

# Making mobile financial services stick: an empirical investigation into user attitudes and intentions for sustainable adoption

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## Abstract

**Purpose** – This study examined the factors that affect attitudes and intentions for sustainable adoption of mobile financial services (MFS) in Nigeria.

**Design/methodology/approach** – The study expands the Technology Acceptance Model (TAM) by incorporating constructs like perceived service quality, perceived ease of use, perceived usefulness, perceived credibility, perceived trust and attitude. It includes an empirical analysis with 382 participants and qualitative insights from semi-structured interviews to investigate the challenges and opportunities associated with MFS adoption in Nigeria.

**Findings** – The findings show that perceived service quality, perceived usefulness and attitude positively influence the adoption of MFS. However, perceived ease of use and perceived credibility have little impact on adoption. Qualitative insights from Study 2 shed light on the challenges and opportunities as well as the reasons behind the insignificant effects of perceived ease of use and perceived credibility.

**Originality/value** – This research stands out by using a mixed-methods approach, blending quantitative and qualitative analysis to provide a more detailed understanding of the factors influencing MFS adoption.

**Keywords** Mobile financial services, Technological acceptance model, Perceived service quality, Perceived usefulness, Ease of use, Perceived credibility, Mobile money, Nigeria

**Paper type** Research paper

## Introduction

Mobile commerce (m-commerce) has gained significant traction worldwide, driven by the ongoing development of the internet and mobile devices as essential tools for conducting business. A key component of m-commerce is Mobile Financial Services (MFS), which allows users to perform various financial transactions such as sending and receiving money, depositing funds, and paying bills via mobile phones or software applications (Uddin and Nasrin, 2023). MFS provides users and agents with a reliable, user-friendly, and secure platform for conducting transactions (Himel *et al.*, 2021).

In today's rapidly changing economic and market environments, innovation is crucial for businesses to maintain sustainable profitability. Mobile banking technology is one such



innovation that has created new opportunities for both individuals and organizations. MFS, defined as the ability to conduct financial transactions via mobile devices, includes services such as account statement generation, money transfers, contactless banking, and information-based financial services (Avom *et al.*, 2023; Neves *et al.*, 2023; KA *et al.*, 2024).

Recent studies have highlighted the growing interest in understanding the factors influencing users' attitudes and behaviors towards MFS and mobile banking. This interest stems from the potential of these insights to guide merchants in making more effective strategic decisions for customer acquisition and long-term retention (Avom *et al.*, 2023; Shaikh *et al.*, 2023). Various behavioral theories, including the Technology Acceptance Model (TAM), identify factors such as perceived usefulness (PU), perceived ease of use (PEOU), consumer innovativeness, demographic variables, perceived risk, and performance expectancy as key determinants of users' attitudes and intentions towards adopting MFS (KA *et al.*, 2024).

In Nigeria, the high success rate of mobile money services has been attributed to a supportive legal framework that allows banks, telecommunications companies (TELCOS), and other payment services to participate in mobile financial operations (Mogaji and Nguyen, 2022). According to a recent report by Business Insider, mobile money transactions in Nigeria surged by over 3,000% to N3.85 trillion in the first quarter of 2022, compared to N128.46 billion in the previous quarter of 2019. The Nigeria Interbank Settlement System (NIBSS) also reported a 14.01% increase in the telecom subscriber base, rising from 176.62 million in 2019 to 201.35 million in 2022. The report further indicated that smartphone transactions would continue to be the primary means of payment (Mogaji and Nguyen, 2022).

The Instant payment report from NIBSS highlighted a dramatic 3,406.95% increase in mobile transactions during the COVID-19 pandemic, rising from 4.36 million to 152.99 million. The GSMA's State of the Industry Report on Mobile Money also emphasized that a significant portion of the \$490 billion in mobile money transactions in 2022 occurred in Nigeria and other sub-Saharan African (SSA) countries, with SSA maintaining its position as the global leader in mobile financial transactions due to increased capital investment by TELCOS (Statista, 2022).

Despite these advances, research on MFS adoption in Nigeria remains limited, with most studies conducted in digitally advanced countries like Singapore, India, China, Korea, and the United States, where high-speed internet penetration and urbanization are prevalent (Shaikh *et al.*, 2023; Uddin and Nasrin, 2023). In contrast, digital consumer behavior in less developed countries like Nigeria is less pervasive (Avom *et al.*, 2023; Neves *et al.*, 2023).

To address this gap, this study employs an extended version of the original Technology Acceptance Model (TAM). Numerous scholars have built upon Davis's foundational work to empirically validate the relationships between perceived usefulness, ease of use, and system utilization (Inan *et al.*, 2023; Isiaku *et al.*, 2024; Muhammad and Kaya, 2023). This study responds to Tengeh and Gahapa Talom's (2020) call for a mixed-method approach, combining both quantitative and qualitative analyses. Unlike previous studies on MFS adoption that typically focused on either qualitative (Sampat *et al.*, 2024) or quantitative methodologies (Merhi *et al.*, 2019; Mogaji and Nguyen, 2022), this approach allows for a more comprehensive and nuanced understanding of MFS adoption within Nigeria's unique context (Polisetty *et al.*, 2024).

Given these considerations, the following research questions will be explored in this paper:

- (1) What factors contribute to attitudes and intentions towards adopting MFS?
- (2) What are the challenges and opportunities of adopting MFS within the Nigerian context?

This study contributes to the theoretical understanding of MFS adoption by providing empirical evidence from a developing region, thus enriching our understanding of

technology acceptance models. In practice, it offers data-driven insights for policymakers and businesses to formulate effective strategies for fostering MFS adoption. The study also has broader implications for the economy and society by promoting informed MFS adoption, balancing innovation with consumer protection, and potentially enhancing economic growth and societal well-being. Additionally, the research offers technological and informational insights that can improve MFS technologies and user experiences, benefiting both users and the broader technological ecosystem.

