The Role of Perceived Value and Risk in USSD Mobile Banking Adoption

*Abbas Musa and Najeeb Abbas Al-Sammarraie
Department of Information and Communication Technology, Al-Madinah International University, Malaysia

Abstract

The adoption of Unstructured Supplementary Service Data (USSD) technology has significantly transformed mobile banking in Nigeria, offering cost-effective and seamless access to financial services. This study i[1]nvestigates the factors influencing the adoption of USSD mobile banking within the Katsina banking sector, using an Extended Technology Acceptance Model (TAM) as the analytical framework. A quantitative survey involving 120 valid responses from bank customers was analyzed using simple regression in SPSS. The findings reveal that perceived usefulness, perceived ease of use, perceived cost, and perceived efficiency are significant determinants of USSD mobile banking adoption. However, perceived risk did not exhibit a significant impact on user acceptance, indicating that customers generally view USSD banking as secure and reliable. The study underscores the importance of expanding USSD services to rural areas, where its low-cost, non-smartphone-dependent functionality can bridge financial inclusion gaps. Recommendations are provided for banks to enhance service delivery and accessibility in underserved regions, leveraging USSD's unique advantages.

1.0 Introduction

The rapid evolution of telecommunications and information technology has significantly transformed the global banking sector. Mobile banking has emerged as a pivotal innovation, addressing the financial service needs of individuals, particularly in developing regions where access to traditional banking remains limited. In Nigeria, the advent of Unstructured Supplementary Service Data (USSD) mobile banking represents a noteworthy development. USSD enables users to perform essential banking functions, such as fund transfers, bill payments, and airtime purchases, using basic mobile phones without requiring internet access. Despite its potential to advance financial inclusion, especially in regions like Katsina State, USSD mobile banking adoption remains suboptimal.

The prevailing challenge lies in the widespread lack of trust, awareness, and adoption of USSD banking, particularly in northwestern Nigeria. Customers often perceive high levels of risk and

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*Corresponding author contact: wabans05@yahoo.com. +234-7039213875

insufficient value in using these services, while limited digital literacy and awareness compound the problem. This research investigates the determinants of USSD mobile banking adoption, focusing on the roles of perceived value and perceived risk in shaping customer behavior. The study aims to provide insights that can guide strategies to enhance USSD adoption, aligning with Nigeria's financial inclusion goals and cashless economy policies.

The Technology Acceptance Model (TAM), developed by Davis (1989), provides a robust theoretical framework for examining user acceptance of new technologies. Its core constructs, perceived usefulness and perceived ease of use, have been widely validated in studies of digital financial services. Extensions to TAM, incorporating variables such as perceived risk and trust, are particularly relevant for understanding the adoption of mobile banking technologies in contexts characterized by low trust and high uncertainty. This study leverages TAM to explore how perceived value and risk influence the adoption of USSD mobile banking in Katsina State. The model's flexibility allows it to be adapted to this unique context, offering valuable insights into the barriers and facilitators of technology acceptance.

Several studies have examined the adoption of mobile banking in various contexts. Singh (2014) identified security, reliability, and demographic factors as key influences in India, while Grace (2014) highlighted the importance of risk and convenience in Tanzania. In Nigeria, Faniran (2015) explored mobile banking acceptance using an enhanced TAM framework, identifying factors such as usefulness, ease of use, and risk as critical determinants. Similarly, Samuel (2017) emphasized trust and convenience as significant adoption drivers in rural Nigeria. However, these studies often focused on mobile banking broadly, neglecting the unique attributes and challenges of USSD technology. Additionally, most existing research has concentrated on urban populations, leaving rural and underserved areas underexplored. These gaps underscore the necessity of this study, which focuses on the under-researched region of Katsina State and the specific dynamics of USSD banking.

While mobile banking research is extensive, the unique characteristics of USSD banking—its internet-independence and reliance on basic GSM networks—demand targeted investigation. By addressing the specific factors influencing USSD adoption in Katsina State, this study contributes to bridging the knowledge gap in mobile banking research. Furthermore, it provides practical recommendations for enhancing financial inclusion in underserved regions, supporting Nigeria's broader economic objectives.

