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MODERATING EFFECT OF DIGITAL LITERACY IN MOBILE BANKING - CUSTOMER SATISFACTION RELATIONSHIP AMONG BANKS IN KANO METROPOLIS

Mahmud Umar Abba, Adamu Yahaya and Orinya John Ogbu.

Department of Business Management, Federal University Dutsin-Ma, Katsina State-Nigeria

Abstract

This study examined the moderating effect of digital literacy in the relationship between mobile banking and customer satisfaction among retail bank customers in Kano Metropolis, Nigeria. A cross-sectional descriptive survey design was used, and data was collected from 390 customers across three randomly selected banks. Structural equation modeling revealed that digital literacy had a direct positive effect on customer satisfaction and significantly strengthened the influence of mobile banking on satisfaction. These results align with the Technology Acceptance Model and Social Cognitive Theory, highlighting digital literacy as a critical cognitive resource that enhances perceptions of ease, efficiency and reliability in electronic banking use. The study concludes that mobile banking alone cannot sustain customer satisfaction without adequate digital competence. It recommends that banks and financial regulators pair technological upgrades with structured digital literacy initiatives, particularly customer-focused training programs. Enhancing users' digital capabilities will not only improve satisfaction but also support broader, more inclusive adoption of electronic banking services in emerging economies.

Keywords: Digital literacy, electronic banking, customer satisfaction, mobile banking, service quality.

1. Introduction

The highly competitive banking environment demands that institutions prioritize customer satisfaction as a key driver of business success and sustainability. Customer satisfaction reflects how well banks' products and services meet customer expectations, influencing repeat patronage and profitability (Ali et al., 2021; Akoi & Yesiltas, 2020). The integration of traditional branch banking with electronic banking platforms, such as Internet banking, mobile applications, ATMs, and point-of-sale (POS) systems, has revolutionized financial service delivery by enhancing convenience, transaction speed, security, and accessibility (Ismail & Abdullah, 2023; Abdulaziz et al., 2022). These digital solutions have become essential in meeting evolving customer expectations and improving service quality.

Empirical evidence on the link between electronic banking adoption and customer satisfaction remains mixed. While studies report positive impacts of mobile banking on customer satisfaction (AbdulAziz Maruf Adeniran, 2022; Fatima Usman, 2022; Smith et al., 2023; Okwuchi, 2024; Yakubu Adamu, 2025), others find insignificant or negative effects in deposit

ISSN 2756-3162

money banks (Adamu, 2025; Adeoti, 2022; Chinedu & Okoro, 2023; Moyo, 2025; Yakubu & Usman, 2024). Key service attributes such as responsiveness, reliability, security, privacy, and speed influence satisfaction but are insufficient alone to explain disparities in customer experiences (Ayinaddis et al., 2023). This inconsistency points to the importance of considering additional factors (digital literacy) that shape how customers engage with digital banking.

Digital literacy prominently emerges as a critical moderator in this relationship. It encompasses the skills to effectively access, evaluate, and use digital information and platforms, empowering users to navigate, communicate, and transact confidently in technologically driven environments (Mane, 2025). Enhanced digital literacy not only improves customers' ability to leverage mobile banking services but also fosters responsible digital citizenship, reducing transaction errors, and increasing satisfaction. Prior research underscores digital literacy's influence on consumer behavior and engagement in digital finance, yet its moderating role between mobile banking and customer satisfaction in Kano Metropolis' deposit money banks remains understudied.

This study, therefore, integrates theoretical and practical perspectives by investigating how digital literacy moderates the relationship between mobile banking adoption and customer satisfaction among deposit money bank customers in Kano Metropolis. The findings aim to inform both academic discourse and banking industry practices, guiding the enhancement of e-banking strategies that align with customers' digital competencies to optimize satisfaction outcomes.

2. Literature Review

This section provides a review of literature related to mobile banking, digital literacy and customers satisfaction.

2.1 Concept of Customer Satisfaction (CS)

Customer satisfaction reflects how well a company's products or services meet or exceed customer expectations. Zendesk (2025) describes it as the degree of customer happiness that fosters loyalty, while ASQ (2022) views it as essential for improving service delivery and retention. Rastegar-Panah (2025) underscores the importance of trust and effective problem resolution in shaping satisfaction. Ultimately, satisfaction depends on the alignment between expected and actual service performance (Recent Banking Industry Reviews, 2023). In this study, customer satisfaction refers to how money bank customers in Kano Metropolis perceive mobile banking services in terms of convenience, reliability, and security.

