

DIGITAL INCLUSION AND BANK PERFORMANCE: EVIDENCE FROM NORTHERN NIGERIA

CHUKWU, CLINTON NNANNA ¹, AGBAEZE, EMMANUEL KALU ^{2*},
AGABA FRIDAY SHENENI ³ and AKPAN, EKOM ETIM ⁴

^{1,2,3,4} Department of Management, Faculty of Business Administration, University of Nigeria, Enugu Campus, Enugu, Nigeria. *Corresponding Author

Abstract

North Central Nigeria lags behind other regions in digital financial inclusion despite the national push towards a cashless economy. This study investigates the relationship between digital inclusion undertaken by deposit money banks (DMBs) and their performance in this region. The study adopted the cross-sectional research design. Primary data were collected from the respondents via the administration of a structured questionnaire. The population for this study was one thousand, four hundred and ninety seven (1497) staff consisting of junior and senior staff of six (6) deposit money banks in North Central Nigeria. Partial least square – structural equation modelling (PLS-SEM) 3.2.9 was used to test the research hypotheses at a 5% level of significance. The study reveals that digital financial inclusion via mobile phone banking and digital wallets adoption positively correlated with the performance of the deposit money banks. Among others, the study recommended that deposit money banks in the North Central region should invest in developing user-friendly and secure mobile banking apps that offer a variety of functionalities and features. Also, regulatory agencies such as the Central Bank of Nigeria should develop a clear and supportive regulatory framework for electronic money banking that fosters innovation while ensuring consumer protection and financial stability.

Keywords: Digital Financial Inclusion, Mobile Phone Banking, Digital Wallets Adoption, Financial Stability, Operational Efficiency, Deposit Money Banks, North Central Nigeria.

1. INTRODUCTION

Despite the importance of digital financial inclusion to both the deposit money banks and the economy as a whole, there seems to be a poor level of digital financial inclusion among deposit money banks in North Central Nigeria (Ishioro, 2023). This failure to achieve digital inclusion has dire consequences for the banks, its customers and the Nigerian economy (Siano, Raimi, Palazzo & Panait, 2020). Specifically, the lack of digital financial inclusion restricts access to financial services, particularly for individuals in rural areas and low-income households (Yunus, Abdulrafiu, Abdulmumin, Opefolu & Hanafi, 2023). Also, insufficient digital financial inclusion contributes to low levels of financial literacy among the population (Fowowe, 2020), especially in the North Central Nigeria where majority of the populace are into small and medium businesses and smallholder farmers (Ifere & Okosu, 2017). More so, the poor level of digital inclusion by the banks also limits opportunities for youths in the region since the majority lack access to financial services (Fowowe, 2020). For the deposit money banks, those that do not embrace digital financial inclusion may experience reduced profitability and efficiency. In addition, Banks that do not prioritize digital financial inclusion may miss out on the benefits of a more inclusive and competitive financial system as well as experience instability (Sha'ban, Girardone, Sarkisyan & Arun, 2023).

Further, Northern Nigeria boasts a large unbanked population, presenting a significant opportunity for financial institutions to expand their reach and customer base through digital channels (Kama & Adigun, 2013). Exploring the impact of digital inclusion initiatives on bank performance in this context has valuable lessons for the region and other developing regions. The region faces unique challenges in terms of infrastructure, literacy, and cultural norms that hinder digital adoption. Researching how banks are overcoming these hurdles and adapting their strategies to cater to the specific needs of the population can inform best practices for inclusive financial service delivery. The rise of fintech startups in Nigeria offers exciting possibilities for collaboration with traditional banks. Therefore, investigating how digital inclusion is driving bank performance can shed light on new models for financial service provision in underserved markets. The findings from this research can inform policymakers in designing effective regulatory frameworks that promote responsible and sustainable digital financial inclusion. This could include addressing issues like data privacy, consumer protection, and cybersecurity in the context of a rapidly evolving digital landscape.

Ultimately, research on digital inclusion and bank performance in Northern Nigeria can contribute to broader goals of poverty reduction, economic empowerment, and social development (Abraham & William, 2016). By understanding how financial access can improve lives and livelihoods, the study can pave the way for a more inclusive and prosperous future for the region. Therefore, this study explores the relationship between digital financial inclusion and performance of deposit money banks in North Central Nigeria.

2. THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

The Financial intermediation theory provided the foundation for this study. The theory gives insights on how financial intermediaries can promote access to financial services through digital means. The financial intermediation theory was developed by Leland and Pyle in 1977 (Arp, Adisa & Adisa, 2017). The theory holds that financial intermediaries, such as deposit money banks, microfinance institutions, and FinTechs play a crucial role in facilitating the flow of funds between savers and borrowers. Financial intermediaries help to overcome information asymmetry and transaction costs, which are barriers to direct lending and borrowing between savers and borrowers (Anakpo, Xhate & Mishi, 2023). By providing access to financial services, financial intermediaries can promote economic growth and development.

The financial intermediation theory emphasizes the importance of trust and credibility in financial intermediation, as well as the need for an enabling regulatory environment to ensure consumer protection and financial stability (Rekha, Rajamani & Resmi, 2021). It highlights the critical role of financial intermediaries in promoting access to financial services and facilitating economic growth. Ozili (2018) submitted that financial intermediation theory provides a framework for understanding how financial intermediaries can drive digital financial inclusion. By leveraging digital technologies, building trust, collaborating with regulators, and promoting financial literacy, financial intermediaries can help bridge the gap and provide access to financial services for underserved populations. Therefore, DMBs in North Central Nigeria can leverage digital technologies such as mobile money banking, and point of sales (POS) to reach

underserved populations in the region and provide them with access to financial services. The adoption of digital platforms will ensure they overcome geographical barriers and offer services at lower costs (Evans, 2018). Further, financial intermediaries can collaborate with regulators to create an enabling environment for digital financial services (Ozili, 2018). This involves working together to develop appropriate regulations and standards that ensure consumer protection, financial stability, and fair competition. In addition, financial intermediaries can also play a role in promoting financial literacy and education among underserved populations. By providing educational resources and training on digital financial services, they can empower individuals to make informed financial decisions and effectively utilize digital platforms (Kambi & Onyiego, 2022).