The subsequent sections of this paper are organized as follows: [Section 2](#) presents a comprehensive literature review and the formulation of hypotheses. [Section 3](#) outlines the methodology employed in this study. [Section 4](#) presents the data and findings, followed by a discussion of the study's implications, limitations and future research in [Section 5](#).

## Literature review and hypothesis development

### *Theoretical background*

According to the Technology Acceptance Model (TAM), two critical factors that significantly influence the acceptance of new technology or applications are “perceived usefulness” (PU) and “perceived ease of use” (PEOU). Perceived ease of use refers to the degree to which an individual believes that using a particular system or application will be free of effort. On the other hand, perceived usefulness indicates the extent to which an individual believes that using a specific system will provide a greater advantage compared to other alternatives ([Davis, 1989](#)).

In TAM, both PEOU and PU play a vital role in shaping users' attitudes, which subsequently affect their behavioral intentions. While behavioral intention reflects the likelihood of users adopting Mobile Financial Services (MFS), attitude represents their positive or negative evaluations of adopting MFS.

However, concerns have been raised about the sufficiency of TAM1 and TAM2 in fully capturing users' technological acceptance ([Liew et al., 2017](#); [Venkatesh et al., 2003](#)). Some scholars suggest that additional factors may also influence the adoption of MFS ([Sathye et al., 2018](#)). Previous studies have validated the expansion of TAM by incorporating constructs such as perceived risk ([Merhi et al., 2019](#)), perceived system quality ([Poromatikul et al., 2020](#)), perceived credibility ([Inan et al., 2023](#)), and perceived trust ([Liu et al., 2018](#); [Riquelme and Rios, 2010](#)).

Empirical findings in the literature support the inclusion of these additional constructs, highlighting their potential to better explain customer acceptance intentions. Given that earlier studies ([Himel et al., 2021](#); [Nayanajith, 2021](#)) successfully expanded the TAM model with additional constructs to predict the intention to adopt and use mobile payment systems, this research adopts a similar approach, extending the conventional TAM model to enhance its predictive power.

### *Perceived service quality and attitude towards using (MFS)*

Perceived service quality was defined by Jiang and Wang ([Jiang and Lu Wang, 2006](#)) as the customer's evaluation of the magnitude of the services they received and how well their expectations are met. [Ali and Raza \(2017\)](#) stated that long-term business success depends on the ability to produce high-quality goods and services. A service company can expand by raising its quality of services, increasing market share and paving the way for new markets ([Ali and Raza, 2017](#)). Perceived service quality and attitude to use were given much attention in earlier service quality literature, including ([Grewal et al., 2020](#); [Wang et al., 2019](#)). The literature suggests that high quality enhances attitude towards using goods and services, leading to customer satisfaction and customer retention ([Jiang and Lu Wang, 2006](#)). Accordingly, the authors can speculate the following while keeping the discussion above in mind:

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H1. Perceived service quality of MFS is positively correlated to attitude towards using MFS

*Perceived ease of use and attitude towards using (MFS)*

According to Davis' Technology Acceptance Model (TAM), among the most critical considerations in a user's acceptance of a system or technology is perceived ease-of-use PEOU. He termed perceived ease of use as the extent users believe using a particular technology will be effortless. Additionally, if users believe a technology is user-friendly, they are more likely to use it. According to studies, the use of different technological systems, including mobile banking (Arcand *et al.*, 2017), m-commerce (Abdallah *et al.*, 2020), mobile and contactless m-payment (Patil *et al.*, 2020), and internet banking (Patel and Patel, 2018), among others, is influenced by the users' perspective of ease to use the system. In light of these empirical studies, the authors hypothesized the following:

H2. Perceived ease of use in MFS positively correlates with attitudes toward using MFS.

*Perceived usefulness and attitude towards using (MFS)*

The degree to which people believe a technology or system would be helpful to them is known as Perceived usefulness (PU) (Davis, 1989). People's perceptions of the system's value are influenced by its productivity, effectiveness, and overall benefits in improving user performance (Patel and Patel, 2018). Furthermore, if a technology or system is perceived as beneficial, individuals are likelier to want to use it. Huei *et al.* (2018) examined the impact of perceived usefulness and users' attitude towards using m-commerce and Fintech products and services, respectively. The outcomes demonstrated that perceived usefulness positively correlates to attitude towards m-commerce and Fintech products and services. Therefore, the more m-commerce and Fintech products are helpful to the customers, the more likely they develop an attitude towards using them in their daily activities. Consequently, the authors proposed the following hypothesis:

H3. The perceived usefulness of MFS and attitude toward using MFS are positively correlated.

*Perceived credibility and attitude towards using (MFS)*

Credibility is the degree to which a recipient considers information realistic (Chakraborty, 2019). The receiver's intention to change their attitude in response to the information presented is influenced by perceptions of credibility (Sharif and Raza, 2017). Consequently, credibility is key when considering users' attitudes and intentions towards using MFS. Lim *et al.* (2019) argued that security concerns about mobile financial service providers' capabilities to safely store and safeguard customers' personal information and financial data from hackers remain the topic of discussion among individuals. Researchers have found a strong correlation between attitudes toward using technology and perceived credibility (Mehrad and Mohammadi, 2017; Vuong *et al.*, 2020). The banks and other MFS service providers gain credibility when customer security and privacy concerns are appropriately addressed (Saputra, 2020). As a result, the researchers hypothesized the following:

H4. Perceived Credibility of MFS will positively influence attitudes towards using MFS

*Perceived trust and perceived credibility of (MFS)*

Van der Werff *et al.* (2019) define trust as a psychological perception that a trusted entity will not act opportunistically. Customers are more inclined to conduct transactions if they trust their financial service providers (Ozili, 2018). At the same time, Shanmugam *et al.* (2016)

stated that credibility is the attribute of being regarded as reliable and trustworthy by users of particular systems or technologies. A research study on adopting mobile financial services in rural unbanked areas (Oh *et al.*, 2019) discovered that locals favored credible channels for conducting financial transactions. It should be clear from the above definition of trust and credibility that any relationship, whether from a personal or business perspective, should be built on a foundation of trust and credibility for it to be truly successful. Customers are more likely to be engaging with businesses from a positive perspective when their relationships are built on trust and credibility (Jalilvand *et al.*, 2017). Based on the literature mentioned above, the authors hypothesized that:

