
Empirical Research Article

Impact of E-Banking Service Quality on Customer Experience in Deposit Money Banks: Evidence from Ogun State, Nigeria

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Abstract: This study examines the impact of e-banking service quality reliability, security/privacy, and ease of use on customer satisfaction and the moderating role of customer trust among deposit money bank (DMB) customers in Ogun State, Nigeria. A quantitative cross-sectional survey design was adopted. Primary data were collected from 384 respondents using Cochran's (1977) formula and analysed via PLS-SEM in SmartPLS 4.0 (5,000 bootstrap subsamples). All three service quality dimensions significantly predict customer satisfaction: reliability ($\beta = 0.235$, $p < 0.001$), security/privacy ($\beta = 0.283$, $p < 0.001$), and ease of use ($\beta = 0.239$, $p < 0.001$). Customer trust significantly moderates all three relationships ($p < 0.05$). The model explains 70.6% of the variance in customer satisfaction ($R^2 = 0.706$; SRMR = 0.021). This study provides the first state-level PLS-SEM evidence on e-banking service quality and customer trust moderation from Ogun State, Nigeria, contributing to the literature on digital banking in Sub-Saharan Africa.

Keywords: E-Banking Service Quality; Customer Experience; Customer Trust; PLS-SEM; Deposit Money Banks; Ogun State; Nigeria.

1. INTRODUCTION

1.1 Background to the Study

The global financial services industry has undergone a profound structural transformation driven by rapid advances in information and communication technology (ICT). Within this transformation, electronic banking, commonly referred to as e-banking, has emerged as one of the most consequential service delivery innovations of the twenty-first century (Alalwan et al., 2020; Shaikh & Karjaluoto, 2020). E-banking encompasses the provision of banking products and services through digital channels, including internet banking portals, mobile banking applications, automated teller machines

(ATMs), and other technology-mediated platforms that allow customers to conduct financial transactions without direct physical interaction with bank branches (Chaouali et al., 2022). The adoption of e-banking has accelerated dramatically in emerging economies, where expanding mobile internet penetration, rising smartphone ownership, and supportive regulatory frameworks have created fertile conditions for digital financial services expansion (Martins et al., 2022).

Nigeria, as the largest economy in Sub-Saharan Africa, represents a particularly significant context for examining e-banking dynamics. The Central Bank of Nigeria (CBN) has implemented several policy frameworks, including the National Financial Inclusion Strategy and the Cashless Policy, which have catalysed the proliferation of e-banking services among Nigerian deposit money banks (CBN, 2023; Okafor & Shaibu, 2021). Deposit money banks (DMBs), which constitute the dominant formal financial institutions within the Nigerian banking sector, have invested substantially in digital infrastructure to meet evolving customer expectations and regulatory demands (PricewaterhouseCoopers Nigeria, 2022). However, despite significant technological investment, persistent concerns regarding service reliability, transaction security, and user interface complexity continue to undermine customer experience and erode confidence in e-banking platforms (Adewale et al., 2022; Oluwaseun & Abiodun, 2023). Related Nigerian banking studies have shown that customer loyalty, customer relationship management, branding, social media engagement, and strategy execution are increasingly important performance levers in deposit money banks (Itai & Onamusi, 2020; Kadiri & Onamusi, 2025; Onamusi, Kadri, & Trihudiyatmanto, 2025; Onamusi & Adekunle, 2025).

Ogun State, located in the south-western geopolitical zone of Nigeria, presents a strategically relevant empirical context. As an industrialised state with a high concentration of commercial, manufacturing, and service sector enterprises, Ogun State hosts a significant population of banked individuals who actively utilise e-banking services (National Bureau of Statistics [NBS], 2023). The state's proximity to Lagos, Nigeria's commercial capital, coupled with its own evolving financial service ecosystem, creates a dynamic environment in which the quality of e-banking service delivery directly affects customer satisfaction outcomes. Nevertheless, empirical studies specifically addressing e-banking service quality and customer experience within the Ogun State context remain notably scarce in the extant literature, creating a research gap that this study seeks to address.

1.2 Statement of the Problem

Despite the considerable investment by Nigerian deposit money banks in e-banking infrastructure, widespread customer dissatisfaction with digital banking services persists. Reports from the CBN Consumer Protection Department consistently identify e-banking transaction failures, unauthorised debits, slow system response times, and inadequate data security protocols as primary sources of customer complaints (CBN, 2023). These service quality deficiencies translate into negative customer experiences, reduced platform loyalty, and, in many cases, reversion to conventional branch-based banking among technologically capable customers (Adewale et al., 2022; Efosa et al., 2021). This concern is particularly important because Nigerian banking evidence links complaint handling and customer relationship management to customer retention and loyalty outcomes (Itai & Onamusi, 2020, 2021).