2.2 Mobile banking

Mobile banking involves using smartphones or tablets to carry out banking activities through apps or mobile browsers. It supports real-time transactions, account management and payments, offering convenient access beyond geographic or time limits (Sharma and Gupta, 2024; Chen et al., 2023). Its mobility, ease of use and personalized features set it apart from other digital channels.

The service relies on secure technologies such as biometric authentication and encryption to protect users and sustain trust (Kumar and Singh, 2025). As customers increasingly depend on

ISSN 2756-3162

mobile devices for routine financial tasks, mobile banking reflects broader shifts in digital consumer behaviour (Patel and Raj, 2023).

For this study, mobile banking refers to the use of mobile devices by deposit money bank customers in Kano metropolis to conduct transactions, manage accounts and access financial products, supported by secure and convenient digital connectivity (Zhou, 2024)

2.3 Digital Literacy (DL)

Digital literacy encompasses the skills needed to access, evaluate, create, and communicate information using digital technologies. EBSCO (2022) defines it as competencies enabling responsible use of digital tools, while Mane (2025) adds that it merges technical ability with critical and ethical awareness. The American Library Association (2023) highlights discerning credible information and managing digital identities, and Potomac.edu (2025) views it as using digital platforms effectively across contexts. BoldDesk (2025) emphasizes its role in promoting communication, problem-solving, and responsible engagement. This study defines digital literacy as customers' ability to access, interpret, and use digital banking technologies, including mobile banking applications, to conduct secure and effective financial transactions in Kano Metropolis.

2.4 Review of empirical studies

Empirical evidence across various contexts underscores the interconnectedness of mobile banking, digital literacy and customers satisfaction.

2.4.1 Mobile banking and Customer satisfaction

Empirical findings on the relationship between mobile banking and customer satisfaction present mixed outcomes across different contexts. For instance, Yakubu (2025), Ojo (2024), found that mobile banking transactions enhance financial accessibility, convenience, and satisfaction, despite challenges like network instability and transaction costs. Similarly, Okwuchi (2024) and Fatima (2022) reported that efficient mobile banking services improve transaction speed, convenience, and overall satisfaction. AbdulAziz (2022) also confirmed a significant positive link between mobile banking and satisfaction, moderated by customer age.

Conversely, Moyo (2025) and Adamu (2025) observed that system downtimes, transaction delays, and fraud undermine satisfaction. Yakubu and Usman (2024) further associated frequent technical issues and poor customer support with declining satisfaction. Likewise, Chinedu and Okoro (2023) and Adeoti (2022) found that outages, slow processing, and high service charges negatively affect trust and satisfaction. In contrast, Smith et al. (2023) in Rwanda demonstrated a strong positive effect of mobile banking usage on satisfaction through regression results ($\beta = 1.785$, $p = 0.000$).

Overall, while most studies highlight mobile banking as enablers of convenience and satisfaction, persistent operational inefficiencies and technical failures continue to diminish their perceived value among banking customers.

2.4.2 Moderating effect of Digital literacy and Customers Satisfaction

Baron and Kenny (1986) define a moderator as a variable that influences the strength or direction of the relationship between an independent and a dependent variable. The

ISSN 2756-3162

inconsistent findings on the relationship between mobile banking and customer satisfaction highlight the need to examine digital literacy as a potential moderator.

Empirical evidence consistently shows that digital literacy enhances customer satisfaction. Lee (2024) found that higher digital literacy significantly increased satisfaction with digital banking among older adults. Similarly, Hassan et al. (2024) and Vijayakumar (2024) reported that financial and digital literacy improved trust, ease of use, and engagement with mobile and e-banking services. Akintoye et al. (2024) and Kaur and Sharma (2025) further confirmed that digital proficiency and cybersecurity awareness foster higher satisfaction with online transactions.

While prior studies (e.g., AbdulAziz, 2022; Fatima, 2022; Okwuchi, 2024; Smith et al., 2023; Yakubu, 2025;) found mobile banking positively influences satisfaction, others (Adamu, 2025; Adeoti, 2022; Chinedu & Okoro, 2023; Moyo, 2025; Yakubu & Usman, 2024) reported negative outcomes due to technical failures and security issues.

However, limited research has examined how digital literacy moderates this relationship. Exploring this moderating role is crucial, especially in emerging economies like Nigeria, where user competence with digital technologies may determine the extent to which mobile banking enhances customer satisfaction. Understanding this interaction could guide strategies to improve digital service delivery and customer experience in the financial sector.

