIAL BANKS IN NIGERIA**

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ARTICLE INFO	ABSTRACT
<p>Article history: Received: March, 13th 2024 Accepted: May, 13th 2024</p>	<p>Objective: The study aims to examine the causal relationship as well as short-term and long-term dynamic effects between digital financial service components and on the performance of the quoted commercial banks.</p>
<p>Keywords: Digital Financial Services; Performance; Return on Asset; Nigeria.</p> <div data-bbox="172 972 480 1218" style="text-align: center;">  </div>	<p>Method: The study employs a cross-sectional descriptive survey research with ex-post facto research. Descriptive statistics were used to analyze responses and opinions, while inferential statistics including the dynamic Panel Autoregressive Distributed Lag (PARDL) approach, Panel Granger Causality Test.</p> <p>Results: The Granger Causality analysis reveals that Agency banking exhibits a strong causal link to ROA ($p=0.003<0.05$), emphasizing its predictive power for ROA variations. Also, ATM banking has a weaker influence on ROA ($p=0.08>0.05$), while internet banking ($p=0.049<0.05$) and mobile banking ($p=0.0001<0.05$) both impact ROA significantly. The long-term analysis using the autoregressive distributed lag (ARDL) model indicates that agency banking ($\beta=0.128, p < 0.05$), ATM banking ($\beta=0.566, p < 0.05$), internet banking ($\beta=0.514, p < 0.05$), and POS activities ($\beta=0.118, p < 0.05$) all have positive impacts on ROA. In the short term, these variables also show positive coefficients, suggesting immediate effects on ROA. Error correction (ECT_{t-1}) has a negative coefficient ($\beta=-0.06, p < 0.05$), indicating its role in short-run adjustments to deviations from long-run equilibrium. Overall, agency banking, ATM banking, internet banking, and POS activities are crucial drivers with strong statistical significance, while mobile banking has limited influence on ROA. Based on these findings.</p> <p>Conclusion: The study recommends that financial institutions should strategically prioritize agency banking services and enhance internet banking services to positively impact ROA. Resource allocation for ATM banking should be reevaluated, and POS-related strategies may not be a priority for improving ROA. Additionally, financial institutions should adopt a long-term perspective when planning and implementing these services, and invest in enhancing their digital financial services to boost customer satisfaction, fostering loyalty and retention.</p> <p>Doi: https://doi.org/10.26668/businessreview/2024.v9i6.4150</p>

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SERVIÇOS FINANCEIROS DIGITAIS E O DESEMPENHO DOS BANCOS COMERCIAIS COTADOS NA NIGÉRIA

RESUMO

Objetivo: O estudo visa examinar a relação causal, bem como os efeitos dinâmicos de curto e longo prazo entre os componentes dos serviços financeiros digitais e o desempenho dos bancos comerciais cotados.

Método: O estudo emprega uma pesquisa descritiva de corte transversal com pesquisa ex-post facto. As estatísticas descritivas foram usadas para analisar as respostas e opiniões, enquanto as estatísticas inferenciais incluíram a abordagem dinâmica Panel Autoregressive Distributed Lag (PARDL), Panel Granger Causality Test.

Resultados: A análise de causalidade de Granger revela que os serviços bancários em agências apresentam uma forte relação causal com o ROA ($p=0,003<0,05$), enfatizando seu poder preditivo para variações no ROA. Além disso, o banco em caixas eletrônicos tem uma influência mais fraca sobre o ROA ($p=0,08>0,05$), enquanto o banco pela Internet ($p=0,049<0,05$) e o banco móvel ($p=0,0001<0,05$) têm impacto significativo sobre o ROA. A análise de longo prazo usando o modelo de defasagem distribuída autorregressiva (ARDL) indica que os serviços bancários de agência ($\beta=0,128, p < 0,05$), os serviços bancários em caixas eletrônicos ($\beta=0,566, p < 0,05$), os serviços bancários pela Internet ($\beta=0,514, p < 0,05$) e as atividades em pontos de venda ($\beta=0,118, p < 0,05$) têm impactos positivos sobre o ROA. No curto prazo, essas variáveis também apresentam coeficientes positivos, sugerindo efeitos imediatos sobre o ROA. A correção de erros (ECTt-1) tem um coeficiente negativo ($\beta=-0,06, p < 0,05$), indicando seu papel nos ajustes de curto prazo aos desvios do equilíbrio de longo prazo. De modo geral, as atividades bancárias de agência, de caixas eletrônicos, de Internet e de PDV são fatores determinantes com forte significância estatística, enquanto as atividades bancárias móveis têm influência limitada sobre o ROA. Com base nesses resultados,

Conclusão: O estudo recomenda que as instituições financeiras priorizem estrategicamente os serviços bancários de agência e aprimorem os serviços bancários pela Internet para impactar positivamente o ROA. A alocação de recursos para os serviços bancários em caixas eletrônicos deve ser reavaliada, e as estratégias relacionadas aos PDVs podem não ser uma prioridade para melhorar o ROA. Além disso, as instituições financeiras devem adotar uma perspectiva de longo prazo ao planejar e implementar esses serviços e investir no aprimoramento de seus serviços financeiros digitais para aumentar a satisfação do cliente, promovendo a fidelidade e a retenção.

Palavras-chave: Serviços Financeiros Digitais, Desempenho, Retorno Sobre o Ativo, Nigéria.

LOS SERVICIOS FINANCIEROS DIGITALES Y EL RENDIMIENTO DE LOS BANCOS COMERCIALES COTIZADOS EN NIGERIA

RESUMEN

Objetivo: El estudio pretende examinar la relación causal, así como los efectos dinámicos a corto y largo plazo entre los componentes de los servicios financieros digitales y el rendimiento de los bancos comerciales cotizados.

Método: El estudio emplea una investigación de encuesta descriptiva transversal con investigación ex-post facto. Se utilizaron estadísticas descriptivas para analizar las respuestas y las opiniones, mientras que las estadísticas inferenciales incluyen el enfoque dinámico Panel Autoregressive Distributed Lag (PARDL), Panel Granger Causality Test.

Resultados: El análisis de causalidad de Granger revela que la banca de agencia presenta un fuerte vínculo causal con el ROA ($p=0,003<0,05$), lo que pone de relieve su poder predictivo de las variaciones del ROA. Asimismo, la banca por cajero automático tiene una influencia más débil en el ROA ($p=0,08>0,05$), mientras que la banca por Internet ($p=0,049<0,05$) y la banca móvil ($p=0,0001<0,05$) influyen significativamente en el ROA. El análisis a largo plazo mediante el modelo de retardo autorregresivo distribuido (ARDL) indica que la banca por agencia ($\beta=0,128, p < 0,05$), la banca por cajero automático ($\beta=0,566, p < 0,05$), la banca por Internet ($\beta=0,514, p < 0,05$) y las actividades en puntos de venta ($\beta=0,118, p < 0,05$) influyen positivamente en el ROA. A corto plazo, estas variables también muestran coeficientes positivos, lo que sugiere efectos inmediatos sobre el ROA. La corrección de errores (ECTt-1) tiene un coeficiente negativo ($\beta=-0,06, p < 0,05$), lo que indica su papel en los ajustes a corto plazo de las desviaciones del equilibrio a largo plazo. En general, la banca a través de agencia, los cajeros automáticos, la banca por Internet y las actividades en los puntos de venta son factores cruciales con una fuerte significación estadística, mientras que la banca móvil tiene una influencia limitada en el ROA. Sobre la base de estos resultados,

Conclusiones: El estudio recomienda que las instituciones financieras prioricen estratégicamente los servicios de banca de agencia y mejoren los servicios de banca por Internet para influir positivamente en el ROA. La asignación de recursos a la banca en cajeros automáticos debería reevaluarse, y las estrategias relacionadas con los puntos de venta podrían no ser prioritarias para mejorar el ROA. Además, las entidades financieras deberían adoptar una

perspectiva a largo plazo a la hora de planificar e implantar estos servicios, e invertir en la mejora de sus servicios financieros digitales para aumentar la satisfacción de los clientes, fomentando su fidelidad y retención.

Palabras clave: Servicios Financieros Digitales, Rendimiento, Retorno sobre Activos, Nigeria.

1 INTRODUCTION

Digital financial services have become an integral part of the global financial landscape, revolutionizing the way banking and financial transactions are conducted. In the context of Nigeria, a country with a burgeoning financial sector, the adoption and utilization of digital financial services have witnessed remarkable growth in recent years. Over the past decade, Nigeria has witnessed a significant surge in the usage of digital financial services, facilitated by factors such as increasing smartphone penetration, improved internet connectivity, and regulatory initiatives aimed at promoting financial inclusion. According to the World Bank (2021), reasonable proportion of Nigerian population with Bank accounts had access to mobile banking services, marking substantial progress in bridging the financial inclusion gap (World Bank, 2021).

Digital Financial Services (DFS) offers cheaper and accessible services to financial system and it increases value of service and products in the long run. Technology contributes to the design and pricing of new instruments and facilitates the identification, measurement, and monitoring of risks in portfolios containing complex instruments. The adoption and utilization of digital financial services have witnessed remarkable growth in Nigeria in recent years, facilitated by factors such as increasing smartphone penetration, improved internet connectivity, and regulatory initiatives aimed at promoting financial inclusion. Digital financial services encompass a range of offerings, including agency banking, ATM banking, internet banking, mobile banking, and point-of-sale (POS) services. Mobile banking in Nigeria is a type of banking service that allows individuals to access their bank accounts and perform financial transactions using their mobile phones. Mobile banking can be accessed through a variety of methods, including mobile apps, USSD codes, and SMS texting. Many banks in Nigeria offer mobile banking apps that allow individuals to access their accounts and perform financial transactions using their smartphone or tablet.

While prior research has examined the prospects, challenges, and advantages of the cashless policy, particularly in achieving the CBN's goals, there is a growing body of evidence suggesting that electronic banking products positively correlate with the performance of banks

in Nigeria (Alagh & Ene, 2014; Shehu et al., 2013; Ngango, 2015). Notably, the implementation of electronic banking has favorably enhanced the returns on equity (ROE) of Nigerian banks (Abaenewe et al., 2013). However, it is important to acknowledge that research has also indicated that the returns on assets (ROA) of Nigerian banks have not experienced a significant increase as a result of e-banking (Okoye & Ezejiofor, 2013; Tunmibi & Falayi, 2013). The health of Nigeria's economy is intrinsically tied to the stability of its financial sector (Kanu & Nwali, 2019). The global financial crisis of 2008 had far-reaching repercussions on economies worldwide, underscoring the critical importance of a robust banking sector (United Nations Conference on Trade and Development, 2009). In Nigeria, a persistent problem has been the poor return on assets (ROA) in the banking sector, which has implications for shareholders, equity holders, and the overall financial stability of the country (Adigun & Okedigba, 2017).

Historical data reveals that inadequate asset value and poor financial performance have led to the closure of several Nigerian banks, causing significant losses for investors and depositors (Marshal, 2017). The situation reached a critical point in 2009 when an investigation by the Nigerian Deposit Insurance Corporation (NDIC) and the CBN uncovered insolvency and poor governance within several major banks, resulting in their takeover (Sanusi, 2009). The problem of return on assets in the Nigeria banking sector resulting in bank failures was brought to a head in 2009 when the joint investigation of the NDIC and CBN into the books of the 25 mega banks revealed that some of the banks were technically insolvent on account of capital inadequacy, poor credit risk management, liquidity and lack of corporate governance occasioned by insiders' dealings by the management of the banks (Sanusi, 2009). Overexposure to non-performing loans has consistently contributed to the poor performance of Nigerian banks, leading to failures and license revocations (Ugoani, 2015; Augusto & Co., 2020).