*H5.* Perceived trust in MFS has a positive influence on perceived credibility of MFS

*Perceived trust and attitude towards using (MFS)*

According to Akhter *et al.* (2020) perceived trust (PT) attempts to measure how users believe adopting MFS is secure without privacy concerns. Researchers have previously used PT to enhance the TAM model, and some research discovered that PT is a significant determinant of customers' attitudes towards embracing innovative technology (Panagiotopoulos and Dimitrakopoulos, 2018). Notably, in the case of e-commerce or mobile payments, where risks and uncertainties significantly influence the users, the importance of trust in controlling users' behavior and intentions is broadly comprehensive (Nie and Amarayoun, 2018). Scholars' earlier research, including the likes of Gupta and Dhingra (2022), provides compelling proof that trust is positively related to users' attitudes and affects their intention to use by enhancing transparency associated with MFS. Therefore, trust can lower risk and uncertainty while conducting online activities or transactions (Park *et al.*, 2019). In line with the explanations made above, the authors hypothesized:

*H6.* Perceived trust of MFS is positively correlated with attitude towards using MFS

*Perceived trust and intention to use (MFS)*

Moslehpour *et al.* (2018) stated that technology acceptance research had been centered towards user trust, more often used along with perceived ease-of-use PEOU and perceived usefulness PU as another essential factor in influencing customers' behaviors to adopt and use innovations. Given the enormous amount of information needed to provide financial services, users' trust is vital in the financial industry (Hu *et al.*, 2019). Trust is essential for technological companies to innovate, especially for systems that enable monetary operations and involve essential customer data (David-West *et al.*, 2018). Additionally, numerous studies have demonstrated that user trust is crucial in adopting any Fintech service (Gbongli *et al.*, 2019). As a result, the PT of customers plays a significant role in the Nigerian market's adoption of mobile-based financial services (Chawla and Joshi, 2019). Therefore, we propose the following research hypothesis:

*H7.* Perceived Trust in MFS positively influence user's intention to use MFS

*Attitude towards using MFS and intention to use MFS*

According to the TAM's emphasis on the connection between attitude and intention, behavior must be judged following one's attitude. The degree to which people perceive a positive or negative feeling associated with mobile money transfer (MMT) relates to their attitude toward using it (Yanto *et al.*, 2023). Past studies on TAM and other consumer-related areas have demonstrated a significant relationship between attitudes and intentions (Marangunic and Granic, 2015; Wu and Chen, 2017). Research has shown that users are more likely to adopt a technological innovation if they have a favorable attitude (Chawla and Joshi, 2019). Earlier IT

studies that use the original TAM model (Krause, 2019; Wu and Chen, 2017) have supported attitude being the most significant determinant of intention to use. Based on the above discussion, the authors hypothesized the following:

*H8.* Attitude towards using MFS has a significant link with intention to use MFS.

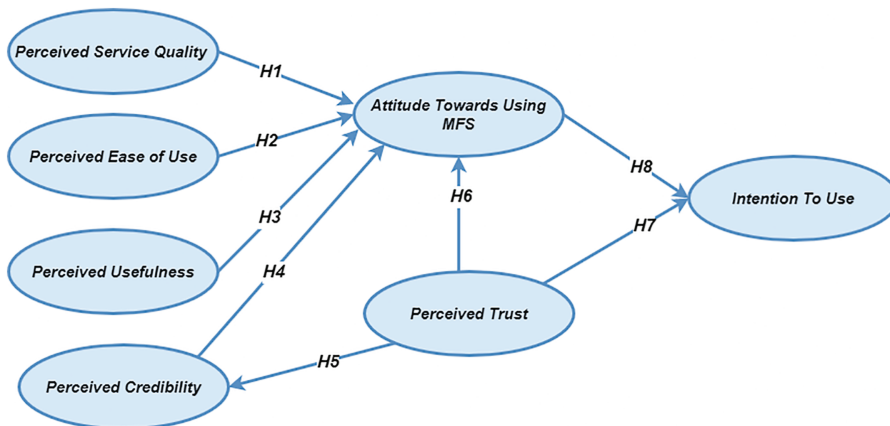
The study hypothesized that eight factors would affect individual attitudes and intentions towards the sustainable adoption of mobile financial services. In light of the constructs above, the authors suggest a conceptual model that can be examined and verified. Figure 1 illustrates the research framework.

**Methodology**

*Study 1: quantitative study*

*Instrument development.* To achieve the main objectives of the research, the authors used a quantitative approach to analyze the numerical data and derive valuable insights and patterns because it is more scientific, unbiased, focused, and acceptable to researchers (Lee, 1999). A questionnaire consisting of closed-ended questions was used to collect primary data, and respondents were limited to a set of alternative questions. A Likert 5-point scale to evaluate respondents’ attitudes or opinions towards mobile financial services adoption is widely used to rate respondents based on their level of agreement (Koran et al., 2022). The respondents were asked to select one out of five of the responses: “strongly agree (1), agree (2), neutral (3), disagree (4), strongly disagree (5)”. The key dimensions are perceived service quality, perceived ease of use, perceived usefulness, perceived credibility, perceived trust, attitude, and intention to adopt. The study items were adopted from previous studies (Al Nawayseh, 2020; Davis, 1989; Dijkstra and Henseler, 2015; Hu et al., 2019; Luarn and Lin, 2005; Shaw and Sergueeva, 2019; Urbach et al., 2010; Venkatesh et al., 2003).

