

## Regulatory Determinants and the Strategic Relevance of ATM Enterprise in Nigeria: Evidence from Deposit Money Banks

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### Abstract

*This study examined the influence of ATM withdrawal limit, ATM fee regulation, and regulatory uncertainty on the strategic relevance of Automated Teller Machine (ATM) enterprise in Nigeria. Anchored on Institutional Theory and the Technology Acceptance Model (TAM), a quantitative cross-sectional survey design was adopted. Data were collected from 317 ATM management personnel across CBN-licensed Deposit Money Banks in Nigeria using a structured questionnaire administered via Google Forms and distributed through WhatsApp. Separate Ordinary Least Squares (OLS) bivariate regression models were employed to test three hypotheses. All three regulatory determinants exerted significant negative effects on ATM strategic relevance. Regulatory uncertainty recorded the strongest effect ( $\beta = -0.349$ ,  $p < .001$ ,  $R^2 = 0.122$ ,  $t = -6.617$ ), followed by ATM withdrawal limit ( $\beta = -0.343$ ,  $p < .001$ ,  $R^2 = 0.117$ ,  $t = -6.472$ ), and ATM fee regulation ( $\beta = -0.284$ ,  $p < .001$ ,  $R^2 = 0.081$ ,  $t = -5.261$ ). All three null hypotheses were rejected. The cross-sectional design limits causal inference. Future research should adopt longitudinal designs with objective performance data. The findings call for transparent regulatory communication, cost-reflective ATM fee frameworks, and strategic repositioning of ATM services to sustain their relevance in Nigeria's evolving cashless payment ecosystem. This study is among the first to empirically examine regulatory determinants of ATM strategic relevance in Nigeria using enterprise-level primary data, extending the discourse beyond customer adoption perspectives.*

**Keywords:** ATM strategic relevance, ATM withdrawal limit, ATM fee regulation, regulatory uncertainty, Deposit Money Banks

### 1. Introduction

Automated Teller Machines (ATMs) remain an important component of retail banking infrastructure, providing customers with convenient access to cash and basic banking services while supporting financial inclusion and payment system accessibility. However, the strategic relevance of ATM enterprises is increasingly being challenged worldwide by the combined effects of digital payment innovation, changing consumer behaviour, and evolving regulatory frameworks. Across both developed and emerging economies,

regulators have introduced policies aimed at promoting digital payments, reducing cash dependency, strengthening financial stability, and improving payment system efficiency. While these reforms have accelerated the adoption of alternative payment channels, they have also altered the operating environment for ATM enterprises by influencing transaction volumes, revenue generation, infrastructure investment, and long-term commercial viability (Verhoef et al., 2021; Ozili, 2023; Bank for International Settlements [BIS], 2023).

International evidence suggests that ATM regulation has progressively evolved beyond consumer protection to encompass broader payment system objectives. In Europe, revisions to interchange fee regulations and payment service directives have reshaped ATM revenue models and encouraged greater competition among payment service providers (European Central Bank, 2022). Similarly, Australia and the United Kingdom have experienced significant reforms in ATM pricing and interchange arrangements following concerns regarding access, competition, and infrastructure sustainability (Reserve Bank of Australia, 2019; UK Payment Systems Regulator, 2021). In the United States, changing interchange fee structures, increasing digital payment adoption, and declining cash usage have contributed to the rationalisation of ATM networks, particularly in low-volume locations (Federal Reserve, 2023). Collectively, these studies demonstrate that regulatory interventions designed to improve payment system efficiency frequently produce unintended consequences for the long-term sustainability of ATM infrastructure.

Nigeria presents a particularly compelling context within which to examine this phenomenon. Although ATMs have remained central to the country's retail banking ecosystem since the early 2000s, recent regulatory reforms and rapid digital payment growth have fundamentally altered their strategic role. The Central Bank of Nigeria (CBN) has implemented a series of regulatory measures including cashless policy initiatives, cash withdrawal limits, periodic revisions of ATM transaction fees, and broader payment system reforms to encourage migration toward electronic payment channels and improve payment system efficiency (CBN, 2022; CBN, 2025). While these reforms have accelerated digital financial inclusion, they have also introduced

significant strategic challenges for ATM enterprises by affecting transaction volumes, revenue opportunities, investment incentives, and operational sustainability.

Evidence increasingly suggests that the cumulative effects of these regulatory interventions extend beyond operational efficiency to influence the long-term strategic relevance of ATM enterprise in Nigeria. Between 2021 and 2025, ATM transaction volumes declined by approximately 19.1%, while Point-of-Sale (POS) transactions increased by about 134% and mobile banking transactions expanded by more than 200% during the same period (CBN, 2024; NIBSS, 2025). These structural shifts indicate not merely a change in customer payment preferences but a broader transformation in the competitive position of ATMs within Nigeria's digital payment ecosystem.

Beyond the withdrawal-limit regime, two additional regulatory mechanisms further shape ATM enterprise sustainability. ATM fee regulation, through CBN's periodic revisions of permissible transaction charges, directly influences operators' ability to recover escalating operating costs associated with energy, maintenance, cash replenishment, security, network connectivity, and imported equipment (CBN, 2025; Chioveanu et al., 2009). Regulatory uncertainty, manifested through frequent policy revisions, inconsistent implementation, and limited advance notice, increases strategic uncertainty and discourages long-term infrastructure investment (Baker et al., 2016; Oyetade & Muzindutsi, 2024; Abaidoo & Agyapong, 2025). Collectively, these regulatory forces have transformed the operating environment within which ATM enterprises compete.

Although previous studies have extensively examined ATM adoption, electronic banking, customer satisfaction, financial inclusion, and digital payment

behaviour, relatively little attention has been devoted to understanding how multiple regulatory instruments jointly influence the strategic relevance of ATM enterprise. Existing studies have generally examined individual policy measures or specific payment channels in isolation, with limited consideration of the cumulative effects of ATM withdrawal limits, ATM fee regulation, and regulatory uncertainty on the long-term relevance of ATM infrastructure, particularly within emerging economies undergoing rapid digital transformation. Consequently, an important gap remains in understanding how regulatory interventions intended to strengthen payment system efficiency may simultaneously reshape the strategic position of ATM enterprises.

This study addresses this gap by examining the effect of ATM withdrawal limit, ATM fee regulation, and regulatory uncertainty on the strategic relevance of ATM enterprise in Nigeria. By integrating these three regulatory dimensions within a single analytical framework, the study extends the literature beyond customer-centric evaluations of payment policy to examine the broader strategic implications of regulation for ATM enterprise sustainability. The findings contribute to the emerging discourse on payment system regulation by providing empirical evidence on how regulatory policy shapes the competitive positioning and long-term viability of ATM infrastructure within rapidly evolving digital payment ecosystems.

### **1.1 Statement of the Problem**

The Automated Teller Machine (ATM) has historically served as the primary self-service banking channel in Nigeria, providing convenient access to cash and supporting retail banking operations. However, its strategic relevance is increasingly threatened by a combination of regulatory interventions, rising operating costs, and the rapid migration of

customers to digital payment channels. Recent industry statistics reveal a significant structural shift in Nigeria's payment ecosystem. Between 2021 and 2025, ATM transaction volume declined from approximately 939.8 million to 760.0 million transactions, representing a 19.1% decrease, while the value of ATM transactions fell from ₦21.97 trillion to approximately ₦16.1 trillion, a decline of about 26.7%. During the same period, Point-of-Sale (POS) transaction volume increased by approximately 134%, while mobile banking transactions expanded by over 200%, indicating a substantial migration of payment activities away from ATM channels (Central Bank of Nigeria [CBN], 2024; Nigeria Inter-Bank Settlement System [NIBSS], 2025). These trends have weakened ATM utilisation rates, reduced transaction-based revenue opportunities, and raised concerns regarding the long-term commercial viability of ATM infrastructure.