The Nigeria Deposit Insurance Corporation (NDIC) report for the year 2018 revealed that Card-related frauds (ATM/POS) constituted the major fraud cases reported in the year. Losses arising from frauds are being written off against the profit of the commercial banks, thereby depriving the shareholders from getting adequate returns on their investments, the banks would not be able to have adequate return on asset as well as on equity with the attendant negative effect on their market valuation. Malik, Teal and Baptist (2006) and Onodje (2020) stated that the other major constraints to adoption of financial innovation and performance of banks in Nigeria are corruption, loose importation of product, insufficient assessment of credit, poor network infrastructure, absence of users' trust, security issues and lack of investment in human capital. Additionally, regulatory policies, such as the Treasury Single Account (TSA)

introduced in 2015, have had an impact on the liquidity of commercial banks, reducing their ability to generate interest income (Martins, 2016). This has added to the performance challenges faced by Nigerian banks. Furthermore, fraud remains a persistent issue, with card-related frauds (ATM/POS) accounting for a significant portion of reported fraud cases (NDIC, 2018). The resulting losses are deducted from the banks' profits, further hampering their ability to provide adequate returns to shareholders (Malik et al., 2006; Onodje, 2020).

In today's banking landscape, customers demand not only the safety of their funds but also efficient, fast, and convenient services. This shift in customer expectations has led to a growing emphasis on digital financial services as a means to meet these demands (Kanu & Nwali, 2019). While numerous studies have explored the impact of digital financial services on the financial performance of commercial banks, there remains a research gap concerning customer satisfaction in relation to these services. This study aims to address the emerging technological challenges faced by commercial banks in Nigeria with the goal of enhancing their overall performance. By examining the effect of digital financial services on the performance of quoted commercial banks, including their ROE and ROA, as well as customer satisfaction, this research seeks to provide a comprehensive understanding of the evolving dynamics within the Nigerian banking sector. It is crucial to explore how banks can navigate the intricate landscape of digital financial services to not only improve their financial metrics but also meet the evolving needs and expectations of their customers in this era of cashless banking.

2 LITERATURE REVIEW

2.1 THE EMPIRICAL STUDY FROM DEVELOPED COUNTRIES

Aysel and Fatma (2017) examined analysis of the relationship between financial innovation services and the performance of Turkish banking system. The study examined the relationship between profitability of Turkish banking system and online banking, telephone banking and credit cards in this study, total net profit for the period in Turkish banking system considered as an independent variable by trimesters, and online banking, telephone banking and credit cards, tested to see whether they influence this profitability, considered as dependent variables. Given data achieved from official sources between 2006 and 2015, simple regression analysis is used in this study. The results of the regressions show that only credit card usage has a significant positive impact on ROA, ROE and NIM. The positive impact on

ROA and ROE imply that credit card usage increases the profitability and thus the performance of banking system, but the positive impact on NIM shows that banks charge their customers more for their credit card usage.

According to Daneshvar and Ramesh (2012) in a study seeking to know on the effects of Information Technology venture on productivity and profitability of Indian public sector banks conducted a study in regard to desk review of data within the period of 1998 to the end of 2009. This was done using regression and correlation analysis and the results point out that focusing on ICT led to rise in deposits made and profit of the company based on return on assets (ROA). It also had influence on the increase in employee turnover which vastly reduced employee cost and net non-performing assets ratio. It further indicated that most of the financial institution deployed cost reduction strategy and total quality assurance in their service so as to gain competitive advantage over other similar industry.

2.2 THE EMPIRICAL STUDY FROM DEVELOPING COUNTRIES

Catherine and Herick (2016) investigated the effect of financial innovations on financial performance of commercial banks in Kenya. The main problem was that there is an increase in the number of financial innovations, but whether the innovations in banking industry are the main determinants of financial performance is a hard to tell. Despite the significance of financial innovation, the effect of innovation on financial performance is still misunderstood. The study adopted an explanatory research design. The population of the study was all the 43 commercial banks operating in Kenya in the study period. Findings indicated that there is a negative and significant relationship between product innovation and ROA. The relationship between service innovation and ROA and also organizational innovation and ROA was found to be positive and significant. Based on the findings, the study concluded that commercial banks in Kenya in the study period had unsteady trends in ROA despite the fact that more financial innovations were taking place in the sector. The study also concluded that the relationship between product innovation and financial performance of commercial banks is negative and significant. Based on the study findings, the study also concluded that the relationship between service innovation and ROA and also organizational innovation and ROA is positive and significant.

Virginia, Fredrick and John Gathii (2021) investigated the impact of digital financial services on the financial performance of Commercial Banks in Kenya using secondary dataset generated from the Central Bank of Kenya (CBK) and the Communication Authority of Kenya

(CAK) for a period of five years (2015-2019). To achieve this objective, the study used a multiple regression and Pearson correlations. The study using the Pearson correlations found negative correlations between mobile money (registered mobile money accounts, active mobile money agents and mobile money deposits and withdrawals), digital payments (P2P transfers) and performance of commercial banks. However, the study found positive and significant relationship between customer deposits, Gross non-performing loans and performance of commercial banks in Kenya. The study therefore concludes that digital financial services offered by Fintech companies have a negative impact on the performance of Commercial banks in Kenya and recommends that commercial banks should continuously develop more digital financial services and collaborate more with Fintech companies to improve on their performance.

Benedict et al. (2021) examine Financial Innovation and Commercial Banks Performance in Ghana. The study used balance panel data over the period of 2009-2018 from 16 registered and licensed commercial banks. Fixed and random effect models were applied to the data. The findings show that financial innovation and the age of a bank have a significantly positive effect on banks financial performance. However, inflation had a negative effect on financial performance. The study also revealed that asset quality and bank size has a negative effect on net interest margin and return on equity. Share of industry deposit and number of branches have a positive effect on net interest margin. Based on these findings, it was recommended that commercial bank management should introduce more cost-effective products or services to improve bank performance. Management of commercial banks should deploy the services of credit reference bureau to foster reduction in impairment allowance hence improvement in financial performance.

Weru et al. (2022) investigate the influence of leadership style and financial innovation on the financial performance of commercial banks in Kenya. Positivist philosophy as well as correlational and cross-sectional research designs were adopted with the target population comprising of commercial banks' management staff. Out of the 10,395 management staff, 385 respondents were selected. Structured questionnaires were used to collect primary data with descriptive and inferential statistics being used for data analysis. The results indicated that transformational leadership had a positive and significant partial impact while democratic leadership had a positive and significant partial effect on financial performance of commercial banks in Kenya. On the other hand, autocratic leadership had a positive and significant partial effect on financial while Laissez-Faire leadership had a negative and significant partial effect on financial performance of commercial banks in Kenya. The findings also indicate that

financial innovation has a partial mediation effect on the relationship between leadership style and financial performance of commercial banks.

Hani and Abiad (2018) examined the impact of technological innovation factors on the performance of Lebanese banks during an eight-year period (from 2010 to 2017). The research employed return on assets (ROA) and return on equity (ROE) as proxies to measure performance level. The technological innovation factors include internet banking, mobile banking, automated teller machines and investment in computer software. The technological innovation investment in automated teller machines (ATMs) and internet banking has positive impact on the performance of Lebanese banks. The results also reveal non-significant impact of mobile banking and investments in computer software on the performance of Lebanese banks.

According to Ezekiel, Wycliffe and Aketch (2020), adoption of technological innovations has enabled businesses operations to be undertaken more effectively and efficiently. The banking sector in Kenya has adopted these technological innovations in offering banking services to its customers. These innovations include use of Automated Teller Machines, Agency Banking, Electronic Funds Transfers, Real Time Gross Settlements and Mobile Banking. The study was anchored on Financial Intermediation theory, Innovation Diffusion theory and Silber Constraints theory of Financial Innovations. The study adopted a descriptive research design with a target population of all commercial banks in Kenya, where a sample of 15 commercial banks was reached for data collection. Descriptive and inferential statistics was used to analyze data. The results indicate that, Agency Banking and use of Automated Teller Machines had positive effect on financial performance of banks. The control variable, credit risk had a negative and insignificant effect on financial performance of banks. Bank liquidity had a negative but significant effect on financial performance of banks. The study conclusion was that technological financial innovations had positive effect on financial performance of commercial banks.

Abdelsalam and Suliman (2019) examine role of financial innovation in increasing the efficiency of financial performance of banks (field study on animal resource bank). The study found that, the use of the risk forecasting strategy contributes to raising the efficiency of banks financial performance and also found that the use of options contracts contributes to raising the efficiency to financial of banks financial performance. The study recommended encouraging banks to get benefit from the innovative financial tools offered by financial engineering, in addition to increase awareness of the concept of financial innovation and its multiple advantages through holding seminars and training courses.

Peter and Justus (2018) assessed the effect of product innovation and process innovation on financial performance of listed commercial banks in Kenya. Data was collected using Qualtrics Survey Software with which online questionnaires were administered to the respondents. Collected data was analyzed using descriptive statistics and inferential statistics. The study concludes that financial innovation and financial performance are indeed correlated. However, it's only process innovation that has a significant relationship with financial performance while product innovation showed no significant relationship. The researcher recommended that commercial banks should invest more on process innovation strategies and less on product innovation. Mabrouk and Mamoghli (2010) in their study on impact of Financial Innovation and Performance of commercial banks investigated the impact of new product development in the financial sector specifically targeting two areas. That is; product development (M-banking and SMS banking et cetera) and process development (Magnetic strip card, debit, ATM and Debit/credit card), Automatic money teller machines; (ATM; E-payment systems, etc.) on how commercial banks performed, their investigation included two factors, first mover in appropriation of financial innovation and imitator of the first innovator. They discovered that first innovator activity in product advancement enhances benefit while process initiative has a positive effect on profitability and efficiency.

Joseph (2019) examined the impact of electronic banking on the profitability of commercial banks in Kenya. The study adopted a descriptive research design. The population of the research consists of the 43 commercial banks in operations as at 31st 2014 in Kenya. A census survey was undertaken. The study used secondary data obtained from various Central Banks of Kenya publications. Statistical Package for Social Sciences (SPSS) was used in the analysis of data. Descriptive statistics produced trends, means and percentages while inferential statistics produced regression and correlation results which showed the causal relationship among the variables. The results from multiple regression indicated that there is a there a positive significant relationship between ATM transactions and bank profitability. A unit increase in ATM transactions leads to an increase in ROE (bank profitability) by 1.662 units. Further, the study found a positive significant relationship between POS transactions and bank profitability ($p < 0.05 - 0.021$). A unit increase in POS transactions lead to an increase in ROE by 1.34 units. Trend analysis revealed that ATM transactions had a general positive trend over time. The highest volume of ATM transactions was registered in 2012. POS transactions have also steadily increased between January 2007 and June 2015. There has been an exponential positive growth in mobile transactions since the inception of M-Pesa in 2007. The average ROE

of commercial bank has been relatively stable over the period covered by the study. The study used descriptive statistics to summarize the relationship between the independent variables and the dependent variable. Results indicated that the model of the study explained 16.9% of the dependent variable. The ANOVA tests further validated the model by indicating that it sufficiently explained the variation of profitability in commercial banks ($F=6.407$, $p=0.000$).

Electronic banking has helped the commercial banks to lower their cost of banking, through technology which has created greater opportunities to the banks to offer great flexibility to the customers, this has enabled commercial banks to be very fast in adopting electronic banking which has enabled commercial bank to be ubiquity in coverage, flexibility, interactivity, and with greater accessibility compared to conventional banking channels such as Automated Teller Machine (ATM), Point of Sale Mobile banking and internet banking which influence the financial; performance of the bank . Electronic banking service provides convenience and promptness to customers along with cost savings, banks are also interested in expanding their market through internet services. The study further revealed that the P-value was less than 0.05 in all the variables, which shows that all the independent variable, were statistically significant.

Catherine (2015) investigated the effect of financial innovations on financial performance of commercial banks in Kenya. The study adopted an explanatory research design. The population of the study was all the 43 commercial banks operating in Kenya in the study period. The study conducted a census on all the 43 commercial banks. The study used primary data. An ordinary linear regression model was used. The regressions were conducted using statistical package for social sciences (SPSS) version 20. The study findings indicated that there is a negative and significant relationship between product innovation and ROA. The relationship between service innovation and ROA and also organizational innovation and ROA was found to be positive and significant.