*Data collection.* The respondents were dispersed across Nigerian cities. The approximate target population is over 60.8 million mobile financial services users. The authors, however, could not identify a sampling frame that covered the respondents’ target group. According to a recent study, social science researchers suggest that it is challenging to apply random sampling without a sampling frame (Krause, 2019). Therefore, a non-probability data



Source(s): Authors’ own work

**Figure 1.**  
Proposed  
research model

collection technique known as snowball sampling was used to collect the data in this research. This approach not only optimizes efficiency in participant recruitment but also acknowledges the practical challenges posed by the novelty of the subject matter and the scarcity of existing resources in this emerging domain. An online questionnaire containing 24 questions was sent to the participants via WhatsApp and email using Google Forms. The respondents were informed that the purpose of the study was purely academic and that their anonymity and confidentiality would be strictly maintained. The selected respondents were asked to invite their network from different regions currently using MFS to participate in the study. These measures have been used to increase response rates (Dörnyei and Taguchi, 2009). The respondents were given a 35-day timeframe to respond to the questionnaire from 25th October to November 28, 2023. After several follow-up calls and messages during this period, 410 responses were received, of which 28 were deemed incomplete and subsequently excluded from further analysis. The final sample consisted of 382 valid responses. This sample size exceeded the threshold of 100, meeting the adequacy criteria proposed by Roscoe (1969) who considered a sample size between 30 and 500.

*Pre-testing and pilot survey.* After searching the relevant literature, a pool of questions was established for the survey questionnaires. After formulating the questionnaire, the authors contacted three experts from Cyprus International University to determine the validity of the structured questionnaire. Several questions were carefully modified in response to their input. The authors conducted a pilot study with 30 respondents (20 MFS customers and 10 MFS agents from various MFS providers) to determine the research instrument's suitability, reliability, and viability (Al Farsi, 2023). The authors calculated the internal consistency of the scale items using data from the pilot survey. All "Cronbach's alpha" scores for the constructs were greater than 0.7 and deemed acceptable as suggested by (Taber, 2018).

*Respondents' profiles and response rates.* Out of the 410 collected responses, 28 were considered invalid due to respondent's error and some unanswered parts in the questionnaire. This shows that 382 responses were considered valid out of the 410 distributed questionnaires used to conduct the analyses. The study's overall rate of participation was 93.17%. Table 1 below represents the demographic profile of the 382 responses used, and the results of the analyses show that (67.5%) of the respondents are primarily male. The respondents' age ranged from 18 to 35 years old at around (80.2%). The respondents' educational background was mainly PhD and master's degrees at around (54.7%). The respondents' marital status was mainly singles at about (66.8%). The number of MFS users in respondents' families was mainly 1–5, which racked up about (54.7%) of the responses. At the same time, MFS brand preferences of the respondents are mostly Opay, PalmPay, and MTN (momo) at about (58%). Table 1 below represents the demographic profile of the 382 responses used in the study.

*Data analysis.* The statistical software SMART-PLS was employed to analyze the data collected for this research. The variance-based structural equation modeling (SEM) method and the partial least squares (PLS) method were employed to evaluate the proposed model (Dijkstra and Henseler, 2015). PLS is a variance-based SEM technique used to assess model fit's effectiveness and evaluate explanatory and predictive studies (Fornell and Larcker, 1981; Hair et al., 2012; Henseler et al., 2016). The authors of this study also utilized PLS since it can be used to measure composites and consistently produces PLS estimates for any model, which helps us measure complex models more effectively (Hair et al., 2017).

*Study 2: qualitative study.* Study 2 employed a qualitative research design, utilizing semi-structured interviews as the primary data collection method. This approach is particularly effective for exploratory studies that seek to uncover initial insights into phenomena (Akteer et al., 2019). The focus of Study 2 was on the challenges and opportunities associated with adopting Mobile Financial Services (MFS) in Nigeria.

Demographics	Details	Percentage	Frequency
Gender	Male	67.5%	258
	Female	32.5%	124
Age In Years	18–25 years	38.5%	147
	26–35 years	41.7%	159
	36–45 years	7.6%	30
	46–55 years	6.1%	23
	55 years above	6.1%	23
Education background	High School	19.5%	74
	Undergraduate	25.8%	99
	Masters	27.2%	104
	PhD	27.5%	105
Marital status	Single	66.8%	255
	Married	23.4%	89
	Divorced	9.8%	38
Number of MFS users in family	1–5	54.7%	209
	6–10	27.1%	104
	10 and above	18.2%	69
MFS brand preferences	Faga's Money	9.3%	36
	MTN (momo)	17.2%	66
	Opay	27.3%	104
	PalmPay	13.5%	52
	EazyMonie	7.4%	28
	FirstMoney	11.3%	43
	Others	14%	53

Source(s): Authors' own work

**Table 1.**  
Demographic profile  
and frequency of the  
respondents

Participants included 14 regular users and agents of mobile financial services, who were identified through snowball sampling. The semi-structured interview questions were informed by previous literature and aimed to expand on the quantitative findings from Study 1, as well as to gather new insights. Each interview session lasted between 30 and 40 min.

Ethical approval for the study was obtained beforehand. A thematic analysis was conducted to explore participants' perspectives, attitudes, knowledge, behaviors, and values. After completing and recording the interviews, the data were transcribed using two different tools, Otter and Temi. To ensure the highest level of accuracy, two independent researchers meticulously verified the transcriptions, correcting any errors or omissions made by the software.

The data were coded in two phases: initially, by identifying emerging concepts and commonly used terms among respondents; and subsequently, through focused coding, which involved refining and categorizing the data for comparative analysis. The entire process adhered to the steps outlined in [Braun and Clarke's \(2006\)](#) thematic analysis framework, using the Atlas.ti software.

## Results and findings

### *Study 1: analysis and model testing*

**Measurement model.** An exploratory analysis using discriminant and convergent validity and scale reliability in measuring the data must be established using ([Fornell and Larcker, 1981](#)) criteria. The study used a preliminary test for common method bias to determine the variables' multi-collinearity. The results shows that the variance inflation factors (VIF) range is between 1.241 and 4.411, lower than the 3.3 ([Kock, 2015](#)). This indicates no multi-collinearity among the data used for the study. [Table 2](#) highlights the exploratory analysis result and VIF.



