

Determinants Of Electronic Payment Systems Adoption: Evidence From Zambia

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Abstract:

This study investigated the factors affecting electronic payment systems (EPS) adoption in Zambia using a sequential mixed-methods design combining quantitative and qualitative approaches. Data were collected from 987 participants across three provinces (Lusaka, Copperbelt, and Eastern) achieving a 92.5% response rate. Multiple regression analysis revealed that five factors collectively explained 67.9% of variance in EPS adoption ($R^2 = .679$, $F = 416.82$, $p < .001$). Technological infrastructure emerged as the strongest predictor ($\beta = .298$, $p < .001$), followed by trust and security perceptions ($\beta = .289$, $p < .001$), socio-economic factors ($\beta = .264$, $p < .001$), financial literacy ($\beta = .254$, $p < .001$), and regulatory framework awareness ($\beta = .182$, $p < .001$). Qualitative analysis revealed three major themes: infrastructure challenges particularly affecting rural areas, cost-benefit considerations influencing adoption decisions, and trust deficits stemming from security concerns and limited digital literacy. The study concludes that successful EPS adoption requires coordinated efforts addressing infrastructure development, cost optimization, trust building, regulatory enhancement, and comprehensive user education. Recommendations include implementing tiered regulatory frameworks, prioritizing rural infrastructure investment, developing innovative pricing models, and establishing national digital literacy programs.

Keywords: *Electronic payment systems, digital financial services, technology adoption, financial inclusion, mobile money, Zambia.*

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I. Introduction

The global financial landscape has experienced fundamental transformation through the emergence and proliferation of electronic payment systems. The World Payments Report 2022 documents a 14% increase in global non-cash transaction volumes during 2021, signaling substantial momentum toward digital payments worldwide. Sub-Saharan Africa has emerged as a particularly dynamic region for digital financial innovation, contributing 70% of the \$1 trillion global mobile money transaction value in 2021 according to the GSMA State of the Industry Report (2022). This remarkable statistic underscores Africa's pioneering role in mobile financial services and its potential to lead global innovations in digital financial inclusion.

Within this continental context, Zambia presents an intriguing case of gradual but steady progress in electronic payment adoption. The Bank of Zambia (2022) reports a 35% increase in electronic funds transfer values during 2021, while the Zambia Information and Communications Technology Authority documents 8.9 million mobile money subscriptions representing approximately 50% of the population. However, the FinScope Zambia 2020 survey reveals a concerning disparity, with only 27.1% of Zambian adults utilizing formal banking services, significantly below regional leaders such as Kenya where mobile money penetration approaches 87% of GDP according to the Central Bank of Kenya (2022). This substantial gap between potential and actual adoption raises critical questions about the factors constraining broader EPS uptake in Zambia.

While existing research has examined isolated aspects of digital financial services in Zambia, comprehensive investigation of the combined influence of technological infrastructure, socio-economic conditions, trust perceptions, regulatory frameworks, and financial literacy on EPS adoption remains limited. This knowledge gap hinders development of effective strategies to promote broader adoption, directly impacting financial inclusion and economic development initiatives. The present study addresses this gap by employing a mixed-methods approach to provide holistic understanding of adoption factors, thereby informing evidence-based policy and practice to advance electronic payment systems in Zambia's unique socio-economic context.

II. Literature Review

This study draws on three complementary theoretical frameworks to understand EPS adoption patterns. The Technology Acceptance Model (TAM), developed by Davis (1989), provides foundational understanding by positing that technology adoption is primarily determined by perceived usefulness and perceived ease of use. Perceived usefulness represents users' beliefs about performance enhancement, while perceived ease of use

captures assessments of effort required for technology utilization. TAM has demonstrated robust predictive power across numerous contexts, explaining significant variance in technology adoption behaviors and proving particularly relevant for understanding financial technology adoption where users evaluate both functional benefits and operational simplicity.