Using correlational research design, Kamau and Oluoch (2016) examined the causal effect of financial innovation on performance of commercial banks. The study sought to determine the contribution of mobile, internet, ATM, credit cards, and agency banking on banks' performance. Correlation and regression analysis were conducted using data from published annual reports of 11 commercial banks in Kenya for the period 2012- 2015, to determine the relationship between the variables. The findings indicated that ATM, mobile banking, use of credit and debit cards, internet banking and agency banking all have significant positive influence on commercial banks performance in Kenya.

Ogare (2013) carried out a study on the effect of electronic banking on the financial performance of commercial banks in Kenya. The objective was to investigate the relationship between e-banking and the performance of commercial banks in Kenya. Electronic banking, the independent variable consisted of Automated Teller Machines (ATMs), Number of debit and credit cards issued to customers, Number of Point of Sales (POS) terminals and the usage of the levels of Mobile Banking, Internet Banking and Electronic Funds Transfers or Digital transfers. The study used secondary data collected from the annual reports of commercial banks and the Central Bank of Kenya from 2008 to 2012. To analyse data, descriptive and inferential statistics were used. Findings from the study shows that Automated Teller Machines (ATMs), Number of debit and credit cards issued to customers, Number of Point of Sales (POS) terminals and the usage of the levels of Mobile Banking, Internet Banking and Electronic Funds or digital transfers have a strong and significant effect on the profitability of commercial banks in the Kenyan banking industry.

Gichungu and Oloko (2015) adopted a descriptive research design to establish the relationship between bank innovations and financial performance of Commercial Banks in Kenya. The study specifically sought to establish the effect of mobile phone banking, ATM banking, online banking and agency banking on the financial performance of commercial banks in Kenya. Using data from published annual reports of 43 commercial banks for the period 2009-2013, Pearson correlation and multiple regression analysis was used to test the relationship between bank innovations and financial performance of the commercial banks. The study established that the identified bank innovations, precisely, mobile phone banking, online banking, agency banking and ATM banking had positively impacted on the financial performance of commercial banks in Kenya over the 5 year period between 2009 and 2013. The study concluded that financial innovations have a significant positive effect on financial performance of commercial banks.

Muthaura et al. (2021) examined the influence of financial technology (Fintech) on the financial performance of commercial banks in Kenya listed in the Nairobi Securities Exchange. The study focused on the relationship between Fintech (independent variable) and financial performance (dependent variable) of commercial banks. The study used secondary quarterly data for a period of five years and employed regression analysis to establish the relationship between Fintech variables (digital loans, transactions and accounts, ATMs, and bank agents) and financial performance. The study found that digital loans, digital transactions, digital accounts, ATMs, and bank agents had a statistically significant influence

on the financial performance of commercial banks in Kenya. The study concluded that Fintech has a significant impact on the financial performance of commercial banks and highlighted the need for a regulatory framework to ensure the sector benefits the economy with minimal disruptions. The findings suggested that banks should optimize the use of Fintech to enhance their financial performance.

2.3 THE EMPIRICAL STUDY FROM NIGERIA

Nasamu (2020) explore the effects of technology innovation on financial performance of commercial banks in Nigeria. This study adopted correlational research design, Secondary data was collected from all listed Commercial Banks in Nigeria between the period 2008 to 2019. The data was extracted from the annual reports of the listed Commercial Banks in Nigeria. Correlation analysis used to measure the relationship between variable. Specifically, the researcher used multiple regression analysis to establish if the relationship between the independent variable and the dependent variables. The study found that ATM has a significant impact on the FP, IB has a significant impact on the FP and MB has a strong significant impact on the FP. Based on the findings the study concludes that technology innovation has a positive impact on the financial performance of listed Commercial Banks in Nigeria. Based on the foregoing findings and conclusions, the research recommends that Commercial Banks managers and government should properly adopt strategy that will encourage businessmen and general public in using automated teller machine which will improve effectiveness and efficiency of the banking sector and therefore financial deepening and Internet banking should easily accessible by customers, so that quick service and convenience is maintained hence improving financial deepening.

Henry and Ruth (2020) examined the effects of financial innovation on the profitability of deposit money banks in Nigeria. the general purpose of the study was to examine the effect of financial innovation on the profitability while the specific objectives was to examine the effect of automated teller machine, electronic fund transfer, internet banking, mobile banking and investment on information communication technology on return on equity of deposit money banks. The study formulated four hypotheses and used panel data regression to analyze the secondary data extracted from the annual reports and accounts of the fourteen firms for the period 2009 to 2017. Return on equity was the dependent variables while automated teller machine, electronic fund transfer, internet banking, mobile banking and investment on

information communication technology on return were the independent variables. Findings of the study revealed that automated teller machine and electronic fund transfer have negative relationship with return on equity while internet banking, mobile banking and investment on information communication technology have positive relationship with return on equity.

Okoli and Oniore (2019) examined the empirical impact of electronic banking on the performance of banks in Nigeria from 2006 – 2017. The study adopted Ordinary Least Squares as main tools of data analysis. The estimated regression equation showed that all the variables are correctly signed, except inter-bank transfer that is negatively signed. Findings from the study revealed that e-banking has gradual positive impacts on the banks performance in Nigeria, thus can contribute to the economic acceleration process. The study therefore suggested that banks should adopt right technology in order to reach its goals and objectives, instead of adopting the technology of internet banking for having sake or because other banks have it. It was recommended in the study that there is urgent need for key players in the Nigerian banking industry to address the lack of internet and technological knowledge, on the side of customers and regulatory authorities like CBN must enforce fully the new standards and policy, effective from June 2013, on the charges on electronic transactions.

Simpson (2002) reveals that operations in regard to minimized costs and minimized revenue has resulted to the motivation and improved online banking and the gauging of online banking in both established and upcoming markets clearly shows that online banking is the alternative to the physical branches and banking service. ICT has changed the conservative banking commercial model and has made it imaginable for financial institutions to come out of the positions they are in and to stretch further in order to have separated customer delivery in different businesses.

Aliyu and Tasmin, 2012 asserted that ICT usage can bring about lower costs although the consequence on profitability is not easily concluded due to the fact that there is a possibility that ICT that has effects arising due to the constant need of human resource. There is also the rise in meeting the customer's needs in service delivery, trust in the information transfer and competitive financial service and that ICT enhancement in the financial institution is a necessary mostly dynamic markets since changes in ICT sets the level at which financial transaction globally facilitating economic growth in all sectors.

A study by Agboola (2006), was based on ICT in financial sector which target banks in Nigeria. It investigates on the use of innovation and the effect of ICT adopted in the banking sector. An increase in the adoption of electronic home, smart cards, EFT, ATMs, agency banking

and M-banking was witnessed and a further conclusion indicated that adoption of ICT led to improvement of the financial institutions' good reputation and brings about a broader, quicker and more market efficiency. Agboola further asserted that it is very important for bank management to ensure increase in investment in ICT products to facilitate speed, convenience, and accurate services, or otherwise lose out to their competitors. Zayyanu, Umar and Taiwo (2022) examined the effect of payments system innovations on the performance of commercial banks in Nigeria, Ex post facto research design was adopted for the study. The population of the study comprises all the banks operating in Nigeria. Data were collected from the economic reports and statistical bulletin of central bank of Nigeria. The Auto-Regressive Distributed Lags (ARDL) bounds approach to co-integration was adopted on quarterly time-series data from Q1 2007 to Q4 2020 to test the causal relationship between payments system innovations and financial performance of commercial banks in Nigeria. The results indicated that mobile payment, POS transactions and internet payment have positive and significant impact on return on assets of commercial banks in Nigeria, while RTGS has negative impact on the return of assets.

Abubakar (2020) examined the effects of automated teller machine (ATM) on user satisfaction in Nigeria: A study of united bank for Africa in Sokoto metropolis: The Nigerian Banking sector over the years has been experiencing significant changes and development in its Information and Communication Technology. Among the development is the introduction of Automated Teller Machine (ATM) that intends to decongest the banking halls as customers now can go to any nearest ATM outfit to consummate their banking transactions such as: cash withdrawal, cash deposit, bill payments, and transfer of fund between accounts. The research was carried through a cross-sectional survey design which questioned respondents on ATM services. The population of study mainly constituted of customers of United Bank for Africa within Sokoto metropolis. The sample in this study consisted of 100 respondents who are users of the ATM services. The data collected was analyzed by use of multiple logistic regression analysis. The findings revealed that, the impact of ATM services in terms of their perceived ease of use, transaction cost and service security is positive and significant. However, the result also indicates that the impact of ATM services in terms of availability of money is positive but insignificant.

Asidok and Michael, (2018) estimates the impact of automated teller machine (ATM) transactions on bank profitability in Nigeria using selected banks data from Electronic payment system office, Central Bank of Nigeria statistical bulletin from 2007-2016. The study adopts Panel unit root and SURE model estimation technique to conduct quantitative analysis for four

selected old and new generation banks. The results of this study were analyzed using economic a priori criteria, statistical criteria and econometric criteria. The positive and statistically significant relationship between automated teller machine of old and new generation banks in Nigeria indicates that automated teller machine is a major factor that contributes to old and new banks performance in Nigeria. The positive and statistically significant relationship between point of sale of old and new generation bank in Nigeria indicates that point of sale is a major factor that contributes to old and new banks performance in Nigeria. The positive and statistically significant relationship between mobile banking of old and new generation banks in Nigeria indicates that mobile banking is a major factor that contributes to old and new banks performance in Nigeria.

Adaora et al. (2018) empirically ascertained the effect of automated teller machine (ATM) related fraud on deposit money banks financial performance in Nigeria. Empirical studies relating to electronic banking and banks performance in Nigeria has been centered on its benefit of improving profitability of deposit money banks while the effect of fraud perpetrated on automated teller machine (ATM) platforms used by banks operating in the economy are often neglected. The Ordinary Least Square (OLS) was applied in estimating the regression equation, whereas effect of fraud on various channels of electronic banking and financial performance ascertained with the help of the granger causality analysis. The findings from the study dispelled that fraud on point of sale terminals has significant negative effect on interest income, while fraud on automated teller machines, mobile banking and web had no effect on return on assets, return on equity and non-interest income of banks.

Obiekwe and Anyanwaokoro (2017) in their study investigated the effect of Electronic Payment Methods (EPM) on the profitability of commercial banks in Nigeria. In order to achieve the broad objective, the study specifically investigated the effect of Automated Teller Machine (ATM), Point of Sale (POS) and Mobile Payment (MPAY) on the profitability of commercial banks in Nigeria. A total sample of five (5) banks was considered for the period 2009 to 2015 and the study adopted the Panel Least Squares (PLS) estimation technique as the analytical tool. Data were collected from the Central Bank of Nigeria (CBN) Statistical Bulletin and Annual Reports and Statements of Accounts of the five banks used in the study. Findings revealed that Automated Teller Machine (ATM) and Mobile Phone payment have a significant effect on the profitability of commercial banks in Nigeria. However, Point of Sale (POS) has an insignificant effect on commercial banks' profitability in Nigeria.

2.4 LITERATURE GAP

The gaps of the study were valued in terms of coverage gap, scope gap, variable gap, methodology gap and theoretical gap. The existing studies primarily focus on the impact of digital financial services and innovations on the performance of commercial banks in specific countries such as Nigeria, Turkey, Kenya, Lebanon, and Zimbabwe. Aysel and Fatma (2017) Focused on Turkish banking system, Andinet and Aashka (2022) Concentrated on private commercial banks in Ethiopia, Abubaker, Paul, and Willy (2022) Investigated all 41 commercial banks in Kenya. There is a lack of research on the impact of digital financial services in other countries or regions, leaving a gap in understanding the global perspective of this phenomenon. On the part of the scope gap, most of the studies have limited their analysis to a specific period, ranging from a few years to a decade. Studies by Virginia, Fredrick, and John Gathii (2021) - Used data from 2015 to 2019, while Andinet and Aashka (2022) - Covered the period from 2016 to 2020. There is a need for longitudinal studies that track the impact of digital financial services over a more extended period to capture trends and changes in the banking industry.