Based on the foregoing empirical studies, the following hypotheses were formulated:

H_{01}: Mobile banking has no significant relationship with customers satisfaction of deposit money banks in Kano metropolis?
H_{02}: Digital literacy has no significant relationship with customers satisfaction of deposit money banks in Kano metropolis?
H_{03}: Digital literacy does not significantly moderate the relationship between mobile banking and customers satisfaction of deposit money banks in Kano metropolis?

2.5 Theoretical Framework

This study is anchored on two principal theories to explain the relationships among electronic banking, digital literacy, and customer satisfaction: the Technology Acceptance Model (TAM) and Social Cognitive Theory (SCT).

2.5.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis (1989), posits that technology adoption is primarily influenced by users perceived usefulness and perceived ease of use. These perceptions shape attitudes toward technology, thereby affecting behavioral intentions and actual usage. In the context of this study, TAM explains how customers' acceptance of electronic banking platforms is influenced by their satisfaction levels. Digital literacy plays an important role in enhancing perceived ease of use and usefulness, thereby influencing the strength of this relationship.

2.5.2 Social Cognitive Theory (STC)

ISSN 2756-3162

Complementing TAM, Social Cognitive Theory (Bandura, 1986) emphasizes the role of cognitive factors, including knowledge, skills, and self-efficacy, in determining behavior. Digital literacy is conceptualized within this framework as an individual's cognitive capability and confidence in using digital technologies effectively. SCT highlights how digital literacy moderates the relationship between electronic banking use and customer satisfaction by empowering users to interact efficiently with banking technologies, manage online transactions, and adopt innovative banking solutions.

3. Methodology

This study employed a cross-sectional descriptive survey design, which allowed data to be gathered at a single point in time to capture population characteristics without manipulating any variables (Swain, 2008). Because banks in Nigeria do not publicly disclose the size of their branch customer base, the population was treated as infinite. Deposit Money Banks were first stratified into five generational categories. Second-generation banks were excluded due to mergers and structural realignments, while fifth-generation banks were omitted because of their relatively small customer bases. From these strata, simple random sampling was applied to select one bank per generation. The final selection comprised First Bank of Nigeria Plc (first generation), Zenith Bank Plc (third generation) and FCMB Group Plc (fourth generation). The choices reflected their generational classification, operational presence in Kano State and accessibility for data collection.

A multistage sampling procedure guided the selection of respondents. After stratifying and randomly selecting the banks, the sample size was determined using Cochran's (1977) formula for infinite populations and adjusted upward by 10 percent, following Israel's (1992) recommendation, resulting in a sample size of 422. Questionnaires were allocated equally across the selected banks, consistent with Cochran's (1977) proportional allocation principle. Purposive sampling was then used to approach bank customers within the banking halls and immediate premises. This approach was considered appropriate given the lack of a comprehensive sampling frame for individual customers (Olukotun et al., 2023).

Primary data were collected using a structured questionnaire divided into four sections. Section A captured demographic details, while Sections B through D assessed the independent, moderating and dependent variables. All construct measures were rated on a five-point Likert scale ranging from "Strongly Disagree (1)" to "Strongly Agree (5)," which supported consistency in interpretation and analysis (Yusuf et al., 2024). Data was analyzed using descriptive and inferential techniques. Descriptive statistics summarized respondents' characteristics, while Partial Least Squares Structural Equation Modeling (PLS-SEM), executed with SmartPLS 4 (Ringle et al., 2024), tested the direct effects of mobile banking and the moderating role of digital literacy on customer satisfaction. PLS-SEM was selected for its capacity to handle complex models with latent variables and for its suitability for predictive, exploratory research contexts.

3.1 Measurement of Variables

Mobile banking was assessed using the five-Item Scale developed by Yusuf & Ologunwa (2024), through five items. To measure **Digital literacy**, the five-item **Scale** developed by Hargittai (2010) was adopted. Lastly, **customer** satisfaction was measured using the Scale

ISSN 2756-3162

developed by Yusuf & Ologunwa (2024), which consists of five items and provides a comprehensive assessment of customer satisfaction dimensions.

4. Results and Discussion

Out of the 422 questionnaires distributed, **411 were retrieved**, representing a **97.4 percent response rate**. After careful screening, **390 responses** were deemed usable for analysis. This final sample size exceeds the **minimum threshold of 384** suggested by Cochran's (1977) sample size. Hence, the 390 valid responses were considered adequate for the subsequent analysis and discussion.