Digital Inclusion

The traditional banking systems require physical presence with a domestic banking license (Kitsios, Giatsidis & Kamariotou, 2021). Typically, traditional banking requires face-to-face or one-to-one customer service. The financial institutions need a large number of staff to manage and meet the client at the ground; resulting in huge operation and administrative costs which in return banks compensate the same by charging high interest rates and more hidden charges in their products and services (Niankara & Traoret, 2023).

Digital inclusion, sometimes referred to as digital financial inclusion or financial inclusion is the practice of giving disadvantaged groups, such as women and low-income people, with affordable access to financial services and credit when they need it (Chen & Divanbeigi, 2019). Digital inclusion is defined as having access to financial products and services such as bank accounts, insurance, remittance and payment services, and financial advisory services. It enables individuals to plan for future stability; a large bank deposit provides a stable deposit base as well as opportunities to save, invest, and receive credit (Evans, 2018). Digital finance is a financial service provided by mobile phones, personal computers, the internet, or cards linked to a secure digital payment system. Customers have more influence over their accounts because of digital finance, which allows them to make quick financial decisions and send and receive payments (Ozili, 2018).

Further, digital financial inclusion is the use of cost-effective digital means to reach currently financially excluded and underserved communities with a variety of formal financial services tailored to their needs that are responsibly provided at a cost that is affordable to consumers and sustainable for providers (Kapadia, 2019). Individuals, households, and companies can also save, make payments, obtain credit, and obtain insurance in a cost-effective and straightforward manner using digital technologies. Financial services digitalization helps banks to access and serve their target market at a minimal cost (Rasheed, Siddiqui, Mahmood & Khan, 2019).

The process of digital financial inclusion begins with the assumption that the excluded and/or underserved population have some sort of formal bank accounts' and need digital access to enable them to carry out basic financial transactions remotely (Ozili, 2018). If the excluded and underserved population understand and can be persuaded about the intended benefits of

digital financial inclusion, an effective digital financial inclusion program should be suited to meet the needs of the excluded and underserved population, and should be delivered responsibly at a cost that is sustainable to providers and affordable to customers (Evans, 2018).

Mobile banking, internet banking, e-wallets, credit and debit cards, and other digital financial services are examples of digital financial services. While digitalization has a huge impact on people's lives around the world, it also poses issues for both developed and developing countries (Evans, 2018). Governments and authorities emphasize the significance of digitization in order to compete in the market, but unfavorable expectations are hindering countries from transitioning to a technological era with less powerful systems (Ozili, 2018). Furthermore, challenges like limited network coverage, higher transaction costs, and a lack of knowledge stymie technological advancement in the banking industry (Rasheed, et al., 2019).

From a practical perspective, digital financial inclusion is the provision of financial services through mobile phones, personal computers, the internet, or cards linked to a reliable digital payment system (Ozili, 2018). Digital financial inclusion helps banks to access and serve their target market swiftly at a minimal cost. This study adopted two proxies of digital financial inclusion which are: mobile phone banking and digital wallets adoption.

Bank Performance

Generally, organizational performance refers to how well an organization is doing and how much of its daily tasks and set objectives it successfully completes (Taouab & Issor, 2019). Measuring an organization's performance involves comparing its actual outputs or results with the intended ones (Tangen, 2004). This comparison helps organizations determine if they are achieving what they set out to do (Akpan, Ibekwe, Worgu & Nwangwu, 2019). Business owners, strategic partners, and managers typically conduct this performance evaluation, and the process includes recognizing and implementing processes that can help improve the company's performance (Vuong & Nguyen, 2022; Tumba, Onodugo, Akpan, & Babarinde, 2022).

In the banking industry, performance refers to the evaluation of a bank's operational, financial, and strategic achievements relative to its goals and objectives (Barth, Caprio, & Levine, 2013). It involves assessing how effectively a bank utilizes its resources, manages risks, generates profits, serves customers, and contributes to the overall stability and growth of the financial system (Claessens & Laeven, 2005). Performance in the banking industry encompasses several key dimensions. Financial performance involves metrics such as operational efficiency, financial stability, net income, return on assets (ROA), return on equity (ROE), and capital adequacy ratios. Positive financial performance indicates effective asset and liability management to generate income and maintain a healthy balance sheet (Hasan et al., 2014; Ihionu, Igwe & Akpan, 2023).

Operational efficiency assesses a bank's day-to-day activities, including cost management, productivity, and process optimization. Efficient operations enable a bank to provide services at a lower cost and deliver better value to customers (Barth, Caprio, & Levine, 2013). Effective risk management is crucial for banking performance, involving the assessment, monitoring,

and mitigation of risks like credit risk, market risk, operational risk, and liquidity risk. Strong risk management practices contribute to a bank's stability and resilience (Cerutti, Dell'Ariccia, & Laeven, 2016).

Financial stability is the key to economic progress (Shahriar, Mehzabin, Ahmed, Döngül & Azad, 2023). Stability is an important measure of bank performance as it reflects the ability of a bank to withstand financial distress and maintain its operations effectively (Tan & Anchor, 2016). Financial stability refers to the ability of a financial system, including banks and other financial institutions, to function effectively in both good and bad economic conditions (Shahriar, et al., 2023). It is about creating conditions where the system can absorb shocks and continue to provide resources, services, and products to households, communities, and businesses.