The regulatory environment has further intensified these challenges. The Central Bank of Nigeria's (CBN) implementation of cash withdrawal limits, particularly during the 2022–2023 currency redesign and cash scarcity episode, restricted customers' access to cash through ATMs, thereby weakening the channel's fundamental value proposition of providing immediate and convenient cash access (Zasha et al., 2026). At the same time, the economics of ATM operations have deteriorated considerably. While ATM transaction values and volumes have continued to decline, operators have faced substantial increases in operating costs arising from persistent inflation, exchange-rate depreciation, higher diesel and electricity prices, increased telecommunications expenses, security costs, and the growing cost of importing ATM hardware and spare parts. These cost pressures prompted the CBN's 2025 review of ATM transaction charges,

acknowledging that prevailing fees had become inadequate to support the rising cost of deploying and maintaining ATM infrastructure. Consequently, regulated fee structures have constrained banks' ability to recover operating costs, reducing the commercial attractiveness of new ATM investments and the long-term sustainability of existing ATM networks. Despite these developments, existing research has largely examined ATM-related issues from the perspectives of customer adoption, service quality, technology acceptance, financial inclusion, and electronic payment behaviour, with comparatively limited attention given to the strategic implications of regulation for ATM enterprises (Shaikh & Karjaluoto, 2015; Ozili, 2023). Existing evidence also indicates that studies investigating regulatory interventions have generally examined individual policy measures such as cashless policy, electronic payment adoption, or ATM pricing in isolation, rather than assessing how ATM withdrawal limits, ATM fee regulation, and regulatory uncertainty jointly influence the strategic relevance of ATM enterprises. Moreover, empirical studies based on the perspectives of ATM management personnel, who are directly responsible for ATM investment, operations, and strategic decision-making, remain scarce. Consequently, there is limited enterprise-level evidence explaining how these regulatory mechanisms collectively shape the strategic relevance and long-term sustainability of ATM operations in Nigeria's evolving digital payments landscape.

This study addresses this gap by examining the combined influence of ATM withdrawal limits, ATM fee regulation, and regulatory uncertainty on the strategic relevance of ATM enterprises using primary data collected from ATM management personnel in Nigerian

Deposit Money Banks. By adopting an enterprise-level perspective, the study provides empirical evidence capable of informing regulatory policy, strategic investment decisions, and the sustainable development of ATM infrastructure within an increasingly digital financial ecosystem.

### **1.2 Objectives of the Study**

The main objective of this study was to examine the influence of regulatory determinants on the strategic relevance of ATM enterprise in Nigeria. Specifically, the study:

1. examined the influence of ATM withdrawal limit on the strategic relevance of ATM enterprise in Nigeria;
2. assessed the effect of ATM fee regulation on the strategic relevance of ATM enterprise in Nigeria; and
3. determined the effect of regulatory uncertainty on the strategic relevance of ATM enterprise in Nigeria.
4. determined the combined effect of the regulatory determinants on the strategic relevance of ATM enterprise in Nigeria.

### **1.3 Research Questions**

1. What is the influence of ATM withdrawal limit on the strategic relevance of ATM enterprise in Nigeria?
2. What is the effect of ATM fee regulation on the strategic relevance of ATM enterprise in Nigeria?
3. What is the effect of regulatory uncertainty on the strategic relevance of ATM enterprise in Nigeria?

### **1.4 Research Hypotheses**

The study was guided by the following null hypotheses:

H<sub>01</sub>: ATM withdrawal limit has no significant influence on the strategic relevance of ATMs in Nigeria.

H<sub>02</sub>: ATM fee regulation has no significant effect on the strategic relevance of ATMs in Nigeria.

H<sub>03</sub>: Regulatory uncertainty has no significant effect on the strategic relevance of ATMs in Nigeria.

H<sub>04</sub>: Regulatory determinants have no significant effect on the strategic relevance of ATMs in Nigeria.

## **2. Literature Review and Theoretical Framework**

The study is theoretically grounded in Institutional Theory and the Technology Acceptance Model (TAM). Institutional Theory explains why organisations comply with regulatory mandates even when compliance undermines economic or strategic outcomes, while TAM provides a framework for understanding how regulatory-driven channel shifts alter the perceived usefulness and ease of use of ATMs relative to competing digital platforms (Davis, 1989; DiMaggio & Powell, 1983).

### **2.1 Conceptual Clarifications**

#### **2.1.1 Strategic Relevance of ATM Enterprise**

Strategic relevance refers to the continuing importance, competitive positioning, and value justification of ATM networks within banks' broader electronic service delivery architecture amid evolving digital payment alternatives, changing customer preferences, and regulatory reforms (Verhoef et al., 2021; Ozili, 2023). Unlike economic viability, which focuses primarily on financial returns and cost recovery, strategic relevance reflects whether ATM infrastructure continues to create competitive value, strengthen customer engagement, and support banks' long-term service delivery objectives.

Existing literature increasingly suggests that digital transformation is reshaping the strategic role of physical banking infrastructure rather than eliminating it altogether. While digital payment channels have reduced dependence on cash-based transactions, empirical evidence remains inconclusive regarding whether ATMs have become strategically obsolete. Some studies argue that digital banking progressively substitutes ATM usage as

customers migrate toward mobile and internet banking platforms (Verhoef et al., 2021; Ozili, 2023). Conversely, evidence from emerging economies indicates that ATMs continue to perform complementary roles by facilitating cash availability, supporting financial inclusion, and providing resilience where digital payment infrastructure remains uneven (World Bank, 2022). This divergence suggests that the strategic relevance of ATM enterprise is context-dependent and influenced by regulatory conditions, payment ecosystem maturity, and customer behaviour rather than technological change alone. Consequently, assessing ATM enterprise solely through transaction volume or profitability provides an incomplete understanding of its strategic contribution, underscoring the need for enterprise-level investigation.

#### **2.1.2 ATM Withdrawal Limit**

ATM withdrawal limit refers to the regulatory ceiling imposed by the CBN on the amount of cash customers may withdraw through ATMs per transaction and within specified periods, serving as one of the principal mechanisms for implementing Nigeria's cashless policy (CBN, 2022, 2025a). The policy aims to reduce cash dependency, promote electronic payments, strengthen financial transparency, and improve payment system efficiency.

Existing studies generally agree that withdrawal limits accelerate migration toward digital payment channels by increasing the relative attractiveness of POS terminals, mobile banking, internet banking, and agency banking (Ozili, 2023; Samuel & Emenyi, 2024). However, the literature has largely evaluated these policies from macroeconomic and consumer adoption perspectives, emphasising financial inclusion, payment efficiency, and economic growth. Comparatively little attention has been given to their unintended consequences for

ATM enterprise. While evidence suggests that cashless transactions contribute positively to economic performance, ATM transactions continue to exert important short-term effects on economic activity (IIARD, 2025), implying that restricting ATM functionality may generate trade-offs between payment system modernisation and infrastructure sustainability. Consequently, literature tends to portray withdrawal limits as a demand-management instrument while overlooking their implications for banks' strategic investment decisions regarding ATM infrastructure. This represents an important conceptual gap addressed by the present study.

### **2.1.3 ATM Fee Regulation**

ATM fee regulation comprises the formal rules issued by the CBN governing permissible charges for ATM transactions, including inter-bank withdrawals and other ATM-related services (CBN, 2024). Such regulation is primarily intended to protect consumers from excessive charges while promoting equitable access to banking services.

Although fee regulation is widely regarded as beneficial from a consumer welfare perspective, existing evidence indicates that prolonged fee controls may create unintended supply-side distortions. Studies consistently demonstrate that regulated price ceilings can weaken operators' incentives to invest where operating costs exceed regulated revenues (Chioveanu et al., 2009; OECD, 2021). In Nigeria, this challenge is amplified by persistent inflation, exchange-rate volatility, increasing energy costs, and dependence on imported ATM equipment, all of which substantially increase the total cost of ATM ownership (Okafor & Eze, 2022). Yet, much of the existing literature evaluates ATM pricing primarily through the lenses of competition policy and consumer welfare, with limited consideration of infrastructure

sustainability. Consequently, insufficient attention has been devoted to understanding how fee regulation influences banks' strategic decisions regarding ATM deployment, replacement, and long-term network expansion. This narrow focus limits understanding of the broader strategic consequences of ATM price regulation.

### **2.1.4 Regulatory Uncertainty**

Regulatory uncertainty refers to the perceived unpredictability associated with regulatory actions, including frequent policy revisions, ambiguous directives, inconsistent implementation, and inadequate transition periods (Baker et al., 2016). Within the Nigerian banking sector, regulatory uncertainty is reflected in recurring revisions to ATM operating guidelines, fee structures, and broader payment system regulations (CBN, 2025b; Abaidoo & Agyapong, 2025).

The broader investment literature consistently demonstrates that regulatory uncertainty discourages irreversible capital investment because firms postpone investment decisions until future policy conditions become clearer (Baker et al., 2016). Nevertheless, ATM enterprise presents a distinctive context in which infrastructure investments typically involve long asset lifecycles, imported technology, significant maintenance commitments, and multi-year capital recovery periods. Existing studies acknowledge that regulatory instability increases investment risk (Oyadeyi, 2026; Eze & Nwankwo, 2024), yet they rarely examine how such uncertainty influences the strategic positioning of ATM infrastructure relative to competing digital banking channels. Moreover, prior research has largely examined regulatory uncertainty independently of other regulatory instruments. Consequently, little empirical evidence exists regarding the cumulative interaction of regulatory uncertainty, ATM withdrawal limits, and

ATM fee regulation in shaping ATM enterprise strategy. Addressing this gap is essential because regulatory interventions rarely operate independently in practice;

rather, their combined effects ultimately determine the long-term strategic relevance of ATM infrastructure.