The primary objectives of this study are as follows:

1. Identify key factors influencing the adoption of USSD mobile banking in Katsina State.

2. Examine the relationship between perceived value and risk and their impact on behavioral intention.

3. Provide actionable recommendations to enhance awareness and trust in USSD banking services.

Through these objectives, this study seeks to expand the theoretical application of TAM while offering practical insights for policymakers and financial institutions aiming to promote financial inclusion through USSD mobile banking. Recent advancements in mobile technology and Nigeria's high mobile phone penetration rates present a timely opportunity to explore this critical issue. References to recent studies and emerging trends will ensure the research's relevance and rigor, contributing to the discourse on digital financial services.

2.0 Materials and Methods

2.1 Research Design

This study adopts a quantitative research methodology to investigate the role of perceived value and risk in USSD mobile banking adoption. Quantitative methods are particularly suitable for examining relationships between variables and testing hypotheses through numerical data analysis (Saunders et al., 2007). The findings derived from this approach offer a foundation for generalizing results and forecasting trends in user behavior concerning USSD mobile banking.

2.2 Sampling Strategy

The study employed a convenience sampling technique due to practical constraints, including time and financial limitations. Convenience sampling was selected to ensure timely data collection and efficient utilization of resources. While convenience sampling has limitations, such as potential selection bias, measures were implemented to mitigate these concerns. Specifically, efforts were made to include a diverse group of respondents representing different demographic and socio-economic characteristics aligned with the target population of USSD mobile banking users. This alignment enhances the relevance and applicability of the findings to the broader user base. Furthermore, the accessible nature of the sample provided a pragmatic solution for gathering data in a developing technology domain where comprehensive population lists were unavailable.

2.3 Triangulation for Data Enrichment

To strengthen the validity and reliability of the findings, a mixed-methods approach was considered. In addition to the primary quantitative survey, a subset of respondents (n=10) participated in in-depth interviews. These interviews provided qualitative insights into the

perceptions, challenges, and motivations underlying USSD mobile banking adoption. By triangulating quantitative data with qualitative insights, the study offers a more holistic understanding of the factors influencing adoption.

2.4 Data Collection

Data were collected using both primary and secondary sources:

- **Primary Data**: A structured questionnaire was designed based on validated scales from existing literature to ensure construct validity. The questionnaire was pilot-tested with 15 respondents to identify ambiguities and refine the instrument. The final survey, consisting of items measuring perceived value, perceived risk, and behavioral intention, was distributed online to 150 potential respondents. A total of 120 valid responses were received, yielding an 80% response rate.

- **Secondary Data**: Relevant academic articles, reports, and online resources were reviewed to contextualize the study and support the formulation of hypotheses.

2.5 Data Quality and Validity

Several steps were taken to ensure data quality and validity:

1. **Pilot Testing**: The questionnaire underwent a pilot test to improve clarity and reliability.

2. **Non-Response Bias**: To address potential non-response bias, follow-up reminders were sent to participants, and responses were analyzed to ensure no systematic differences between early and late respondents.

3. **Statistical Rigor**: Data analysis was conducted using appropriate statistical techniques, including descriptive statistics, correlation analysis, and regression modeling, to test the hypotheses and ensure robustness.

2.6 Ethical Considerations

Participation in the study was voluntary, and informed consent was obtained from all respondents. The anonymity and confidentiality of participants were maintained throughout the research process.

3.0 Results and Discussion

Reliability of Measurement Scales

The reliability of the data collected for each variable was tested using Cronbach's alpha. The statistical mean was computed for each variable item group to derive the central tendency of the

variable in question. Data collection was conducted via an online questionnaire designed around the items of each variable. Cronbach's alpha values above 0.6 were considered reliable, with values above 0.9 deemed most reliable (Grace, 2014). Table 1 summarizes the reliability statistics for all variables.

Variables	Number Of Items	Cronbach's Alpha
Perceived Cost (PC)	3	0.691
Perceived Efficiency (PE)	3	0.719
Perceived Ease Of Use (PEOU)	3	0.720
Perceived Risk (PR)	2	0.741
Perceived Usefulness (PU)	4	0.786
Behavioural Intention To Accept USSD Mobile Banking	2	0.799

The results indicate acceptable reliability levels for all constructs, confirming the consistency of the measurement scales used.

Simple Regression Analysis

Simple linear regression analysis was employed to examine the relationship between each independent variable and the dependent variable (USSD mobile banking adoption). A low p-value (<0.05) was used as the threshold for statistical significance. Table 2 provides a summary of the regression results for each variable.