Indicator	VIF	Factor loading	Composite reliability (CR)	Average variance (AVE)	Cronbach's alpha( $\alpha$ )	Coefficient of determination ( $R^2$ )
			0.811	0.628	0.8021	0.2199
PSQ1	2.092	0.812				
PSQ2	2.381	0.844				
PSQ3	1.686	0.797				
PSQ4	1.532	0.712				
			0.786	0.705	0.789	0.284
AMFS1	1.214	0.750				
AMFS2	4.411	0.894				
AMFS3	4.215	0.868				
			0.743	0.543	0.719	0.217
IMFS1	1.445	0.725				
IMFS2	1.537	0.825				
IMFS3	1.367	0.721				
IMFS4	1.286	0.667				
			0.799	0.682	0.773	
PT1	1.572	0.853				
PT2	1.714	0.797				
PT3	1.521	0.827				
			0.734	0.578	0.735	0.262
PC1	1.315	0.770				
PC2	1.340	0.775				
PC3	1.264	0.736				
			0.707	0.536	0.706	
PU1	1.351	0.644				
PU2	1.696	0.820				
PU3	1.659	0.771				
PU4	1.450	0.678				
			0.844	0.757	0.836	
PEOU1	1.459	0.784				
PEOU2	3.821	0.928				
PEOU3	3.440	0.891				

**Table 2.**  
Exploratory analysis  
result and VIF

**Source(s):** Authors' own work with SmartPLS

Second, the research investigated the discriminant and convergent validity and the model reliability. Convergent validity refers to how various measures of the same construct should be correlated, whereas discriminant validity statistically contrasts two variables (Anderson and Gerbing, 1988). As observed in Table 3, all factor loadings exceeded 0.4, which satisfies

Construct	PSQ	AMFS	IMFS	PT	PC	PU	PEOU
PSQ	0.628						
AMFS	0.153	0.705					
IMFS	0.080	0.199	0.543				
PT	0.334	0.103	0.073	0.682			
PC	0.450	0.104	0.057	0.262	0.578		
PU	0.267	0.253	0.244	0.242	0.202	0.536	
PEOU	0.171	0.047	0.035	0.091	0.132	0.250	0.757

**Table 3.**  
Discriminant validity

**Note(s):** Squared correlations; AVE in the diagonal  
**Source(s):** Authors' own work with SmartPLS

the criteria by (Bagozzi, 1981) recommendation, requiring all factor loadings to be greater than 0.50. Also, the value of AVE satisfied and exceeded 0.50 for all items (Chin, 1998) and values for Cronbach alpha ( $\alpha$ ) satisfied and met the requirement (Taber, 2018). As (Henseler *et al.*, 2009) suggested, all CR (the measure to which items are free from random error and offer consistent outcomes) exceed 0.6. These results demonstrate a good and satisfactory outcome of the measurement model. Additionally, the  $R^2$  for AMFS is 0.284, which has been demonstrated to be significant. IMFS, with an  $R^2$  of approximately 0.217, is moderate. Furthermore, PC, with an  $R^2$  of about 0.262, is also demonstrated to be significant (Chin, 1998). As a result, AMFS (28.4%), IMFS (21.7%) and PC is 26.2%. Additionally, as indicated in Table 3, each construct's test of discriminant validity follows (Fornell and Larcker, 1981) recommendation that each construct should have a higher square root of AVE than its corresponding correlation. Thus, the results demonstrated that the discriminant validity, Cronbach's alpha (construct reliability) values, factor loadings, average extracted variance, and composite reliability were tested and satisfied to evaluate the model's fit and the correlations between the variables to examine the structural model.

*Measurement of model fit.* Various model-fit aggregates frequently represent the measurement of model fit. The composite PLS was used to determine the model's goodness of fit values through the standardized root mean square residual (SRMR), unweighted least squares discrepancy (d\_ULS) and geodesic discrepancy (d\_G). When the squared Euclidean distance (d ULS) of the saturated model bootstrapped at HI 95% of the d ULS estimated model and d G of the saturated model bootstrapped at HI 95% of the d G of the estimated model are all less than 0.08, the model fit is valid. As a result, Table 4 demonstrate that SRMR is less than 0.08, d\_ULS saturated, and d\_G saturated satisfied the requirement suggested by (Henseler *et al.*, 2009; Quintana and Maxwell, 1999).

The study's findings show that among the factors influencing sustainable adoption of MFS in Nigeria, (H1) perceived service quality has a positive relationship with attitude towards sustainable use of MFS ( $\beta = 0.244, p < 0.01; f = 0.081$ ). (H2) perceived ease of use has an insignificant negative impact on attitude towards sustainable adoption of MFS ( $\beta = -0.087, p < 0.01; f = 0.008$ ). (H3) perceived usefulness has a positive relationship with attitude towards sustainable adoption of MFS ( $\beta = 0.439, p < 0.01; f = 0.158$ ). (H4) perceived credibility has an insignificant impact on attitude towards sustainable adoption of MFS in Nigeria ( $\beta = -0.067, p = 0.01; f = 0.002$ ). Thus, empirical evidence supports H1 and H3, and H2 and H4 are unsupported. As shown in Table 5.

