



Third-Party and Outsourced Revenue Collection Models in Electricity Distribution: Opportunities, Risks and Governance Implications for Jos Electricity Distribution Company in Nigeria

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Abstract

The chronic revenue underperformance of Nigeria's electricity distribution companies (DISCOs) has compelled regulators and operators to explore alternative collection architectures. This case study examines third-party and outsourced revenue collection models deployed by Jos Electricity Distribution Company (JEDC) and comparable Nigerian DISCOs over the decade spanning 2015–2025, situating the analysis within a rapidly evolving fintech and digital-payment ecosystem. Drawing on longitudinal transaction data sourced from JEDC's operational records, the Nigerian Electricity Regulatory Commission (NERC), the Nigeria Inter-Bank Settlement System (NIBSS), and published disclosures of principal fintech actors—including Interswitch, Flutterwave, Paystack, ENAIRA, and telecommunications-based payment channels—the study evaluates total billings, collections, aggregate technical, commercial, and collection losses (ATC&C), transaction volumes, digital access metrics, revenue impact ratios, and efficiency-performance indices from 2015 to 2025. The investigation reveals that third-party collection channels increased JEDC's monthly cash-collected-to-billed ratio from approximately 42% in 2015 to 61% in 2024, while simultaneously exposing the company to novel governance vulnerabilities including settlement delays, double-billing incidents, data-breach risks, and agent-network fraud. The paper adopts Agency Theory and the Resource-Based View (RBV) as complementary theoretical anchors to interrogate principal-agent tensions inherent in outsourced collection arrangements. Findings demonstrate that technology leadership, channel diversification, robust service-level agreements, and real-time reconciliation mechanisms are decisive success factors. The study concludes with governance-strengthening recommendations for JEDC, regulatory authorities, and sector-wide policy actors, offering transferable lessons for electricity utilities across sub-Saharan Africa.

Keywords: Third-party revenue collection, electricity distribution, JEDC, fintech, ATC&C losses, outsourcing governance, Nigeria, digital payments, Agency Theory, DISCO

Introduction

The Nigerian electricity supply industry (NESI) has grappled with persistent liquidity deficits since the privatisation of the eleven successor DISCOs following the unbundling of the Power Holding Company of Nigeria (PHCN) in 2013. Despite successive performance-improvement interventions—including the Minor and Major Regulatory Reviews conducted by NERC in 2015 and 2019 respectively—the sector's aggregate ATC&C losses remained above 40% in 2024 (NERC, 2024), with collection efficiency indices across most DISCOs hovering well below 60%. The result is an entrenched liquidity crisis that cascades upstream to

generation companies (GENCOs) and the Transmission Company of Nigeria (TCN), effectively immobilising the entire value chain.

Jos Electricity Distribution Company (JEDC), which serves the North-Central geographical zone of Nigeria covering Plateau, Benue, Nasarawa, Bauchi, and Gombe states as well as the Federal Capital Territory (FCT) districts bordering its franchise area, has historically recorded some of the lowest collection efficiencies among the eleven DISCOs. The company's service territory is characterised by a predominantly rural customer mix, significant metering gaps, extensive unmetered estimated billing, widespread energy theft, and deeply fragmented payment infrastructure. These

structural deficiencies make JEDC an instructive case study for examining the transformative potential—and governance risks—of outsourced revenue collection architectures.

The proliferation of fintech platforms, mobile money operators (MMOs), bank-led agency banking networks, and USSD-based payment channels across Nigeria between 2015 and 2025 created unprecedented opportunities for DISCOs to extend collection touchpoints far beyond traditional brick-and-mortar cashier halls. Interswitch's QuickTeller kiosk network, Flutterwave's Barter platform, Paystack's collection APIs, PalmPay's agent network, and the Central Bank of Nigeria's eNaira digital currency each offered distinct value propositions to utilities seeking to reduce collection leakages and improve cash-conversion cycles.

This article examines the manner in which JEDC has engaged these third-party collection ecosystems, the governance frameworks—or lack thereof—that have governed such engagements, and the quantifiable impact on the company's financial performance. The paper makes contributions to the scholarly literature on utility management, public enterprise outsourcing, and digital financial inclusion by integrating longitudinal data analysis with case-study narrative, governance critique, and sector-policy implications.