Table 2. Regression Analysis Summary

Variable	R	R Square	Beta	t-value	p-value	Supported
Perceived Usefulness	0.614	0.377	0.614	8.419	0.000	Yes
Perceived Ease of Use	0.334	0.112	0.334	3.834	0.000	Yes
Perceived Cost	0.236	0.056	-0.236	-2.624	0.010	Yes
Perceived Risk	0.163	0.026	-0.163	-1.784	0.077	No
Perceived Efficiency	0.472	0.223	0.472	5.797	0.000	Yes

Discussion

Theoretical Implications

Perceived Usefulness (PU):

The analysis shows a strong positive correlation between perceived usefulness and USSD mobile banking adoption (R = 0.614, R² = 0.377). This finding supports the Technology Acceptance Model (TAM), which posits perceived usefulness as a primary determinant of technology adoption (Davis, 1989). Users are more likely to adopt USSD mobile banking if they perceive it as beneficial in achieving financial tasks efficiently. The strong beta value (β = 0.614, p < 0.001) reinforces the argument that practical utility drives behavioral intention. This aligns with prior findings by Alalwan et al. (2017) and extends their applicability to USSD platforms, which often target underserved populations. The results suggest that enhancing the perceived utility of USSD systems—through features like real-time transaction updates or integration with other financial services—could further promote adoption.

Perceived Ease of Use (PEOU):

Although the correlation is weaker than for usefulness, ease of use (R = 0.334, R² = 0.112) still plays a significant role in adoption. The results indicate that simplicity in design and operation facilitates acceptance (β = 0.334, p < 0.001). This finding reaffirms TAM's assertion that ease of use indirectly impacts adoption by enhancing perceived usefulness. From a theoretical perspective, this emphasizes the importance of usability testing in the development of USSD interfaces. Simplified navigation and minimal menu options tailored to low-literacy or first-time users could significantly boost adoption rates, particularly in regions with limited digital literacy (Venkatesh et al., 2012).

Perceived Cost (PC):

The inverse relationship between perceived cost and adoption (R = 0.236, R² = 0.056, β = -0.236, p = 0.010) suggests that financial considerations act as a barrier to USSD mobile banking. This aligns with the Diffusion of Innovations theory (Rogers, 2003), which highlights affordability as a critical factor influencing technology diffusion. The relatively low R² value indicates that while cost is a significant predictor, it explains only a small portion of the variance in adoption, suggesting that other factors, such as service quality or availability, may moderate this relationship. Practical interventions could include subsidized transaction fees or partnerships with governments and NGOs to promote affordable financial inclusion.

Perceived Risk (PR):

The lack of a significant relationship between perceived risk and USSD adoption (R = 0.163, R² = 0.026, β = -0.163, p = 0.077) warrants deeper exploration. This outcome challenges conventional wisdom, which often emphasizes security concerns as a critical barrier to mobile banking adoption (Zhou, 2011). One plausible explanation is the relative familiarity of users with USSD services compared to more advanced digital banking platforms. Another possibility is that users in the study region prioritize functional utility over potential risks, reflecting a pragmatic adoption mindset. This insight aligns with findings from underserved regions, where users may trade security concerns for convenience and accessibility (Shaikh & Karjaluoto, 2015). Future studies should explore the moderating effects of trust-building mechanisms, such as two-factor authentication or transparent transaction logs.

Perceived Efficiency (PE):

Perceived efficiency emerged as a significant predictor of adoption (R = 0.472, R² = 0.223, β = 0.472, p < 0.001). This finding extends the TAM framework by introducing efficiency—defined as the ability to complete tasks quickly and accurately—as a standalone determinant. The significant beta value highlights the importance of operational performance in shaping user attitudes. Theoretically, this underscores the relevance of task-technology fit (Goodhue & Thompson, 1995) in mobile banking. Users adopt USSD systems because they efficiently address specific financial needs, such as transferring money or checking balances, particularly in low-bandwidth environments. Enhancing response times and system reliability can further strengthen this relationship.

Aggregate Theoretical Implications:

The results highlight the interplay between TAM constructs and additional dimensions like cost and efficiency. By integrating these variables, this study provides a more comprehensive framework for understanding USSD mobile banking adoption. The findings also suggest that technology adoption models should account for context-specific factors, such as affordability and accessibility, to remain relevant in diverse economic and cultural settings. These insights can inform future adaptations of TAM and similar frameworks to better capture the nuances of technology adoption in emerging markets.