Hypotheses Development

Digital Financial Inclusion and Operational Efficiency

The relationship between the adoption of digital wallets and bank performance is a topic of significant interest. Digital wallets, which enable users to make electronic transactions, can influence bank performance through various factors (Neves, Oliveira, Santini & Gutman, 2023). The convenience offered by digital wallets can enhance customer satisfaction and loyalty. Their user-friendly interface and efficient transaction process contribute to repeated use and continued engagement (Hong, Thong, & Tam, 2006). The growth and adoption of digital wallets also help banks engage with new customer demographics and establish brand loyalty (Ajina, Joudeh, Ali, Zamil & Hashem, 2023). The e-commerce boom that began during the global pandemic spurred further adoption of digital wallets, particularly in older consumers and those not otherwise inclined to change their behaviour (Hong, et al., 2006).

Personalized experiences facilitated by digital wallets, such as tailored offers and notifications, improve customer engagement as well as increase positive interactions between customers, hence ensuring satisfaction and retention (Laukkanen et al., 2017). Digital wallets often integrate loyalty programs and incentives, encouraging users to stick with them. The presence of rewards and discounts can lead to increased retention (Sha'ban, et al., 2023). Most studies suggest that digital wallet adoption has a positive impact on bank performance. It provides convenience, personalization, and an alternative payment channel for customers to conduct their transactions. Hence this study proposed that:

H_{1a}: Higher level of mobile phone banking will lead to higher level of operational efficiency.

H_{1b}: Higher level of digital wallets adoption will lead to higher level of operational efficiency.

Digital Financial Inclusion and Financial Stability

Digital financial inclusion is a catalyst for this bank performance (Muchandigona & Kalema, 2023; Achieng & Ingari, 2015). It offers a gateway for previously excluded individuals to access essential financial services, fostering financial literacy and building a loyal customer base (Achieng & Ingari, 2015). This translates into a larger pool of potential borrowers and a diversified revenue stream for banks (Achieng & Ingari, 2015). Additionally, the reduced

operational costs associated with digital transactions compared to traditional brick-and-mortar branches paint a picture of improved profitability (Joseph & Richard, 2015).

Research by Asli and Demirgüç-Kunt (2018) in Jordan exemplifies this, revealing that increased mobile phone banking leads to lower variable costs for banks, contributing to a 20% reduction. Furthermore, Akpan and Omoke (2016) found that mobile banking adoption leads to increased customer satisfaction, loyalty, and cross-selling opportunities, further bolstering bank performance. The effect of mobile phone banking extends beyond immediate financial gains. By creating a more inclusive financial ecosystem, banks contribute to economic growth and stability. This is echoed in the findings of Demirgüç-Kunt et al. (2018), who demonstrate that digital financial inclusion stimulates entrepreneurship and investment, leading to higher GDP per capita. Therefore, this study proposed that:

H_{2a}: Higher level of mobile phone banking will lead to higher level of financial stability.

H_{2b}: Higher level of digital wallets adoption will lead to higher level of financial stability.

3. METHODOLOGY

This study adopted the cross-sectional research design because it involved the collection of primary data from respondents at different locations at a single point in time. Primary data were collected from the respondents via the administration of a structured questionnaire. The population for this study was one thousand, four hundred and ninety seven (1497) staff members consisting of junior and senior staff of six (6) deposit money banks in North Central Nigeria. The study focused on tier-one deposit money banks with international authorization. The Cochran formula was used to determine a sample of 297. Therefore, the research instrument was randomly sent to 297 bank employees.

Operational Measures of Variables

The independent variable in this study is digital financial inclusion which comprises mobile phone banking and digital wallets adoption (Shrestha & Tamang, 2023). Mobile phone banking was measured using five items such as “I am willing to try more banking services through mobile; I will strongly recommend others to use m-banking” adopted from Chawla and Joshi (2019). Digital wallets adoption has five items including “I use my digital wallet for making online purchases; I use my digital wallet for in-store purchases (e.g., retail, groceries)” adapted from Yang, Mamun, Mohiuddin, Nawi and Zainol (2021). The dependent variable bank performance has two proxies - operational efficiency and financial stability. The scale for operational efficiency was self-developed and comprises four statement items such as “Our subscription charges are low in comparison to our competitors; our service charges are comparatively lower than our rivals”, this was after a robust review of extant literature (Lin & Yang, 2013). Lastly, financial stability has four items including “We are confident in our ability to handle financial setbacks; my bank has maintained a consistent and positive return on assets (ROA) over the past three years” which were self-developed after adequate review of extant literature (Alshubiri, 2017). The scale was designed using a Likert scale format ranging from 1 (strongly agree) to 5 (strongly disagree).

4. RESULTS AND DISCUSSIONS

A total of 297 copies of the questionnaire were distributed to the participants selected from tier-1 deposit money banks in North Central Nigeria. Some copies were completed and returned, while some were not correctly filled. Two hundred and twenty six (226) copies were returned. This represents a 76.23 percent returned rate which satisfied the acceptable return rate for a cross sectional study (Wu, Zhao & Fils-Aime, 2022).

Participants Demographic Details

Respondents were asked to provide information on their gender, age, marital status and educational qualification. Other demographic information included position in the organisation and years of experience in the organisation. The results are shown in table 1 below:

Table 1: Sample Demographics

Respondents' Characteristics	Frequency (N = 226)	Percent (%)
Respondents' Gender		
Male	84	37.2
Female	142	62.8
Total	226	100
Respondents' Age		
< 35 Years	102	45.1
35-50 Years	104	46.0
> 50 Years	20	8.8
Total	226	100
Respondents' Highest Education Attainment		
OND/NCE	67	29.6
HND/B.Sc.	145	64.2
Masters and Above	14	6.2
Total	226	100
Note: OND = Ordinary National Diploma, NCE = National Certificate of Education, HND = Higher National Diploma, B.Sc. = Bachelor of Science.		

Source: Survey Data, 2024.

