Digital Finance in Fragile Settings: Structural Predictors of Mobile Money Retention in North Kivu, Democratic Republic of Congo

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Abstract

This study investigated the factors influencing the continuous usage of mobile money services in the cities of Butembo and Beni, North Kivu (DRC), using a structural equation modelling approach via SmartPLS. The findings reveal that Trust, Subjective Norms, and Perceived Cost significantly affect users' continued use of mobile money platforms, while Customer Experience and Perceived Quality do not show a direct effect. The results highlight Continuous Usage as a central mechanism that strongly predicts both Behavioural Intention and User Engagement, reinforcing its role as a critical bridge between initial perceptions and long-term behaviour. From a managerial standpoint, building trust, leveraging social influence, and reducing transaction costs are key strategies for increasing adoption and retention. Theoretically, the study confirms the relevance of trust- and norm-based models in digital finance usage within low-infrastructure contexts. The paper concludes with a call for future research to explore longitudinal patterns, qualitative dimensions of service perception, and contextual moderators such as digital literacy and income level.

Keywords: *Continuous Usage, Cost Perception, Democratic Republic of Congo, Digital Finance, Intention to Use, Mobile Money, North Kivu, SmartPLS, Subjective Norms, Trust, User Engagement.*

Introduction

Mobile money has emerged as a major enabler of financial inclusion in recent years, especially in developing economies. [1]. In economies with low banking penetration, often due to various infrastructure and economic challenges, the whisper of mobile phones serves as a beacon of hope for enhancing access to financial services among unbanked and underbanked populations.[2]. By leveraging mobile technology, financial institutions can provide innovative solutions that overcome traditional barriers to banking, thereby fostering greater financial inclusion and economic empowerment for these underserved communities.[3]. Mobile money provides accessible financial services at a lower cost that can benefit the underbanked.[4].

Thanks to mobile phones, customers can send and receive money, pay for goods and services, subscribe to services, get loans, check their balance and much more [5]. These advantages, among many others, drive many customers, banks and other financial service providers globally, particularly in Africa, to use mobile money services [6]. According to [7], with Kenya at the forefront, Africa was an early adopter of mobile money technology. This innovation has subsequently disseminated to various regions globally.

Notwithstanding the spread of fintech technologies, the Democratic Republic of Congo (DRC)'s context remains unique. Because of its specific geography and the challenges associated with access to roads and other primary infrastructures, the rate of bank penetration remains low. Consequently, there is scope for traditional banking services to be supplanted by mobile money services. Moreover, the recent conflict in the eastern regions of the DRC has further exacerbated financial exclusion, particularly in major urban centers of North and South Kivu, where large segments of the population have been cut off from formal banking services.

In terms of the use of cellular networks, the report carried out in 2024 by [8] indicates that 53.36 million cellular connections were active in the DRC in 2024, compared with 48.15 million the previous year [9], reflecting an increase of more than two million telephone users in one year. The same growth dynamic has been observed in internet use, with an internet penetration rate of 22.9% [9] in 2023 and 28.31% [8] In 2024. It clearly emerges that the use of mobile phones and the internet continues to grow in the DRC, providing a great opportunity for mobile money solutions.

Regarding bank penetration and financial inclusion, with a penetration rate of around 8.3%, the DRC is considered to be one of the most underbanked countries in the world.[10]. With just 18 banks, concentrated mainly in large towns, the rate of financial inclusion is very low.[11]. To compensate for this poor financial inclusion, more and more mobile applications are being developed by banks and other financial institutions. In addition, there is a high take-up of services offered by telecommunications companies such as Airtel Money, M-PESA, Orange-Money, etc. It is noteworthy that banks in the Democratic Republic of Congo are intensifying their efforts in electronic banking by developing mobile banking applications [12]. These include Rawbank's Illicocash and TMB's Pepele

Mobile, which are playing a crucial role in the expansion of digital financial services in the country.

Despite these advances in terms of telephony, the DRC is recognised as one of the countries lagging furthest behind in terms of technology adoption [13] The DRC is characterised by a low rate of adoption of technology for business purposes [14]. It has been observed that the majority of Congolese citizens exhibit a preference for traditional methods over new technologies [15]. This cultural inclination poses a significant challenge to adopting electronic and mobile banking services.

In addition, despite several studies on Mobil Money and financial inclusion, to our knowledge, there are very few studies that address this issue in the context of the Democratic Republic of Congo.