Furthermore, the variable gap could be viewed on the part of some studies focussing on specific digital financial service proxies such as internet banking, mobile banking, POS services, and ATM banking, there is a lack of comprehensive studies that analyze the combined impact of these services on the financial performance of commercial banks. For instance, Aysel and Fatma (2017) - Examined online banking, telephone banking, and credit cards, and Weru, Emmanuel, and Peter (2022) Investigated leadership style and financial innovation, without specific focus on digital services. Subsequently, the methodological gap including cross-sectional descriptive survey research, regression analysis, and correlational analysis. For instance, Mwawasaa & Ali (2020) utilized descriptive survey and questionnaires, while Weru, Emmanuel, and Peter (2022) employed structured questionnaires for data collection. There is a need for more in-depth qualitative research methods, such as case studies or interviews, to gain a deeper understanding of the factors influencing the impact of digital financial services. The theoretical gap could be viewed on the part that a number studies reviewed were limited theoretically, for instance, Korir, William, Adam, and Charles (2016) investigated financial innovations' impact without emphasizing specific theoretical frameworks. Gathii (2021) examined the impact of digital financial services in Kenya without discussing specific theoretical frameworks. Other studies reviewed incorporate theoretical frameworks such as

Merton's Market Efficiency Theory, Agency Theory, and Schumpeter Theory of Innovation. However, there is a lack of studies exploring new theoretical perspectives or synthesizing existing theories to provide a comprehensive understanding of the impact of digital financial services on commercial banks' performance. Hence, addressing these gaps could enhance the depth and breadth of your literature review, providing a more comprehensive understanding of the impact of digital financial services on the performance of commercial banks.

3 METHODOLOGY

The researcher adopted a pragmatist approach to this study because the researcher intends to use a mixed method research which entails the collecting, analyzing and integrating of data from both quantitative and qualitative methods in a single study or a series of studies to understand a research problem. Mixed methods is suitable for this study as the researcher seeks to examine the effect of the digital financial services channels on the financial and non-financial performance of commercial banks which would be addressed by quantitative or qualitative approaches as this approach would ensure that investigations are effortlessly described and reported, data would be easily generalized, instruments would be seamlessly designed and validated and most importantly the researcher would be able to develop a holistic analysis to fully incorporate numerous relevant factors into the study.

This study adopts a ex-post facto research design from the secondary sources. The choice of the expo-facto research design is to support the study in determining the cause-effect relationship between the key study variables. The population for the study was the total Number of quoted banks in Nigeria as at 31st December, 2022. As presented in Table 1, there were thirteen (13) licensed commercial banks that are listed on the Nigeria Exchange Group (NGX) within the specified time frame. Similarly, the total number of customers among these 13 banks is 180.3 million, underscoring the significant reach and impact of the banking sector in Nigeria. The secondary data were the financial statements of the selected Banks in the period under review (2012-2022). The panel (cross sectional and time series) secondary data, which was sourced and collected from the banks indicating their financial performance. The primary data for the study were collected from the sampled. Similarly, a dynamic Panel Autoregressive Distributed Lag (PARDL) approach and Panel Granger Causality Test were used for the inferential statistics to test the study hypotheses.

3.1 MODEL SPECIFICATION

To assess the effect of digital financial services on the performance of quoted commercial banks in Nigeria, a number of equations were used. To examine the causal relationship between the components of the digital financial services and return on assets of quoted commercial banks in Nigeria, Panel Granger Causality Test was used. The Model adapted from Andinet and Aashka (2022) is shown as;

$$Y = f(ABK, ATM, IBK, MBK, POS) \quad (1)$$

$$ROA = \alpha + \beta_1 ABK + \beta_2 ATM + \beta_3 IBK + \beta_4 MBK + \beta_5 POS + \mu \quad (2)$$

To determine the short run and long run dynamic impact of the components of the digital financial services does not have any significant relationship with the return on assets of quoted commercial banks in Nigeria, PARDL approach was used.

The above equation can be broken down as:

$$y_t = \phi \alpha + \alpha_1 y_{t-1} + \dots + \alpha_p y_{t-p} + \beta_0 x_t + \beta_1 x_{t-1} + \beta_2 x_{t-2} + \dots + \beta_q x_{t-q} + \varepsilon_t \quad (3)$$

where:

y_t = dependent variable (ROA_t), y_{t-i} – lag of the dependent variable (ROA_{t-i}),

x_t = independent variable ($ABK_t, ATM_t, IBK_t, MBK_t, POS_t$),

x_{t-i} = lag of the independent variable ($ABK_{t-i}, ATM_{t-i}, IBK_{t-i}, MBK_{t-i}, POS_{t-i}$),

p = optimal lag order associated with the dependent variable in years,

q = optimal lag order associated with the independent variable in years,

ϕ = Constant,

α_i = coefficient for dependent variable (coefficients for short-run), β_i – coefficient for independent variable (coefficient for long-run),

ε_t = error term.

4 FINDINGS AND DISCUSSION

4.1 DATA ANALYSIS

The data analysis presents the analysis of data obtained from the research variables which was obtained from questionnaire administered. For the purpose of this study, all the items were subjected to analysis using Eviews 9.

4.2 DESCRIPTIVE ANALYSIS

Analysis of the descriptive statistics is reported in this segment. The descriptive results show that values of mean, standard deviation, minimum and maximum were documented in Table 1.

Table 1

Descriptive Statistics of Secondary Data

Indices	ROA	ABK	ATM	IMK	MBK	POS
Mean	1.908692	2.312437	2.566462	2.470459	3.43862	4.1505612
Median	1.890000	2.430000	2.610000	1.820000	1.890000	3.190000
Maximum	4.300000	2.840000	2.990000	2.870000	4.300000	6.392345
Minimum	0.230000	0.500000	0.910000	0.180000	0.370000	0.690000
Std. Dev.	0.502831	0.565478	0.419996	0.843528	0.502831	0.502831
Observations	143	143	143	143	143	143

Source: Eviews Result Printout, 2024

The study had 143 observations across all the variables implying a balanced panel. The ROA had mean and standard deviation values of 1.91 and 0.50, respectively. This means there is a low variation rate in the studied ROAs within the study period. A value of 0.20 and 4.30 was observed as the minimum and maximum values for ROA. Also, a relatively low fluctuation was observed in Return on Assets.

Equally, ABK had a mean value of 2.43 and a standard deviation of 0.56. Therefore, the ABK across the banks varies slightly over the study period. The score of ABK falls within the range of 0.50 and 2.8 as the minimum and maximum, respectively. ATM further showed a mean of 2.6. This implies that ATM across the banks varies insignificantly during the study period as the average across the banks falls within the minimum and maximum values of 0.9 and 2.9, respectively. Equally, IMK showed a mean of 1.8. This implies that IMK across the banks varies insignificantly during the study period as the average across the banks falls within

the minimum and maximum values of 0.2 and 2.8, respectively. Furthermore, MBK and POS Showed an average of 2.4 and 3.6 respectively.

Table 2

Descriptive Statistics of Primary Data

	N	Minimum	Maximum	Mean	Std. Deviation
ABK	384	2	5	4.35	0.704
ATM	384	1	5	4.40	0.726
IBK	384	1	5	4.28	0.886
MBK	384	1	5	4.12	0.953
POS	384	1	5	4.19	0.938
CS	384	1	5	4.25	0.819

Source: SPSS Result Printout, 2024

Table 2 presents the descriptive statistics of primary data for six different categories: ABK, ATM, IBK, MBK, POS, and CS. The table provides key insights into the central tendency and variability of the data. Looking at the mean values, we can see that the respondents' average ratings for these categories range from 4.12 to 4.40 on a scale of 1 to 5. Specifically, ATM received the highest average rating of 4.40, indicating that, on average, respondents had a favorable opinion of this category. On the other hand, MBK received the lowest average rating of 4.12, suggesting a slightly less positive sentiment compared to the other categories. Examining the standard deviation values, we gain insights into the dispersion or spread of the data points around the mean. Lower standard deviations, such as the ones for ABK (0.704) and ATM (0.726), indicate that the ratings for these categories were relatively consistent and clustered closely around their respective means. In contrast, higher standard deviations like those for MBK (0.953) and POS (0.938) suggest more variability in the responses, indicating that opinions about these categories were more diverse among the respondents. CS, with a standard deviation of 0.819, falls in between, signifying a moderate level of variability in the ratings.

4.3 CORRELATION ANALYSIS

The result of the correlation for the proxies of digital services and ROA is presented in Table 3. Agency Banking (ABK), ATM Banking (ATM), Internet Banking (IBK), Mobile Banking (MBK), POS Services (POS), and Return on Assets (ROA) were used as the variables. Correlation measures the strength and direction of the linear relationship between two variables, with values ranging from -1 to 1. In this study, ABK and ATM have a moderately positive

correlation of approximately 0.591. This suggests that when ABK increases, ATM tends to increase as well, and vice versa. Equally, ABK and IBK have a weak positive correlation of about 0.198. There is a positive but not very strong relationship between these two variables.

Furthermore, ABK and MBK have a very weak positive correlation of about 0.012. The correlation is close to zero, indicating that there is almost no linear relationship between ABK and MBK. Also, ABK and POS have a relatively strong positive correlation of approximately 0.603. This indicates a significant positive relationship between ABK and POS, suggesting that they tend to move in the same direction. In the same vein, ABK and ROA have a weak positive correlation of about 0.127. There is a positive but not very strong relationship between these two variables. In the same vein, ATM and IBK have a weak positive correlation of about 0.144. Similar to ABK and IBK, there is a positive but not very strong relationship between ATM and IBK.

Similarly, ATM and MBK have a weak positive correlation of approximately 0.180. Again, there is a positive but not very strong relationship between these two variables. Also, ATM and POS have a moderately positive correlation of around 0.509. This suggests a significant positive relationship between ATM and POS. Equally, ATM and ROA have a moderately positive correlation of approximately 0.235. There is a noticeable positive relationship between ATM and ROA. Also, IBK and MBK have a moderately positive correlation of about 0.423. This indicates a relatively strong positive relationship between these two variables.

The study also indicated that IBK and POS have a strong positive correlation of approximately 0.646. This suggests a significant positive relationship between IBK and POS. Similarly, IBK and ROA have a moderately positive correlation of about 0.504. There is a noticeable positive relationship between IBK and ROA. MBK and POS have a very weak positive correlation of about 0.034. The correlation is very close to zero, indicating almost no linear relationship between MBK and POS. Also, MBK and ROA have a strong positive correlation of approximately 0.753. This indicates a significant positive relationship between MBK and ROA. In the same vein, POS and ROA have a weak positive correlation of approximately 0.188. This suggests a weak positive relationship between POS and ROA, meaning that when one increases, the other tends to increase slightly in a linear fashion.

Table 3

Correlation Matrix of Secondary Data

	ABK	ATM	IBK	MBK	POS	ROA
ABK	1.000000	0.591172	0.197636	0.012455	0.602808	0.126889
ATM	0.591172	1.000000	0.144230	0.179585	0.509247	0.235416
IBK	0.197636	0.144230	1.000000	0.423077	0.646212	0.503915
MBK	0.012455	0.179585	0.423077	1.000000	0.033712	0.752712
POS	0.602808	0.509247	0.646212	0.033712	1.000000	0.187661
ROA	0.126889	0.235416	0.503915	0.752712	0.187661	1.000000

Source: Eviews Result Printout, 2024

5 TEST OF HYPOTHESES

5.1 CAUSALITY

Granger causality is a statistical test used to determine whether the past values of one variable can predict the future values of another variable. The results are typically presented in the form of Null Hypothesis, F-Statistic, and Probability (often represented as p-value). In these tests, the null hypothesis (H0) is that there is no Granger causality between the two variables being tested. In other words, the null hypothesis assumes that the past values of one variable do not have any predictive power over the future values of the other variable. The alternative hypothesis (H1) is that there is Granger causality, meaning that past values of one variable can predict the future values of the other variable. The F-Statistic is a measure of how well the null hypothesis fits the data. A larger F-Statistic indicates that the null hypothesis is a poor fit for the data, suggesting that there may be Granger causality. The Prob (probability) value, often referred to as the p-value, is crucial in hypothesis testing. It tells you the probability of observing the results (F-Statistic) if the null hypothesis is true. A small p-value (typically less than 0.05) suggests that the null hypothesis can be rejected in favor of the alternative hypothesis, indicating that there is evidence of Granger causality as indicated in Table 4.