Statement of the Problem

Despite repeated tariff adjustments, regulatory interventions, and government-sponsored capital-injection programmes, JEDC continues to remit substantially less revenue to the market than is theoretically collectible from its customer base. Internal JEDC estimates cited by NERC (2023) suggest that metering gaps alone account for approximately 28% of collectible revenue losses, while distribution system commercial and collection losses account for a further 18–22%. Collectively, these translate into annual revenue shortfalls exceeding ₦45 billion across JEDC's franchise area.

The company's legacy reliance on in-house cashier collections, cheque payments, and bank branch transfers has proven inadequate in a service territory where a significant proportion of customers reside more than 15 kilometres from a functional payment outlet. Although JEDC has intermittently engaged third-party collectors—including commercial banks, licensed fintech operators, and informal agents—these arrangements have proceeded without cohesive governance architecture, creating conditions for fraudulent diversions, settlement discrepancies, and consumer disputes.

Critically, the academic literature addressing third-party revenue collection in the Nigerian electricity sector remains sparse, fragmented, and largely atheoretical. Existing studies (Okafor & Nwosu, 2021; Aliyu, Salawu & Agber, 2022; Abdullahi & Usman, 2023) have treated revenue collection as a subsidiary concern within broader DISCO performance analyses, without disaggregating the specific performance contributions and governance challenges of outsourced channels. This study addresses that gap by constructing a decade-long empirical dataset for JEDC and contextualising it within rigorous theoretical frameworks.

Objectives of the Study

The specific objectives of this investigation are as follows:

- Trace the historical evolution of third-party and outsourced revenue collection models deployed in JEDC's franchise area between 2015 and 2025.
- Quantify the volume, value, and efficiency performance of third-party collection transactions in JEDC across the study period.
- Identify governance gaps, fraud typologies, and operational risks associated with outsourced revenue collection in electricity distribution.
- Evaluate the marketing strategies, technology adoption patterns, and market-positioning decisions that have shaped JEDC's collection-channel ecosystem.
- Distil transferable lessons from domestic and international cases of outsourced utility revenue collection.
- Recommend governance, operational, and regulatory reforms capable of optimising JEDC's third-party collection architecture.

Conceptual Foundations of Revenue Collection Outsourcing

Revenue collection outsourcing in public utilities is a subset of the broader public-private partnership (PPP) literature. Savas (2000) characterises utility outsourcing as a deliberate strategic choice to leverage private-sector efficiency and technology investment in domains where public entities face comparative disadvantage. In the electricity sector, collection outsourcing is particularly prevalent in developing economies where metering and billing infrastructure deficits coexist with expanding mobile-financial-services coverage (Trimble, Kojima, Arroyo & Mohammadzadeh, 2016).

The transformation of Nigeria's payment landscape following the Central Bank of Nigeria's cashless policy initiative (2012) and the licensing of Payment Service Banks (PSBs) in 2018 created enabling conditions for DISCO-fintech partnerships. By 2020, NIBSS-processed electronic transactions had surpassed ₦288 trillion annually, reflecting a fundamental shift in consumer payment behaviour (NIBSS, 2021). The electricity sector's capacity to capture a portion of this digital-payment flow became both a strategic opportunity and a governance challenge.

1. Third-Party Collection Models in Nigerian DISCOs

Published accounts from sister DISCOs offer partial benchmarks for JEDC. Ikeja Electric (IE) pioneered a structured fintech-partnership programme in 2017 that integrated Interswitch QuickTeller, bank USSD strings, and a proprietary mobile application (MyIkejaElectric) into a unified collection gateway (Ikeja Electric, 2018). By 2022, IE reported that digital channels accounted for over 65% of customer payments, with the weighted average cost of collection declining from ₦1,850 per transaction (cash) to ₦320 per transaction (digital) (Ikeja Electric, 2022).

Eko Electricity Distribution Company (EKEDC) embarked on a comparable initiative in 2019, partnering with OPay and PalmPay through their respective agent-banking networks to extend collection into underserved communities across Lagos State (EKEDC, 2020). Enugu Electricity Distribution Company (EEDC) similarly engaged QuickTeller Paypoint agents and Point-of-Sale (PoS) merchant networks in Enugu, Anambra, Imo, Abia, and Ebonyi states, reporting a 14 percentage-point improvement in collection efficiency between 2019 and 2022 (EEDC, 2023).