Furthermore, the study's findings show that (H5) perceived trust has a positive impact on perceived credibility ( $\beta = 0.512, p < 0.01; f = 0.356$ ). (H6) Perceived trust has an insignificant impact on attitude towards sustainable use of MFS in Nigeria ( $\beta = 0.024; f = 0.001$ ). (H7) perceived trust has a significant impact on intention towards sustainable use of MFS ( $\beta = 0.0142; p < 0.01; f = 0.023$ ), and (H8) attitude has a positive impact on intention towards sustainable use of MFS ( $\beta = 0.401, p < 0.01; f = 0.184$ ). Thus H5, H7, and H8 are supported, and H6 is not empirically supported. According to the structural model analysis findings, all

	Value	HI95	HI99
SRMR	0.0586	0.0571	0.0599
d <sub>ULS</sub>	0.9835	0.9774	1.0754
d <sub>G</sub>	0.3661	0.3537	0.3726

**Note(s):** The values for the model fit evaluate the discrepancy between the empirical correlation matrix and the model-implied correlation matrix

**Source(s):** Authors' own work with SmartPLS

**Table 4.**  
Overall model fit  
Saturated

**Table 5.**  
Structural model

Effect	Original coefficient	Standard error	t-value	p-value	Cohen's $f^2$
H1 PSQ → AMFS	0.244	0.085	2.881	0.004	0.018
H2 PEOU → AMFS	-0.087	0.064	-1.355	0.175	0.008
H3 PU → AMFS	0.439	0.054	8.153	0.000	0.158
H4 PC → AMFS	-0.067	0.073	-0.915	0.360	0.002
H5 PT → PC	0.512	0.036	14.088	0.000	0.356
H6 PT → AMFS	0.024	0.065	0.372	0.710	0.001
H7 PT → IMFS	0.142	0.038	3.722	0.000	0.023
H8 AMFS → IMFS	0.401	0.044	9.088	0.000	0.184

**Source(s):** Authors' own work with SmartPLS

the direct impacts were significant except for H2, H4, and H6. As a result, all the hypothesized models were measured accordingly. Figure 2 shows the result of the graphical representation of the validated model.

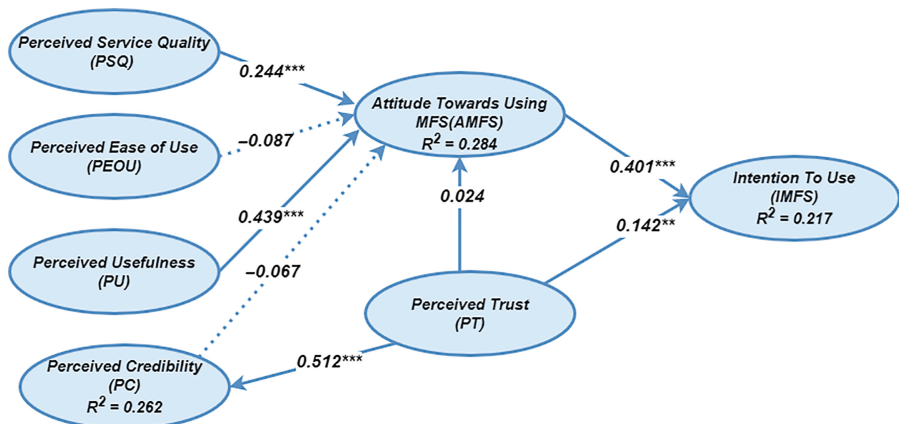
*Study 2: qualitative findings*

*Challenges in mobile financial services.* Transaction difficulties. Participants commonly experienced issues with transaction delays and network reliability. Problems such as network failures and poor service coverage often disrupt the smooth execution of financial transactions. Participant 1 noted,

I often face network failures that disrupt our transactions, causing delays.

Transaction delays were also highlighted by Participants 2 and 4, who observed that such delays adversely affect their financial activities. Inconsistent network coverage and poor power supply create barriers to accessing mobile services, particularly in rural areas where infrastructure is often underdeveloped. These infrastructural deficiencies limit the **penetration of MFS** and restrict many potential users from experiencing the benefits of digital financial platforms.

Security concerns. Security remains a significant concern for users of mobile financial services, with multiple participants reporting issues such as fraud and unauthorized access



**Figure 2.**  
Validated  
research model

**Source(s):** Authors' own work

to their accounts. For instance, Participant 6 noted, “We’ve experienced instances of fraud and unauthorized access to our accounts, which makes us wary of using these services.” This lack of trust in the security of mobile financial services is further exacerbated by widespread concerns about data protection, as highlighted by Participants 11 and 13. To build user confidence, it is essential to enhance security measures.

Mogaji and Nguyen (2022) emphasize that the relationship between customers and agents hinges on the assurance that customer information is secure and not vulnerable to fraud or other security threats. Additionally, the relationship between developers and agents requires ongoing training, robust security protocols, and technical support to ensure the integrity and safety of the services provided.

Digital divide and accessibility issues. Digital divide and accessibility presents another significant challenge. Participants reported difficulties related to the availability of mobile money agents and infrastructure limitations. For instance, Participants 5 and 7 mentioned that limited agent availability and sporadic network issues make it hard to access services in certain regions. Infrastructure challenges, as highlighted by Participant 7, further exacerbate the difficulty of using these services effectively.

Infrastructure issues make it difficult to use these services effectively, especially in less developed areas.

Fees and charges. High transaction fees and charges were frequently cited as barriers to using mobile financial services. Participants expressed frustration with the high costs associated with small transactions, which hinders broader adoption, particularly among low-income users.

Participant 1 shared, “*The fees for small transactions are too high, and it discourages us from using the service. For example, to withdraw or transfer 1,000 Naira, we are charged a certain amount, and it keeps on adding like this.*”

Regulatory and support challenges. Participants identified gaps in government and regulatory support as obstacles to the growth of mobile financial services. Outdated and stringent regulations were seen as barriers to innovation and broader adoption. Participants 1, 2, and 4 highlighted this issue, suggesting a need for regulatory reform. Participant 4 agreed, “*We need regulatory reforms to support the growth of these services and make them more accessible.*”

While some frameworks exist, they are not comprehensive enough to protect users from inconsistent services and potential fraud. This regulatory gap erodes user confidence and creates a fragmented market. To address this issue, the government should take a more active role in establishing clear and enforceable **regulatory frameworks** that protect users and promote healthy competition within the MFS sector.