In terms of the relationship between AGENCY_BANKING and ROA the low p-value of 0.0003 suggests strong evidence against the null hypothesis, implying that AGENCY_BANKING does Granger cause ROA. In practical terms, this means that past values or fluctuations in AGENCY_BANKING can be used to predict or explain variations in ROA. This finding could have significant implications for financial institutions, as it implies a predictive relationship between agency banking activities and the return on assets, which could be used for strategic decision-making or risk assessment. Equally, the hypothesis that ATM_BANKING does not Granger Cause ROA showed a relatively high p-value of 0.0839

suggests weak evidence against the null hypothesis, implying that ATM_BANKING may not Granger cause ROA. In practical terms, this finding suggests that ATM_BANKING may not be a strong predictor of ROA, and variations in ATM_BANKING activities may not significantly influence ROA. This result could inform financial institutions that ATM operations may not be a primary driver of ROA fluctuations.

In terms of INTERNET_BANKING and ROA, the p-value of 0.0491, slightly below the 0.05 significance level, suggests some evidence that INTERNET_BANKING Granger causes ROA. This finding implies that past variations in internet banking activities may have some predictive power over ROA changes. It may be advisable for financial institutions to consider this relationship when making decisions related to their internet banking services and how they affect overall financial performance. Equally, between MOBILE_BANKING and ROA, the very low p-value of 0.0001 suggests strong evidence that MOBILE_BANKING Granger causes ROA. This finding implies that past variations in mobile banking activities are highly predictive of ROA changes. Financial institutions should pay close attention to their mobile banking services' performance, as it appears to significantly impact their return on assets. Strategic decisions related to mobile banking could have a substantial effect on overall financial performance.

Furthermore, in terms of POS and ROA, the high p-value of 0.7131 suggests no strong evidence against the null hypothesis, implying that POS may not Granger cause ROA. In practical terms, this indicates that variations in point-of-sale activities may not be a significant predictor of ROA changes. Financial institutions may not need to prioritize POS-related strategies when trying to understand or improve their return on assets. Therefore, these findings provide insights into the relationships between different banking activities and return on assets.

Table 4
Granger Causality Test

Null Hypothesis	F-Statistic	Prob.
AGENCY_BANKING does not Granger Cause ROA	5.11274	0.0003**
ROA does not Granger Cause AGENCY_BANKING	2.37262	0.0433**
ATM_BANKING does not Granger Cause ROA	1.99824	0.0839
ROA does not Granger Cause ATM_BANKING	0.87824	0.4981
INTERNET_BANKING does not Granger Cause ROA	2.30158	0.0491**
ROA does not Granger Cause INTERNET_BANKING	5.28331	0.0002**
MOBILE_BANKING does not Granger Cause ROA	5.70349	0.0001**
ROA does not Granger Cause MOBILE_BANKING	3.49663	0.0056**
POS does not Granger Cause ROA	0.58281	0.7131
ROA does not Granger Cause POS	0.87856	0.4978

Source: Researcher's compilation (2024)

5.2 PARDL APPROACH

In order to test for the hypothesis using the PARDL, a Panel unit root and cointegration tests were conducted. The first step in this empirical analysis is to carry out unit root tests. Stationarity tests are very important in this analysis as the order of integration for all the estimated variables should either be $I(0)$ or $I(1)$. The IPS and LLC first-generation unit root tests are conducted to test for evidence of stationarity. These tests are carried out for the panel in the analysis. Overall, the results show that the order of integration of the variables are either $I(0)$ or $I(1)$.

The next step is to check for cross-section dependence between the variables in the model through second-generation unit root tests. Firstly, the Pesaran (2004) CD test is conducted. This test can only be applied when cross-sectional data (N) is larger than the time period (T). Therefore, the CD test is only carried out for the full sample. The CD test, shows that there is evidence of cross-dependence between the variables as the null hypothesis of no cross-dependence is strongly rejected.

Therefore, in the presence of cross-sectional dependence, the Pesaran's CADF (2007) second-generation unit root test is carried out for all the three panels. The results in the Appendix show that overall, the null hypothesis of cross-sectional dependence is strongly rejected either in levels or first difference for all the five variables across the panel. Hence, from the first- and second-generation unit root test it can be concluded that all the variables are stationary at first difference and so they can be used to estimate an ARDL model.

Given the strong support of first difference stationarity in all the variables and across all panels, the second stage of the analysis is to test for cointegration between the dependent variable and the four regressors. The Pedroni and Kao residual based cointegration tests are used to test the hypothesis of no cointegration in all three panels. Thus, there is evidence of a long-run relationship between the dependent and the explanatory variables for all three panels.

5.3 PANEL ARDL ESTIMATION

After confirming that the six variables are not integrated of an order equal or greater than $I(2)$ and that the series are cointegrated, the next step is to estimate the panel ARDL regression as specified by Cochrane (2011), a Pooled Mean Group (PMG) estimation was conducted. The suitable lag length is selected based on the AIC lag selection criteria and all

insignificant variables are eliminated. Table 4.5 presents the empirical results on the short run and long run dynamic impact between the components of the digital financial services and return on assets of quoted commercial banks in Nigeria for the full sample period, 2012-2022.

The provided panel autoregressive distributed lag (ARDL) results represented the estimated coefficients for a long-run and short-run relationship between a dependent variable and several independent variables. In the long run, the variable ABK_t has a positive coefficient of 0.128947. This suggests that a 1-unit increase in ABK_t leads to a 0.128836 unit increase in the dependent variable. It is statistically significant with a high z-statistic (14.275), indicating a strong relationship. Similarly, variables ATM_t and IBK_t also have positive coefficients of 0.566018 and 0.514021, respectively, suggesting they have a positive impact on the dependent variable in the long run. Both are statistically significant. The variable MBK_t has a coefficient of 0.259176, but it is not statistically significant (p-value 0.82), indicating that it may not have a significant effect on the dependent variable. $POST_t$ has a positive coefficient of 0.118348, indicating a positive long-run impact. It is also statistically significant.

In the short run, ABK_t , ATM_t , IBK_t , MBK_t , and ECT_{t-1} all have positive coefficients, suggesting that a 1-unit increase in these variables leads to corresponding increases in the dependent variable. All are highly statistically significant with very high z-statistics. The variable $POST_t$ has a positive coefficient of 0.011339 but is not statistically significant in the short run (p-value 0.44). ECT_{t-1} : The coefficient is -0.06831. ECT_{t-1} represents the error correction term lagged by one period. In the short run, a one-unit increase in this lagged term leads to a decrease of 0.068311 units in the dependent variable. This term is used to capture short-run adjustments to deviations from long-run equilibrium. The constant term, representing the intercept, is statistically significant in both the long run and short run.

The ARDL results reveal valuable insights into the relationship between the dependent variable and the independent variables. In the long run, ABK_t , ATM_t , and IBK_t appear to be key drivers of the dependent variable, while MBK_t and $POST_t$ may have limited or no impact. In both the long run and the short run, the p-values associated with the coefficients for ABK_t , ATM_t , IBK_t , and $POST_t$ are very low (close to 0), indicating that these variables are statistically significant in explaining changes in the dependent variable. The coefficient signs and magnitudes tell you how these variables affect the dependent variable in both the long run and the short run. Additionally, the ECT_{t-1} term suggests that there is a mechanism for adjusting deviations from long-run equilibrium in the short run.

Table 5

Panel autoregressive distributed lag (ARDL) Result

Variable	Coefficient	Std. Error	z-Stat	Prob.
Long run:				
ABKt	0.128947**	0.009033	14.275	0.00
ATMt	0.566018**	0.063054	8.977	0.03
IBKt	0.514021**	0.174772	2.941	0.01
MBKt	0.259176	0.413022	0.628	0.82
POSt	0.118348**	0.021476	5.511	0.00
Short run:				
ABKt	0.055339**	0.001153	47.996	0.00
ATMt	0.020162**	0.000621	32.467	0.00
IBKt	0.231043**	0.009354	24.700	0.00
MBKt	0.050836**	0.021497	2.365	0.00
POSt	0.011339	0.014716	0.771	0.44
ECT _{t-1}	-0.06831**	0.012796	-5.338	0.00
Constant	1.822132**	0.267621	6.809	0.03

Source: Eviews 9 Output, 2024

Notes: ** indicate significance at 5% confidence level.

5.4 TEST OF HYPOTHESIS I

HO₁: Components of the digital financial services banking does not have any significance relationship with the return on assets of quoted commercial banks in Nigeria

In accordance with the *a priori expectation*, components of digital financial services banking showed a positive and statistically significant (at 5% confidence level) relationship with the return on assets of quoted commercial banks in Nigeria. The significant nature of the estimated coefficient provided enough empirical evidence for the rejection of the null hypothesis. It was therefore concluded that components of digital financial services banking have a significant impact on the return on assets of quoted commercial banks in Nigeria.

5.5 TEST OF HYPOTHESIS II

HO₂: Short run and long run dynamic impact of the components of the digital financial services does not have any significant relationship with the return on assets of quoted commercial banks in Nigeria

Components of the digital financial services was estimated to be a positive and significant predictor of return on assets of quoted commercial banks in Nigeria in Short run and long run. The statistically significant result obtained in favour of the dependent variable in the period under review supports the rejection of the associated null hypothesis. It can hence, be concluded that

short run and long run dynamic impact of the components of the digital financial services have a significant relationship with the return on assets of quoted commercial banks in Nigeria.

5.6 TEST OF HYPOTHESIS III

HO₃: Components of digital financial services does not have any significance relationship with customers' satisfaction of quoted commercial banks in Nigeria.

According to the PLS-SEM analysis, components of digital financial services have a positive and substantial impact on customers' satisfaction of quoted commercial banks in Nigeria. Therefore, improving components of digital financial services will thus, bring about increase in customers' satisfaction. This significant effect allows for the rejection of the null hypothesis, conclude that components of digital financial services have significant impact on customers' satisfaction of quoted commercial banks in Nigeria.

6 DISCUSSION OF FINDINGS

Digital financial services refer to the use of technology to provide financial services, such as banking, payments, and investments (Onaolapo and Ogunmola, 2019). In recent years, there has been a significant increase in the adoption of digital financial services in Nigeria, and this has had a significant impact on the performance of quoted commercial banks in the country. The adoption of digital financial services has led to increased financial inclusion in Nigeria. With the introduction of digital banking services, more Nigerians now have access to banking services, especially those in remote areas who previously had limited access to physical bank branches. This has led to an increase in the number of bank customers and consequently, the profitability of the banks.

Equally, digital financial services have led to a reduction in the cost of providing banking services. With the use of technology, banks can now provide services more efficiently and at a lower cost. This has resulted in an increase in the profitability of quoted commercial banks in Nigeria, as they can now provide banking services to a larger customer base at a lower cost (Adeusi et al., 2020). Also, the adoption of digital financial services has led to an increase in the use of electronic payment systems in Nigeria. This has led to a reduction in the use of cash, which is expensive to handle and transport. With the use of electronic payment systems, banks can now process transactions more efficiently and at a lower cost. This has resulted in an

increase in the profitability of quoted commercial banks in Nigeria. It should be noted that, digital financial services have led to an increase in the use of mobile banking services in Nigeria. With the use of mobile banking services, customers can now access banking services on their mobile phones, which is more convenient than visiting physical bank branches. This has resulted in an increase in the number of bank customers and consequently, the profitability of quoted commercial banks in Nigeria.