### 2.1.5 Conceptual Model

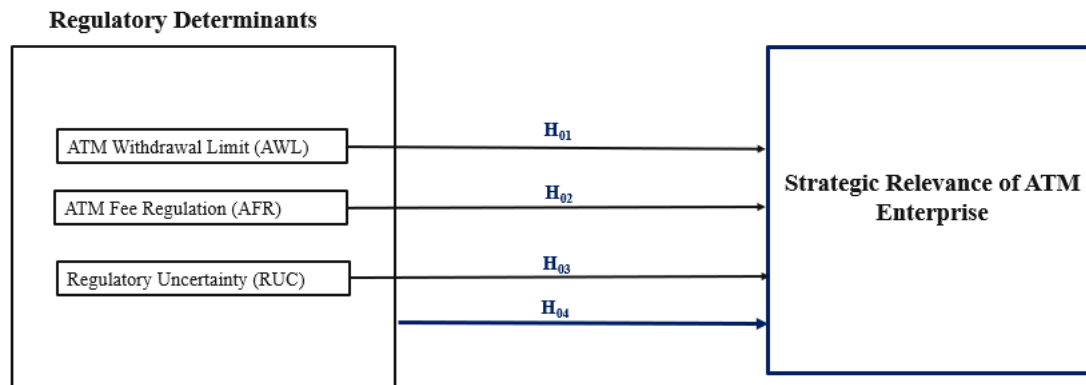


Figure 2.1: Conceptual Model illustrating the regulatory determinants and Strategic Relevance of ATM enterprise in Nigeria, (Researcher, 2026).

Figure 2.1 presents the conceptual model underpinning this study. The model proposes that the strategic relevance of ATM enterprise, which represents the continuing importance, competitive positioning, and value justification of ATM infrastructure within banks' service delivery architecture, is influenced by three regulatory determinants: ATM Withdrawal Limit (AWL), ATM Fee Regulation (AFR), and Regulatory Uncertainty (RUC).

The model assumes that each regulatory determinant exerts a direct influence on the strategic relevance of ATM enterprise. Specifically, ATM Withdrawal Limit ( $H_{01}$ ) is expected to influence ATM usage by restricting customers' access to cash, thereby affecting the strategic importance of ATMs within the banking channel mix. ATM Fee Regulation ( $H_{02}$ ) is hypothesised to affect the strategic relevance of ATM enterprise by influencing banks' ability to recover operating and infrastructure costs,

which may ultimately shape investment decisions regarding ATM deployment and maintenance. Similarly, Regulatory Uncertainty ( $H_{03}$ ) is expected to influence strategic relevance by increasing investment risk and discouraging long-term infrastructure planning due to frequent or unpredictable policy changes. In addition to the individual effects, the model proposes a combined effect of the three regulatory determinants on the strategic relevance of ATM enterprises, as represented by  $H_{04}$ . This proposition recognises that regulatory policies rarely operate in isolation. Instead, their cumulative interaction influences banks' strategic decisions regarding ATM investment, network expansion, operational sustainability, and the continued relevance of ATMs within an increasingly digital payment ecosystem. The conceptual model is anchored on Institutional Theory and the Technology Acceptance Model (TAM). Institutional Theory explains how regulatory pressures compel banks to comply with policy directives even when such compliance may reduce the strategic attractiveness of ATM

investments (DiMaggio & Powell, 1983). Conversely, TAM explains how regulatory-induced shifts toward digital payment channels influence customers' perceptions of the usefulness and convenience of ATMs relative to alternative electronic banking channels (Davis, 1989). Together, these theoretical perspectives provide a comprehensive framework for understanding how regulatory interventions influence both organisational investment behaviour and customer channel preferences, thereby shaping the strategic relevance of ATM enterprise.

## **2.2 Theoretical Framework**

### **2.2.1 Institutional Theory**

Institutional Theory, pioneered by Meyer and Rowan (1977) and extended through DiMaggio and Powell's (1983) concept of institutional isomorphism, posits that organisations operating in institutionally dense environments adapt their structures and strategies not only to maximise technical efficiency but also to achieve legitimacy by conforming to the regulatory requirements, professional standards, and societal expectations of their institutional environment. Three mechanisms of institutional isomorphism are identified. Coercive pressures from legal and regulatory mandates, normative pressures from professional standards & industry norms and mimetic pressures arising from imitation of peer organisations under conditions of uncertainty (DiMaggio & Powell, 1983; Kostova et al., 2020).

This study applies Institutional Theory to explain how ATM withdrawal limit, ATM fee regulation, and regulatory uncertainty function as coercive institutional pressures imposed by the CBN on ATM enterprise operators, compelling compliance with policy mandates including fee caps and withdrawal-limit directives even when such compliance undermines strategic relevance. The theory's concept of decoupling is particularly relevant.

Organisations may formally comply with regulatory expectations while internally diverging from the mandated strategic direction, explaining how Nigerian banks continue to nominally maintain ATM networks while progressively reducing strategic investment (Meyer & Rowan, 1977). Regulatory intervention effectiveness has been shown to significantly influence the performance and strategic orientation of financial institutions in Nigeria (IJRISS, 2024).

### **2.2.2 Technology Acceptance Model (TAM)**

The Technology Acceptance Model (TAM), originally developed by Davis (1989), posits that the adoption and continued use of technology is determined by two primary constructs: perceived usefulness which is the degree to which a technology is believed to enhance performance and perceived ease of use which is the degree to which the technology is believed to be free of effort. TAM has been widely applied in financial technology research to explain electronic payment adoption and channel migration behaviour (Davis, 1989; Shamanth & Aparna, 2022).

In the context of this study, TAM provides a complementary theoretical lens for understanding how ATM withdrawal limits alter customers' and banks' comparative evaluation of ATMs versus digital payment alternatives. As POS terminals and mobile banking platforms are promoted through regulatory incentives and infrastructure investment, their perceived usefulness relative to ATMs increases while ATMs' perceived usefulness declines particularly for standard cash-access functions that mobile wallets and POS systems now fulfil at lower cost, greater convenience and without exposure to withdrawal ceilings. The strategic relevance of ATMs is therefore partly a function of the comparative perceived usefulness that

withdrawal-limit and cashless policy pressures generate in Nigeria's payment ecosystem. Together, Institutional Theory and TAM provide complementary macro-institutional and micro-behavioural explanations for how regulatory forces undermine ATM strategic relevance.

### **2.2.3. Integrated Theoretical Insights**

While institutional theory and TAM are typically applied different levels of analysis, they are integrated in this study through a sequential causal logic. The regulatory determinants and their effect on ATM strategic relevance revealed a compound pattern: coercive regulatory constraints (withdrawal limits, fee caps) coincide with a parallel behavioural re-evaluation of ATMs relative to POS and mobile alternatives. Addressing this pattern requires attention to both the structural pressures compelling banks' compliance and the perceptual shifts driving customers' and banks' channel preferences. Institutional Theory and TAM together explain these intertwined dynamics, each illuminating a distinct facet of the phenomenon.

Institutional Theory shows that coercive pressure from CBN regulatory mandates compels formal compliance with withdrawal-limit and fee-cap directives regardless of their effect on strategic viability, while normative and mimetic pressures explain the industry-wide, rather than firm-specific, character of the shift toward digital channels (Islam & Polas, 2025). The theory's concept of decoupling further accounts for banks' continued nominal maintenance of ATM networks even as substantive strategic investment declines (Meyer & Rowan, 1977). TAM shows that perceived usefulness and perceived ease of use are the proximate constructs through which regulatory pressure is behaviourally enacted. Withdrawal limits reduce ATMs' perceived usefulness for cash-access functions, while regulatory promotion of

POS and mobile infrastructure raises the comparative perceived usefulness and ease of use of these alternatives (Davis, 1989). These frameworks are complementary rather than competing.

Institutional Theory explains why regulatory pressure arises and why compliance is structurally uneven (formal maintenance versus substantive disinvestment), while TAM explains how that pressure is converted into observable shifts in channel preference and strategic relevance. Read together, consistent with recent calls for dual macro-institutional and micro-behavioural approaches in fintech adoption research (Albuainain & Ashby, 2025), they provide a fuller account of ATM strategic relevance than either theory offers alone, and they inform this study's hypothesis that regulatory determinants affect strategic relevance both directly, through coercive compliance and indirectly, through their effect on comparative perceived usefulness.