4.1 Assessment of Measurement Model

The measurement model treated all constructs as reflective, meaning the indicators were viewed as manifestations of the underlying concepts rather than independent components. Their evaluation followed the typical criteria for reflective measurement: composite reliability to judge internal consistency, convergent validity through factor loadings and AVE, and discriminant validity to ensure each construct was empirically distinct, in line with the guidelines of Hair et al. (2024). Following Hulland (1999), indicators with loadings between 0.40 and 0.70 were considered for removal only if their exclusion improved the model's reliability or validity. In this study, MB4 & MB5 were removed as presented in Figure 1 below.

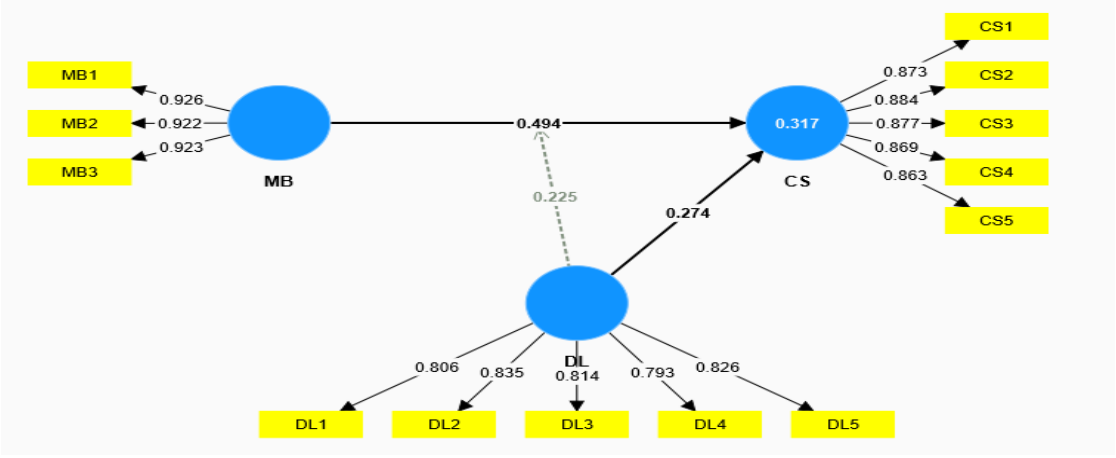

Figure: 1 PLS Path Model

Source: Authors computation (2025), using SmartPLS 4.0

4.1.2 Reliability and Validity Assessment

The reliability and validity of the reflective constructs, **mobile banking (MB), Digital Literacy (DL), and Customers' satisfaction (CS),** were assessed following Hair et al. (2022). **Cronbach's alpha** evaluated internal consistency, while **Composite Reliability (CR)** and **rho_A** assessed construct reliability. **Convergent validity** was examined using the **Average Variance Extracted (AVE).** All indicators met the recommended thresholds of 0.70 for alpha,

ISSN 2756-3162

CR, and rho_A, and 0.50 for AVE (Fornell & Larcker, 1981; Hair et al., 2022). The results are presented in **Table 1 below**.

Table 1 Internal consistency, reliability and validity

Construct	Cronbach's Alpha	rho_A	Composite Reliability	Variance Extracted (AVE)
CS	0.822	0.823	0.841	0.763
DL	0.874	0.879	0.808	0.664
MB	0.814	0.815	0.846	0.853

Source: Authors computation (2025), using SmartPLS 4.0

The reliability of the measurement model was evaluated using Cronbach's Alpha, rho_A, Composite Reliability (CR), and Average Variance Extracted (AVE). As presented in Table 1, all constructs, **Mobile banking (MB), Digital Literacy (DL), and Customers' satisfaction (CS),** demonstrated strong reliability and validity. Cronbach's Alpha and rho_A values exceeded the recommended 0.70 threshold, confirming internal consistency. CR values were also above 0.70 for CS (0.841), DL (0.808), and MB (0.846), indicating robust indicator reliability. Furthermore, AVE values surpassed the 0.50 benchmark (CS = 0.763; DL = 0.664; MB = 0.853), establishing convergent validity. Collectively, these results confirm that the measurement model is both reliable and valid for subsequent analysis.