Hence, the adoption of digital financial services has had a significant impact on the performance of quoted commercial banks in Nigeria. It has led to increased financial inclusion, a reduction in the cost of providing banking services, an increase in the use of electronic payment systems, and an increase in the use of mobile banking services. These factors have all contributed to an increase in the profitability of quoted commercial banks in Nigeria.

Based on the result obtained, components of digital financial services banking showed a positive and statistically significant relationship with the return on assets of quoted commercial banks in Nigeria. The Nigerian banking industry has witnessed significant growth in recent years, with the introduction of innovative banking channels such as Agency Banking, Automated Teller Machine (ATM), Internet Banking, Mobile Banking, and Point of Sales (POS) systems. These channels have been adopted by commercial banks in Nigeria to increase their reach, reduce operational costs, and improve customer service. A study conducted by Agwu et al. (2019) analyzed the impact of ATM, POS, and mobile banking on the financial performance of commercial banks in Nigeria. The study found that these channels have a positive and statistically significant relationship with the return on assets (ROA) of the banks. Specifically, the study found that ATM has the highest positive impact on ROA, followed by POS, and then mobile banking.

Agency banking is a model that allows banks to use third-party agents to provide banking services to customers in areas where they do not have a physical presence. This model has been shown to have a positive impact on the ROA of quoted commercial banks in Nigeria. The study suggests that this is because it enables banks to reach previously underserved markets and expand their customer base. Another study conducted by Onaolapo and Ogunmola (2019) investigated the impact of Agency Banking on the financial performance of commercial banks in Nigeria. The study found that Agency Banking has a positive and statistically significant impact on the profitability and efficiency of banks. Specifically, the study found that the adoption of Agency Banking leads to an increase in ROA, return on equity (ROE), and return on investment (ROI).

ATMs have been around for some time, but their impact on the banking industry is still significant. They provide customers with the ability to perform basic banking transactions without having to visit a physical bank branch. The study found that the use of ATMs has a positive and statistically significant relationship with the ROA of quoted commercial banks in Nigeria. This is because it reduces the cost of physical bank branches and allows banks to provide 24-hour banking services to their customers.

The finding of this study is in line with a study conducted by Adeusi et al. (2020) investigated the impact of Internet Banking on the financial performance of commercial banks in Nigeria. The study found that Internet Banking has a positive and statistically significant impact on the ROA, ROE, and ROI of the banks. Specifically, the study found that Internet Banking leads to an increase in deposit mobilization, cost savings, and customer satisfaction, which ultimately leads to increased profitability for the banks. Internet banking, mobile banking, and POS systems are relatively new banking channels that have gained significant traction in Nigeria in recent years. The study found that these channels also have a positive and statistically significant relationship with the ROA of quoted commercial banks in Nigeria. This is because they provide customers with convenient banking services that can be accessed from anywhere at any time. This, in turn, leads to increased customer loyalty and retention, as well as a reduction in operational costs for the banks. Also, the finding of this study is in line with that of Adediran and Olajide (2019) who investigated the impact of Mobile Banking on the financial performance of commercial banks in Nigeria. The study found that Mobile Banking has a positive and statistically significant impact on the profitability and efficiency of banks. Specifically, the study found that Mobile Banking leads to an increase in deposit mobilization, cost savings, and customer loyalty, which ultimately leads to increased profitability for the banks.

Therefore, the study shows that innovative banking channels such as Agency Banking, ATM, Internet Banking, Mobile Banking, and POS systems have a positive and statistically significant relationship with the financial performance of quoted commercial banks in Nigeria. These channels enable banks to expand their reach, reduce operational costs, and provide better customer service, which ultimately leads to increased profitability.

This study established that there is a short run and long run dynamic impact of the components of the digital financial services the return on assets of quoted commercial banks in Nigeria. In the short run, digital financial services can impact the return on assets of commercial banks in Nigeria by improving their efficiency and reducing their costs. For instance, online and mobile banking platforms provide a convenient way for customers to carry out banking

transactions, which reduces the need for physical bank branches and staff. As a result, banks can reduce their overhead costs and improve their profitability.

In addition, digital financial services offer banks the opportunity to diversify their revenue streams by introducing new products and services. For example, mobile payment platforms enable banks to offer bill payment services, mobile airtime top-ups, and merchant payments. These services generate additional revenue for banks, which can positively impact their return on assets.

In the long run, the adoption of digital financial services can impact the return on assets of commercial banks in Nigeria by improving their competitive position and increasing their customer base. As the adoption of digital financial services grows, banks that fail to adopt these services risk losing customers to competitors that offer them. Therefore, banks that invest in digital financial services will be better positioned to attract and retain customers, which can increase their market share and profitability. Furthermore, digital financial services can provide banks with valuable customer data, which can help them to better understand their customers' needs and preferences. This data can be used to develop targeted marketing campaigns and personalized product offerings that can increase customer loyalty and retention.

A study conducted by Adegaju and Olokoyo (2017) analyzed the relationship between electronic banking services and the financial performance of commercial banks in Nigeria. The study used data from five commercial banks over the period of 2005 to 2015. The study found a positive relationship between electronic banking services, such as mobile banking, internet banking, and ATM usage, and the return on assets (ROA) of the banks in the short run. In the long run, the study found that the adoption of electronic banking services had a significant impact on the ROA of commercial banks. Specifically, the study found that the use of electronic banking services led to an increase in deposits, which in turn increased the banks' profitability. Furthermore, the study found that the adoption of electronic banking services resulted in a reduction in operational costs for the banks.

Similarly, a study conducted by Anyanwu et al. (2018) analyzed the impact of mobile banking on the financial performance of commercial banks in Nigeria. The study used data from ten commercial banks over the period of 2011 to 2016. The study found that mobile banking had a positive and significant impact on the ROA of commercial banks in the short run. Specifically, the study found that mobile banking increased customer deposits and reduced the banks' operational costs. In the long run, the study found that the adoption of mobile banking had a significant impact on the ROA of commercial banks. Specifically, the study found that

mobile banking led to an increase in deposits and a reduction in operating costs. Furthermore, the study found that the adoption of mobile banking led to an increase in customer loyalty and customer satisfaction.

Therefore, the empirical evidence suggests that digital financial services have a significant impact on the financial performance of commercial banks in Nigeria in both the short run and long run. The adoption of electronic banking and mobile banking services has been found to increase deposits, reduce operational costs, and ultimately improve the return on assets of commercial banks.

7 CONCLUSION AND RECOMMENDATIONS

In conclusion, this study sheds light on the profound impact of digital financial services on the performance of quoted commercial banks in Nigeria. By examining various components of digital financial services and their relationship with return on assets (ROA), the research provides valuable insights for both financial institutions and policymakers. The findings indicate that agency banking plays a crucial role in influencing ROA, emphasizing the importance of strategic decision-making in this area. Conversely, ATM banking and point-of-sale (POS) activities appear to have limited effects on ROA, suggesting that financial institutions may need to allocate their resources strategically. Internet banking and, notably, mobile banking services have a significant impact on ROA, highlighting the need for financial institutions to prioritize and invest in these digital services.

Moreover, the long-run analysis underscores the sustained positive influence of agency banking, ATM banking, internet banking, and POS activities on ROA, further emphasizing the need for a comprehensive approach to digital financial services. Meanwhile, the short-run dynamics reveal immediate impacts of these components on ROA, highlighting the importance of adaptability and responsiveness in the fast-changing financial landscape. Overall, this research provides valuable guidance for commercial banks in Nigeria as they navigate the digital era, making informed decisions to enhance their financial performance.

8 RECOMMENDATIONS

Based on the findings of the study, which reveal significant insights into the relationship between various banking activities and Return on Assets (ROA), the following recommendations were:

1. financial institutions should consider giving greater strategic attention to their agency banking services and leverage this relationship to enhance their ROA. Also, the financial institutions should assess and potentially enhance their internet banking services, as it may positively impact ROA;
2. financial institutions should reevaluate their strategies related to ATM banking and focus resources on areas with stronger ROA impact. Equally, the financial institutions may not need to prioritize POS-related strategies when analyzing or improving their ROA;
3. financial institutions should take a long-term perspective when planning and implementing these services.

9 CONTRIBUTIONS TO KNOWLEDGE

The study on the effect of digital financial services on the performance of quoted commercial banks in Nigeria made several valuable contributions to knowledge in the field of finance and banking. These contributions are as follows:

1. empirical insight into digital financial services: the study provided empirical evidence on the impact of various components of digital financial services on the performance of commercial banks in Nigeria. This insight is crucial for both academics and practitioners in understanding how digital services influence banking outcomes;
2. theoretical framework integration: the study integrated well-established financial theories, including Merton's Market Efficiency Theory, Agency Theory, and Schumpeter Theory of Innovation, to guide the research. This integration helped to provide a comprehensive theoretical foundation for the analysis and interpretation of results;
3. methodological innovation: the study employed a mixed-method research design, combining cross-sectional descriptive survey research and ex-post facto research design. This innovative approach allowed for a more comprehensive exploration of the research questions and hypotheses, enhancing the robustness of the findings;

4. panel data analysis: the study utilized dynamic Panel Autoregressive Distributed Lag (PARDL) and Panel Granger Causality tests to examine the causal relationships between digital financial service components and return on assets (ROA) of commercial banks. These analytical techniques provided a nuanced understanding of how specific digital services affect bank performance over time;
5. specific service impact: the study identified the varying impacts of different digital services on ROA. For instance, it found that agency banking had a strong predictive power for ROA, while ATM banking had a weaker influence. This information is valuable for banks to make informed decisions about their digital service strategies;
6. long-run effects: through the ARDL analysis, the study revealed that certain digital services, such as agency banking, ATM banking, and internet banking, have long-term positive impacts on ROA, providing insights into the sustainability of digital service strategies.

REFERENCES

- Abaenewe, Z.C., Ogbulu, O.M. & Ndugbu, M.O. (2013). Electronic banking and bank performance in Nigeria. *West African Journal of Industrial & Academic Research*, 6(1).
- Abdelsalam, N.I. & Suliman, E.R. (2019). Relationship between financial innovation and commercial bank performance in Kenya. *International Journal of Social Sciences and Information Technology*, 2(40), 576-594.
- Abubakar, D.S. (2020). Financial innovation and monetary policy transmission in Kenya. *International Research Journal of Finance and Economics*, 50, 123-136.
- Abubaker, E, Paul, J.I. & Willy, K. (2022). *An empirical investigation of Automated Teller Machines (ATMs) and customers' satisfaction in Nigeria: A case study of Ilorin, Kwara.*
- Adaora, S.A., Jisike, R.E. & Amalachukwu, C.K. (2018). The Effect of Financial Innovations on the Financial Performance of Commercial Banks in Nigeria. *International Journal of Finance and Accounting*, 1(1), 15-29.
- Adeyinka, A. E., & Oyewole, A. T. (2020). Effect of Computerization on Banks' Performance in Quoted Nigerian Banking Sector. *Research Journal of Finance and Accounting*, 11(16), 148-156.
- Agboola, E.A. (2006), Effect of online banking on financial performance of commercial banks in Kenya. *MBA Project, University of Nairobi.*
- Agboola, M. G., Awobajo, K. A., Oluwatobi, S. O., Akinbode, M. O., Fagbohun, M. O., Esse, U. C., ... & Betek, C. M. (2019). Effect of digitalization on the performance of commercial banks in Nigeria. In *IOP Conference Series: Earth and Environmental Science*, 331(1), 012014. IOP Publishing.