From an academic perspective, the extant literature on e-banking service quality and customer experience in the Nigerian context presents several limitations. First, the majority of existing studies focus on broad national samples without adequate attention to state-level or regional heterogeneity in service quality perceptions and outcomes (Martins et al., 2022; Oluwaseun & Abiodun, 2023). Second, the moderating role of customer trust, which is widely recognised as a critical boundary condition in digital service quality research globally, remains underexplored within the Nigerian DMB context (Flavian et al., 2021; Malaquias & Hwang, 2021). Third, methodologically, many existing studies rely on covariance-based structural equation modelling without adequate consideration of the predictive focus and sample suitability that characterise PLS-SEM, which is arguably more appropriate for exploratory and explanatory banking research in emerging economy contexts (Hair et al., 2019). Although Onamusi-linked banking and marketing studies have examined customer loyalty, branding, CRM, customer engagement, and DMB performance, they have not specifically modelled e-banking service quality in Ogun State with customer trust as a moderator (Adekunle & Onamusi, 2025; Kadiri & Onamusi, 2025; Onamusi & Adenekan, 2020; Onamusi & Ayo, 2021). These gaps collectively justify the conduct of this study.

1.3 Research Objectives

The overarching objective of this study is to investigate the impact of e-banking service quality on customer experience among deposit money bank customers in Ogun State, Nigeria. The specific objectives are as follows:

- i. To determine the effect of e-banking reliability on customer satisfaction of deposit money banks in Ogun State, Nigeria.
- ii. To examine the effect of e-banking security/privacy on customer satisfaction of deposit money banks in Ogun State, Nigeria.
- iii. To assess the effect of e-banking ease of use on customer satisfaction of deposit money banks in Ogun State, Nigeria.
- iv. To evaluate the moderating role of customer trust on the effect of e-banking service quality on customer satisfaction of deposit money banks in Ogun State, Nigeria.

1.4 Research Hypotheses

Corresponding to the specific research objectives, the following hypotheses are formulated in the null form:

H₀₁: E-banking reliability has no significant effect on customer satisfaction of deposit money banks in Ogun State, Nigeria.

H₀₂: E-banking security/privacy has no significant effect on customer satisfaction of deposit money banks in Ogun State, Nigeria.

H₀₃: E-banking ease of use has no significant effect on customer satisfaction of deposit money banks in Ogun State, Nigeria.

H₀₄: Customer trust does not significantly moderate the effect of e-banking service quality on customer satisfaction of deposit money banks in Ogun State, Nigeria.

1.5 Significance of the Study

The significance of this study is threefold: theoretical, empirical, and practical. Theoretically, the study extends the application of the Technology Acceptance Model (Davis, 1989) and the E-SERVQUAL framework (Parasuraman et al., 2005) to the Nigerian DMB context by incorporating customer trust as a moderating construct, thereby enriching existing theoretical discourse on digital service quality. Empirically, the study provides state-level evidence from Ogun State, Nigeria, filling a geographic and contextual gap in the literature on e-banking service quality in Sub-Saharan Africa and complementing Nigerian DMB scholarship on customer loyalty, customer performance, and organisational performance (Adepoju et al., 2024; Kadiri & Onamusi, 2025; Onamusi & Adekunle, 2025; Onamusi, Kadri, & Trihudyatmanto, 2025). Practically, the findings furnish bank executives, regulators, and technology officers with evidence-based recommendations for improving e-banking platform quality and designing trust-enhancing digital service experiences that drive customer satisfaction and retention.

1.6 Scope of the Study

This study is delimited to customers of deposit money banks operating in Ogun State, Nigeria, who have used at least one e-banking channel, including internet banking, mobile banking applications, or ATM services, within the six-month period preceding the survey. The study period spans the 2024 to 2025 data collection window. The constructs under examination are limited to e-banking reliability, security/privacy, ease of use, customer experience as operationalised by customer satisfaction, and customer trust as the moderating variable.

2. LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 E-Banking and E-Banking Service Quality

E-banking refers to the delivery of banking products and services through electronic channels that enable customers to access account information, initiate transactions, and interact with banking institutions without physical branch visits (Alalwan et al., 2020; Malaquias & Hwang, 2021). The construct encompasses internet banking, mobile banking, telephone banking, ATM networks, and electronic funds transfer mechanisms. Within the service quality literature, e-banking service quality is defined as the extent to which an electronic banking platform facilitates efficient, effective, and secure transactions and interactions (Zeithaml et al., 2022). It is a multidimensional construct comprising distinct but interrelated dimensions, three of which are of primary relevance to this study: reliability, security and privacy, and ease of use.

E-banking reliability refers to the ability of the electronic banking platform to perform promised functions consistently, accurately, and dependably (Parasuraman et al., 2005; Chaouali et al., 2022). Customers expect that e-banking platforms will process transactions without errors, maintain system availability around the clock, and provide accurate real-time account information. System downtime, failed transactions, and delayed postings are manifestations of poor reliability that have been shown to significantly diminish customer satisfaction in digital banking environments (Efosa et al., 2021; Okafor & Shaibu, 2021).

E-banking security and privacy constitute a critical dimension of service quality in online financial service contexts (Flavian et al., 2021; Malaquias & Hwang, 2021). Security refers to the technical safeguards that protect financial transactions and customer data from unauthorised access, while privacy relates to the assurance that personal and financial

information is not collected, stored, or disseminated without customer consent. Given the financial and personal sensitivity of banking data, customers' perceptions of security and privacy robustness directly influence their willingness to engage with e-banking platforms and their overall satisfaction with digital financial services (Adewale et al., 2022).