## **2.3 Empirical Review**

### **2.3.1 ATM Withdrawal Limit and ATM Strategic Relevance**

Because ATM withdrawal limits operate as the principal enforcement mechanism of Nigeria's broader cashless policy agenda, the empirical literature on cashless policy and channel substitution provides the closest available evidence base for withdrawal-limit effects, pending the accumulation of a dedicated withdrawal-limit literature. Kanu et al. (2025) studied the transition from ATM to POS systems in Nigeria, found that POS systems offer a cost-effective alternative to ATMs, benefiting financial institutions and end-users alike, with POS adoption creating a structural shift that reduces the competitive necessity of ATM investment. This shift is consistent with customers routing transactions around binding withdrawal ceilings. Samuel and Emenyi (2024) examined cashless policy and economic growth in Nigeria using data from 2013 to

2022, found significant relationships between POS and ATM transactions and real GDP growth, establishing that policy-driven channel transitions carry direct implications for the relative economic contribution and strategic positioning of each channel. Monye (2024) and Obiekbo (2024) examined the regulatory and socioeconomic dimensions of Nigeria's cashless policy and found that the policy, including its cash withdrawal restrictions, imposes significant cost burdens on existing infrastructure operators, particularly ATM deployers. These additional costs are not adequately compensated under the current policy framework, thereby weakening the strategic rationale for sustained investment in ATM infrastructure.

Not all evidence supports a strategically weakening trajectory for ATMs under cashless-policy pressure, however. Ogbeide (2019), examining cashless payment instruments and financial inclusion in Nigeria using ordinary least squares regression on Central Bank of Nigeria and NIBSS time-series data, found that ATM transaction volume exerted a positive and statistically significant effect on financial inclusion indicators, an effect more pronounced in urban centres than in rural areas. This finding suggests that ATM channels retained a significant and measurable role in extending formal financial access even as cashless-policy instruments intensified, complicating the assumption that withdrawal restrictions uniformly diminish the strategic value of ATM infrastructure.

In a broader macroeconomic context, all cashless transactions including mobile money and online payments showed noteworthy long-term impacts on economic performance, while ATM transactions demonstrated a strong short-term impact, suggesting that the strategic relevance of ATMs is transitional rather than terminal with tightening withdrawal

ceilings accelerating the pace of strategic repositioning required (IIARD, 2025). The electronic banking channels literature further establishes that ATM usage enhances financial performance across different bank categories, but that regulatory shifts have contributed to uneven ATM performance across Nigerian banking institutions, indicating that regulatory dynamics rather than technology limitations are the primary driver of ATM strategic variability (UMYU Journal, 2025).

### **2.3.2 ATM Fee Regulation and Strategic Relevance**

ATM fee regulation consistently establishes its constraining effect on ATM enterprise strategic investment and deployment. Okafor and Eze (2022) found that CBN ATM fee caps reduced ATM profitability by approximately 18%, with the effect most pronounced for banks with extensive inter-bank ATM networks operating in high-cost deployment environments. Chioveanu et al. (2009) established theoretically and empirically that pricing restrictions on ATM services reduce the incentive for network investment and expansion, creating long-run strategic contraction. Not all evidence points in this direction. However, Ajibola et al. (2024) examined the relationship between financial performance and electronic banking channels in Nigeria and found that all three electronic banking platforms, including ATMs, exert positive and statistically significant effects on financial performance. This finding stands in some tension with the cost-recovery constraints identified above.

Similarly, research on electronic banking channels in Nigeria covering the period 2014–2024 found that ATM networks, online banking, and point-of-sale (POS) systems contribute positively to customer satisfaction and bank profitability when supported by sustained operational investment (Musa & Eyo, 2025), the same

period during which fee-regulation pressures intensified. More directly, Obiekwe and Anyanwaokoro (2017), using panel least squares analysis of five Nigerian commercial banks from 2009 to 2015, found a positive and statistically significant relationship between ATM transaction value and bank profitability (return on equity), attributing this in part to the maintenance and service-charge revenue generated through ATM usage itself. This finding is notable because it suggests that ATM-related fees can function as a revenue-generating mechanism for banks rather than solely a constraint on cost recovery, which complicates the assumption that fee regulation uniformly weakens the strategic case for ATM investment. The direction of the effect may depend on whether fee regulation is framed as a ceiling on recoverable operating costs or as an outright restriction on a revenue stream, banks can still monetise within permitted limits.

Collectively, these findings suggest that restrictive ATM fee regulation is widely, though not universally, recognized as a constraint on the level of investment required to maintain the relevance, operational efficiency, and long-term sustainability of ATM infrastructure. However, the divergence between studies highlighting cost-recovery constraints and those reporting continued positive profitability effects indicates that the relationship may be contingent upon factors such as the stringency of fee regulation, the scale of ATM network operations, and the specific measures of profitability employed. These variations underscore the likelihood that the impact of ATM fee regulation is context-dependent rather than uniform across banking environments.

### **2.3.3 Regulatory Uncertainty and Strategic Relevance**

The empirical literature on regulatory uncertainty and financial sector performance provides robust evidence that policy unpredictability deters long-term infrastructure investment and undermines strategic planning. Abaidoo and Agyapong (2025) established that regulatory policy uncertainty significantly undermines financial institution performance in emerging market economies across sub-Saharan Africa. Oyetade and Muzindutsi (2024) found that economic policy uncertainty significantly reduced bank performance across African economies, operating primarily through its dampening effect on long-term investment decisions. Oyadeyi (2026) confirmed that regulatory uncertainty reduces firm profitability in Nigeria, with the effect more pronounced in regulated industries where compliance costs are substantial and operationally non-discretionary. Baker et al. (2016), whose economic policy uncertainty index has been widely validated across empirical contexts, established the theoretical and empirical basis for treating regulatory uncertainty as a measurable and significant determinant of firm-level strategic outcomes. Nigeria's regulatory changes in 2024 including significant CBN-driven reforms across the banking and finance sector exemplify the institutional unpredictability that ATM operators must navigate (Mondaq, 2025).

This body of evidence is not entirely unanimous, however. Aina (2025), using a nonlinear autoregressive distributed lag model on Nigerian data spanning April 2016 to June 2023, found that while economic policy uncertainty exerted a significant negative effect on economic growth in the long run, its short-run effects were statistically insignificant, indicating that immediate policy shifts do not always translate into measurable short-term strategic harm. More directly, Ekeocha et

al. (2023), examining economic policy uncertainty across 47 African countries between 2010 and 2019 using system GMM and quantile regression techniques, found that domestic policy uncertainty had negligible effects on economic performance, with governance institutions showing no significant moderating role. This finding stands in tension with the uniformly negative domestic-uncertainty narrative elsewhere in this literature and suggests that RUC's strategic impact may be more context- and time-horizon-dependent than the preponderance of evidence implies.

#### **2.3.4 Research Gaps**

The literature review reveals three critical empirical gaps that this study addresses. First, no existing study examines ATM strategic relevance as a distinct dependent construct subject to multiple regulatory determinants in an integrated empirical framework. Second, existing studies examine cashless-related withdrawal restrictions, fee regulation, and regulatory uncertainty in isolation, precluding comparative assessment of their relative magnitudes and independent contributions. Third, enterprise-level primary data from ATM management personnel across the full spectrum of CBN-licensed DMBs as opposed to secondary macroeconomic data remains absent from the literature. The

**Table 1**

*Population Distribution of Banks Considered in the Study*

| <b>Bank Category</b> | <b>Number of Banks</b> | <b>Percentage (%)</b> |
|----------------------|------------------------|-----------------------|
| International Banks  | 8                      | 28.6                  |
| National Banks       | 16                     | 57.1                  |
| Regional Banks       | 4                      | 14.3                  |
| Total                | 28                     | 100.0                 |

*Note. Bank classification is based on CBN (2026) licensing categories.*

The minimum sample size was determined using Yamane's (1967) formula at a 5% margin of error, yielding a minimum of 272 respondents. A 30% attrition

present study addresses all three gaps simultaneously.

### **3. Methodology**

#### **3.1 Research Design**

A quantitative cross-sectional survey research design was adopted to determine the influence of regulatory determinants and ATM strategic relevance across a defined institutional population at a single point in time (Creswell & Creswell, 2018).