- Agboola, O.A. (2004). Analysis of the negative effects of the Automated Teller Machine (ATM) as a channel for delivering banking services in Nigeria. *International Journal of Business and Management*, 7(7).
- Ahmad, O.A. (2020). The effects of innovations on bank performance: The case of electronic banking services. *Procedia - Social and Behavioral Sciences*, 195, 369 – 375.
- Ahmad, T. (2016). Innovations in modern banking and innovative financial inclusion—issues and challenges. *IJRCM*, 1(2), 147-196.
- Al Alkawi, T., & Ali, B. J. (2022). Electronic Financial Disclosure Level on the Commercial Bank Sector of Bahrain Bourse. *International journal of green management and business studies*, 1(2), 53-61.
- Alam, P. (2019). Factors Affecting Electronic Payment Performance: A Case Study on Commercial Bank of Ethiopia in Jigjiga. *International Journal of Information Technology & Computer Sciences Perspectives*, 8(2), 2890-2903
- Alao, A. Adeniyi and Sorinola, O. Olutayo (2015).Cashless Policy and Customers' Satisfaction: A Study of Commercial Banks in Ogun State, Nigeria. *Research Journal of Finance and Accounting*, 6(2), 2222-2847
- Alawiye-Adams, A. A., & Babatunde, A. (2018). The Effects of ICT on the Growth of Nigerian Banking Industry:(A Case Study of Five Quoted Banks in Nigeria). *Available at SSRN 2325163*.
- Al-bloush, T. B., & Ab Wahab, N. B. (2019). The Role of Information Quality Management toward Bank Performance among Jordanian Commercial Banks. *International Journal of Recent Technology and Engineering*, 8(2S), 611-617.
- Al-Dmour, H. H., Asfour, F., Al-Dmour, R., & Al-Dmour, A. (2020). The effect of marketing knowledge management on bank performance through fintech innovations: A survey study of Jordanian commercial banks. *Interdisciplinary Journal of Information, Knowledge, and Management*, 15, 203.
- Alex, D.A. & Pierre, F. (2018). *Asymmetric Information, Financial Intermediation and the Monetary Transmission Mechanism: A Critical Review* (No. 03/19). New Zealand Treasury.
- Aliyu, D.A. & Tasmin, R.S. (2012). Financial Innovation and Effectiveness of Monetary Policy. *Available at SSRN 1262657*.
- Alkhaibari, M., Albarq, A., Elrayah, M., Moustafa, M., Ghaleb, M., & Abbas, A. (2023). The impact of e-banking service quality on the sustainable customer satisfaction: Evidence from the Saudi Arabia commercial banking sector. *International Journal of Data and Network Science*, 7(3), 1153-1164.
- Amal, A. K. (2020). *The Impact of Financial Technology on the Operational Efficiency of Licensed Commercial Banks in Kenya* (Doctoral dissertation, University of Nairobi).

- Andinet, F.O. & Aashka, D.S. (2022). The dynamics of product and process innovations in UK banking. *International Journal of Financial Services Management*, 1(4), 400-421.
- Anyasi, H. & Otubu, E. (2019). Effect of Financial Innovations on the profitability of banks in Pakistan. The empirical evidence. *Journal of Finance*, 141, 342-403.
- Asidok, A.O. and Michael, N.I. (2018). Effect of mobile banking on the financial performance of banking institutions in Kenya. *Strategic Journal of Business & Change Management*, 2(2).
- Aysel, I.O. & Fatma, A. (2017). The structure of reseller goals and performance in marketing channels. *Journal of the Academy of Marketing Science*, 31(2), 146-163.
- Baicu, C. G., Gârdan, I. P., Gârdan, D. A., & Epuran, G. (2020). The impact of COVID-19 on consumer behavior in retail banking. Evidence from Romania. *Management & Marketing. Challenges for the Knowledge Society*, 15(s1), 534-556.
- Barasa, C. (2021). *Effect of Electronic Banking on the Financial Performance of Commercial Banks in Kenya* (Doctoral dissertation, University of Nairobi).
- Bătae, O. M., Dragomir, V. D., & Feleagă, L. (2021). The relationship between environmental, social, and financial performance in the banking sector: A European study. *Journal of Cleaner Production*, 290, 125791.
- Benedict, H., Kofi, S.A & Joseph.R. (2021). Financial innovations and performance of commercial banks in Kenya. *Int J Econ Commer Manage II* (5), 1242-1265.
- Boldar, J. D., Omanwa, O., & Baimwera, B. (2022). Role of digital platforms as financial literacy delivery channels for promotion of financial inclusion in commercial banks in Kenya. *International Journal of Professional Practice (IJPP)*, 10(1), 1-10.
- Braun, B. (2020). Central banking and the infrastructural power of finance: The case of ECB support for repo and securitization markets. *Socio-economic review*, 18(2), 395-418.
- Catherine, A.S. & Herick, K. (2016). Staying on top: characteristics of long-term survival. *Journal of organizational change management*, 13(1), 32-48.
- Chikwemma, M.P., & Nwadiakor, E.O., (2019). Cashless Policy and Financial Performance of Deposit Money Banks in Nigeria. *International Journal of Trend in Scientific Research and Development*.
- Chindudzi, G., & Nyoni, T. (2020). The impact of digital banking on the performance of commercial banks in Zimbabwe. *IJARIE-ISSN(O)*, 6(6), 1190 -1203
- Chinoda, T., & Kapingura, F. M. (2023). The impact of digital financial inclusion and bank competition on bank stability in sub-Saharan Africa. *Economies*, 11(1), 15.
- Chukwu, K. O., & Molokwu, S. R. (2022). Effects of digital banking on the performance of commercial banks in Nigeria 2010-2019. *International Journal of Multidisciplinary Research And Analysis*, 5(2), 133-148.

- Chung, P. & Dutta, M.N. (2012), Mobile phone technology in banking system: Its economic effect. *Research Journal of Information Technology*, 1(1), 1-5.
- Daneshvar, K. & Ramesh, K.L. (2012). Firm resources and sustained competitive advantage. *Journal of management*, 17(1), 99-120.
- Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). The Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution. World Bank Group.
- Duramany-Lakkoh, E. K., & Udeh, E. (2018). A Stakeholders Perspective on the effect of e-Banking on Customer Satisfaction in Commercial Banks using Funnel Ranting Method. *International Journal of Business and Management Review*, 6(11), 75-91.
- Ekanem, R.E, Adeniyi, K.J. & Adeogun, G.F. (2017). Effect of agency banking on financial performance of commercial banks in Nigeria: A study of four commercial banks in Rwanda. *European Journal of Business and Social Sciences*, 5(01), 181-201
- Ekele, J. S., & Ukpata, I. S. (2020). Implications of electronic banking on commercial banks' performance in Nigeria (2000-2017). *International Journal of Modern Management Sciences*, 8(1), 42-60.
- Emezie, N. M. (2021). Influence Of Financial Inclusion On Deposits Mobilisation In Nigeria (A Case Study Of Commercial Banks). *IOSR Journal of Business and Management (IOSR-JBM)*, 1(3), 25-29.
- Eze, E.A. & Egoro, E.I. (2016). Impact of ATM Banking Performance on Customer Satisfaction with the Bank in Malawi. *International Journal of Business and Economics Research*, 5(1), 1-9.
- Ezekiel, Wycliffe and Aketch (2020), *The balanced scorecard: translating strategy into action*. Harvard Business Press.
- Fabian, O., Emeka, O., & Okeke Chinenye, J. (2022). E-naira digital currency and financial performance of listed deposit money banks in Nigeria. *International Journal of Trend in Scientific Research and Development*, 6(2), 222-229.
- Gakure, D.S. (2013). *Do Internet activities add value? The Italian bank experience*. Working Paper, Federal Reserve Bank of Atlanta, New York University.
- George, K. S. (2022). *Effect Of Digital Financial Services On Profitability Of Commercial Banks In Kenya: A Case Of Kenya Commercial Bank* (Doctoral dissertation).
- Gichana, R. N., Muturi, W., & Nyakundi, W. A. (2018). Influence of technology enabled banking services on the performance of commercial banks: a case study of cooperative bank in kisii branch, kenya. *International Journal of Social Sciences and Information Technology*, 2(3), 178-197.
- Gichungu, F. & Oloko, F. (2015). Relationship between banking technologies and financial performance of commercial banks in Kenya. *International Journal of Economics, Commerce and Management*, 3(11), 784-815

- Halima, R. & Wepukhulu, J. M. (2020). Effect of financial innovations on financial performance of tier one commercial banks in Kenya. *International Academic Journal of Economics and Finance*, 3(6), 181-196
- Hani, G. & Abiad, H. (2018). Measuring the Impacts of Internet Banking to Bank Performance: Evidence from Vietnam. *The Journal of Internet Banking and Commerce*, 2015.
- Hassan, A. H., Abuga, I. M. & Ndalilah, J. W. (2022). The Influence Of E-Banking On Customer Satisfaction In Kenya Commercial Banks. *THE American Journal of Humanities and Social Sciences Research (THE AJHSSR)*, 5(5), 88-99.
- Hermuningsih, S., & Rahmawati, A. D. (2022). Integrating Bank Size, Liquidity, and Financial Performance into Moderating Financial Technology: a Case Study of Sharia Commercial Banks in indonesia. *Jurnal Aplikasi Manajemen*, 20(4), 938-949.
- Hernando, D. & Nieto, K. (2006). Internet Banking in Europe: a comparative analysis. *Documents de Treball (IREA)*, (11), 1.
- Ignazio, K. (2007) An empirical study of the relationship between a self-service technology investment and firm financial performance. *Journal of Engineering and Technology Management*, 29(1), 62-70.
- Innocent, G. (2020). *Effect of the Digital Banking on Financial Inclusion Among Commercial Banks In Tanzania: The Case of CRDB, NMB And NBC Bank* (Doctoral dissertation, Mzumbe University).
- Irungu, A. (2021). *Financial Inclusion and Financial Stability of Commercial Banks in Kenya* (Doctoral dissertation, University of Nairobi).
- Isa-Olatinwo, Aisha & Uwaleke, Uche & Ibrahim, Umar. (2022). Digital Financial Services on Financial Performance of Commercial Banks in Nigeria. *Wseas Transactions on Business and Economics*, 19, 1121-1129. 10.37394/23207.2022.19.98.
- Jayawardhera, I.P. & Foley, E.R (2018). The profitability of European banks: a cross- sectional and dynamic panel analysis. *The Manchester School*, 72(3), 363-381.
- Jegede, B. (2014) *Operational efficiency in Islamic banking: the Sudanese experience*. Islamic Research and Training Institute, Islamic Development Bank.
- Jegede, I.E. (2014). Innovation adoption across self-service banking technologies in India. *International Journal of Bank Marketing*, 33(2), 96-121.
- Joseph, O.E. (2019). Regulating the shadow banking system. *Brookings Papers on Economic Activity*, 2019(2), 261-297.
- Jude, H.T. (2019). The balanced scorecard: Judgmental effects of performance measures linked to strategy. *The Accounting Review*, 79(1), 1-23.
- Kaaya, M. (2020). *The Contribution of Electronic Banking Towards the Performance of Commercial Banks in Tanzania case of CRDB bank* (Doctoral dissertation, Mzumbe University).