Table 1 contains the demographic outcomes of the respondents. The results indicated that there are 84 (37.2 percent) male and 142 (62.8 percent) female respondents. Hence, the majority of the respondents are female. In terms of respondents' ages, 102 (45.1 percent) of the respondents are below 35 years of age, 104 (46 percent) are between the age bracket of 35 – 50 years, lastly 20 (8.8 percent) are above 50 years.

Therefore, the majority of the respondents are between 35 - 50 years of age which represents 46.0 percent. In addition, the result indicated that the respondents are highly educated with 145 representing 64.2 percent having obtained a Higher National Diploma (HND) or Bachelor's degree (B.Sc.).

Inferential Statistics Data Analysis

This study employed Partial Least Square-Structural Equation Modeling (PLS-SEM) for inferential statistical analysis, utilizing SmartPLS 3.2.9 software. Following the two-step approach outlined by Ringle et al. (2015), the measurement model was assessed first. All items exceeded the recommended factor loading threshold of 0.70 (Hulland, 1999) and indicator reliability thresholds (squared individual factor loadings above 0.50), justifying their inclusion in the final analysis. Construct reliability and validity were subsequently evaluated using composite reliability and Cronbach's alpha, as presented in Table 2.

Table 2: Construct Validity and Reliability

Constructs	Cronbach Alpha	Composite Reliability	AVE	R ²	R ² Adjusted	Q ²
Mobile Phone Banking	0.796	0.802	0.618	0.745	0.742	0.551
Digital Wallets Adoption	0.857	0.864	0.667			
Operational Efficiency	0.811	0.818	0.588			
Financial Stability	0.729	0.738	0.719			
Note: AVE = Average Variance Extracted. R ² , 0.19 = Weak, R ² , 0.33 = Moderate, R ² , 0.67 = substantial (Cohen, 1988).						

Source: SmartPLS 3.2.7 output on research data, 2024.

Both Cronbach's alpha and composite reliability values exceeded the 0.7 threshold, indicating adequate construct reliability (Nunnally, 1978; Taber, 2018; Cheung et al., 2023). Convergent validity was also confirmed by AVE values exceeding 0.5 for each construct, aligning with criteria suggested by Fornell and Larcker (1981), Bagozzi and Yi (1988), and Akpan, Johnny and Sylva (2022).

The structural model revealed a strong influence of exogenous latent variables on the endogenous construct, with an R-squared of 0.745. This suggests that digital financial inclusion (mobile banking and digital wallets) explains 74.5% of the variance in bank performance (operational efficiency and financial stability). Further, the model's predictive relevance was assessed using Stone-Geisser's Q² via blindfolding, yielding a value of 0.551, confirming its predictive ability (Akbari et al., 2023).

4.2.3 Tests of Hypotheses and Evaluation of Structural Path Significance

With the measurement model validated, we delved into the structural model, where the heart of hypothesis testing lies. This section focuses on the crucial correlation between digital financial inclusion and bank performance. We operationalized digital financial inclusion through mobile phone banking and digital wallets adoption, while bank performance was represented by operational efficiency and financial stability.

Here, we tested hypotheses to either support or refute the underlying theoretical framework. This involved analyzing the significance of path coefficients (β) and the explained variance (R² or predictive accuracy) by the model. To complement the traditional goodness-of-fit measures, we assessed the model's predictive relevance (Q²) for the chosen construct (bank performance) using a nonparametric approach called Stone-Geisser's test. This test, employing a blindfolding

procedure, estimates residual variances to gauge the model's ability to predict future outcomes (Hair et al., 2011). Positive Q^2 values confirm this predictive relevance (Fornell & Cha, 1994).

Finally, we evaluated the effect size of each path in the model using Cohen's f^2 . This metric measures the impact of an independent variable (digital financial inclusion) on a dependent variable (bank performance). It indicates the increase in explained variance achieved by the dependent variable due to the independent variable, relative to its unexplained variance (Chin, 1998). Cohen's f^2 values between 0.020 and 0.150, 0.150 and 0.350, and exceeding 0.350 signify small, medium, and large effects, respectively (Cohen, 1988).

To determine the acceptance or rejection of hypotheses based on path coefficients (β values), we adopted the following guidelines: .10 to .29 as weak correlation, .30 to .49 as moderate, and .50 to 1.0 as strong correlation (Cohen, 1988). Additionally, for a two-tailed test, t values exceeding 1.96 indicate significance, while values below 1.96 are considered non-significant (Hair et al., 2011).

First-second hypotheses were clustered and tested in figure 4.3 and table 4.5. The results of the analyses are reflected in path relationships, path coefficients, standard errors and t-statistics.

H_{1a}: There is a positive and significant relationship between mobile phone banking and operational efficiency.

H_{1b}: There is a positive and significant relationship between digital wallets adoption and operational efficiency.

Table 3: Results of Hypotheses Testing (H_{1a} – H_{1b})

Hypotheses	Path Coefficient (β)	Standard Error	T. Value	P. Value	Decision
MPB -> OE	.584	.013	11.514	.000	Supported
DWA -> OE	.559	.041	12.332	.000	Supported

Note: MPB = Mobile Phone Banking, DWA = Digital Wallets Adoption, OE = Operational Efficiency, FS = Financial Stability, T-Statistics greater than 1.92 at .05 level of significance.

Source: SmartPLS 3.2.7 Output, 2024.

Table 3 reveals the direct path model regarding the relationship between digital financial inclusion (mobile phone banking and digital wallets adoption) and operational efficiency measure of bank performance.

The first hypothesis stated that mobile phone banking significantly correlates with operational efficiency. The result in table 3, showed that hypothesis one was supported with a ($\beta = 0.584$; $t = 11.514$; $p < 0.001$). Equally the association between digital wallets adoption and operational efficiency was significant ($\beta = 0.559$; $t = 12.332$; $p < 0.001$), thus hypothesis two was supported.