In light of the foregoing, this study seeks to offer a comprehensive understanding of how mobile money contributes to narrowing the financial divide in the Democratic Republic of Congo (DRC). The findings are expected to enrich the wider discourse on financial inclusion and provide actionable insights for policymakers, financial institutions, and development practitioners aiming to harness mobile technology as a catalyst for economic empowerment.

Literature Review and Hypothesis Development

Financial Inclusion

Financial inclusion is the possibility for everyone, especially the poor and excluded, to access financial services [16]. Financial inclusion can also be defined as universal access to financial products and services [17]. Based on these definitions, it is clear that financial inclusion requires everyone to have easy access to financial services. Around the world, governments and private companies are working to achieve financial inclusion. Nevertheless, a large proportion of the world's

population is excluded from the traditional financial system [17]. According to the same source, this exclusion harms marginalised populations by limiting their opportunities to access education, accumulate financial assets and gain access to other essential services.

In acknowledgement of the significance of financial inclusion as a pivotal strategy for poverty alleviation, the World Bank is committed to advancing this objective on a global scale. To this end, it allocated over $5 billion in 2015 for the enhancement of this initiative [18]. Alongside the World Bank, banks and other financial institutions are increasing their financial inclusion efforts [19]. Banks and telecoms companies are increasingly promoting digital solutions that enable access to financial services from any connected device, thereby promoting financial inclusion [20].

Mobil Money and Financial Inclusion

The positive impact of Mobil Money on financial inclusion has been highlighted by several studies [21]. The results of these studies show that mobile money is a solution to the problem of poor access to finance, particularly in Africa [22]. Mobile Money facilitates the achievement of this objective by enabling individuals who are unbanked or underserved by traditional financial institutions to perform essential financial transactions on their smartphones. These transactions include deposit and withdrawal of funds, payment, savings, and account information access, which can sometimes circumvent geographical limitations.

These advantages are prompting many people to adopt this innovation. In some countries, such as Kenya, mobile money is already integrated into people's daily lives and is used in virtually every sector [23]. It is becoming more widespread in other countries, including the DRC, despite the relatively slow rate of adoption of technological solutions [12].

Hypothesis Development

The factors affecting continuous usage (COU) of digital financial services and mobile money platforms, along with their impact on user intention (INT) and engagement (ENG), have garnered significant scholarly interest. Building on existing research, this study formulates and examines a detailed model that identifies trust, customer experience, cost, quality, and subjective norms as key predictors of continuous usage, which is expected to affect both intention and engagement. Additionally, we investigate the mediating influence of continuous usage within these relationships.

Trust and Continuous Usage

Trust is a foundational element in mobile money transactions, particularly in environments where users depend on digital platforms for sensitive financial exchanges. Previous studies confirm that trust positively affects users' willingness to continue using such platforms [24]. Trust reduces perceived risk and enhances perceived reliability in financial contexts. According to [25] Trust plays a role in shaping IT-related beliefs and behaviour.

- H1: Trust positively influences continuous usage (COU).

Customer Experience and Continuous Usage

Customer experience (CE) refers to the overall perception of a user's interactions with a service platform and is vital for boosting satisfaction and retention. In the context of mobile money services, providing a seamless and efficient experience significantly enhances user loyalty [26].

- H2: Customer experience (CE) positively influences continuous usage (COU).

Perceived Cost and Continuous Usage

Perceived price is the price that the customer charges for the product, and it is very important that the actual price [27]. High perceived costs (e.g., transaction fees, service charges) may discourage repeated usage of mobile money

services. When users perceive that the costs outweigh the benefits, discontinuation becomes more likely [28].

- H3: Perceived cost (COST) influences continuous usage (COU).

Perceived Quality and Continuous Usage

Service quality in mobile money—reliability, transaction speed, customer support—is a known determinant of satisfaction and loyalty. High-quality platforms enhance perceived usefulness and encourage repeated usage [29].

- H4: Perceived quality (QUAL) positively influences continuous usage (COU).

Subjective Norms and Continuous Usage

Subjective norms reflect social influences on user behaviour. In many regions, social circles and community leaders play a significant role in technology adoption and the continuous usage of mobile money [30].

- H5: Subjective norms (SN) positively influence continuous usage (COU).

Continuous Usage and Behavioural Intention

Frequent use of mobile money services influences future behavioural intentions. Regular interaction reinforces intention through increased familiarity and trust [31].

- H6: Continuous usage (COU) positively influences intention to use (INT).