Table 2 Individual Item Reliability, Internal Consistency Reliability, Convergent Validity

		Convergent Validity			Internal Consistency Reliability		
Latent Variable	**Indicators**	**Loadings**	**Indicator Reliability**	**AVE**	**Cronbach's Alpha**	**Reliability**	**Composite Reliability**
CS	CS1 <- CS	0.873	0.762	0.763	0.822	0.823	0.841
	CS2 <- CS	0.884	0.781				
	CS3 <- CS	0.877	0.769				
	CS4 <- CS	0.869	0.755				
	CS5 <- CS	0.863	0.745				
DL	DL1 <- DL	0.806	0.650	0.664	0.874	0.879	0.808
	DL2 <- DL	0.835	0.697				

ISSN 2756-3162

	DL3 <- DL	0.814	0.663				
	DL4 <- DL	0.793	0.629				
	DL5 <- DL	0.826	0.682				
MB	MB1 <- MB	0.926	0.857	0.853	0.805	0.846	0.840
	MB2 <- MB	0.922	0.850				
	MB3 <- MB	0.923	0.852				

Source: Authors computation (2025), using SmartPLS 4.0

4.1.3 Discriminant Validity

Discriminant validity ensures that constructs intended to be distinct are empirically different. In this study, it was evaluated using the Fornell–Larcker criterion and the Heterotrait–Monotrait ratio (HTMT).

Table 3 Discriminant validity Using Fornell and Lacker criterion

Construct	CS	DL	MB
CS	**0.873**		
DL	0.205	**0.815**	
MB	0.451	-0.09	**0.924**

Source: Authors computation (2025), using SmartPLS 4.0

Discriminant validity was assessed using the Fornell–Larcker criterion. As shown in Table 3, the square roots of the AVE for Customers satisfaction CS (0.873), Digital Literacy DL (0.815), and mobile banking (0.924) all exceeded their respective inter-construct correlations. This confirms that each construct is empirically distinct, thereby establishing discriminant validity (Fornell & Larcker, 1981).

Table 4 Discriminant validity Using HTMT ratio

	CS	DL	MB	DI x MB
CS				
DL	0.227			

ISSN 2756-3162

MB	0.490	0.102	
DL x MB	0.172	0.109	0.087

Source: Authors computation (2025), using SmartPLS 4.0

As shown in Table 4, the HTMT values between the constructs were below the threshold of 0.85, confirming discriminant validity (Henseler et al., 2015). To further validate this, the HTMT confidence interval bias-corrected method was applied using a 10,000-bootstrap procedure, with results presented in Table 5 (Hair et al., 2024).

Table 5 Discriminant validity Using HTMT ratio Confidence Interval Bias

Construct	Original Sample (O)	Sample Mean (M)	Bias	5.00%	95.00%
DL <-> CS	0.227	0.226	-0.001	0.120	0.338
MB <-> CS	0.490	0.489	-0.001	0.396	0.576
MB <-> DL	0.102	0.113	0.011	0.042	0.213

Source: Authors computation (2025), using SmartPLS 4.0

As shown in Table 5, the 95% confidence interval values (0.338, 0.576, 0.213) were all below the threshold of 0.85 at a 5% error probability. This confirms the discriminant validity of the constructs based on the HTMT criterion. With both reliability and validity established, the study proceeded to evaluate the structural model.

4.2.0 Assessment of Structural Model

The PLS-SEM structural model assessment evaluates the model's ability to explain variance in the dependent variables. After confirming reliability and validity, key metrics assessed include variance inflation factors (VIF) to detect collinearity, path coefficients, coefficients of determination (R^2), effect sizes (f^2), and predictive relevance (Q^2) (Hair et al., 2022).

4.2.1 Exogenous Constructs Collinearity Assessment

According to Hair et al. (2024), the first step in assessing the structural model is to examine collinearity among predictor constructs, as presented in Table 6.

Table 6: Assessment of Exogenous Constructs

Path	VIF
DI -> CS	1.021
MB -> CS	1.017
DL x MB -> CS	1.019

Source: Authors computation (2025), using SmartPLS 4.0

ISSN 2756-3162

Table 6 presents the collinearity statistics for the predictor constructs. All VIF values fall below the conservative threshold of 3.3 (Kock, 2015), indicating that collinearity is not a concern in the structural model.