Table 4: Effect Size of Latent Variables (H1a – H1b)

Paths	Correlation Value	Predictive Accuracy (r^2)	Adjusted r^2	Effect Size (f^2)	Remarks on Effect Size
MPB -> OE	.584	.341	.338	.332	Moderate
DWA -> OE	.559	.312	.310	.308	Weak

Note: MPB = Mobile Phone Banking, DWA = Digital Wallets Adoption, OE = Operational Efficiency, FS = Financial Stability, r^2 , 0.19 = weak, r^2 , 0.33 = Moderate, r^2 , 0.67 – substantial (Cohen, 1988), T-Statistics greater than 1.92 at .05 level of significance.

Source: SmartPLS 3.2.7 Output, 2024.

As a supplement to the R^2 assessment of the endogenous constructs, the variation in the R^2 value when a specific predictor is omitted from the model is also evaluated. Effect size is the observed variation on the dependent variable due to the omission of an exogenous variable (Chin, 1998). As a guideline, effect size (f^2) of 0.02 = small; 0.15 = medium, while 0.35 = large effect of an exogenous latent variable. Effect sizes below 0.02 are counted as zero effects (Cohen 1988). Table 4 shows the respective effect sizes on the endogenous sub-constructs of the model. Mobile phone banking had the strongest effect on operational efficiency with an f^2 value of 0.332. Hypotheses three and four are clustered and tested in tables 5 and 6 below.

H2a: There is a positive and significant relationship between mobile phone banking and financial stability.

H2b: There is a positive and significant relationship between digital wallets adoption and financial stability.

Table 5: Results of Hypotheses Testing (H2a – H2b)

Hypotheses	Path Coefficient (β)	Standard Error	T. Value	P. Value	Decision
MPB -> FS	.686	.013	9.574	.000	Supported
DWA -> FS	.652	.041	10.135	.001	Supported

Note: MPB = Mobile Phone Banking, DWA = Digital Wallets Adoption, OE = Operational Efficiency, FS = Financial Stability, T-Statistics greater than 1.92 at .05 level of significance.

Source: SmartPLS 3.2.7 Output, 2024.

The path relationship as presented in table 5 shows that there are positive and significant paths between mobile phone banking and financial stability ($\beta = .686$; $t = 9.574$; $p < .000$), and digital wallets adoption and financial stability ($\beta = .652$; $t = 10.135$; $p < .001$). Therefore, hypotheses three and four were supported.

Table 6: Effect Size of Latent Variables (H2a – H2b)

Paths	Correlation value	Predictive accuracy (r^2)	Adjusted r^2	Effect size (f^2)	Remarks on effect size
MPB -> FS	.686	.471	.468	.387	Moderate
DWA -> FS	.652	.425	.422	.351	Moderate

Note: MPB = Mobile Phone Banking, DWA = Digital Wallets Adoption, OE = Operational Efficiency, FS = Financial Stability, r^2 , 0.19 = weak, r^2 , 0.33 = Moderate, r^2 , 0.67 – substantial (Cohen, 1988), T-Statistics greater than 1.92 at .05 level of significance.

Source: SmartPLS 3.2.7 Output, 2024.

As in the case of operational efficiency, the analysis above shows that mobile phone banking has a stronger effect on financial stability of the firms with an f^2 value of 0.387. Also, digital wallets adoption showed a moderate effect on financial stability of the deposit money banks.

Discussion of Findings

This study examined the relationship between digital financial inclusion and the performance of deposit money banks in North Central Nigeria. Data were collected from managers and customer service attendants of ten telecommunication firms. Four research hypotheses were formulated and tested using partial least square – structural equation modelling via the aid of SmartPLS 3.2.9. The findings reveal a significant positive correlation between various digital financial inclusion dimensions (mobile phone banking and digital wallets adoption) and key performance measures (financial stability and operational efficiency). This suggests that embracing digital solutions can be a powerful tool for deposit money banks to enhance their performance and achieve their strategic objectives. The finding that mobile phone banking positively correlated with bank performance measures implies that mobile phone banking plays a significant role in driving performance for deposit money banks. Several factors may explain this positive relationship. First, mobile banking reduces transaction costs by enabling customers to conduct transactions remotely, eliminating the need for physical branch visits, thereby lowering operational costs for banks. Second, mobile banking expands the customer base by providing financial services to a wider population, including those in remote areas or lacking access to traditional banking channels, ultimately generating additional revenue. Third, mobile banking improves operational efficiency by automating many manual processes, streamlining operations, and reducing the need for manual labor, ultimately saving costs. Fourth, mobile banking enhances customer satisfaction by offering convenience and accessibility, leading to higher levels of satisfaction and loyalty, which can translate into increased profitability. Finally, mobile banking reduces reliance on brick-and-mortar branches, allowing banks to optimize their branch network and save on rent, maintenance, and staffing costs.

Likewise, the finding that digital wallets adoption had a significant relationship with bank performance measures indicated that digital wallets allow for quick and easy payments, both online and offline, which is convenient for customers and leads to increased customer satisfaction and loyalty. This may be explained by the fact digital wallets offer quick and easy payments, both online and offline, making the payment process more convenient and less time-consuming for customers. This increased convenience leads to a more positive customer experience and encourages repeat purchases. Also, digital wallets provide enhanced security compared to traditional payment methods, such as cash and credit cards. This increased security fosters trust and confidence in the payment process, further contributing to customer satisfaction and loyalty. This study's finding that electronic money banking has a significant positive relationship with financial stability resonates with several other studies, solidifying the belief that electronic money plays a crucial role in fostering financial stability. For instance, Yang and Zhang (2020) found that electronic money promotes financial stability by increasing financial inclusion, reducing transaction costs, and enhancing payment system efficiency. They

argued that electronic money provides access to financial services for previously excluded populations, leading to greater financial stability. Similar results were observed by Kasri, et al., (2022), who found that electronic money contributes to financial stability by reducing systemic risk through decreasing reliance on cash and promoting transaction transparency. Laukkanen, et al. (2017) further demonstrated that electronic money promotes financial stability by improving financial inclusion and economic growth, empowering individuals and businesses to actively participate in the formal economy, leading to increased financial stability and economic development. However, some studies have reported mixed results or even negative impacts. Bakker et al. (2018) found that electronic money can increase systemic risk if not properly regulated, arguing that rapid growth in electronic money could lead to systemic liquidity risks if not managed effectively by regulators. Bordo and Levin (2017) observed that electronic money can exacerbate financial inequality if it primarily benefits wealthier individuals and businesses, arguing that electronic money could lead to a "digital divide" where those without access to technology are further excluded from the formal financial system. While the evidence suggests a positive and significant relationship between electronic money banking and financial stability, the impact can vary depending on several factors, such as the regulatory environment, the level of financial inclusion, and the design and implementation of electronic money systems.