## Opportunities in mobile financial services

### *Convenience*

Despite the challenges, mobile financial services offer significant convenience. Participants valued the ability to manage finances, make transactions, and pay bills from mobile devices. This ease of use is particularly beneficial for individuals in remote areas, where traditional banking services may be limited. Additionally, mobile financial services contribute to financial inclusion by providing access to banking services in underserved regions, as noted by Participants 2 and 6.

### *Financial management*

The potential for improved financial management through mobile services was also emphasized. Participants, including Participants 4 and 5, recognized the benefits of

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1,2 budgeting tools, savings features, and expense tracking capabilities. Participant 4 said, “*The budgeting tools and savings features available through mobile services help us manage our finances better.*” The ability to access funds quickly in emergencies was highlighted as a crucial support mechanism by Participants 1 and 7.

**130** *Potential innovations*  
There is significant interest in new features and services within mobile financial platforms. Participants expressed a demand for affordable microloans and crowdfunding platforms to support small businesses. For example, Participant 1 said, “*We’re looking for affordable microloans and crowdfunding options to support small businesses.*” Additionally, there is a desire for investment opportunities and financial planning tools, as mentioned by Participants 8 and 10. These innovations could further enhance the value of mobile financial services.

*Education and awareness*

Enhancing education and awareness is seen as a key opportunity to improve the use of mobile financial services. Participants acknowledged the need for better education on how to use these services effectively and safely. Educational initiatives, such as workshops and informational resources, could help address gaps in understanding and build user trust. As suggested by Participants 4 and 5, Participant 4 stated, “*Educational programs and resources could help users understand and trust mobile financial services better.*”

**Discussion, implications, limitations and future research directions**

*Discussion*

This study extends the Technology Acceptance Model (TAM) to explore individuals’ attitudes and intentions for the sustainable use of Mobile Financial Services (MFS) in Nigeria. The findings highlight both challenges and opportunities associated with adopting MFS in the region.

First, the results confirm that **perceived service quality** positively influences attitudes toward sustainable MFS adoption in Nigeria (H1). This aligns with the qualitative findings, where participants emphasized the importance of service quality in their overall experience with MFS. As noted by participants in Study 2, issues like transaction delays and network reliability directly impact their perception of service quality. This finding is consistent with prior research by Zhou *et al.* (2021) and Moghavvemi *et al.* (2018), which underscores the need for MFS providers to maintain high service standards to retain customers.

In contrast, PEOU was found to have an insignificant impact on attitudes toward sustainable MFS adoption (H2). The findings is not in line with previous studies (Abdallah *et al.*, 2020; Patil *et al.*, 2020; Patel and Patel, 2018). This limited role may be explained by technical and infrastructural challenges such as inconsistent network connectivity, power outages, and unreliable service delivery. Users may be less concerned with how easy a platform is to use and more focused on whether they can access it consistently. In such an environment, service reliability and trustworthiness are more important factors than ease of use. This reflects the need to revisit the (TAM) to account for contextual realities in developing countries. The qualitative findings also provide context for this result, revealing that users often face significant challenges, such as mental stress and the time and effort required to navigate new technology. As participants noted, difficulties in using MFS due to network failures and poor service coverage contribute to a negative perception of ease of use, which diminishes their intention to adopt these services. This is supported by Mustafa (2022), who highlighted the challenges users face when new technologies require considerable effort to learn and use.

The study also found a favorable relationship between **perceived usefulness** (PU) and attitudes toward sustainable MFS adoption (H3). Participants in the qualitative study expressed appreciation for the convenience MFS offers, particularly in managing finances, paying bills, and accessing services in underserved areas. This supports previous literature, such as Huei *et al.* (2018), which suggests that users are more likely to adopt technology if they believe it will improve their efficiency and effectiveness in completing tasks.

In contrast to previous literature (Mehrad and Mohammadi, 2017; Vuong *et al.*, 2020), which emphasizes the critical role of perceived credibility in shaping user attitudes toward technology adoption, this study found that perceived credibility (H4) had no significant impact on attitudes toward adopting MFS. This skepticism is likely driven by the high incidence of cyber fraud and data breaches, making it difficult for users to trust MFS providers. Trust is critical in financial transactions, and without credible assurances of security and privacy, users are reluctant to adopt MFS on a sustainable basis. The study underscores the need for MFS providers to bolster their security protocols and improve transparency to build user confidence. Furthermore, the qualitative findings revealed that security concerns, such as fraud and unauthorized account access, are major deterrents for users. This discrepancy suggests that while credibility may not directly influence attitudes, it plays a crucial role in shaping users' overall trust in the system. This is further elaborated in the study's findings on perceived trust (H5), which is shown to be closely linked with the credibility of MFS providers and their ability to secure users' financial transactions. As participants indicated, trust in the security and reliability of MFS is essential for fostering positive attitudes towards these services, consistent with Saputra (2020) and Shanmugam *et al.* (2016).

However, the study found that **perceived trust** alone does not significantly influence attitudes toward sustainable MFS adoption (H6). The qualitative study sheds light on this by highlighting users' skepticism about MFS providers' ability to safeguard their personal information and manage transactions securely. This skepticism undermines users' trust, leading to negative attitudes toward the adoption of MFS. Despite this, the results for H7 suggest that perceived trust still plays a crucial role in influencing overall attitudes towards using MFS, as trust reduces perceived risk and uncertainty in digital transactions, a point echoed by Hu *et al.* (2019).

Finally, the study confirms that **individual attitudes** positively influence the intention to use MFS (H8). This is consistent with the qualitative findings, where participants expressed a strong desire for innovations such as microloans, investment opportunities, and financial education, all of which could enhance their willingness to adopt MFS. As Wu and Chen (2017) and Yanto *et al.* (2023) suggest, a favorable attitude towards technological innovation is a significant predictor of adoption intention.