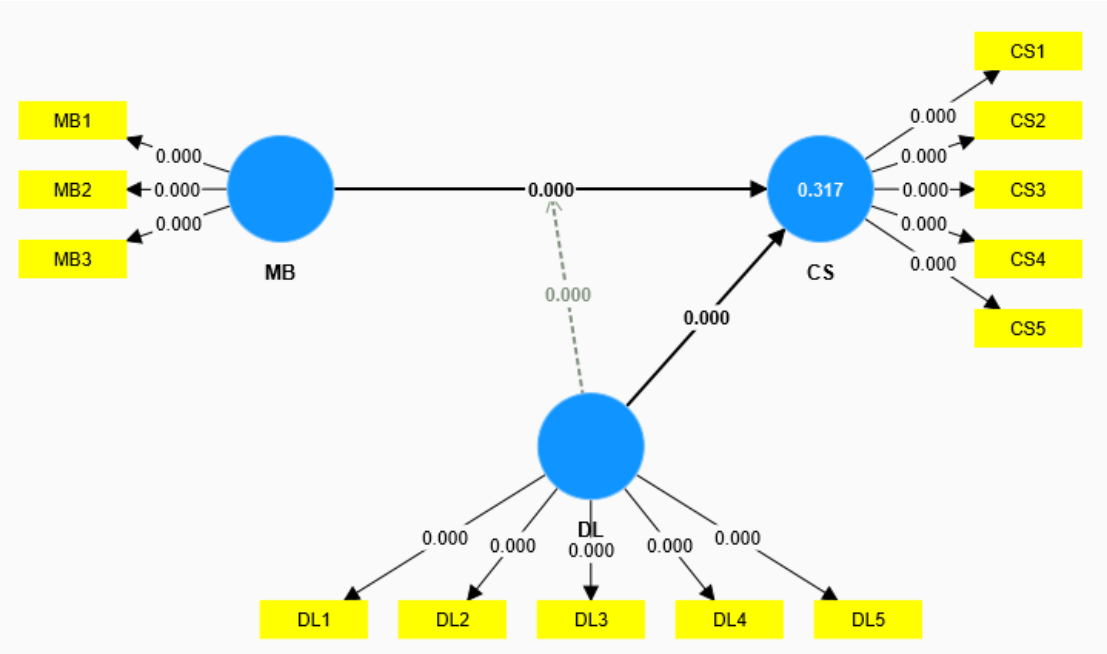

Figure 2: Bootstrapping (10,000) procedure showing P-values

Source: Authors computation (2025), using SmartPLS 4.0

4.2.2 Coefficients of Determination (R^2 Values)

The R^2 value, or coefficient of determination, indicates the proportion of variance in the dependent variable explained by the independent variables, reflecting the model's explanatory power. Higher values suggest stronger predictive ability. The results are presented in Table 7 below.

Table 7: Coefficients of Determination (R^2 values)

Construct	R Square	R-square adjusted
CS	0.317	0.312

Source: Authors computation (2025), using SmartPLS 4.0

The explanatory power of the model was evaluated using the coefficient of determination (R^2). As shown in Table 7, Customers' satisfaction (CS) recorded an R^2 of 0.317, indicating that 31.7% of its variance is explained by mobile banking and the direct and moderating effect of Digital literacy (DL), while 68.3% is attributable to other factors. Similarly, the adjusted R^2 value (0.312) confirm that the model is not overfitted and remains robust.

ISSN 2756-3162

According to Hair et al. (2024), R^2 values of 0.75, 0.50, and 0.25 indicate substantial, moderate, and weak explanatory power, respectively. Hence, the model demonstrates weak explanatory power. Nonetheless, consistent with Ozili (2022), an $R^2 \geq 0.10$ is acceptable when explanatory variables are statistically significant, suggesting that the observed R^2 values (0.317) fall within acceptable standards for management research.

4.2.3 Effect Size (F^2)

The f^2 statistic assesses the practical significance of each independent variable by examining the change in R^2 when the variable is excluded from the model. Following Kenny (2016), f^2 values of 0.005, 0.01, and 0.025 represent small, medium, and large effects, respectively. The results are presented in Table 8.

Table 8: Effect Size (F2)

Construct	Customers' Satisfaction (CS)	Effect Size
DI -> CS	0.108	Large
MB -> CS	0.352	Large
DL x MB -> CS	0.078	Large

Source: Authors computation (2025), using SmartPLS 4.0

Effect size (f^2) analysis assessed the contribution of each exogenous construct to Customers satisfaction (CS). As shown in Table 8, mobile banking (MB → CS, $f^2 = 0.352$) demonstrated a large effect, making it the strongest predictor of CS. Digital literacy (DL → CS, $f^2 = 0.108$) also showed a large effect, whereas DL x MB -> CS ($f^2 = 0.078$) also had a large effect.