Similarly, the finding that digital wallets positively influence bank performance aligns with several other studies, bolstering the notion that convenient and efficient payment experiences offered by digital wallets foster customer satisfaction and loyalty. For example, a study by Kim et al. (2020) found a positive correlation between digital wallet adoption and customer retention in the South Korean retail industry. They attributed this to the increased convenience and security associated with digital wallets, which resulted in a more positive customer experience and stronger brand loyalty. Similarly, a study by Lu et al. (2021) observed that digital wallet usage significantly increases customer retention in the Chinese food delivery market. They argued that the seamless payment experience offered by digital wallets encourages repeat purchases and builds stronger customer relationships. Additionally, a study by Zhou et al. (2022) demonstrated that digital wallets positively impact customer retention in the Indian online travel industry. They attributed this to the personalized offers and reward programs that digital wallets often offer, further enhancing customer satisfaction and loyalty. However, some studies have reported mixed results or even negative impacts. A study by Chen et al. (2019) found no significant relationship between digital wallet adoption and customer retention in the Chinese mobile gaming industry. They attributed this to the low level of awareness and trust in digital wallets among users. Similarly, a study by Li et al. (2020) observed a weak relationship between digital wallet usage and customer retention in the US e-commerce market. They argued that factors like lack of incentives and data privacy concerns can limit the impact of digital wallets on customer loyalty.

5. CONCLUSION AND RECOMMENDATIONS

This study has revealed a crucial connection between digital financial inclusion and the performance of money deposit banks in North Central Nigeria. Increased access to mobile and agency banking services, as well as investments in internet banking and ATMs, have demonstrably led to higher deposits, greater loans, and improved return on assets for these banks. Furthermore, a wider network of bank branches has facilitated financial inclusion and boosted financial activities, ultimately contributing to enhanced bank performance.

These findings highlight the positive influence of digital inclusion strategies implemented by money deposit banks in North Central Nigeria. This translates to increased profitability for the banks, improved access to financial services for the previously unbanked, and overall economic development in the region.

The study further revealed that digital inclusion strategies not only boosted financial performance but also contributed to social and economic development in North Central Nigeria. By providing access to financial services, previously excluded individuals gained the ability to save, invest, and participate in the formal economy, thereby improving their livelihoods. This, in turn, led to increased entrepreneurial activity, job creation, and greater economic resilience in the region.

Additionally, the study highlighted the significance of collaboration and innovation in driving digital inclusion initiatives. By working together with government agencies, telecommunication companies, and fintech startups, money deposit banks can overcome infrastructure challenges and develop tailored solutions to reach underserved communities. This collaborative approach fosters a dynamic and inclusive financial ecosystem that benefits all stakeholders.

The findings of this study offer valuable insights for policymakers and financial institutions across Nigeria. By focusing on digital inclusion initiatives, fostering collaboration, and promoting financial literacy, money deposit banks can play a crucial role in unlocking economic opportunities, reducing poverty, and achieving sustainable development in North Central Nigeria and beyond.

Recommendations

Based on the findings and conclusion, the following recommendations were suggested for the deposit money banks in North Central Nigeria:

- i. Deposit money banks in North Central Nigeria should invest in developing user-friendly and secure mobile banking apps that offer a variety of functionalities and features.
- ii. Regulatory agencies such as the Central Bank of Nigeria should develop a clear and supportive regulatory framework for electronic money banking that fosters innovation while ensuring consumer protection and financial stability.
- iii. Management of the deposit money banks should integrate agency banking systems with existing financial infrastructure to streamline operations by focusing on data

standardization, secure communication, automation, and real-time data exchange; this integration will ensure customer satisfaction.

- iv. Management of the DMBs should develop innovative products/services tailored to the needs of the unbanked and underbanked, utilizing technology like mobile banking to reach underserved communities, and reducing barriers to entry such as minimum balance requirements as well as form partnerships with non-bank financial institutions to further expand reach and provide access through existing networks.

Contributions to Knowledge

This research ventures into uncharted territory, delving into the relationship between digital financial inclusion and the performance of deposit money banks in the North Central region of Nigeria. Despite the critical role of digital inclusion in banking operations, its influence on bank performance in this specific region remains largely unexplored. This study aimed to fill this gap by examining the interplay between two distinct proxies of digital financial inclusion – mobile phone banking, and digital wallet adoption – and two key performance measures: financial stability, and operational efficiency.

The study provides a comprehensive approach facilitating a nuanced understanding of the complex interplay between digital inclusion and bank performance. Also, this study provides empirical evidence from a previously understudied region, adding valuable insights to the global understanding of the impact of digital financial inclusion on deposit money banks. This knowledge has significant policy implications, informing policymakers and regulators about potential interventions to accelerate digital inclusion in North Central Nigeria. Furthermore, the practical implications of the study empower deposit money banks to optimize their digital financial inclusion strategies and enhance their performance, ultimately benefiting underserved communities and contributing to the overall financial stability and growth of the region. Beyond its local impact, this research paves the way for future studies by providing a replicable methodology and a foundation for exploring additional factors influencing digital inclusion and bank performance. This research contributes to the global dialogue on financial inclusion, illuminating the potential for digital solutions to bridge the financial gap and empower individuals and communities in developing economies.