The Unified Theory of Acceptance and Use of Technology (UTAUT), developed by Venkatesh et al. (2003), extends TAM by integrating multiple theoretical perspectives. UTAUT identifies four core determinants of technology adoption: performance expectancy (perceived utility), effort expectancy (ease of use), social influence (normative pressures), and facilitating conditions (organizational and technical infrastructure). Additionally, UTAUT incorporates moderating variables including gender, age, experience, and voluntariness of use. This comprehensive framework proves particularly valuable for understanding EPS adoption in developing economies where social influences and infrastructure conditions play critical roles alongside individual perceptions.

Social Cognitive Theory (SCT), pioneered by Bandura (1986), contributes understanding of how environmental factors, personal factors, and behavioral patterns interact reciprocally to shape adoption decisions. SCT emphasizes self-efficacy, individuals' beliefs about their capabilities to execute behaviors necessary to produce specific performance attainments, as a crucial determinant of technology adoption. In the EPS context, this theory helps explain how confidence in using digital payment technologies influences actual adoption and sustained usage, particularly relevant in contexts where digital literacy varies substantially across populations.

Global research demonstrates that technological infrastructure constitutes a fundamental prerequisite for EPS adoption. The European Central Bank (2022) documents that card payments now constitute 48% of all transactions in the Euro area, reflecting mature digital payment infrastructure. However, the World Bank Global Findex Database (2021) reveals substantial disparities, with only 57% of adults in developing economies engaging in digital payments, highlighting the digital divide's persistent influence. Research by Cao et al. (2018) establishes that user satisfaction mediates the relationship between initial trust and continued mobile payment system use, emphasizing trust's critical role. The COVID-19 pandemic accelerated digital payment adoption globally, with contactless payments experiencing dramatic increases across both developed and developing markets.

Africa's EPS landscape presents unique innovation patterns, particularly in mobile money services. Kenya exemplifies successful implementation, with mobile money transactions reaching 87% of GDP in 2021 according to the Central Bank of Kenya (2022). Research by Alalwan et al. (2018) emphasizes technological infrastructure's crucial role across Africa, finding that 10% improvements in network coverage correspond to 15-20% increases in mobile money adoption. Demographic factors significantly influence adoption patterns; Acopiado et al. (2022) revealed that young adults aged 18-35 demonstrate highest adoption rates, while urban populations show 2.5 times greater likelihood of digital payment use compared to rural counterparts, underscoring geographic and demographic disparities requiring targeted interventions.

In Zambia specifically, Mvula et al. (2020) examined mobile payment systems' technical infrastructure, proposing blockchain-based interoperability schemes to enhance transaction efficiency. Chikalipah (2017) investigated mobile money adoption determinants, finding significant correlations between income levels and adoption likelihood. Bwalya (2023) assessed e-Government implementation in local authorities, noting that socioeconomic disparities significantly affect digital payment platform access, with lower-income populations facing greater barriers due to limited technology access and financial literacy. These studies collectively suggest that Zambian EPS adoption requires multifaceted approaches addressing infrastructure, economic, and educational dimensions simultaneously.

III. Methodology

Research Design

This study employed a sequential explanatory mixed-methods design, beginning with quantitative data collection and analysis to identify statistical relationships between variables, followed by qualitative investigation to provide deeper contextual understanding and explanatory insights. This design enables comprehensive examination of both the magnitude of relationships between adoption factors and the nuanced experiences shaping adoption decisions in the Zambian context. The sequential approach allows qualitative findings to illuminate and expand upon quantitative results, providing holistic understanding essential for developing effective interventions.

Sampling and Data Collection

The study targeted 1,067 participants across three provinces: Lusaka, Copperbelt, and Eastern Province, selected to represent diverse urban-rural characteristics and varying levels of financial services penetration. The final sample achieved 987 valid responses, representing a 92.5% response rate that substantially exceeds recommended thresholds for survey research. Quantitative data were collected through structured questionnaires employing five-point Likert scales measuring five key constructs: technological infrastructure, socio-economic

factors, trust and security perceptions, regulatory framework awareness, and financial literacy, along with the dependent variable of EPS adoption. Each construct was measured through multiple items to ensure comprehensive assessment and enhance measurement reliability.