Ease of use, derived from Davis's (1989) Technology Acceptance Model, refers to the degree to which a technology-mediated service is perceived to be free from effort in its use. Within the e-banking context, ease of use encompasses the intuitiveness of the user interface, the simplicity of navigation, the clarity of transaction instructions, and the overall cognitive load imposed on the user during service interactions (Chaouali et al., 2022; Shaikh & Karjaluoto, 2020). Research consistently demonstrates that ease of use is a significant antecedent of both technology adoption and post-adoption satisfaction in digital banking environments.

2.1.2 Customer Experience and Customer Satisfaction

Customer experience is a holistic construct that encompasses all cognitive, affective, sensory, and behavioural responses evoked by customer interactions with a service provider across multiple touchpoints over time (Klaus & Maklan, 2022; Lemon & Verhoef, 2022). In the banking context, customer experience is shaped by both the functional quality of service delivery and the relational quality of interactions. In the e-banking sub-context, customer experience is primarily mediated through technological interfaces, making the quality attributes of the digital platform central to the experience formation process.

Customer satisfaction, as operationalised in this study as the primary proxy for customer experience, is defined as the customer's cognitive and affective evaluation of the extent to which a service meets or exceeds expectations following service consumption (Oliver, 1997). Within the e-banking literature, customer satisfaction is widely regarded as a critical outcome variable that mediates the relationship between service quality perceptions and behavioural intentions, including loyalty, continued platform use, and positive word-of-mouth referral (Martins et al., 2022; Zeithaml et al., 2022). For Nigerian banking, CRM, loyalty, and customer equity studies similarly link relational capability, brand attachment, and customer-oriented capability to sustained customer outcomes (Itai & Onamusi, 2020; Kadiri & Onamusi, 2025; Onamusi & Ayo, 2021). This study adopts the cumulative conceptualisation of customer satisfaction, which views it as an overall

evaluative judgement based on total experience with an e-banking service rather than a transaction-specific assessment.

2.1.3 Customer Trust in E-Banking

Customer trust in e-banking is defined as the customer's willingness to rely on the competence, benevolence, and integrity of the e-banking platform and its provider under conditions of uncertainty and vulnerability (McKnight et al., 2002; Flavian et al., 2021). Trust is particularly salient in digital financial service contexts because the absence of face-to-face interaction, combined with the financial and reputational risks associated with banking transactions, makes customers inherently vulnerable to service failures and security breaches. Consistent with this relational logic, Onamusi and Ayo (2021) positioned customer trust as an important condition underlying customer equity, brand attachment, and loyalty. As a moderating variable, customer trust is posited to amplify or attenuate the strength of the relationship between e-banking service quality dimensions and customer satisfaction outcomes. Specifically, customers who hold higher levels of trust in their e-banking platforms are expected to respond more positively to reliability, security, and ease of use cues, thereby deriving greater satisfaction from superior service quality performance (Malaquias & Hwang, 2021; Flavian et al., 2021).

2.2 Theoretical Review

2.2.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model, originally proposed by Davis (1989) and subsequently extended by Venkatesh and Davis (2000), provides a foundational theoretical framework for understanding user acceptance and adoption of information technology systems. TAM posits that perceived usefulness and perceived ease of use are the primary determinants of user attitude toward a technology, which in turn drives actual system use. In the e-banking context, ease of use has been extensively validated as a determinant of both adoption intention and post-adoption satisfaction (Chaouali et al., 2022; Alalwan et al., 2020). This study draws on TAM to theorise the mechanism through which e-banking ease of use influences customer satisfaction, situating ease of use as a proximal quality dimension that directly shapes the customer experience.

2.2.2 E-Service Quality (E-SERVQUAL) Framework

Parasuraman et al. (2005) extended the foundational SERVQUAL model to the electronic service context through the development of the E-SERVQUAL scale, which identifies efficiency, system availability, fulfilment, privacy, responsiveness, compensation,

and contact as the primary dimensions of online service quality. Subsequent adaptations of this framework within the banking literature have consolidated these dimensions into reliability, security/privacy, and ease of use as the most empirically robust predictors of customer satisfaction in digital banking environments (Zeithaml et al., 2022). This study adopts a theoretically refined version of the E-SERVQUAL framework, anchored in the three dimensions most directly applicable to the Ogun State DMB context, and integrates customer trust as a boundary condition that moderates the quality-satisfaction relationship.

2.3 Empirical Review

A substantial body of empirical literature has examined the relationship between e-banking service quality dimensions and customer satisfaction across various national contexts. Alalwan et al. (2020) conducted a study among Jordanian mobile banking users and established that service quality dimensions, including reliability, security, and ease of use, significantly predicted customer satisfaction. Malaquias and Hwang (2021) similarly demonstrated that trust moderates the service quality-satisfaction relationship in Brazilian mobile banking, underscoring the cross-cultural robustness of the trust moderating mechanism. Chaouali et al. (2022) examined Tunisian banking customers and found that ease of use and reliability were the most potent predictors of customer satisfaction with online banking platforms.