#### **3.2 Population and Sampling**

The study population comprised 850 ATM management personnel across all 28 CBN-licensed Deposit Money Banks in Nigeria. These personnel covered ATM Business Management, ATM Service Delivery Administration, Information Technology Management, Technology Sourcing and Procurement, Branch Channel Management, Regulatory Compliance, and Facility Management functions. These functional categories were selected for their direct knowledge of regulatory and operational factors affecting ATM strategic relevance. Banks were stratified into three categories reflecting CBN's licensing classification: International Banks (8 banks, 28.6%), National Banks (16 banks, 57.1%), and Regional Banks (4 banks, 14.3%) as presented in Table 1 (CBN, 2026).

allowance was added, producing an adjusted sample of 354, consistent with best practices for survey research with busy professional respondents (Saunders et

al., 2023; Taherdoost, 2023). Purposive sampling was employed to select only personnel directly involved in ATM management functions, as this technique is appropriate when the researcher requires information-rich respondents with specific operational expertise (Saunders et al.,

**Table 2**

*Sample Size Determination and Response Rate Analysis*

| Item                                    | Value  |
|-----------------------------------------|--------|
| Population (N)                          | 850    |
| Yamane Minimum Sample Size              | 272    |
| 30% Attrition Allowance                 | 82     |
| Adjusted Sample Size                    | 354    |
| Valid Responses Retrieved               | 317    |
| Response Rate (%)                       | 89.5%  |
| Valid Responses as % of Required Sample | 116.5% |

*Note. Yamane's (1967) formula:  $n = N / (1 + Ne^2)$  at  $e = 0.05$ .*

### **3.3 Research Instrument and Data Collection**

A structured questionnaire comprising 30 items measured on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) was employed as the primary data collection instrument. The questionnaire was developed in Google forms and distributed via Whatsapp. The use of WhatsApp and Google Forms for survey distribution carries recognised methodological risks, including coverage bias arising from the exclusion of non-internet users and the inability to fully characterise the sampling frame, as well as the potential for duplicate submissions (Andrade, 2020). These risks were mitigated in three ways specific to this study's population and design.

The coverage bias was minimised because the target population are staff of CBN-licensed Deposit Money Banks. This is not a general population but a professionally employed, digitally literate cohort for whom smartphone access and WhatsApp

2023; Campbell et al., 2020). Of 354 questionnaires distributed, 317 valid responses were retrieved, representing an 89.5% response rate and 116.5% of the required minimum, as summarised in Table 2.

use are near-universal features of routine workplace communication and digital banking operations, the risk of excluding eligible respondents on account of connectivity or device access is therefore substantially lower than in general-population online surveys (Andrade, 2020). The digital exclusion was further addressed by combining direct dissemination through official bank contacts with a snowball strategy, allowing the survey to reach respondents across geographically dispersed branches who might otherwise have been underrepresented, while follow-up telephone reminders provided an alternative, non-digital point of contact for respondents with limited digital confidence.

The duplicate responses may pose a documented risk in WhatsApp-based survey distribution owing to message forwarding beyond the intended sample (Ameen & Praharaj, 2020). These were controlled through Google Forms'

response-restriction settings requiring a unique, verified email address per submission, supplemented by a manual screening of respondent name, bank and branch details to identify and remove duplicate or near-identical entries prior to analysis. These measures substantially reduce the specific risks of coverage bias, digital exclusion and duplication raised in respect of the chosen distribution channels. Content validity was established through alignment with the conceptual and empirical literature and expert review by academic and industry practitioners. Internal consistency reliability was assessed via Cronbach's alpha on a 30-respondent pilot study, yielding a coefficient of 0.876, which exceeds the 0.70 threshold recommended for exploratory research and the 0.80 benchmark for confirmatory studies (Hair et al., 2019; Taber, 2018).

### **3.4 Measurement of Variables**

ATM strategic relevance (dependent variable) was measured across eight items capturing the continued importance and competitive positioning of ATM networks within banks' service delivery strategies. ATM withdrawal limit (AWL) was measured across three items reflecting transaction volume displacement, digital channel adoption, and directional policy impact on ATM relevance. ATM fee regulation (AFR) was assessed through three items measuring cost recovery constraints, economic viability impact, and expansion disincentives. Regulatory uncertainty (RUC) was measured across three items capturing investment planning uncertainty, long-term commitment deterrence, and operational risk perception. All items are anchored on the five-point Likert scale and are fully operationally aligned with the conceptual definitions and theoretical framework.

### **3.5 Model Specification and Analytical Technique**

The relationship between the regulatory determinants and the strategic relevance of ATM enterprise is specified using the following multiple linear regression model:

$$ATM-SR = \beta_0 + \beta_1(AWL) + \beta_2(AFR) + \beta_3(RUC) + \varepsilon$$

where ATM-SR represents the Strategic Relevance of ATM Enterprise,  $\beta_0$  is the intercept,  $\beta_1$ – $\beta_3$  are the regression coefficients measuring the effects of the independent variables, AWL denotes ATM Withdrawal Limit, AFR represents ATM Fee Regulation, RUC denotes Regulatory Uncertainty, and  $\varepsilon$  is the random error term capturing the effects of other factors not explicitly included in the model. The model hypothesises that the strategic relevance of ATM enterprise is a function of the combined effects of ATM withdrawal limits, ATM fee regulation, and regulatory uncertainty. The estimated coefficients ( $\beta_1$ ,  $\beta_2$ , and  $\beta_3$ ) indicate the magnitude and direction of the influence of each regulatory determinant on the strategic relevance of ATM enterprise, while controlling for the effects of the other explanatory variables.

OLS regression was selected as the analytical method because all variables are continuous (aggregated Likert scores), the study tests directional linear relationships, and the sample size of 317 satisfies the asymptotic requirements for reliable OLS estimation (Lechene et al., 2022). Descriptive statistics, including means, standard deviations, and frequency distributions, were computed prior to hypothesis testing. Data were analysed using IBM SPSS Statistics Version 25. Ethical approval was obtained prior to data collection, with informed consent secured from all participants in compliance with the Nigeria Data Protection Act (NDPA, 2023).

## 4. Results

### 4.1 Respondents' Profile

The achieved sample of 317 respondents was predominantly postgraduate-qualified (51.7% MSc/MBA/MPhil; 0.9% PhD/DBA; 47.4% BSc/HND), reflecting strong professional competence. By functional role, ATM Support/Service Delivery Administration constituted the largest group (25.6%), followed by Branch Operations/Branch Services (26.5%), ATM Business/E-Business (14.2%), and Information Technology Management (9.8%), ensuring broad coverage of ATM-related functions. By position, ATM Support/Service Delivery Personnel

accounted for 31.1% of respondents, followed by ATM Business/E-Business Management (12.9%) and Branch Channel Management (11.4%). Most respondents had between five and fourteen years of professional experience in ATM or electronic banking operations (54.9%), indicating substantial operational insight. National Banks contributed 57.1% of respondents, International Banks 28.6%, and Regional Banks 14.3%, ensuring comprehensive institutional representation across the CBN licensing spectrum. The socio-demographic profiles are presented in Tables 3 and 4.

**Table 3**

*Educational Qualifications of Respondents*

| Qualification  | Frequency | Percentage (%) |
|----------------|-----------|----------------|
| SSCE           | 0         | 0.0            |
| B.Sc/HND       | 150       | 47.4           |
| M.Sc/MBA/MPhil | 164       | 51.7           |
| Ph.D/DBA       | 3         | 0.9            |
| Total          | 317       | 100.0          |

*Note. SSCE = Senior Secondary Certificate Examination; HND = Higher National Diploma.*

**Table 4**

*Years of Professional Experience in ATM/Electronic Banking*

| Years of Experience | Frequency | Percentage (%) |
|---------------------|-----------|----------------|
| Less than 5 years   | 79        | 24.9           |
| 5–9 years           | 93        | 29.3           |
| 10–14 years         | 81        | 25.6           |
| 15–19 years         | 59        | 18.6           |
| 20 years and above  | 5         | 1.6            |
| Total               | 317       | 100.0          |

**Table 5**

*Descriptive Statistics: Regulatory Determinants and ATM Strategic Relevance*

| Construct / Item                                                                                                          | Mean | Std. Dev. | Grand Mean |
|---------------------------------------------------------------------------------------------------------------------------|------|-----------|------------|
| AWL1: Withdrawal-limit/cashless policy initiatives have reduced the volume of transactions conducted through ATMs         | 3.68 | 1.26      |            |
| AWL2: Increased adoption of POS terminals and mobile banking has reduced reliance on ATMs                                 | 3.98 | 1.13      | 3.79       |
| AWL3: The direction of withdrawal-limit/cashless policy weakens the strategic relevance of ATMs within the banking sector | 3.72 | 1.18      |            |
| AFR1: Regulated ATM fees limit my bank's ability to recover rising ATM operating costs                                    | 3.46 | 1.06      |            |
| AFR2: Current ATM fee regulations negatively affect the economic viability of ATM operations                              | 3.37 | 1.09      | 3.42       |
| AFR3: ATM fee regulation discourages the expansion of ATMs in high-cost locations                                         | 3.43 | 1.18      |            |
| RUC1: Frequent changes in banking regulations create uncertainty for ATM investment planning                              | 3.43 | 1.05      |            |
| RUC2: Regulatory unpredictability discourages long-term commitment to ATM infrastructure                                  | 3.38 | 1.13      | 3.40       |
| RUC3: Uncertainty in regulatory requirements increases the perceived risk of ATM operations                               | 3.38 | 1.10      |            |

*Note.* AWL = ATM Withdrawal Limit; AFR = ATM Fee Regulation; RUC = Regulatory Uncertainty. Scale: 1–5 (Strongly Disagree to Strongly Agree). *n* = 317. AWL items were originally piloted under the label “cashless policy pressure” and relabelled for conceptual alignment; see Sections 3.4 and 6.4 for a transparent discussion of this construct–measurement limitation.