Qualitative data collection followed quantitative analysis, employing semi-structured interviews with purposively selected participants representing diverse adoption experiences and perspectives. Interview participants included individual users at various adoption stages, financial institution representatives, telecommunications executives, regulatory officials, and FinTech entrepreneurs, ensuring comprehensive stakeholder representation. This purposive sampling strategy enabled deep exploration of adoption dynamics from multiple vantage points within Zambia's EPS ecosystem.

Data Analysis

Quantitative data were analyzed using SPSS version 26, employing descriptive statistics to characterize sample demographics and variable distributions, followed by inferential statistics to test hypotheses. Reliability analysis using Cronbach's alpha confirmed internal consistency across all constructs (α ranging from .847 to .923), substantially exceeding recommended thresholds. Multiple regression analysis assessed the collective and individual predictive power of the five independent variables on EPS adoption. Qualitative data were analyzed through thematic analysis, employing systematic coding procedures to identify recurring themes and patterns in interview transcripts, with findings integrated with quantitative results to provide comprehensive understanding of adoption dynamics.

IV. Findings

Demographic Profile

The sample demonstrated balanced gender representation with males comprising 52.3% and females 47.7% of respondents. Age distribution showed concentration among younger adults, with 38.4% aged 25-34 and 29.7% aged 35-44, reflecting the demographic profile typically associated with technology adoption. Educational attainment was relatively high, with 41.2% holding bachelor's degrees and 28.6% possessing diplomas, indicating a predominantly educated sample. Monthly income distribution revealed economic diversity, with 33.8% earning between ZMW 3,001-5,000 and 26.4% earning ZMW 5,001-8,000. Geographic distribution showed 45.6% of respondents from Lusaka, 32.1% from Copperbelt, and 22.3% from Eastern Province, ensuring representation across diverse regional contexts.

Regression Analysis Results

Multiple regression analysis revealed robust explanatory power, with the five factors collectively explaining 67.9% of variance in EPS adoption ($R^2 = .679$, Adjusted $R^2 = .677$). The F-statistic (416.82, $p < .001$) confirmed overall model statistical significance. Individual predictor analysis established technological infrastructure as the strongest determinant ($\beta = .298$, $p < .001$), indicating that each standard deviation improvement in infrastructure corresponds to a .298 standard deviation increase in adoption likelihood. Trust and security perceptions emerged as the second strongest predictor ($\beta = .289$, $p < .001$), underscoring the fundamental importance of user confidence in system security and reliability.

Socio-economic factors demonstrated substantial influence ($\beta = .264$, $p < .001$), suggesting that income levels, employment status, and related economic conditions significantly shape adoption capacity and willingness. Financial literacy showed strong predictive power ($\beta = .254$, $p < .001$), indicating that understanding of digital financial services and their benefits critically influences adoption decisions. Regulatory framework awareness, while lowest among the five predictors, remained statistically significant ($\beta = .182$, $p < .001$), suggesting that knowledge of consumer protections and regulatory safeguards contributes meaningfully to adoption confidence. Variance Inflation Factor (VIF) values ranging from 1.23 to 2.14 confirmed absence of problematic multicollinearity, validating result reliability.

Qualitative Findings

Thematic analysis of qualitative data revealed three major themes. First, infrastructure challenges emerged consistently, with rural participants reporting unreliable network connectivity, limited agent availability, and inadequate digital infrastructure hampering adoption. Urban participants described better infrastructure access but noted occasional service disruptions affecting confidence. Second, cost-benefit considerations significantly influenced adoption decisions, with transaction fees, minimum balance requirements, and withdrawal charges frequently cited as barriers, particularly among lower-income participants who conducted detailed cost comparisons with cash-based alternatives. Third, trust deficits stemming from security concerns, fraud experiences (personal or vicarious), and limited digital literacy created adoption hesitancy, with participants expressing desires for stronger consumer protections and more accessible education about safe digital payment practices.