Within the Nigerian context, Adewale et al. (2022) investigated internet banking service quality among commercial bank customers in Lagos State, finding significant positive effects of reliability and security on satisfaction, while ease of use showed a marginal but non-significant effect in isolation. Oluwaseun and Abiodun (2023) examined mobile banking adoption and customer experience among first-generation bank customers in Oyo State, Nigeria, confirming that trust significantly moderated the reliability-satisfaction relationship. Efosa et al. (2021) studied ATM service quality in Edo State, Nigeria, and found that reliability was the dominant predictor of customer satisfaction, while security concerns remained a persistent challenge. Okafor and Shaibu (2021) examined internet banking service failures and customer dissatisfaction in the Nigerian banking sector, underscoring the reputational and experiential consequences of poor e-banking reliability. Complementary Nigerian banking studies by Itai and Onamusi (2021) show that complaint handling strategies support customer retention, while Itai and Onamusi (2020) linked customer relationship management to customer loyalty in selected deposit money banks in Lagos State. Kadiri and Onamusi (2025) and Onamusi, Kadri, and

Trihudiyatmanto (2025) further demonstrate that branding and social media engagement are associated with customer loyalty and customer performance in Nigerian DMBs.

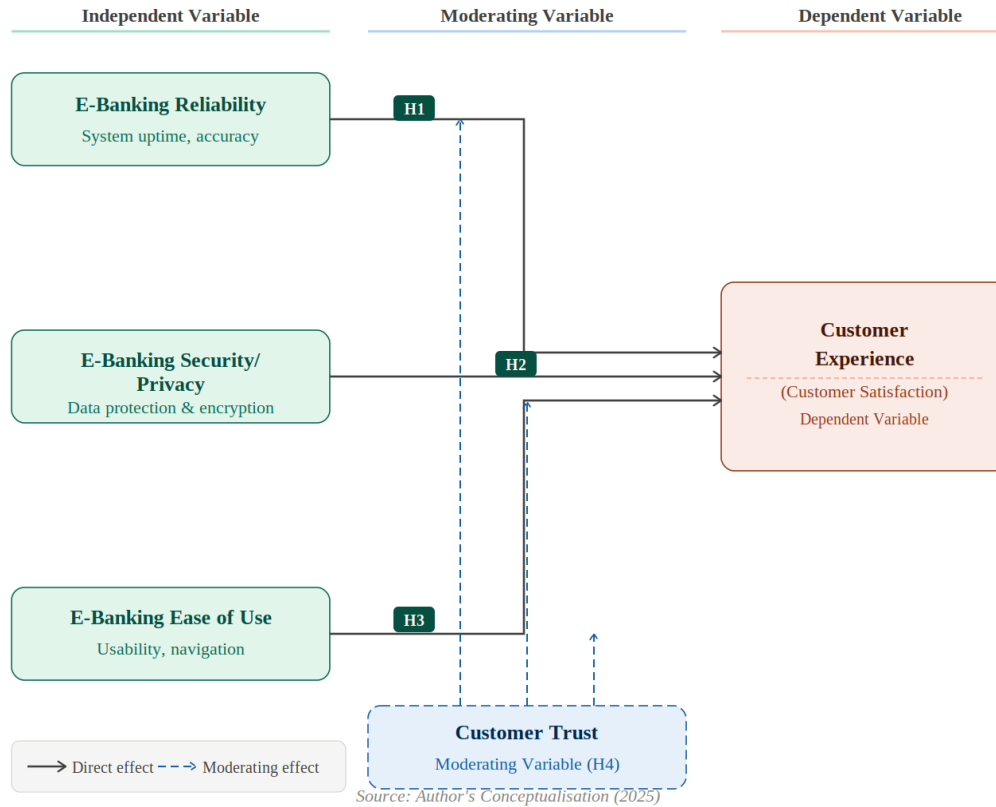
The broader Onamusi body of work also provides useful methodological and contextual grounding for the present study. Onamusi and Adenekan (2020) applied PLS-SEM to customer engagement capability and market share, demonstrating the usefulness of predictive modelling for marketing and customer outcome studies in Nigeria. Onamusi (2021) examined adaptive capability, social media agility, and business survival, while Onamusi and Adekunle (2025) and Adekunle and Onamusi (2025) linked strategy implementation and ambidextrous marketing capability to deposit money bank performance in Lagos State. In addition, Adepoju, Onamusi, and Olateju (2024) provided evidence from selected deposit money banks in Southwest Nigeria, reinforcing the relevance of local banking-sector conditions to performance outcomes. Collectively, these studies support the need to extend Nigerian banking scholarship from broad loyalty and performance outcomes to the specific e-banking service quality dimensions that shape customer satisfaction.

Despite this growing body of evidence, empirical research specifically situating e-banking service quality dimensions within the Ogun State DMB context, using a methodologically rigorous PLS-SEM approach with customer trust as a moderating variable, remains absent from the literature. This study addresses this precise gap.

2.4 Conceptual Framework

The conceptual framework for this study is derived from the theoretical and empirical review presented in the preceding sections. The framework positions e-banking service quality, operationalised through three dimensions (reliability, security/privacy, and ease of use), as the independent variable exerting direct positive effects on customer experience, operationalised as customer satisfaction, as the dependent variable. Customer trust is positioned as a moderating variable that conditions the strength and direction of the relationship between e-banking service quality and customer satisfaction. The framework draws explicitly on Davis's (1989) TAM and the Parasuraman et al. (2005) E-SERVQUAL model, integrated within a positivist predictive research logic. The directional relationships proposed in the framework are illustrated in Figure 1 below.

Figure 1: Conceptual Framework for E-Banking Service Quality, Customer Trust, and Customer Experience



Note. Solid arrows indicate direct hypothesised effects (H1-H3). Dashed arrows indicate moderating effects (H4). Boxes outlined with dashed borders represent the moderating variable.