4.2.4 Predictive Relevance (Q^2)

Table 9: PLSpredict

	Q²predict	PLS-SEM_RMSE	PLS-SEM_MAE	LM_RMSE	LM_MAE
CS1	0.234	1.010	0.828	1.038	0.854
CS2	0.242	1.029	0.863	1.081	0.901
CS3	0.239	0.996	0.815	1.031	0.843
CS4	0.213	1.006	0.829	1.037	0.849
CS5	0.220	1.023	0.852	1.064	0.881

Source: Authors computation (2025), using SmartPLS 4.0

The PLS predict procedure was applied to assess the model's out-of-sample predictive power, consistent with PLS-SEM best practices (Hair et al., 2022; Shmueli et al., 2019;). As presented in Table 9, all indicators of Customers satisfaction (CS1–CS5) produced Q^2predict values greater than zero, ranging from 0.213 to 0.242, thereby confirming predictive relevance (Hair et al., 2024). Among the indicators, CS2 recorded the highest predictive relevance ($Q^2 = 0.242$).

Furthermore, the PLS-SEM model demonstrated superior predictive accuracy over the linear benchmark, as reflected in its lower RMSE (1.010) and MAE (0.828) for CS1, compared to the linear model's RMSE (1.038) and MAE (0.854).Overall, these findings confirm that the PLS-SEM model demonstrates adequate predictive capability and strong predictive validity, reinforcing the robustness of the structural model beyond its explanatory strength.

4.2.5 Cross-Validated Predictive Ability Test Predictive

Table 10: Comparison of Predictive Loss between PLS and IA Models

Indicator	PLS Loss	IA Loss	Avg. Loss Difference	t-value	p-value
CS	1.026	1.333	-0.306	6.088	0.000
Overall	1.026	1.333	-0.306	6.088	0.000

Source: Authors computation (2025), using SmartPLS 4.0

To further validate the predictive power of the PLS-SEM model, a loss comparison was conducted using the PLS predict framework as shown in Table 10. The average loss from the PLS-SEM model for CS was 1.026, which is substantially lower than the 1.333 loss observed from the linear benchmark model (IA). Similarly, the CVPAT result ($p = 0.000$) revealed that the predictive ability of the PLS model was significantly superior to that of the linear regression benchmark (Liengaard et al., 2021).

4.2.6 Model Fit

Table 11: model fit

	Saturated model	Estimated model
SRMR	0.042	0.041
NFI	0.928	0.929

Source: Authors computation (2025), using SmartPLS 4.0

Model fit was assessed using several goodness-of-fit indices. From the result in Table 11 above, the Standardized Root Mean Square Residual (SRMR) for both the saturated and estimated models was 0.041, well below the recommended threshold of 0.08 (Henseler et al., 2014), indicating an excellent fit between the model and the data. The Normed Fit Index (NFI) was 0.929 surpassing the commonly accepted benchmark of 0.90, further confirming the model's good fit. This indicates the model is both efficient in structure and consistent with the observed data.

4.3.0 Test of Hypotheses

This study tested three null hypotheses as indicated below:

H_{01}: Mobile banking has no significant relationship with customers satisfaction of deposit money banks in Kano metropolis?

ISSN 2756-3162

H_{02}: Digital literacy has no significant relationship with customers satisfaction of deposit money banks in Kano metropolis?

H_{03}: Digital literacy does not significantly moderate the relationship between mobile banking and customers satisfaction of deposit money banks in Kano metropolis?

Table 12: Total Effect Sizes

Path	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values	Decision
DL -> CS	0.274	0.277	0.043	6.313	0.000	Rejected
MB -> CS	0.494	0.495	0.037	13.295	0.000	Rejected
DL x MB -> CS	0.225	0.223	0.041	5.467	0.000	Rejected

Source: Authors computation (2025), using SmartPLS 4.0

The hypothesis tests as shown in Table 12 above reveal significant findings regarding the relationships among digital literacy, mobile banking, and customer satisfaction. Specifically, digital literacy shows a statistically significant positive effect on customer satisfaction, with a path coefficient of 0.274, a T-statistic of 6.313, and a p-value less than 0.05, leading to rejection of the null hypothesis. Similarly, mobile banking significantly influences customer satisfaction positively, demonstrated by a path coefficient of 0.494, a T-statistic of 13.295, and a p-value below 0.05, also resulting in rejection of the null hypothesis. Furthermore, the interaction term between digital literacy and mobile banking reveals a significant moderating effect on customer satisfaction, indicated by a path coefficient of 0.225, a T-statistic of 5.467, and a p-value less than 0.05.