Continuous Usage and Engagement

Engagement in mobile money services includes activities like budgeting, bill payments, and savings. Regular usage encourages behavioural involvement and emotional attachment [32]

- H7: Continuous usage (COU) positively influences engagement (ENG).

Mediating Role of Continuous Usage

Continuous usage may act as a mediator that explains how trust, experience, cost, quality, and social norms translate into deeper outcomes like intention and engagement. Sustained usage builds routine, trust, and familiarity [33].

- H8: Continuous usage (COU) mediates the relationship between trust (Alpha) and intention/engagement.
- H9: Continuous usage (COU) mediates the relationship between customer experience (CE) and intention/engagement.
- H10: Continuous usage (COU) mediates the relationship between perceived cost (COST) and intention/engagement.
- H11: Continuous usage (COU) mediates the relationship between quality (QUAL) and intention/engagement.
- H12: Continuous usage (COU) mediates the relationship between subjective norms (SN) and intention/engagement.

Methodology

Research Design and Context

The research adopted a quantitative, explanatory approach to investigate the factors influencing sustained use of mobile money services in Butembo and Beni, two economically active urban centers located in North Kivu province of the Democratic Republic of Congo. A structural model was constructed and assessed using SmartPLS 4.0, incorporating constructs such as Trust, Customer Experience, Perceived Cost, Perceived Quality, and Subjective Norms. Within this framework, Continuous Usage served both as a dependent variable and as a mediating factor shaping users' Intention to Use and their level of Engagement.

Data Collection

Primary data were obtained through a structured questionnaire employing a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The survey was administered both online and face-to-face over a two-month period in 2024. Due to the absence of a comprehensive sampling frame, participants were selected using a non-probability convenience sampling approach. Following

data cleaning procedures, a total of 393 valid responses were retained for analysis.

Instrument Development

The measurement items used across all constructs were derived and refined based on established research on established research within the domains of technology acceptance and mobile financial services e.g., [7, 12, 23, 34]. The instrument was pretested for clarity, and necessary adjustments were made before full-scale deployment.

Data Analysis

Data analysis was conducted using Partial Least Squares Structural Equation Modelling (PLS-SEM), an approach well-suited to complex models that incorporate both reflective constructs and mediating pathway [35].

The measurement model was evaluated to ensure internal consistency reliability—using indicators such as Cronbach's Alpha and Composite Reliability—and to confirm convergent validity through the Average Variance Extracted (AVE) as recommended by [36].The structural model was analysed by examining path coefficients, the coefficient of determination (R^2), effect sizes (f^2), and the model's predictive relevance (Q^2) following the guidelines of [37].To assess the mediating role of Continuous Usage, indirect effects of the predictors on both Intention and Engagement were examined using bootstrapping techniques.[38].

Ethical Considerations

Participation was voluntary, and respondents were informed about the confidentiality of their data. No personal identifiers were collected.

Result

Measurement Model Assessment

A robust measurement model is essential in ensuring the validity and reliability of the constructs used in structural equation modelling (SEM). In this study, we assess the measurement model using three key criteria: construct reliability, convergent validity, and discriminant validity. All analyses were performed using SmartPLS, a variance-based SEM tool particularly suitable for exploratory research and complex models [39].

Construct Reliability and Internal Consistency

Reliability of the constructs was examined through Cronbach's Alpha (CA) and Composite Reliability (CR). In line with established guidelines, a Cronbach's Alpha value of 0.70 or higher is deemed acceptable for exploratory research [40], Likewise, CR values exceeding 0.70 indicate satisfactory internal consistency [41].

The table below (Table 1) presents the reliability metrics for each construct:

Table 1. Reliability metrics

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Customer Experience (CE)	0.72	0.81	0.63
Cost (COST)	0.84	0.88	0.67
Continuous Usage (COU)	0.91	0.93	0.80
Engagement (ENG)	0.86	0.89	0.63
Intention to Use (INT)	0.89	0.92	0.80
Quality (QUAL)	0.83	0.87	0.63
Subjective Norms (SN)	0.91	0.93	0.86
Trust	0.90	0.92	0.86

All constructs exceed the threshold levels for CA and CR, demonstrating strong internal consistency. All AVE values exceed the threshold of 0.50, demonstrating that the latent constructs capture more than 50% of the variance in their associated indicators and thereby establish convergent validity [42].

Convergent Validity

Convergent validity ensures that indicators of a specific construct are indeed correlated and measure the same underlying concept. As shown above, all constructs present AVE values above 0.50, meeting the required threshold [36]. This confirms that each construct explains a sufficient proportion of variance in its observed indicators.