#### **4.2 Descriptive Statistics**

Table 5 presents the descriptive statistics for the three regulatory determinants. ATM withdrawal limit recorded the highest grand mean (3.79), indicating strong agreement among respondents that withdrawal-limit and associated cashless-channel pressures have reduced ATM transaction volumes and weakened strategic relevance. Notably, Item 2 - Increased adoption of POS terminals and mobile banking has reduced reliance on ATMs’ recorded the highest individual

item mean in the entire study (*M* = 3.98, *SD* = 1.13), underscoring the depth of perceived channel substitution. ATM fee regulation recorded a moderate grand mean (3.42), with respondents agreeing that regulated fees limit cost recovery and discourage ATM expansion in high-cost locations. Regulatory uncertainty recorded the lowest grand mean (3.40), though still above the 3.0 neutral midpoint, indicating moderate but genuine perceived impact on investment planning and strategic commitment.

### 4.3 Hypothesis Testing

Three separate bivariate OLS regression models were estimated to test the

hypotheses. Table 6 presents the consolidated regression results for all three models.

**Table 6**

*Bivariate OLS Regression Results: Regulatory Determinants and ATM Strategic Relevance*

| Hypothesis/Variable                            | R     | R <sup>2</sup> | F      | Beta   | t         | Decision               |
|------------------------------------------------|-------|----------------|--------|--------|-----------|------------------------|
| H <sub>01</sub> : ATM Withdrawal Limit (AWL)   | 0.343 | 0.117          | 41.885 | -0.343 | -6.472*** | Reject H <sub>01</sub> |
| H <sub>02</sub> : ATM Fee Regulation (AFR)     | 0.284 | 0.081          | 27.683 | -0.284 | -5.261*** | Reject H <sub>02</sub> |
| H <sub>03</sub> : Regulatory Uncertainty (RUC) | 0.349 | 0.122          | 43.787 | -0.349 | -6.617*** | Reject H <sub>03</sub> |

*Note.*  $p < .001$ . Dependent variable: ATM Strategic Relevance (ATM-SR). Constants: AWL model = 15.873; AFR model = 16.693; RUC model = 16.067. Unstandardised B coefficients: AWL = -0.440 (SE = 0.068); AFR = -0.408 (SE = 0.078); RUC = -0.473 (SE = 0.071).  $n = 317$ .

Hypothesis 1 (H<sub>01</sub>): ATM withdrawal limit demonstrated a significant negative influence on ATM strategic relevance ( $\beta = -0.343$ ,  $t = -6.472$ ,  $p < .001$ ), explaining 11.7% of variance in ATM strategic relevance ( $R^2 = 0.117$ ,  $F = 41.885$ ,  $p < .001$ ). The model equation is:  $ATM-SR = 15.873 - 0.440(AWL) + \epsilon$ . The null hypothesis was rejected. The negative beta confirms that tightening of ATM withdrawal limits is associated with declining ATM strategic relevance, with POS and mobile banking adoption serving as the primary channel substitution mechanism.

Hypothesis 2 (H<sub>02</sub>): ATM fee regulation demonstrated a significant negative effect on ATM strategic relevance ( $\beta = -0.284$ ,  $t = -5.261$ ,  $p < .001$ ), explaining 8.1% of variance ( $R^2 = 0.081$ ,  $F = 27.683$ ,  $p < .001$ ). The model equation is:  $ATM-SR = 16.693 - 0.408(AFR) + \epsilon$ . The null hypothesis was

rejected. The finding confirms that fee regulatory constraints undermine strategic investment rationale by preventing adequate cost recovery from ATM deployments, with a weaker explanatory effect than the other two regulatory determinants.

Hypothesis 3 (H<sub>03</sub>): Regulatory uncertainty demonstrated the strongest negative effect on ATM strategic relevance ( $\beta = -0.349$ ,  $t = -6.617$ ,  $p < .001$ ), explaining 12.2% of variance ( $R^2 = 0.122$ ,  $F = 43.787$ ,  $p < .001$ ) — the highest individual  $R^2$  among the three regulatory determinants. The model equation is:  $ATM-SR = 16.067 - 0.473(RUC) + \epsilon$ . The null hypothesis was rejected, confirming that regulatory unpredictability constitutes the most potent independent regulatory constraint on ATM strategic relevance, operating through its deterrent effect on long-term strategic planning and infrastructure commitment.

**Table 7**

**Model Summary**

| Model | R                 | Adjusted R Square | Std. Error Change Statistics |          |        |        |     |     | Sig. Change | F |
|-------|-------------------|-------------------|------------------------------|----------|--------|--------|-----|-----|-------------|---|
|       |                   |                   | of the Estimate              | R Square | Change | Change | df1 | df2 |             |   |
| 1     | .529 <sup>a</sup> | .280              | .273                         | 2.18523  | .280   | 40.492 | 3   | 313 | .000        |   |

a. Predictors: (Constant), AWLT, AFRT, RUCT

**Hypothesis 4 (H<sub>04</sub>):** ATM Withdrawal Limit, ATM Fee Regulation, and Regulatory Uncertainty jointly demonstrated a significant effect on ATM strategic relevance ( $R = 0.529$ ,  $F(3, 313) = 40.492$ ,  $p < .001$ ), collectively explaining 28.0% of the variance in ATM strategic relevance ( $R^2 = 0.280$ ; Adjusted  $R^2 = 0.273$ ). The adjusted coefficient of determination indicated that the model retained substantial explanatory stability after accounting for the number of

predictors. The null hypothesis was therefore rejected, confirming that the three regulatory determinants jointly exert a statistically significant influence on ATM strategic relevance in Nigerian Deposit Money Banks. This finding indicates that the combined regulatory environment plays an important role in shaping the strategic value, investment attractiveness, and continued relevance of ATM services in Nigeria.

**Table 8**

*Multivariate OLS Regression Results with Collinearity Statistics: Regulatory Determinants and ATM Strategic Relevance*

| Model        | Unstandardized Coefficients |            | Standardized Coefficients | T          | Sig. | 95.0% Confidence Interval for B |             | Collinearity Statistics |       |
|--------------|-----------------------------|------------|---------------------------|------------|------|---------------------------------|-------------|-------------------------|-------|
|              | B                           | Std. Error | Beta                      |            |      | Lower Bound                     | Upper Bound | Tolerance               | VIF   |
| 1 (Constant) | 14.652.902                  |            |                           | 16.246.000 |      | 12.878                          | 16.427      |                         |       |
| AFRT         | -0.096.099                  |            | -0.067                    | -0.971.332 | .098 | .290                            | .580        | .580                    | 1.725 |
| RUCT         | -0.268.098                  |            | -0.198                    | -2.739.007 | .076 | .461                            | .520        | .520                    | 1.921 |
| AWLT         | -0.221.096                  |            | -0.172                    | -2.309.022 | .033 | .410                            | .490        | .490                    | 2.039 |

a. Dependent Variable: AESR

#### **Multicollinearity Diagnostic Test.**

Prior to interpreting the regression coefficients, multicollinearity among the independent variables was assessed using the Tolerance and Variance Inflation Factor (VIF) statistics. As presented in the regression results, the Tolerance values ranged from 0.490 to 0.580, all of which exceeded the recommended minimum threshold of 0.10 (and the more conservative threshold of 0.20). Likewise, the VIF values ranged from 1.725 to 2.039, remaining well below the commonly accepted maximum threshold of 5.0.

This finding indicates that multicollinearity was not a concern in the regression model, suggesting that ATM Fee Regulation (AFRT), Regulatory Uncertainty (RUCT), and ATM Withdrawal Limit (AWLT) each contributed distinct explanatory information in predicting ATM Strategic

Relevance (AESR). Consequently, the estimated regression coefficients are considered stable and reliable for hypothesis testing and interpretation (Hair et al., 2022).