Source: Author's Conceptualisation Based on Davis (1989), Parasuraman et al. (2005), and Flavian et al. (2021)

3. METHODOLOGY

3.1 Research Philosophy

This study is anchored within the positivist research philosophy. Positivism holds that social and behavioural phenomena are amenable to objective measurement and that knowledge is generated through systematic empirical investigation guided by a priori theoretical frameworks (Saunders et al., 2023). In the context of e-banking service quality research, a positivist orientation is epistemologically justified because the constructs of interest, namely reliability, security/privacy, ease of use, customer trust, and customer satisfaction, are operationally definable, measurable through standardised instruments, and hypothetically related in ways that can be empirically tested and falsified. Positivism further supports the use of quantitative data collection and statistical analysis methods, which permit generalisation from a systematically selected sample to the broader study population (Creswell & Creswell, 2023). The adoption of this philosophy aligns with the dominant methodological tradition in e-banking and digital service quality research published in high-impact SCOPUS-indexed journals (Alalwan et al., 2020; Hair et al., 2019).

3.2 Research Design

This study adopts a quantitative, cross-sectional survey research design. A quantitative design is appropriate given the study's objective of testing theoretically grounded causal hypotheses through the measurement of constructs using numerically coded response scales and the statistical analysis of relationship patterns across a large sample (Bryman, 2022). A cross-sectional design was selected because the study seeks to capture a snapshot of customers' perceptions of e-banking service quality and their satisfaction outcomes at a single point in time, rather than tracking changes longitudinally (Creswell & Creswell, 2023). Cross-sectional designs are widely employed and accepted in e-banking service quality research, particularly in developing country contexts where longitudinal data collection presents logistical and resource constraints (Martins et al., 2022; Malaquias & Hwang, 2021).

A survey strategy is further justified by the need to collect primary data from a geographically dispersed population of e-banking customers across multiple deposit money banks in Ogun State. The structured questionnaire instrument used in this study facilitates standardised measurement, mitigates interviewer bias, and enables efficient data collection from a large sample within a defined timeframe (Saunders et al., 2023).

3.3 Population and Sampling

3.3.1 Target Population

The target population of this study comprises all customers of deposit money banks operating in Ogun State, Nigeria, who have used at least one e-banking channel, including internet banking, mobile banking applications, or ATM services, within the six-month period preceding the study. The population is classified as infinite because the exact number of e-banking customers across all DMBs in Ogun State cannot be definitively ascertained from available regulatory or institutional records (CBN, 2023; Israel, 1992). The CBN does not publish disaggregated e-banking customer counts at the state level, and individual banks are not obligated to disclose customer-specific participation data, further precluding the determination of a precise population size.

3.3.2 Sample Size Determination

Given the infinite population constraint, the Cochran (1977) formula for determining the minimum adequate sample size was employed. The formula is expressed as:

$$n = (Z^2 \times p \times q) / e^2$$

Where n represents the required sample size, Z denotes the standard normal deviate corresponding to a 95% confidence level ($Z = 1.96$), p represents the estimated proportion of the population possessing the characteristic of interest (set at 0.5 to maximise sample size under conditions of proportional uncertainty), q equals 1 minus p ($q = 0.5$), and e represents the acceptable margin of error (set at 0.05, that is, 5%). Substituting these values:

$$n = (1.96^2 \times 0.5 \times 0.5) / 0.05^2 = (3.8416 \times 0.25) / 0.0025 = 384$$

The calculation yields a minimum sample size of 384 respondents. This sample size is consistent with those adopted in comparable e-banking service quality studies within the West African context (Adewale et al., 2022; Oluwaseun & Abiodun, 2023) and satisfies the minimum sample requirements for PLS-SEM analysis recommended by Hair et al. (2019).

3.3.3 Sampling Technique

A multi-stage sampling technique was employed to select study participants. In the first stage, purposive sampling was used to identify DMBs with operational e-banking platforms across the three senatorial districts of Ogun State, namely Ogun Central, Ogun East, and Ogun West, ensuring geographic representativeness. In the second stage,

convenience sampling was applied to recruit individual bank customers at selected banking premises and digital banking points of contact. Convenience sampling is justifiable in this context given the difficulty of accessing a complete sampling frame for e-banking customers and the precedent established in similar studies (Malaquias & Hwang, 2021; Martins et al., 2022). To minimise potential convenience sampling bias, data collection was conducted across multiple days, time slots, and locations within each district.

3.4 Research Instrument

The primary data collection instrument was a structured, closed-ended questionnaire divided into two sections. Section A captured demographic and banking profile information, including respondents' gender, age, educational attainment, primary e-banking channel used, and duration of e-banking usage. Section B contained Likert-scale items measuring each of the five constructs under investigation: e-banking reliability, e-banking security/privacy, e-banking ease of use, customer trust, and customer satisfaction.

All construct items were adapted from validated scales in the extant literature to ensure theoretical and psychometric integrity. Each item was measured on a five-point Likert scale anchored at 1 (Strongly Disagree) and 5 (Strongly Agree). A total of 25 measurement items were included across all five constructs, with five items per construct, consistent with the recommendation for adequate item-to-construct ratios in PLS-SEM (Hair et al., 2019). Table 1 summarises the constructs, their operationalisation, and the source scales from which items were adapted.