V. Discussion

The finding that technological infrastructure constitutes the strongest predictor of EPS adoption ($\beta = .298, p < .001$) provides compelling empirical validation for UTAUT's emphasis on facilitating conditions while extending understanding to developing economy contexts. This result aligns with Alalwan et al.'s (2018) African findings demonstrating infrastructure's critical role, while adding precision through quantification of its relative importance compared to other factors. The infrastructure challenge proves particularly acute in Zambia's rural areas, where qualitative findings revealed persistent connectivity issues and limited agent networks. This urban-rural disparity mirrors broader patterns documented across sub-Saharan Africa but assumes heightened significance given Zambia's specific geographic and demographic characteristics.

Trust and security perceptions' emergence as the second strongest predictor ($\beta = .289, p < .001$) extends Cao et al.'s (2018) work on trust-satisfaction relationships in mobile payments while demonstrating trust's particularly crucial role in contexts where digital financial systems are relatively nascent. Qualitative findings revealed that trust deficits stem not merely from technical security concerns but from broader issues including limited digital literacy, inadequate consumer education, and insufficient recourse mechanisms for fraud resolution. This multidimensional nature of trust challenges suggests that building adoption confidence requires comprehensive approaches addressing technical security, user education, and institutional accountability simultaneously.

The significant influence of socio-economic factors ($\beta = .264, p < .001$) and financial literacy ($\beta = .254, p < .001$) underscores adoption's fundamentally economic and educational dimensions. These findings align with Chikalipah's (2017) Zambian research demonstrating income-adoption correlations while extending understanding by revealing how economic constraints interact with literacy limitations to create compounding barriers. The qualitative evidence on cost-benefit calculations among lower-income participants illustrates how transaction fees and service charges, seemingly modest in absolute terms, assume prohibitive significance for users with limited financial margins. This cost sensitivity suggests that pricing strategies must account for target users' economic realities rather than applying uniform fee structures developed for more affluent contexts.

VI. Conclusion

This study provides robust empirical evidence that EPS adoption in Zambia is determined by multiple interacting factors collectively explaining 67.9% of adoption variance. The research establishes technological infrastructure as the paramount determinant, followed by trust and security perceptions, socio-economic conditions, financial literacy, and regulatory awareness, all achieving statistical significance. These findings extend existing theoretical frameworks by demonstrating their applicability to Zambian contexts while revealing important modifications required for resource-constrained environments where infrastructure limitations and economic barriers assume heightened significance.

The integration of quantitative and qualitative findings reveals that successful EPS adoption requires coordinated approaches addressing infrastructure development, cost optimization, trust building, regulatory enhancement, and user education simultaneously. Single-factor interventions prove insufficient given the multidimensional nature of adoption barriers and the complex interactions among determining factors. The study makes several important contributions: theoretically, it validates TAM, UTAUT, and SCT applicability to developing market EPS contexts while identifying necessary contextual modifications; empirically, it provides quantifiable evidence of adoption determinants in an understudied African context; practically, it offers actionable insights for stakeholders seeking to promote digital financial inclusion.

Based on these findings, the study recommends that the Bank of Zambia implement tiered regulatory frameworks accommodating diverse user segments and service providers while maintaining robust consumer protections. Telecommunications companies should prioritize rural infrastructure investment to address connectivity disparities constraining adoption. Financial institutions should develop innovative pricing models including fee waivers for small transactions and loyalty programs rewarding consistent usage. The Ministry of Technology and Science should establish comprehensive national digital literacy programs targeting underserved populations. Future research should employ longitudinal designs tracking adoption trajectories over time, expand geographic coverage to additional provinces, and investigate sector-specific adoption patterns revealing industry-dependent dynamics.

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