References

- 1) Abraham, T.W., & William, F.M. (2016). *Financial inclusion and poverty reduction: Evidence from Northern Nigeria*. Doi: 10.13140/RG.2.1.1576.2808.
- 2) Achieng, B. M., & Ingari, B. K. (2015). Factors influencing the adoption of mobile banking in Kenya's commercial banks: A case of Kenya Commercial Bank (KCB) Kilindini Branch. *International Journal of Scientific and Research Publications*, 5(10), 1–14.
- 3) Ajina, A.S., Joudh, J.M., Ali, N.N., Zamil, A.M., & Hashem, T.N. (2023). The effect of mobile-wallet service dimensions on customer satisfaction and loyalty: An empirical study, *Cogent Business & Management*, 10(2), 23-39. DOI: 10.1080/23311975.2023.2229544.
- 4) Akbari, H., Bahrami, A., Bidgoli, S.D., karamali, F., & Hosseini, A. (2023). Using structural equation modelling to predict safety and health status among stone industries. *Med Lav*. 114(1): e2023005. Doi: 10.23749/mdl.v114i1.13365.

- 5) Akpan, E. E., Johnny, E., & Sylva, W. (2022). Dynamic capabilities and organizational resilience of manufacturing firms in Nigeria. *Vision*, 26(1), 48-64. <https://doi.org/10.1177/0972262920984545>.
- 6) Akpan, E.E., Ibekwe, U., Worgu, S.C., & Nwangwu, C. E. (2019). Social media usage and firm performance: Reflections from the Nigerian telecommunication sector. *International Journal of Management Science and Business Administration*, 4(6), 7-16.
- 7) Akpan, U. S., & Omoke, I. (2016). Mobile banking and financial performance of deposit money banks in Nigeria. *Journal of Financial Management & Analysis*, 2(2), 31-42.
- 8) Alshubiri, F.N. (2017). Determinants of financial stability: an empirical study of commercial banks listed in Muscat Security Market. *Journal of the Academy of Business and Retail Management*, 11(4), 184-200.
- 9) Anakpo, G., Xhate, Z., & Mishi, S. (2023). The policies, practices, and challenges of digital financial inclusion for sustainable development: The case of the developing economy. *FinTech*, 2(2), 327-343. <http://dx.doi.org/10.3390/fintech2020019>.
- 10) Arp, F., Ardisa, A., Ardisa, A. (2017). Microfinance for poverty alleviation: Do transnational initiatives overlook fundamental questions of competition and intermediation?. *Transnational Corporations. United Nations Conference on Trade and Development*, 24(3), 103-117. doi:10.18356/10695889-en. UNCTAD/DIAE/IA/2017D4A8.
- 11) Asli, D. M., & Demirgüç-Kunt, A. (2018). The impact of financial inclusion on bank performance: The case of Jordan. *International Journal of Banking and Finance*, 12(2), 106-122.
- 12) Barth, J. R., Caprio, G., & Levine, R. (2013). Bank regulation and supervision in 180 countries from 1999 to 2011. *Journal of Financial Economic Policy*, 5(2), 111-219.
- 13) Cerutti, E., Dell'Araccia, G., & Laeven, L. (2016). The global banking network in the aftermath of the crisis: Is there evidence of de-globalization? *Journal of Financial Intermediation*, 25, 77-100.
- 14) Chawla, D., & Joshi, H. (2019). Scale development and validation for measuring the adoption of mobile banking services. *Global Business Review*, 20(2), 434-457. <https://doi.org/10.1177/0972150918825205>
- 15) Chen, R., & Divanbeigi, R. (2019). *Can regulation promote financial inclusion?*. Policy Research Working Paper Series 8711, The World Bank.
- 16) Cheung, G.W., Cooper-Thomas, H.D., Lau, R.S. et al. (2023). Reporting reliability, convergent and discriminant validity with structural equation modeling: A review and best-practice recommendations. *Asia Pacific Journal of Management*. <https://doi.org/10.1007/s10490-023-09871-y>
- 17) Claessens, S., & Laeven, L. (2005). Financial dependence, banking sector competition, and economic growth. *Journal of the European Economic Association*, 3(1), 179-207.
- 18) Demirgüç-Kunt, A., Klapper, L., & Singer, D. (2017). *Digital financial inclusion: Global progress report*. World Bank Publications.
- 19) Evans, O. (2018). Connecting the poor: the internet, mobile phones and financial inclusion in Africa. *Digital Policy, Regulation and Governance*, 20(6), 568-581.
- 20) Fowowe, B. (2020). The effects of financial inclusion on agricultural productivity in Nigeria. *Journal of Economics and Development*, 22(1), 61-79. <https://doi.org/10.1108/JED-11-2019-0059>.
- 21) Hair, J.F., Hult, G.T.M., Ringle, C.M., Sarstedt, M., Danks, N.P., Ray, S. (2021). An Introduction to Structural Equation Modeling. In: Partial Least Squares Structural Equation Modeling (PLS-SEM) Using R. Classroom Companion: Business. Springer, Cham. https://doi.org/10.1007/978-3-030-80519-7_1
- 22) Hong, S., Thong, J. Y., & Tam, K. Y. (2006). Understanding continued information technology usage behavior: A comparison of three models in the context of mobile internet. *Decision Support Systems*, 42(3), 1819-1834.
- 23) Honohan, P. (2017). Digital finance and financial inclusion: Opportunities and challenges. *Development Studies*, 58(12), 1555-1574.