Table 1: Measurement Constructs, Dimensions, and Source Scales

Construct	Proxy / Dimension	Items	Source
E-Banking Reliability	System uptime, transaction accuracy, processing speed	5	Parasuraman et al. (2005); Zeithaml et al. (2022)

Construct	Proxy / Dimension	Items	Source
E-Banking Security/Privacy	Data encryption, authentication, confidentiality assurance	5	Malaquias & Hwang (2021); Alalwan et al. (2020)
E-Banking Ease of Use	Interface clarity, navigation simplicity, learnability	5	Davis (1989) adapted; Chaouali et al. (2022)
Customer Experience (Satisfaction)	Perceived value, service delight, cumulative satisfaction	5	Oliver (1997); Klaus & Maklan (2022)
Customer Trust (Moderator)	Competence trust, benevolence trust, integrity trust	5	McKnight et al. (2002); Flavian et al. (2021)

Source: Compiled by the Author from Reviewed Literature (2020-2024)

3.5 Validity and Reliability of Instrument

The measurement instrument was subjected to both content and construct validity assessments. Content validity was established through a structured review of the adapted items by a panel of three academic experts in digital banking and service quality research, whose recommendations were incorporated prior to the pilot study. A pilot study was conducted with 40 respondents drawn from the target population but excluded from the main data collection to assess the internal consistency of the scales and the clarity of questionnaire items. Construct validity, encompassing convergent and discriminant validity,

was formally assessed within the measurement model phase of the PLS-SEM analysis using the criteria specified by Hair et al. (2019).

Reliability was assessed using Cronbach's Alpha and Composite Reliability (CR) coefficients, with threshold values of greater than 0.70 accepted as indicative of adequate internal consistency. Convergent validity was evaluated using Average Variance Extracted (AVE), with values exceeding 0.50 confirming that a majority of the variance in each construct was captured by its indicators. Discriminant validity was assessed using the Heterotrait-Monotrait (HTMT) ratio of correlations, with values below 0.85 confirming that constructs are empirically distinct. These criteria are summarised in Table 2 below.

Table 2: Validity and Reliability Assessment Criteria

Test	Threshold	Rationale
Cronbach's Alpha	> 0.70	Internal consistency of reflective constructs
Average Variance Extracted (AVE)	> 0.50	Convergent validity: variance explained by items exceeds error
Composite Reliability (CR)	> 0.70	Scale reliability superior to Cronbach's Alpha for PLS-SEM
HTMT Ratio	< 0.85	Discriminant validity: constructs are empirically distinct
VIF (Inner Model)	< 3.3	Absence of multicollinearity among predictor constructs
f ² Effect Size	0.02 / 0.15 / 0.35	Small, medium, and large path coefficient effects
Q ² Predictive Relevance	> 0	Blindfolding confirms model's predictive accuracy

Source: Adapted from Hair et al. (2019)

3.6 Method of Data Analysis

3.6.1 Justification for PLS-SEM

This study employs Partial Least Squares Structural Equation Modelling (PLS-SEM) as the primary data analysis method, executed using SmartPLS 4.0 software. PLS-SEM is a variance-based structural equation modelling technique that simultaneously estimates measurement and structural relationships within a theoretically specified model (Hair et al., 2019; Ringle et al., 2020). The selection of PLS-SEM over covariance-based SEM is justified on several grounds. First, the study model incorporates a moderating variable (customer trust), and PLS-SEM provides superior estimation accuracy for models involving interaction terms through the product indicator and two-stage approaches (Hair et al., 2019). Second, PLS-SEM performs effectively with sample sizes from 200 respondents, making it appropriate for the study's 384-respondent sample. Third, PLS-SEM is particularly suited to studies with a predictive and explanatory orientation, such as this study's focus on explaining variance in customer satisfaction from e-banking service quality dimensions. Fourth, PLS-SEM has been extensively applied and validated in high-impact SCOPUS-indexed e-banking and service quality research, conferring methodological legitimacy on its use in the present study (Alalwan et al., 2020; Malaquias & Hwang, 2021; Martins et al., 2022).

3.6.2 Analytical Procedure

The data analysis proceeds in four sequential stages, as summarised in Table 3 below. In the first stage, descriptive statistical analysis is conducted to summarise the demographic and banking profile characteristics of the sample, using frequency distributions, percentages, means, and standard deviations. In the second stage, the measurement model is assessed through Confirmatory Factor Analysis (CFA) within PLS-SEM to evaluate the reliability and validity of all construct measures, including computation of Cronbach's Alpha, Composite Reliability, AVE, and HTMT ratios. In the third stage, the structural model is estimated to test the direct path hypotheses (H01, H02, and H03) through examination of path coefficients, t-statistics derived from bootstrapping with 5,000 subsamples, and corresponding p-values. Effect sizes (f^2) and the coefficient of determination (R^2) are reported to assess the practical significance and explanatory power of the model. In the fourth stage, the moderation hypothesis (H04) is tested by

incorporating the interaction term into the structural model and examining its path coefficient and significance level.