4.3.0 Discussion of findings

The findings indicate that both digital literacy and mobile banking independently enhance customer satisfaction among deposit money bank customers in Kano Metropolis. The significant positive path coefficients and p-values below 0.05 confirm these direct effects.

Importantly, the interaction effect (DL x MB) is also significant, demonstrating that digital literacy strengthens the positive impact of mobile banking on customer satisfaction. Customers with higher digital literacy are more able to leverage the convenience and efficiency of mobile banking, leading to greater satisfaction.

This aligns with previous studies highlighting digital literacy as a critical enabler in maximizing benefits from electronic banking technologies, specifically mobile banking and improving customer experiences (AbdulAziz Maruf Adeniran, 2022; Fatima Usman, 2022; Smith et al., 2023; Okwuchi, 2024; Vijayakumar et al., 2025; Yakubu Adamu, 2025). The moderation effect underscores the need for banks to invest not only in technology adoption but also in enhancing customers' digital skills to optimize satisfaction outcomes.

5.0 Conclusion and Recommendations

This study has demonstrated that digital literacy significantly influences customer satisfaction in the context of electronic banking services among deposit money banks in Kano Metropolis. The findings reveal that digital literacy not only has a direct positive effect on customer satisfaction but also significantly moderates the relationship between mobile banking and customer satisfaction. The results align with the Technology Acceptance Model, showing that digital literacy enhances perceived ease of use and usefulness of electronic banking channels, thereby increasing satisfaction. Social Cognitive Theory further explains how digital literacy empowers users cognitively to leverage digital banking technologies effectively. The positive impact of mobile banking on customer satisfaction confirms that accessible, reliable, and secure electronic payment solutions are crucial for improving customer experience.

Based on the study's findings, the following recommendations are proposed for bank management:

1. **Enhance mobile banking features and reliability:** Banks should prioritize continuous improvement of their mobile platforms, focusing on speed, stability, security and user friendliness. Upgrades such as clearer navigation, faster transaction processing and a more intuitive interface will encourage smoother customer experiences and strengthen satisfaction.
2. **Strengthen customer digital literacy support:** Since digital literacy significantly improves customer satisfaction, banks should adopt practical strategies that help users become more confident with digital services. This may include short instructional videos, in-app guidance, responsive help-desk support and community outreach programmes designed to simplify learning for less tech-savvy customers.
3. **Integrate digital literacy initiatives with mobile banking promotion:** Because digital literacy enhances the effect of mobile banking on satisfaction, banks should combine both elements within a unified strategy. Structured onboarding for new users, guided first-time login steps and incentive-driven digital training modules can help customers understand and adopt mobile banking more effectively, leading to improved overall satisfaction.

This study advances theory by integrating the Technology Acceptance Model and Social Cognitive Theory to demonstrate how digital literacy directly and indirectly (as a moderator) influences customer satisfaction with electronic banking. It fills gaps in understanding technology adoption in emerging economies, emphasizing cognitive skills as key drivers of positive user outcomes.

Practically, the findings urge banks to invest in digital literacy programs to empower customers, enhancing their ability to use electronic banking platforms effectively. Strengthening digital skills alongside expanding mobile banking infrastructure can significantly improve user satisfaction and loyalty.

From a policy perspective, the research highlights the need for regulatory bodies and government agencies to integrate digital literacy initiatives into national financial inclusion strategies. Policies promoting education, cybersecurity, and accessible digital payment frameworks will foster inclusive digital financial ecosystems aligned with Nigeria's cashless economy goals.

Despite its contributions, the study's focus on Kano Metropolis limits how well the findings apply to areas with different economic or digital conditions. Reliance on self-reported data for digital literacy and satisfaction may introduce perceptual bias, and the cross-sectional design restricts causal interpretation. The analysis also centered on a single electronic banking channel, leaving other digital services unexplored.

Future research should widen the geographic scope beyond Kano Metropolis to improve generalizability across regions with different socioeconomic and digital conditions. Studies using objective or behavioural measures of digital literacy and satisfaction are recommended to reduce self-report bias. Longitudinal designs would help establish clearer causal relationships. Further work should also examine additional electronic banking channels to provide a more comprehensive understanding of digital service effects on customer satisfaction.

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