#### **Discussion**

##### **ATM Withdrawal Limit and ATM Strategic Relevance**

The finding that ATM withdrawal limit significantly and negatively influences ATM strategic relevance ( $\beta = -0.343$ ,  $R^2 = 0.117$ ) suggests that withdrawal restrictions affect ATM enterprise not merely by limiting cash access but by fundamentally altering customer transaction behaviour. The strongest item mean in the study (AWL2:  $M = 3.98$ ) indicates that respondents overwhelmingly perceive POS terminals and mobile banking as substitutes for ATM services. This implies that withdrawal limits accelerate behavioural migration toward

digital channels by increasing the inconvenience associated with ATM usage. Once customers become accustomed to alternative payment channels, their reliance on ATMs declines even when withdrawal restrictions are relaxed, thereby reducing the strategic importance of ATM infrastructure over time. The finding therefore reflects a structural shift in transaction behaviour rather than a temporary response to regulatory intervention.

This interpretation is consistent with Institutional Theory. Coercive regulatory pressures imposed through withdrawal-limit policies reshape organisational incentives by encouraging banks to promote lower-cost digital channels, while mimetic pressures encourage competing institutions to replicate successful digital transformation strategies. Consequently, banks increasingly allocate investment towards mobile and POS platforms at the expense of ATM expansion. The Technology Acceptance Model (TAM) further explains this behavioural transition, as customers increasingly perceive digital payment channels as more useful and convenient than ATMs for routine financial transactions. The moderate explanatory power ( $R^2 = 0.117$ ) indicates that withdrawal limits constitute an important but not exclusive determinant of ATM strategic relevance, suggesting that regulatory measures interact with broader economic and technological factors in influencing infrastructure sustainability.

These findings are consistent with Kanu et al. (2025), Samuel and Emenyi (2024), Monye (2024), and Obiekbo (2024), who similarly demonstrate that the expansion of digital payment channels and the increasing operational burden of ATM infrastructure have weakened the competitive position of ATMs within Nigeria's evolving payment ecosystem. However, the current study extends this understanding by demonstrating that the

decline in ATM strategic relevance is driven not only by the availability of digital alternatives but also by the behavioural and investment responses triggered by withdrawal-limit regulations. This suggests that regulatory policies can accelerate an ongoing digital transition by simultaneously influencing customer transaction choices and banks' strategic allocation of resources.

### **ATM Fee Regulation and Strategic Relevance**

ATM fee regulation was found to exert a significant negative effect on ATM strategic relevance ( $\beta = -0.284$ ,  $R^2 = 0.081$ ), although its explanatory power was the weakest among the three regulatory determinants. This relatively smaller effect suggests that fee regulation does not immediately reduce ATM utilisation but gradually weakens the economic viability of ATM deployment. Unlike withdrawal limits, which directly influence customer behaviour, regulated pricing primarily affects the investment decisions of banks by constraining their ability to recover increasing operational costs such as energy, maintenance, security, cash replenishment, and imported spare parts. Consequently, banks may continue operating existing ATMs while becoming increasingly reluctant to expand networks or maintain machines in low-volume or high-cost locations.

This explains why respondents perceived fee regulation as a persistent structural constraint rather than an immediate operational threat. The relatively lower descriptive mean (grand mean = 3.42) indicates that respondents recognise its influence but regard its effects as cumulative rather than abrupt. Institutional Theory explains this relationship through coercive regulatory pressure, whereby mandatory pricing restrictions shape organisational investment decisions by limiting managerial flexibility in responding to rising operating costs.

Rather than stimulating efficiency, prolonged fee controls may reduce incentives for infrastructure renewal and technological upgrades, thereby gradually diminishing the strategic relevance of ATM networks.

The finding is consistent with Okafor and Eze (2022), who reported reduced ATM profitability under regulated pricing, and with Chioveanu et al. (2009) and OECD (2021), whose studies demonstrate that price regulation in network industries can discourage long-term infrastructure investment when regulated revenues fail to reflect underlying operating costs. However, the present study extends this evidence by showing that the negative effect of fee regulation is not merely a consequence of reduced profitability. Rather, it occurs because regulated pricing changes banks' strategic investment priorities, encouraging them to allocate resources toward digital banking platforms that offer greater long-term efficiency while gradually reducing the strategic importance of ATM networks.

### **Regulatory Uncertainty and ATM Strategic Relevance**

Regulatory uncertainty emerged as the strongest independent regulatory determinant of ATM strategic relevance ( $\beta = -0.349$ ,  $R^2 = 0.122$ ), indicating that uncertainty surrounding future regulatory actions has a greater influence on banks' strategic decisions than the individual regulatory measures themselves. This suggests that the challenge for banks is not simply complying with current regulations but managing the risk created by an unpredictable regulatory environment. ATM infrastructure requires substantial capital investment, continuous maintenance, and long payback periods. When banks cannot anticipate future policy directions, they are less able to estimate future operating costs, revenue potential, or compliance requirements. Under such conditions, committing

resources to long-term ATM investments becomes increasingly risky.

The stronger negative effect of regulatory uncertainty compared with ATM withdrawal limits and fee regulation can therefore be explained by its influence on strategic planning. While banks can adapt their operations to a clearly defined regulation, uncertainty makes it difficult to determine whether current investment decisions will remain economically viable in the future. Consequently, banks may delay replacing ageing ATMs, postpone network expansion, or favour investments in digital banking platforms that can be modified more easily in response to future regulatory changes. In this sense, uncertainty affects ATM strategic relevance not because it directly reduces customer demand, but because it alters the timing and direction of banks' investment decisions. The relatively modest explanatory power ( $R^2 = 0.122$ ) indicates that although regulatory uncertainty is the most influential regulatory factor examined in this study, it operates alongside other drivers such as technological innovation, changing consumer payment preferences, and competitive pressures within the banking sector. This suggests that ATM strategic relevance is shaped by a combination of regulatory and market forces rather than by policy uncertainty alone.

The finding supports Institutional Theory by demonstrating that organisations respond not only to existing regulatory requirements but also to expectations about future institutional conditions. When the regulatory environment is perceived as unstable, banks adopt more cautious investment strategies to reduce exposure to future policy risks. This interpretation is also consistent with the policy uncertainty framework of Baker et al. (2016), which argues that uncertainty encourages firms to postpone irreversible investments until greater policy clarity emerges. Similar

evidence reported by Abaidoo and Agyapong (2025), Oyetade and Muzindutsi (2024), and Oyadeyi (2026) supports this interpretation. However, the present study extends these findings by showing that regulatory uncertainty affects ATM strategic relevance primarily by discouraging long-term infrastructure investment and accelerating the strategic shift toward more adaptable digital banking channels. This implies that improving regulatory consistency, transparent stakeholder engagement, and advance communication of policy changes may strengthen banks' confidence to sustain ATM investments even without fundamentally changing existing regulations.

#### **Comparative Assessment and Synthesis**

The comparative analysis reveals a clear hierarchy of regulatory influence on ATM strategic relevance: Regulatory Uncertainty ( $\beta = -0.349$ ,  $R^2 = 0.122$ ), ATM Withdrawal Limit ( $\beta = -0.343$ ,  $R^2 = 0.117$ ), and ATM Fee Regulation ( $\beta = -0.284$ ,  $R^2 = 0.081$ ). More importantly, this ordering provides insight into the mechanisms through which regulation influences ATM enterprise sustainability. The results suggest that strategic decisions are influenced less by the existence of regulation itself than by how regulation affects managerial confidence, customer behaviour, and investment expectations.

Regulatory uncertainty emerged as the strongest determinant because it simultaneously influences multiple organisational decisions, including investment timing, technology renewal, and long-term infrastructure planning. ATM withdrawal limits exert a slightly weaker effect because they primarily operate through behavioural substitution, encouraging customers to migrate toward digital payment channels. Fee regulation, although statistically significant, demonstrates the weakest effect because its influence accumulates gradually through

reduced profitability and constrained cost recovery rather than through immediate changes in customer usage patterns.

Collectively, the findings suggest that regulatory policies influence ATM strategic relevance through different but complementary mechanisms. Withdrawal limits primarily affect customer demand, fee regulation constrains economic returns, while regulatory uncertainty shapes strategic investment confidence. Together, these determinants explain between 8.1% and 12.2% of the variance in ATM strategic relevance individually, indicating that regulation constitutes a meaningful but partial explanation of ATM enterprise sustainability. The remaining unexplained variance highlights the importance of complementary macro-environmental determinants such as energy costs, exchange-rate volatility, inflation, import dependence, and organisational capabilities which warrant further investigation. This reinforces the multidimensional nature of ATM enterprise sustainability and supports the broader conceptual framework adopted in this study.