Practical Applications

The results suggest actionable strategies for financial institutions aiming to promote USSD mobile banking adoption. For instance, industry reports such as the GSMA Mobile Economy report (2023) and case studies from regions with high USSD adoption, like sub-Saharan Africa, illustrate the effectiveness of combining affordability-focused pricing strategies with user education initiatives. By leveraging these approaches, institutions can better address the barriers identified in this study while capitalizing on the proven drivers of adoption. Emphasizing the utility and efficiency of USSD platforms in marketing campaigns can positively influence user perceptions. Additionally, mitigating perceived cost concerns through competitive pricing models and transparent fee structures can enhance adoption rates. While perceived risk was not statistically significant, addressing potential security concerns remains crucial for long-term trust-building.

Socioeconomic Considerations

Future research should incorporate measures of socioeconomic status, such as income levels, education, and geographic location, to explore their moderating effects on adoption. Studies such

as Jack and Suri (2014), which highlight the socioeconomic implications of mobile money services, and Kim et al. (2016), which examine income and education as predictors of mobile technology use, could provide valuable frameworks for understanding these dynamics. Integrating insights from such research can illuminate the interplay between socioeconomic variables and adoption behaviors in diverse populations. Understanding how these factors influence user perceptions and behaviors can provide a more nuanced perspective, particularly in diverse cultural and economic contexts.

Expanding the Scope

To enhance the generalizability of the findings, cross-cultural studies should be conducted. By comparing USSD adoption patterns across countries with varying technological infrastructures, regulatory environments, and cultural attitudes toward mobile banking, researchers can identify universal and context-specific factors driving adoption. Studies such as Straub et al. (1997) and Dwivedi et al. (2020) provide cross-cultural analyses of technology adoption, illustrating how cultural dimensions and institutional differences can influence adoption behaviors. Incorporating such frameworks can help validate and extend the findings of this study across diverse contexts.

Mixed Methods Approach

Employing mixed methods—integrating quantitative analysis with qualitative insights—can offer a deeper understanding of the underlying motivations and barriers to USSD mobile banking adoption. Focus groups and interviews with users and non-users can complement the statistical findings, revealing richer insights into user experiences and expectations.

Limitations and Future Research

Several limitations should be acknowledged. First, the reliance on self-reported data via an online questionnaire may introduce response biases, as participants may overreport or underreport behaviors due to social desirability or recall errors (Podsakoff et al., 2003; Tourangeau & Yan, 2007). Methodological studies emphasize the importance of triangulating self-reported data with behavioral or objective measures to mitigate these biases. Second, the study's focus on a single geographic region limits the generalizability of the findings. Third, the exclusion of qualitative data restricts a holistic understanding of the factors influencing adoption.

Future research should address these limitations by:

1. Expanding the sample to include diverse demographic and cultural groups.
2. Incorporating qualitative data to complement quantitative findings.
3. Exploring additional variables, such as trust, accessibility, and digital literacy.

Conclusion

This research provides valuable insights into the factors influencing the acceptance of the USSD mobile banking channel in Katsina. Using the Extended Technology Acceptance Model (TAM) as a conceptual framework, the study identified perceived usefulness, perceived ease of use, perceived cost, and perceived efficiency as significant determinants of USSD mobile banking adoption. Simple regression analysis confirmed that these predefined variables exert a notable impact on user acceptance, underscoring their critical role in enhancing customer engagement and promoting utilization of this banking channel. Interestingly, perceived risk was found to have no significant effect on USSD mobile banking adoption in the research area. This result warrants further consideration and may be attributed to two key factors. First, the minimal reported cases of cyber fraud in the study area could contribute to users perceiving USSD banking as a low-risk platform. The relatively secure nature of USSD, coupled with its simplicity, might foster trust among users, thereby diminishing the salience of risk concerns. Second, the respondents' lack of awareness about potential cyber security threats associated with mobile banking could lead to an underestimation of risks. This limited awareness might stem from inadequate exposure to digital literacy campaigns or a general unfamiliarity with the broader implications of cybersecurity vulnerabilities. These findings suggest a critical opportunity for financial institutions and policymakers. While it is encouraging that perceived risk does not hinder USSD adoption, efforts should still be made to enhance cybersecurity awareness among users to mitigate any potential future risks. Proactive education and awareness programs can ensure users are informed and remain confident in utilizing USSD services. Additionally, continued emphasis on improving the core factors—usefulness, ease of use, cost efficiency, and performance efficiency—will further solidify USSD mobile banking as a reliable and accessible financial tool in regions similar to Katsina.

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