Discriminant Validity: Fornell-Larcker Criterion

Discriminant validity assesses the extent to which constructs are conceptually and empirically distinct from one another [41]. n accordance with the criteria outlined by [41], the square root of the Average Variance Extracted (AVE) for each construct should exceed its correlations with any other construct. This condition was satisfied, as evidenced by the Fornell–Larcker matrix presented below (Table 2).

Table 2. Fornell-Larcker Matrix

	CE	COST	COU	ENG	INT	QUAL	SN	Trust
CE	0.794							
COST	-0.029	0.818						
COU	0.063	0.715	0.892					
ENG	0.393	0.543	0.644	0.794				
INT	0.396	0.571	0.653	0.683	0.897			
QUAL	0.015	0.626	0.703	0.528	0.545	0.794		
SN	0.029	0.753	0.819	0.611	0.644	0.758	0.928	
Trust	0.027	0.790	0.844	0.637	0.662	0.783	0.869	0.926

Note: Diagonal elements represent the square root of AVE. Off-diagonal values represent inter-construct correlations.

The results presented in the table demonstrate that each construct exhibits greater shared variance with its own indicators than with any other construct. This finding supports the presence of discriminant validity and confirms that all constructs are empirically distinct.

Summary and Interpretation

Overall, the measurement model exhibits satisfactory psychometric properties. The constructs demonstrate strong internal consistency, adequate convergent validity, and solid discriminant validity. These results justify proceeding with the evaluation of the structural model to test the hypothesised relationships.

Structural Model Evaluation

Once the measurement model had been validated, the structural model was examined to evaluate the strength and statistical significance of the hypothesised relationships between constructs. This evaluation involved the analysis of path coefficients, coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2), following guidelines by [39].

Collinearity Assessment

Collinearity was assessed using the Variance Inflation Factor (VIF). All predictor constructs demonstrated VIF values below 5, indicating no multicollinearity issues and ensuring the stability of the path coefficient estimates.

Coefficient of Determination (R^2)

R^2 values indicate the proportion of variance explained in the endogenous variables by the exogenous constructs. According to [42], R^2 values of 0.75, 0.50, and 0.25 are considered

substantial, moderate, and weak, respectively (Table 3).

Table 3. Coefficient of Determination

Endogenous Variable	R²	Interpretation
Continuous Usage (COU)	0.781	Substantial
Intention to Use (INT)	0.426	Moderate
Engagement (ENG)	0.411	Moderate

Path Coefficients and Hypothesis Testing

To evaluate the statistical significance of the path coefficients, bootstrapping was performed using 5,000 resamples. A summary of the results is presented in Table 4.

Table 4. Path coefficients

Hypothesis	Path	β	t-value	p-value	Result
H1	Trust → COU	0.306	4.952	< 0.001	Supported
H2	CE → COU	0.014	0.273	0.785	Not supported
H3	COST → COU	0.168	2.019	0.044	Supported
H4	QUAL → COU	0.129	1.278	0.202	Not supported
H5	SN → COU	0.379	3.771	< 0.001	Supported
H6	COU → INT	0.653	12.222	< 0.001	Supported
H7	COU → ENG	0.644	11.858	< 0.001	Supported

These findings (Table 4) indicate that Trust, Cost, and Subjective Norms significantly influence Continuous Usage. In turn, Continuous Usage strongly predicts both Intention and Engagement. Customer Experience and Quality did not exhibit statistically significant effects on Continuous Usage.

Effect Size (f²)

The effect size (f²) was employed to evaluate the extent to which each exogenous variable contributed to the variance in the corresponding endogenous variable. In accordance with established thresholds, f² values of 0.02, 0.15, and 0.35 are interpreted as indicating small, medium, and large effects, respectively [43] (Table 5).

Table 5. Effect Size

Path	f²	Effect Size
Trust → COU	0.143	Medium
COST → COU	0.034	Small
SN → COU	0.185	Medium
COU → INT	0.745	Large
COU → ENG	0.707	Large

Predictive Relevance (Q²)

The blindfolding procedure was applied to evaluate the model's predictive relevance, using the Stone–Geisser Q² statistic. A Q² value exceeding zero signifies that the model possesses predictive capability for the

corresponding endogenous construct [44] (Table 6).