## **5. Conclusion and Implications**

### **5.1 Conclusion**

This study provided an enterprise-level empirical examination of regulatory determinants of ATM strategic relevance in Nigeria. Three principal conclusions emerge. First, all three regulatory determinants, namely ATM withdrawal limit, ATM fee regulation, and regulatory uncertainty significantly and negatively influence ATM strategic relevance, establishing the regulatory environment as a substantive structural constraint on ATM enterprise positioning. Second, regulatory uncertainty is the most potent individual regulatory constraint, confirming that process quality of regulation matters more than policy content alone for ATM enterprise strategic confidence. Third,

ATM withdrawal limit operates through the channel substitution mechanism most directly, with POS and mobile banking adoption identified by respondents as the primary driver of reduced ATM reliance - a finding that underscores the urgency of ATM strategic repositioning within Nigeria's evolving digital payment ecosystem.

## **5.2 Recommendations**

### **5.2.1 Policy Recommendations**

1. The Central Bank of Nigeria should periodically review ATM withdrawal limits to reflect prevailing macroeconomic conditions, including inflation and changes in purchasing power. The findings demonstrate that restrictive withdrawal limits significantly reduce the strategic relevance of ATM enterprise by encouraging customers to substitute ATM transactions with alternative electronic payment channels. A balanced review of withdrawal limits would help preserve the strategic role of ATMs within Nigeria's payment ecosystem while supporting customer convenience and maintaining alignment with the objectives of the cashless policy.
2. The Central Bank of Nigeria should periodically review ATM fee regulations to ensure that regulated charges reasonably reflect the increasing total cost of ownership of ATM infrastructure. Since ATM fee regulation was found to significantly reduce the strategic relevance of ATM enterprise by constraining cost recovery, a cost-reflective pricing framework would improve investment sustainability while maintaining consumer protection through transparent and evidence-based regulatory oversight.
3. Regulatory authorities should strengthen regulatory predictability by adopting structured stakeholder consultation, impact assessment, and adequate implementation timelines before

introducing major ATM policy changes, except in exceptional circumstances requiring immediate intervention. Since regulatory uncertainty was identified as the strongest regulatory determinant reducing ATM strategic relevance, greater policy consistency and transparency would improve long-term investment planning, strengthen industry confidence, and encourage sustained investment in ATM infrastructure.

### **5.2.2 Practice Recommendations**

4. Deposit Money Banks should incorporate regulatory-scenario planning into their ATM investment and deployment decisions, rather than treating withdrawal limits, fee ceilings, and policy shifts as isolated operational adjustments. Given that all three regulatory determinants examined in this study independently reduced ATM strategic relevance, bank management should develop internal frameworks for anticipating and modelling the cumulative strategic impact of regulatory changes on channel investment, rather than responding reactively to each policy shift.
5. Bank management should reassess ATM deployment and channel-mix strategy to account for the erosion of strategic relevance under current regulatory conditions. For instance, by targeting ATM investment toward locations or customer segments (e.g., areas with lower digital/POS penetration) where ATMs retain comparative strategic value, while reallocating capital elsewhere as substitution accelerates. This allows banks to preserve ATM infrastructure where it remains commercially justified rather than sustaining uniform investment across all locations.
6. The Nigeria Inter-Bank Settlement System should establish structured, ongoing engagement channels with the Central Bank of Nigeria to represent

operator cost concerns during policy formulation, given that regulatory uncertainty was found to be the strongest determinant reducing strategic relevance. Proactive industry engagement, rather than post-hoc compliance, may help mitigate this effect at the practice level.

### **6.2.3 Research Recommendations**

7. Future studies should extend this model longitudinally, tracking ATM strategic relevance and its regulatory determinants over multiple policy cycles, to establish whether the effects identified here (particularly the withdrawal-limit and fee-regulation effects) are stable, cumulative, or moderated by the pace and sequencing of regulatory change over time.
8. Future research should examine the potential moderating or mediating roles of contextual factors such as bank size or category, geographic location (urban versus rural), and the level of digital payment and POS infrastructure penetration in the relationship between ATM Withdrawal Limit (AWLT), ATM Fee Regulation (AFRT), Regulatory Uncertainty (RUCT), and the strategic relevance of ATMs. Investigating these factors would provide a more nuanced understanding of how regulatory determinants influence ATM strategic relevance across different banking and regional contexts, as the aggregate findings reported in this study may obscure important variations among these subgroups. Such analyses would enhance the explanatory power of future models and offer more targeted policy and managerial insights for strengthening ATM service delivery in Nigeria.
9. Future studies should complement this study's quantitative, bank-level survey design with qualitative or mixed-

methods approaches, such as interviews with bank ATM strategy decision-makers, to explore the mechanisms through which regulatory uncertainty specifically (given its identification here as the strongest determinant) translates into reduced strategic commitment, which survey-based regression cannot fully capture.

The findings suggest that improving the strategic relevance of ATM enterprise in Nigeria requires a balanced regulatory framework that simultaneously supports financial innovation, investment sustainability, and policy predictability. Regulatory reforms should therefore seek to preserve consumer protection while creating an enabling environment for long-term investment in ATM infrastructure and the continued resilience of Nigeria's electronic payment ecosystem.

### **5.3 Theoretical Contributions**

This study makes three theoretical contributions. First, it extends Institutional Theory beyond its conventional emphasis on organisational conformity and legitimacy by applying it to the strategic relevance of ATM enterprises. Specifically, the study demonstrates that coercive pressures arising from withdrawal limits, fee regulation, and regulatory uncertainty do not merely compel banks to comply with formal rules; they also influence infrastructure investment decisions, deployment priorities, and the continued strategic positioning of ATMs. the study extends Institutional Theory by showing that institutional pressures affect not only organisational conformity but also long-term infrastructure investment, resource allocation, and strategic repositioning. This broadens the explanatory scope of the theory from why organisations comply to how regulatory environments influence the strategic relevance and sustainability of organisational infrastructure over time. Second, it integrates TAM with

Institutional Theory to provide complementary macro-institutional and micro-behavioural explanations of how withdrawal-limit and cashless-channel promotion progressively reduce the perceived usefulness of ATMs relative to digital alternatives. Finally, by providing enterprise-level evidence on the regulatory determinants of ATM strategic relevance in Nigeria, the study contributes to the infrastructure sustainability literature, which has largely focused on customer adoption behaviour or macroeconomic outcomes. The findings introduce ATM strategic relevance as an organisational-level outcome through which regulatory policies influence the sustainability of banking infrastructure, thereby providing a new perspective for understanding how regulation shapes financial service delivery in emerging economies.

#### **5.4 Practical and Policy Implications**

For the CBN, the finding that regulatory uncertainty is the most potent determinant of ATM strategic relevance supports priority investment in regulatory process reform: establishing advance-notice protocols for ATM guideline and withdrawal-limit changes, creating formal industry consultation mechanisms, and providing adequate operational transition periods before new requirements take effect. Regarding ATM fee regulation, the findings support a differentiated fee framework that permits cost-reflective charges across deployment environments, particularly in rural, highway, and high-cost locations without compromising consumer protection objectives in urban areas. Regarding ATM withdrawal limit, the findings suggest complementary measures that support ATM operators in repositioning their networks as hybrid financial service touchpoints, extending ATM functionality beyond cash dispensing to include cardless withdrawals, bill payments, and digital onboarding services that align ATM value

propositions with the evolving cashless payment landscape.

For banks and ATM operators, the findings indicate that strategic regulatory engagement including active participation in CBN consultations and industry advocacy on fee frameworks and withdrawal-limit design should be elevated as a core strategic management priority. Proactive ATM functionality diversification, combined with intelligent site rationalisation informed by total cost of ownership analysis, represents the most evidence-grounded pathway to sustaining ATM strategic relevance under current and anticipated regulatory conditions.

#### **5.5 Limitations and Directions for Future Research**

This study has three principal limitations. First, the cross-sectional survey design captures regulatory perceptions at a single point in time, limiting causal inference and precluding analysis of how regulatory effects evolve over ATM investment cycles. Future studies should adopt longitudinal panel designs using objective ATM performance data including actual transaction volumes, revenue, and cost recovery rates to validate and extend the perceptual evidence provided here. Second, the study examined only the regulatory dimension of macro-environmental determinants, deliberately excluding economic variables and other factors. Future research should adopt an integrated multivariate framework that simultaneously examines regulatory and other macro-environmental determinants such as economic, social and technology factors to establish their relative magnitudes and potential interaction effects on ATM strategic relevance. Third, the study's focus on DMB employees excludes ATM deployers or vendors and supply-side ecosystem participants, whose strategic perspectives would provide a more complete picture of regulatory effects across the ATM value chain.

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