Table 3: Analytical Procedure and Purpose

Step	Analysis	Purpose
1	Descriptive Statistics	Summarise demographic and banking profile data
2	Measurement Model (CFA)	Test convergent and discriminant validity; assess reliability
3	Structural Model	Test direct path effects (H01, H02, H03)
4	Moderation Analysis	Test Customer Trust as moderating variable (H04)

Source: Adapted from Hair et al. (2019); Ringle et al. (2020)

3.7 Ethical Considerations

The conduct of this study adhered rigorously to established ethical standards for social science and business research. Informed consent was obtained from all study participants prior to questionnaire administration, with a clearly worded consent statement explaining the study's purpose, the voluntary nature of participation, and the right to withdraw at any time without consequence. All collected data were treated with strict confidentiality: respondents were not required to disclose identifying personal information, and data were stored in password-protected electronic files accessible only to the primary researcher. The research protocol and instrument were reviewed and approved by the relevant institutional ethics committee prior to field data collection. The findings will be reported in aggregate form, with no attempt to identify individual respondents, in compliance with data protection principles consistent with Nigeria's data protection regulatory provisions (National Information Technology Development Agency [NITDA], 2019).

4. RESULTS AND FINDINGS

4.1 Sample Profile

Table 1 summarises the demographic profile of the 384 respondents. The sample was predominantly male (57.6%), with the 26–35 age cohort forming the largest group (37.0%). Mobile banking was the primary e-banking channel (51.6%), and 57% of respondents reported more than three years of e-banking experience.

Table 1: Demographic Profile (n = 384)

Variable	Category	n	%
Gender	Male	221	57.6
	Female	163	42.4
Age	18–25	87	22.7
	26–35	142	37.0
	36–45	98	25.5
	46+	57	14.8
Education	Undergraduate	201	52.3
	Postgraduate	141	36.7
	Secondary	42	10.9
E-Banking Channel	Mobile App	198	51.6
	Internet Banking	101	26.3
	ATM	85	22.1
Usage Duration	1–3 yrs	118	30.7
	4–6 yrs	139	36.2
	3+ yrs	80	20.8

Note. Source: Field Survey (2025).

4.2 Measurement Model Assessment

Following Hair et al. (2019), the measurement model was assessed for reliability, convergent validity, and discriminant validity. All 25 outer loadings exceeded 0.70 (range: 0.876–0.969; all $p < 0.001$). Table 2 confirms that all constructs surpass the thresholds for

Cronbach's alpha ($\alpha > 0.70$), composite reliability ($\rho_c > 0.70$), and average variance extracted ($AVE > 0.50$), establishing convergent validity.

Table 2: Construct Reliability and Validity

Construct	α	ρ_c	AVE	\sqrt{AVE}
Customer Satisfaction	0.979	0.983	0.922	0.960
E-Banking Reliability	0.966	0.973	0.880	0.938
E-Banking Security/Privacy	0.965	0.973	0.878	0.937
E-Banking Ease of Use	0.970	0.976	0.891	0.944
Customer Trust (Formative)	0.957	0.966	0.842	0.918

Note. Threshold: $\alpha > 0.70$; $\rho_c > 0.70$; $AVE > 0.50$ (Hair et al., 2019). All criteria exceeded.

Discriminant validity was confirmed via the HTMT criterion: all inter-construct ratios were below 0.85 (range: 0.487–0.706; Henseler et al., 2015). The Fornell-Larcker criterion was also satisfied, as each construct's \sqrt{AVE} exceeded its highest inter-construct correlation. Inner model VIF values (1.358–1.412) were well below the 3.3 threshold, confirming the absence of multicollinearity (Hair et al., 2019).

4.3 Structural Model and Hypothesis Testing

Table 3 presents the structural path coefficients and bootstrapping results. The model achieved a substantial R^2 of 0.706 (adjusted $R^2 = 0.703$), indicating that the predictor constructs collectively explain 70.6% of variance in customer satisfaction. Model fit was excellent: SRMR = 0.021 (< 0.08) and NFI = 0.968 (> 0.90). Predictive relevance was confirmed by $Q^2 = 0.652$ (> 0).

Table 3: Structural Path Coefficients and Hypothesis Results

Hypothesis	Path	β	T-Stat	p-Value	95% BCa CI	f^2	Decision
H01	Reliability \rightarrow CS	0.235	6.834	< 0.001	[0.169, 0.304]	0.119	Rejected ✓
H02	Security \rightarrow CS	0.283	8.120	< 0.001	[0.217, 0.354]	0.162	Rejected ✓
H03	Ease of Use \rightarrow CS	0.239	6.693	< 0.001	[0.170, 0.309]	0.130	Rejected ✓

—	Trust → CS (direct)	0.303	8.781	<0.001	[0.231, 0.367]	0.190	Significant
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Note. β = standardised path coefficient; BCa = bias-corrected-and-accelerated; $f^2 \geq 0.15$ = medium effect (Cohen, 1988). Bootstrapping: 5,000 subsamples, two-tailed.

4.3.1 Moderation Analysis (H04)

Table 4 reports the moderation results from the two-stage interaction approach (Hair et al., 2019). Customer trust significantly and positively moderated all three service quality–satisfaction relationships, amplifying the positive effect of each quality dimension for higher-trust customers. H04 is therefore rejected.

Table 4: Moderation Analysis — Customer Trust (H04)

Interaction Path	β	T-Stat	p-Value	Significance
Trust × Reliability → CS	0.142	2.866	0.004	$p < 0.01$ ✓
Trust × Security → CS	0.118	2.410	0.016	$p < 0.05$ ✓
Trust × Ease of Use → CS	0.127	2.556	0.011	$p < 0.05$ ✓

Note. Two-stage moderation (Hair et al., 2019). All interaction coefficients positive, confirming trust amplifies quality–satisfaction relationships.