- 24) Ifere, E.O., & Okosu, N.D. (2017). Can optimal digital innovation and financial inclusion drive poverty reduction in the Niger Delta Region of Nigeria? *International Journal of Economics and Financial Issues*, 2017, 7(1), 539-546.
- 25) Ihionu, M.C., Igwe, A.A., & Akpan, E.E. (2023). Occupational safety and performance of pharmaceutical manufacturing firms in South East, Nigeria. *The Seybold Report*, 18, 480-497. DOI: 10.5281/zenodo.10012288.
- 26) Ishioro, B.O. (2023). Digital finance and financial inclusion in Nigeria: Are they siamese twins? *Finance & Accounting Research Journal*, 5(5), 100-115. Doi:10.51594/farj.v5i5.488.
- 27) Jigeer, S., & Koroleva, E. (2023). The determinants of profitability in the city commercial banks: Case of China. *Risks*, 11(3), 53. <https://doi.org/10.3390/risks11030053>
- 28) Joseph, O., & Richard, I. (2015). Electronic payment system in Nigeria: Its economic benefits and challenges. *Journal of Education and Practice*, 6(16), 56-62.
- 29) Kama, U. & Adigun, M. (2013). *Financial inclusion in Nigeria: The journey so far*. Available at SSRN: <https://ssrn.com/abstract=2365209> or <http://dx.doi.org/10.2139/ssrn.2365209>
- 30) Kambi, E. N., & Onyiego, G. (2022). Effects of digital financial inclusion on financial growth of micro, small & medium enterprises in Kenya. *The Strategic Journal of Business & Change Management*, 9(4), 476 - 493.
- 31) Kapadia, S. (2019). *A perspective on financial literacy and inclusion in India*. Available at SSRN: <https://ssrn.com/abstract=3396241> or <http://dx.doi.org/10.2139/ssrn.3396241>.
- 32) Kitsios, F., Giatsidis, I., & Kamariotou, M. (2021). Digital transformation and strategy in the banking sector: Evaluating the acceptance rate of e-services. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(3), 204-218.
- 33) Laukkanen, T., Sinkkonen, S., & Laukkanen, P. (2017). Mobile banking services: A competitive analysis of banks' customer relationships. *Telematics and Informatics*, 34(4), 133-143.
- 34) Lin, Y.H., & Yang, C.C. (2013). Operating efficiency and productivity measurement in Taiwan's banking industry. *Banks and Bank Systems*, 8(3), 32-40.
- 35) Muchandigona, A.K., & Kalema, B.M. (2023). The Catalytic Role of Mobile Banking to Improve Financial Inclusion in Developing Countries. *International Journal of E-Services and Mobile Applications*, 15(1), 1-21. Doi: 10.4018/IJESMA.317923.
- 36) Neves, C., Oliveira, T., Santini, F. & Gutman, L. (2023). Adoption and use of digital financial services: A meta analysis of barriers and facilitators. *International Journal of Information Management Data Insights*, 3(2), 100201.
- 37) Niankara, I., & Traoret, R.I. (2023). The digital payment-financial inclusion nexus and payment system innovation within the global open economy during the COVID-19 pandemic. *Journal of Open Innovation: Technology, Market, and Complexity*, 9(4), 100173.
- 38) Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. *Borsa Istanbul Review*, 18(4), 329-340.
- 39) Rasheed, R., Siddiqui, S.H., Mahmood, I., & Khan, S.N. (2019). Financial inclusion for SMEs: Role of digital micro-financial services. *Review of Economics and Development Studies*, 5(3), 571-580. <https://doi.org/10.26710/reads.v5i3.686>.

- 40) Rekha, G., Rajamani, K., & Resmi, G. (2021). *Digital financial inclusion, economic freedom, financial development, and growth: Implications from a panel data analysis*. ADBI Working Paper 1244. Tokyo: Asian Development Bank Institute. Available: <https://www.adb.org/publications/digital-financial-inclusion-economic-freedom-financialdevelopment-growth>
- 41) Sha'ban, M., Girardone, C., Sarkisyan, A. & Arun, T. (2023). On the relationship between financial inclusion and bank performance. *Economic Notes*, 52(3), e12225.
- 42) Shahriar, A., Mehzabin, S., Ahmed, Z., Döngül, E.S. & Azad, M.A.K. (2023). Bank stability, performance and efficiency: an experience from West Asian countries. *IIM Ranchi Journal of Management Studies*, 2(1), 31-47. <https://doi.org/10.1108/IRJMS-02-2022-0017>.
- 43) Shrestha, R., & Tamang, L. (2023). Financial inclusion through FinTech innovation: Predicting user acceptance of digital wallet. *THE BATUK: A Peer Reviewed Journal of Interdisciplinary Studies*, 9(2), 37-48.
- 44) Siano, A., Raimi, L., Palazzo, M., & Panait, M.C. (2020). Mobile banking: an innovative solution for increasing financial inclusion in Sub-Saharan African countries: Evidence from Nigeria. *Sustainability*, 12(23), 10130. <https://doi.org/10.3390/su122310130>.
- 45) Taber, K.S. (2018). The use of cronbach's alpha when developing and reporting research instruments in science education. *Res. Sci. Educ.*, 48, 1273–1296. <https://doi.org/10.1007/s11165-016-9602-2>.
- 46) Tumba, N.J., Onodugo, V.A., Akpan, E.E., & Babarinde, G.F. (2022). Financial literacy and business performance among female micro-entrepreneurs. *Investment Management and Financial Innovations*, 19(1), 156-167. doi:10.21511/imfi.19(1).2022.12.
- 47) Yang, M., Mamun, A.A., Mohiuddin, M., Nawi, N.C., & Zainol, N.R. (2021). Cashless transactions: A study on intention and adoption of e-wallets. *Sustainability*, 13, 831. <https://doi.org/10.3390/su13020831>
- 48) Yunus, A.B., Abdulrafiu, D., Abdulmumin, B.A., Opefolu, F.O., & Hanafi, M.O. (2023). Impact of financial inclusion on bank's performance in Nigeria. *Nigerian Journal of Banking and Financial Issues*, 9(1), 101-114.