### *Theoretical implications*

This study extends the Technology Acceptance Model (TAM) to explore individuals' attitudes and intentions toward the sustainable adoption of Mobile Financial Services (MFS) in Nigeria. By integrating additional constructs such as Perceived Credibility and Trust into the TAM framework, this research addresses a critical gap in the literature, offering deeper insights into the factors that influence the sustainable use of MFS. The extension of the TAM model in this study is significant as it broadens the understanding of the dynamics between technological factors and user attitudes, particularly in the context of perceived trust and credibility, which are crucial for the adoption of financial technologies in developing economies.

One of the key theoretical contributions of this study is the conceptualization of Perceived Credibility and Trust as pivotal factors that impact not only the Perceived Usefulness and Ease of Use but also the Attitude Toward Using MFS. By incorporating these constructs, the study enhances the predictive power of the TAM model, providing a more comprehensive

understanding of the determinants of user intention to adopt MFS. This is particularly important in the context of Nigeria, where trust and credibility issues are often heightened due to concerns about security, fraud, and regulatory oversight.

Moreover, this research distinguishes itself from previous studies on MFS by adopting a mixed-methods approach. This approach combines quantitative and qualitative analyses, allowing for a richer and more nuanced exploration of the factors influencing MFS adoption. The quantitative analysis identifies the key determinants, while the qualitative component provides contextual insights into the challenges and opportunities that shape user experiences with MFS. This dual approach not only validates the extended TAM model but also offers practical insights into the real-world complexities of MFS adoption in Nigeria. The findings from this study also contribute to the broader theoretical discourse on financial inclusion and the role of technology in expanding access to financial services.

This research highlights both the challenges and opportunities associated with MFS adoption in Nigeria. Challenges such as transaction difficulties, security concerns, accessibility, digital divide, fees, and regulatory issues are examined alongside opportunities like convenience, financial management, potential innovations, and education/awareness. These findings provide a robust theoretical framework that not only advances the academic understanding of MFS adoption but also offers practical guidance for future research and policy interventions in this field. A related issue is the low level of digital literacy among many potential users, which makes the adoption of MFS even more challenging. Many individuals, particularly in rural and less developed regions of Nigeria, struggle to understand or effectively use mobile financial platforms. The study emphasizes that this knowledge gap creates a significant obstacle for the widespread and sustainable use of MFS, slowing adoption rates despite the potential benefits. The absence of sufficient government regulation and support is another critical issue that negatively impacts the MFS ecosystem in Nigeria.

While there is some framework in place, it is not robust enough to ensure the smooth operation of mobile financial services. This regulatory deficiency leads to a fragmented market where users face inconsistent service delivery, eroding trust and confidence in these platforms. Security concerns, especially regarding cybercrime and fraudulent activities, represent a major hurdle in the adoption of MFS in Nigeria. The study sheds light on how users' fears of financial loss or identity theft significantly dampen their enthusiasm for using mobile financial services. In a country where cyber fraud is prevalent, MFS providers face an uphill battle in convincing users that their platforms are secure and reliable.

Lastly, the cultural resistance to adopting MFS, particularly among older demographics, presents a unique challenge. Many Nigerians still prefer traditional banking systems, relying on face-to-face transactions and paper-based financial records. This cultural preference poses a significant barrier to the widespread adoption of MFS, particularly for older users who may not trust or feel comfortable using mobile technology. Overcoming this resistance will require a culturally sensitive approach, where MFS providers offer hybrid models that blend traditional banking services with digital solutions.

#### *Practical implications*

This research has the following practical ramifications: First, the findings thoroughly understand how people in Nigeria use MFS as a dependable, simple-to-use, and secure method for carrying out transactions. This study suggests that users' comprehension of an MFS's technological development, particularly its attention in the academic and financial sectors, is due to the potential to support merchants in identifying and implementing better tactical decisions. To promote sustainable MFS adoption in Nigeria, efforts must focus on improving the technological infrastructure—including consistent network connectivity and

reliable electricity. Governments and private sector players should invest in expanding network coverage to underserved areas and ensuring stable access to financial services across the country. Addressing these infrastructural bottlenecks is crucial to ensuring that MFS can reach the broader population.

Given the prevalence of cybercrime and fraud, MFS providers must place a stronger emphasis on security protocols, encryption technologies, and fraud prevention systems. They need to communicate these measures effectively to users to build trust. Providers could also collaborate with regulatory bodies to ensure tighter cybersecurity frameworks and financial data protection measures, reassuring users that their transactions are safe.

The study highlights the need for stronger government intervention and regulation in the MFS sector. Policymakers should create a more robust and consistent regulatory framework that provides clear guidelines for MFS providers and protects users from fraud and service inconsistencies. Government support can also incentivize broader adoption through public awareness campaigns and financial inclusion policies, especially targeting low-income groups.

High transaction fees act as a significant barrier to adoption, especially among low-income users who would benefit the most from MFS. Providers should explore ways to reduce costs, potentially by offering tiered pricing models, low-cost transactions for small-scale users, or partnerships with traditional banking institutions to provide competitive rates.

The low level of digital literacy in rural and underserved areas needs to be addressed. Governments, NGOs, and MFS providers should invest in educational initiatives to improve the public's understanding of how MFS works and the benefits it offers. Such initiatives could be incorporated into broader financial inclusion programs, focusing on improving financial literacy alongside digital skills.

MFS providers should consider the cultural preferences for traditional banking services, especially among older demographics. To overcome this resistance, providers could develop hybrid models that combine elements of traditional banking with mobile platforms, offering in-person customer service for older users while providing the convenience of mobile transactions for younger, tech-savvy users.

### Limitations and future studies

This study has several limitations that future research could address. First, the data were obtained from a particular region of a country, which raises questions regarding the generalizability of the findings. Future studies should focus on multiple countries to test these hypotheses. Second, many developing countries have the potential to use mobile financial services to improve their businesses, maintain sustainable profitability, and grow under economic and market conditions. Finally, future research should consider other important factors, such as and financial data when using mobile financial services.

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