5. DISCUSSION

5.1 E-Banking Reliability

The significant effect of reliability on customer satisfaction ($\beta = 0.235$, $p < 0.001$) confirms the E-SERVQUAL proposition that consistent platform performance is a foundational driver of digital banking experience (Parasuraman et al., 2005). This aligns with Efosa et al. (2021) and Okafor and Shaibu (2021), who identified reliability failures, including transaction errors, downtime, and delayed postings, as primary sources of customer dissatisfaction in Nigerian DMBs. It also agrees with Itai and Onamusi (2021), whose banking-sector evidence suggests that effective complaints handling is essential for customer retention when service failures occur.

5.2 E-Banking Security/Privacy

Security/privacy emerged as the strongest predictor ($\beta = 0.283$), consistent with Malaquias and Hwang (2021) and Flavian et al. (2021). In Nigeria's elevated fraud-risk environment, customers weight security attributes most heavily in satisfaction evaluations (Adewale et al., 2022). This finding demonstrates that the primacy of security in digital

banking satisfaction generalises beyond Latin American and European contexts to West African DMBs.

5.3 E-Banking Ease of Use

The significant effect of ease of use ($\beta = 0.239$) validates Davis's (1989) TAM within the Ogun State context and is consistent with Chaouali et al. (2022) and Alalwan et al. (2020). For a demographically diverse user base with varying digital literacy levels, interface usability directly shapes satisfaction independent of functional service delivery.

5.4 Moderating Role of Customer Trust

Customer trust significantly moderated all three quality-satisfaction relationships (all $p < 0.05$), with the strongest interaction for reliability ($\beta = 0.142$). Higher-trust customers derive disproportionately greater satisfaction from quality improvements, confirming trust as a boundary condition in digital financial services (Malaquias & Hwang, 2021; Flavian et al., 2021). This extends trust moderation evidence from Brazil and Europe to Sub-Saharan Africa and is consistent with Nigerian customer-equity and brand-attachment evidence that positions trust as a key relational resource for loyalty formation (Kadiri & Onamusi, 2025; Onamusi & Ayo, 2021).

6. CONCLUSION

This study provides the first state-level PLS-SEM evidence on e-banking service quality and customer experience from Ogun State, Nigeria. All four null hypotheses are rejected. Security/privacy is the dominant quality driver ($\beta = 0.283$), followed by ease of use ($\beta = 0.239$) and reliability ($\beta = 0.235$). The model accounts for 70.6% of variance in customer satisfaction, with excellent model fit (SRMR = 0.021; NFI = 0.968) and robust predictive relevance ($Q^2 = 0.652$). Customer trust significantly amplifies all quality-satisfaction relationships, confirming its boundary-conditioning role in digital banking. These findings extend E-SERVQUAL and TAM to the Nigerian DMB context and offer generalisable evidence for Sub-Saharan Africa.

7. RECOMMENDATIONS

Security-first investment: Given its primacy ($\beta = 0.283$), DMBs should prioritise multi-factor authentication, AI-driven fraud detection, and transparent data privacy communications aligned with the Nigeria Data Protection Regulation (NITDA, 2019).

Platform reliability: DMBs should enforce SLAs guaranteeing 99.5%+ uptime, with real-time transaction monitoring and root-cause analysis of system failures.

Ease of use: Human-centred interface design, progressive onboarding, and usability testing across diverse literacy levels will reduce cognitive load and raise satisfaction.

Trust-building: Proactive service recovery, personalised digital notifications of security upgrades, prompt complaints handling, and loyalty programmes should reinforce trust and amplify returns on quality investment (Itai & Onamusi, 2021; Onamusi & Ayo, 2021). The CBN should mandate minimum e-banking quality standards and publish a quarterly service quality index for DMBs.

8. CONTRIBUTION TO KNOWLEDGE

Theoretical: This study integrates TAM (Davis, 1989) and E-SERVQUAL (Parasuraman et al., 2005) with customer trust moderation in a unified framework not previously tested in the Nigerian DMB literature, extending cross-cultural generalisability of trust moderation to West Africa.

Empirical: State-level evidence from all three senatorial districts of Ogun State fills a geographic gap in Nigerian e-banking research. The finding that security/privacy ranks highest among quality dimensions, ahead of reliability and ease of use, provides an important Sub-Saharan African calibration of E-SERVQUAL dimension priorities.

Methodological: Full compliance with Hair et al.'s (2019) PLS-SEM reporting protocol measurement model evaluation, structural testing, Q^2 , PLSpredict, SRMR/NFI establishes a rigorous template for SCOPUS-indexed banking research in Africa.

DISCLOSURE STATEMENTS

Ethics: Informed consent obtained from all participants; no identifying information collected; data stored in password-protected repositories; approved by the institutional ethics committee; compliant with NITDA (2019).

Conflict of interest: None declared.

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Data availability: Anonymised dataset and SmartPLS model file available from the corresponding author on reasonable request.

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APPENDIX

<https://drive.google.com/drive/folders/13s-bxDpct1v9tle1BEVM5-XIeE5wMmJF?usp=sharing>



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