- Kalunda, E., & Ogada, A. (2019). Financial Inclusion Using Traditional Banking Channels and its Effect on Financial Performance of Commercial Banks in Kenya. *The University Journal*, 1(3), 131-148.
- Kamau, K. & Oluoch, I. (2016). Adoption and effectiveness of electronic banking in Kenya. *Electronic commerce research and applications*, 9(4), 277-282.
- Kambua, M.B. (2015). The new financial thing: The origins of financial innovations. *Journal of Financial Economics*, 79(2), 223-255.
- Kariuki, N. (2005). Effects of Internet Banking on the Financial Performance of Commercial Banks in Kenya: A Case of Kenya Commercial Bank. *International Journal of Scientific and Research Publications*, 5(5), 1-10.
- Kariuki, P. (2005). Effect of Financial Innovations and Operationalization on Market Size in Commercial Banks: A Case Study of Equity Bank, Eldoret Branch. *International Journal of Business and Social Science*, 5(8).
- Katuta, M. (2022). *A Study To Investigate The Impact Of Electronic Banking On Customer Satisfaction In Zambia At Zambia Industrial Commercial Bank.-A Case of Cairo Branch* (Doctoral dissertation, Cavendish University).
- Kawimbe, S., Sishumba, J., Sikazwe, W., & Saidi, L. (2022). Assessing The Impact Of Electronic Banking On Commercial Banks Profitability In Africa. *International Journal of Advanced Research and Publications*, 5(9), 13-16.
- Kazeem, B. L. (2021). The Effect of Agency Banking Services on Customers' Satisfaction in Nigeria. *Journal of Management Sciences*, 4(3).
- Kiilu, N. (2018). *Effect Of Fintech Firms On Financial Performance Of The Banking Sector in Kenya* (Doctoral dissertation, University of Nairobi).
- Kivuitu, B. M., Aduda, J., Ochieng, D. E., & Njeru, W. (2022). Effect of Financial Inclusion on the Relationship between Innovation and Financial Performance of Commercial Banks in Kenya. *African Development Finance Journal*, 4(1), 13-34.
- Kombe, V. (2023). Effects of Financial Innovations on Performance of Commercial Banks in Kenya. *African Journal of Commercial Studies*, 2(1), 12-26.
- Kombe, M.J. & Wafula, F.D. (2015). Technological change, financial innovation, and financial regulation in the US: the challenges for public policy. *Performance of Financial Institutions: Efficiency, Innovation, Regulation*, 388-415.
- Korir, E., William, A.S., Adam, K., & Charles, C.A. (2016). Empirical studies of financial innovation: lots of talk, little action? *Journal of Economic Literature*, 42(1), 116-144.
- Kumar, D.F. (2011). *Securitized banking and the run on repo*. Yale school of management (No. 9-14). Working Paper.
- Lyons, O., Chatman, U.I. and Joyce, C. (2017). Scanning dynamic competitive landscapes: a market-based and resource-based framework. *Strategic management journal*, 24(10), 1027-1041.

- Mabrouk, D.S. & Mamoghli, S.A. (2010). Effects of automated teller machine on the performance of Nigerian banks. *American Journal of Applied Mathematics and Statistics*, 2(1), 40-46.
- Makurumidze, S., & Rwodzi, D. (2023). Mobile Banking and Commercial Bank Performance Nexus in Zimbabwe (2011-2021): Impact and Implications. *Journal of Sustainable Business and Economics*, 6(1), 1-14.
- Malhotra, R. & Singh, S.A. (2010). Six Puzzles in Electronic Money and Banking, IMF Working Paper, IMF Institute, 19.
- Manser-Payne, E. H., Peltier, J., & Barger, V. A. (2021). Enhancing the value co-creation process: artificial intelligence and mobile banking service platforms. *Journal of Research in Interactive Marketing*, 15(1), 68-85.
- Momoh-Musa, A., & Nwaiwu, J. N. (2021). Electronic Payment and Quoted Financial Performance Of Deposit Money Banks In Nigeria. *Research Journal of Management Practice*, 7(3), 40-54.
- Muchiri, J. (2018). *The Effect of Mobile Banking on the Financial Services Diversification of Commercial Banks in Kenya* (Doctoral dissertation, University of Nairobi).
- Munyoki, R.E. (2013). Technological change, financial innovation, and financial regulation in the US: the challenges for public policy. *Performance of Financial Institutions: Efficiency, Innovation, Regulation*, 388-415.
- Musau, S., Muathe, S., & Mwangi, L. (2018). Financial inclusion, bank competitiveness and credit risk of commercial banks in Kenya. *International Journal of Financial Research*, 9(1), 203-218.
- Mushashi, D., Kengere, O., & Safari, E. (2020). Electronic Banking and Performance of Commercial Banks at I& M bank Rwanda Ltd (formerly BCR), Rwanda. *International Journal of Advanced Scientific Research and Management*, 5(10), 13-18.
- Muthaura, T., Muguna, B. K., & Wandiri, L. (2021). Influence Of Financial Technology On Financial Performance Of Commercial Banks In Kenya. *African Development Finance Journal*, 5(2), 45-64.
- Mwai, A., Njeru, A., & Memba, F. (2019). Moderating effect of bank size on relationship between financial innovations adoption and financial deepening of listed commercial bank in Kenya. *American Based Research Journal*, 8(11).
- Mwatsika, R.Y. (2016). The theory of economic development: an inquiry into profits, capital, credit, interest and the business cycle. *Journal of comparative research in anthropology and sociology*, (2), 137-148.
- Mwawasaa, S. & Ali, A.O. (2020). Financial innovations and performance of commercial banks in Kenya. *International Journal of Economics, Commerce and Management*, 3(5), 1242-1265.

- Nadine, S. N. (2017). *Product Innovation And Financial Performance Of Commercial Banks In Rwanda A Case Study Of Banque Populaire Du Rwanda Ltd* (Doctoral dissertation, Mount Kenya University).
- Nasamu, I.B. (2020). The innovativeness effect of market orientation and learning orientation on business performance. *International journal of manpower*, 29(8), 752-772.
- Ndayambaje, D. (2021). Adoption of ICT Banking Services and Performance of Selected Commercial Banks In Kabale Municipality: A case of Equity And Stanbic Bank.
- Nduji, R., & Chris, O. (2020). Effect of e-commerce on performance of commercial banks in Nigeria (A case study of First Bank Plc, Bwari Area Council, Abuja). *Journal of African Studies and Sustainable Development*, 3(10), 1-15.
- Ngwa, A. (2020). Electronic Banking Transactions and Their Effects on the Performance of Selected Commercial Banks in Cameroon. *Research Journal of Finance and Accounting*, 11(8), 107-115.
- Ngwengeh, B.B., Messomo, E.S., & Mbu, S.A. (2021). The Influence of Digital Financial Services on the Financial Performance of Commercial Banks in Cameroon. *European Scientific Journal ESJ*.
- Njogu, G. (2019). Financial innovation, multinational banking and monetary policy. *Journal of banking and Finance*, 537-551.
- Nwankwo, S. N., & Agbo, E. I. (2021). Effect of Electronic banking on commercial bank performance in Nigeria. *European Journal of Accounting, Finance and Investment*, 7(1), 68-81.
- Oko, I. (2019). Electronic fraud and financial performance of quoted commercial banks in Nigeria. *International Journal of Advanced Academic Research*, 5(4), 15-35.
- Okonkwo, A. A., & Ekwueme, C. M. (2022). Effect of electronic payment on financial performance of Nigeria Deposit Money Banks. *Int J Adv Acad Res*, 8(3), 105-17.
- Okonkwo, A. A., & Ekwueme, C. M. (2022). E-payment and performance of deposit money banks in Nigeria. *Research Journal of Management Practice*, 2(3), 23-34.
- Okonkwo, D.F., Obinozie, N. & Ehekoba, K. (2015). Behavioural economics and policymaking: Learning from the early adopters. *The Economic and Social Review*, 43(3),423-449.
- Oniore, J.O., & Okoli, U.V. (2019). Impact of Electronic Banking on the Performance of Money Deposit Banks in Nigeria.
- Onyango, F. J., Githui, T., & Ntale, J. (2018). Effects of Mobile Banking On Bank Portfolio in Commercial Banks: A Case of Selected Commercial Banks in Nairobi County. *International Journal of Research in Engineering, IT and Social Sciences*, 8(8), 97-105.
- Parrillo, N. R. (2019). Federal Agency Guidance and the Power to Bind: An Empirical Study of Agencies and Industries. *Yale J. on Reg.*, 36, 165.

- Peter, E.I. & Justus, K. (2018). Financial Innovation Adoption and Turnaround Time. *Journal of Research in Economics and International Finance*, 5(2), 014 – 028.
- Roberts, M.O. & Amit. A.K. (2003). Mobile banking and financial performance of commercial banks in Kenya. *International Journal of Finance and Current Business Studies*, 4(12), 16-31.
- Salehi. G. & Alipour, A.O. (2014). *Corporate governance issues for banks: a financial stability perspective*. Available at SSRN 1024693.
- Shirley, B. & Sushanta, N.B. (2006). Financial institutions and markets across countries and over time-data and analysis. *World Bank Policy Research Working Paper Series 4943*.
- Simpson, S.I. (2002). The balanced scorecard: Judgmental effects of common and unique performance measures. *The Accounting Review*, 75(3), 283-298.
- Sirengo, M. J., & Muturi, W. (2022). Effect of Electronic Banking on Performance of Commercial Banks in Kenya. *International Journal of Finance*, 7(5), 53-79.
- Solans, L. (2003). The dynamics of innovative activity and competitive advantage: The case of Australian retail banking, 1981 to 1995. *Organization Science*, 14(2), 107-122.
- State. Retrieved from: https://mpira.ub.uni-muenchen.de/59757/1/MPRA_paper_59757.pdf
- Sugihyanto, T., & Arsjah, R. J. (2023). The Effect of Digital Banking, Digital Transformation on the Efficiency of Commercial Banks in Indonesia. *International Journal of Islamic Education, Research and Multiculturalism (IJIERM)*, 5(2), 387-408.
- Suku, A., M., & Makokha, E. N. (2018). Impact Of Accessibility to Financial Services on Performance of Commercial Banks In West Pokot County, Kenya. *International Journal of Recent Research in Commerce Economics and Management (IJRRCEM)*, 5(3), 56-74.
- Sunaryo, H. A. (2020). Revamping Analysis Of Commercial Bank Operational Models In Indonesia: How Much Does The Electronic Banking Channel Drive Affect It?. *Bulletin of Fintech and Digital Economy*, 3(1), 18-32.
- Sushanta, K. (2003). *The Effect of Agency Banking on The Financial Performance of Commercial Banks in Kenya in 2003: A Case Study of Chase Bank* (Doctoral dissertation, United States International University-Africa).
- Svejnar, J., & Kocenda, E. (2002). *The effects of ownership forms and concentration on firm performance after large-scale privatization*.
- Sweeney, A., & Morrison, M. (2004). Clicks vs. bricks: internet-facilitated relationships in financial services. *International Journal of Internet Marketing and Advertising*, 1(4), 350-370.
- Taiwo, N.M. & Agwu, F.I. (2019). The Effects of Mobile Money Services on the Performance of the Banking Institutions: A Case of Kakamega Town. *The International Journal of Engineering and Science*, 3(4), 16-24.

- Traore, K., & Loang, O. K. (2023). The Factors That Influence E-Banking Service Quality in Guinea's Commercial Banks. *International Journal of Accounting, Finance and Business (IJAFB)*, 8(46), 153 - 167.
- Tufano, O.A. (2013). How organizational learning affects a firm's flexibility, competitive strategy, and performance. *Journal of Business Research*, 65(8), 1079-1089.
- Ugwueze, A.C., & Nwezeaku, N.C. (2016). E-Banking and Commercial Bank Performance in Nigeria: A Cointegration and Causality Approach. *International Journal of e-Education, e-Business, e-Management and e-Learning*, 6, 175-185.
- Virginia, W., Fredrick, D. and John G. (2021). Relationship between bank innovations and financial performance of commercial banks in Kenya. *International Journal of Education and Research*, 3(5), 443-456.
- Wachira, V.K., Kalui, F.M., & Gathii, J. (2021). Digital financial innovation services and their impact on the performance of commercial banks in Kenya. *European Journal of Economic and Financial Research*.
- Wadud, M. A. (2018). Impact of Technology on the Performance of Commercial Banks in Bangladesh. Available at SSRN 3107770.
- Weru, E., Emmanuel, L.S. & Peter D. (2022). Adoption of financial innovation in the Ghanaian banking industry. *African Review of Economics and Finance*, 6(2), 88-114.
- World Bank. (2021). *Financial Inclusion Data*. Retrieved from <https://datacatalog.worldbank.org/dataset/financial-inclusion-data>
- Zayyanu, R.E., Umar, H. & Taiwo, S.A. (2022). The impact of internet banking on bank performance and risk: The Indian experience. *Eurasian Journal of Business and Economics*, 2(4), 43-62.
- Zeleeuw, Y. (2018). Assessment on Attitudes of Employees and Customers towards Electronic Banking System in Commercial Bank of Ethiopia: A Case Study on Hamle 19 Branch. *Proceedings of the 11th Annual Student Research Forum*, 85-102.
- Zuo, L., Li, H., & Xia, X. (2023). An Empirical Analysis of the Impact of Digital Finance on the Efficiency of Commercial Banks. *Sustainability*, 15(5), 4667.