Table 6. Stone-Geisser Q² coefficients

Endogenous Variable	Q²
Continuous Usage (COU)	0.515
Intention to Use (INT)	0.305
Engagement (ENG)	0.322

Summary of Structural Model Findings

The structural model demonstrated strong explanatory and predictive capabilities. Five of the seven hypothesised relationships were supported. Continuous Usage emerged as a central construct, mediating key paths and exerting a strong influence on Intention and Engagement. Trust and Subjective Norms were the most influential predictors of Continuous Usage.

Discussion

The findings of this study provide valuable insights into the underlying mechanisms that drive sustained use of mobile money services, as well as their subsequent impact on users' intention and engagement within the context of the Democratic Republic of Congo (DRC).

The analysis highlights Trust and Subjective Norms as the strongest predictors of continuous usage, while Cost has a moderate but significant influence. In contrast, Customer Experience and Perceived Quality did not significantly affect continuous usage in this model.

The strong influence of Trust confirms previous studies emphasising the role of reliability and perceived safety in digital financial services [45, 46]. In regions like Butembo and Beni, where institutional confidence may be limited and digital infrastructure is still maturing, trust becomes a critical enabler of adoption and sustained usage. Users are more inclined to sustain their use of mobile money platforms when they perceive the systems to be secure, reliable, and administered with professional competence

Subjective Norms also significantly influenced continuous usage, reflecting the impact of social circles and peer behaviours on mobile money habits. This aligns with the findings of [33, 30], who also found that perceived social pressure and community endorsement strongly influence behavioural intention in technology usage.

Perceived Cost, though not the strongest factor, exhibited a statistically significant negative effect, suggesting that transaction fees and service charges remain a concern for users. This finding resonates with [47], affirming that users weigh value against expense when making usage decisions.

Interestingly, Customer Experience and Service Quality did not significantly affect continuous usage. This could be attributed to the relatively low expectations or awareness of digital service standards in underserved environments, or the dominance of brand-driven loyalty rather than experience-based engagement. This suggests a potential gap in user education or platform design optimisation that future service providers might address.

Moreover, Continuous Usage emerged as a significant predictor of both behavioural intention and user engagement. This emphasises the importance of habit formation and sustained exposure in strengthening user commitment to mobile money platforms. The more consistently users engage with the service, the more likely they are to recommend it, explore its features, and embed it into daily financial routines.

The mediation results support the notion that continuous usage works as a key conduit

between foundational perceptions (trust, norms, cost) and meaningful behavioural outcomes (intention and engagement). This strengthens the theoretical proposition that mobile money usage is not simply a one-time adoption issue, but an evolving user journey built on sustained experience.

Conclusion

This study contributes to the literature on digital financial services by providing empirical evidence from a fragile and underbanked context. It confirms that trust, social influence, and cost considerations are pivotal to promoting the continuous use of mobile money platforms in the DRC. The absence of significant effects from customer experience and service quality suggests that deeper structural and cultural factors may shape user loyalty more than immediate user interface features.

From a practical standpoint, these results provide actionable insights for mobile money providers and financial institutions operating in North Kivu and similar regions:

1. Build trust through transparency, data security, and consistent service delivery.
2. Leverage local influencers and social networks to normalise mobile money usage.
3. Offer cost-friendly packages or promotional incentives to reduce perceived financial burden.

Finally, this study underscores the potential of continuous usage not only as an outcome but as a strategic lever to increase user engagement and long-term financial inclusion. Policymakers and practitioners seeking to expand digital finance in underserved areas should prioritise sustaining user interaction over time, rather than focusing solely on initial adoption.

Future Research Directions

While this study offers important insights, several areas remain open for future investigation. First, longitudinal research could explore how trust and usage behaviours evolve in volatile regions. Second, qualitative studies may provide a deeper understanding of why customer experience and quality were not significant in this context. Third, future work could incorporate moderating variables such as digital literacy, income level, or network infrastructure, which may affect how users perceive and use mobile money services. Lastly, comparative studies between urban and rural users in the DRC or between different African countries could help generalize or contextualize the findings further.

Author Contributions

Both authors contributed to the conception and design of the study. Rodrigue Kalumendo performed the material preparation, data collection, and analysis, and drafted the initial manuscript. Paluku Vaghéni provided critical feedback on earlier drafts. Both authors approved the final manuscript for submission.

Ethical Approval

This study did not require formal ethical approval, as it involved non-sensitive, anonymous survey data collected from adult participants. All respondents were informed of the research's purpose and participated voluntarily. Informed consent was obtained before participation, and no personally identifiable information was collected. The study adhered to ethical principles of confidentiality, autonomy, and responsible data handling throughout the research process.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability

The data underlying this study are available from the corresponding author upon reasonable request.

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