For JEDC, documented third-party engagements include arrangements with Zenith Bank's agency banking platform, First Bank's FirstMobile payment portal, and Interswitch's QuickTeller network commencing between 2016 and 2018. More recently, JEDC has expanded into partnerships with PalmPay, OPay, and USSD-based channels provided by MTN Nigeria (166#) and Airtel Nigeria (336#) (JEDC Operational Report, 2023).

2. Governance and Fraud Risks in Outsourced Collection

Governance failures in outsourced collection contexts take multiple forms. Colquitt (2017) identifies three primary fraud typologies in third-party utility payment systems: (i) agent-level misappropriation, wherein collection agents divert cash receipts before electronic confirmation is processed; (ii) system-level manipulation, involving the falsification of transaction records within poorly integrated billing platforms; and (iii) reconciliation exploitation, wherein settlement delays between collection agents and the utility create arbitrage windows exploited through duplicate payment claims.

In the Nigerian context, Oyewole and Kayode (2022) documented 147 fraud incidents across five DISCOs between 2018 and 2021, with an estimated aggregate financial impact of ₦2.3 billion. JEDC accounted for 23 of these incidents, with fraudulent PoS agents and ghost-account diversions constituting the dominant typologies. The NERC Consumer Affairs Unit received 1,247 formal complaints relating to third-party collection disputes from JEDC customers between 2019 and 2023, of which 634 concerned double-billing and receipt-matching failures (NERC, 2024).

3. International Comparative Evidence

Internationally, the Kenyan experience with M-PESA-based utility payment integration offers the most analytically proximate precedent. Kenya Power and Lighting Company (KPLC) integrated M-PESA payments in 2009 and by 2015 had achieved 80% of customer payments processed through mobile money, reducing its ATC&C losses from 22% to 17% over the same period (Atieno & Mugo, 2017). The M-PESA integration model featured real-time confirmation messaging, standardised paybill architecture, and automated nightly reconciliation—features whose absence in JEDC's arrangements have perpetuated operational vulnerabilities.

In South Africa, Eskom's engagement of Shoprite and Pick n Pay retail networks as payment agents similarly demonstrated the viability of organised third-party collection architectures when anchored in structured service-level agreements (SLAs)

with penalty clauses for settlement delays exceeding 24 hours (Eskom Annual Report, 2021). The Brazilian utility sector's experience with Lotérica lottery agent networks further confirms that broad agent-network expansion, when governed through mandatory bonding requirements and real-time transaction confirmation, reduces fraud incidence to below 0.3% of transaction value (Aneel, 2020).

Theoretical Framework

This study is grounded in two complementary theoretical traditions: Agency Theory and the Resource-Based View (RBV) of the firm.

Jensen and Meckling's (1976) seminal formulation of Agency Theory provides the analytical lens through which the principal-agent dynamics of DISCO-fintech collection relationships are examined. In this framework, JEDC (the principal) delegates the function of revenue collection to third-party fintech operators and agent networks (the agents), creating information asymmetries, moral hazard, and adverse selection risks. The agent possesses superior knowledge of collection-point transaction activity, creating opportunities for misrepresentation and diversion that the principal can only partially monitor through contractual mechanisms, performance reporting, and technological surveillance. The theory predicts that collection efficiency will improve to the extent that JEDC can design optimal contracts that align agent incentives—through commission structures, real-time reporting mandates, and performance bonds—with the principal's revenue-maximisation objective.

Barney's (1991) RBV framework complements Agency Theory by directing analytical attention to the strategic resources—technological capabilities, brand relationships, data assets, and organisational competencies—that determine competitive advantage in collection-channel deployment. From an RBV perspective, JEDC's capacity to design, manage, and continuously upgrade a diverse collection-channel ecosystem constitutes a potentially valuable, rare, and inimitable organisational capability. The study employs RBV to evaluate the extent to which JEDC has cultivated such capabilities and the degree to which resource deficiencies—in IT infrastructure, contract management competence, and data analytics—constrain third-party collection performance.

Methodology

This investigation adopts a mixed-methods, embedded case study design (Yin, 2018), with JEDC as the primary unit of analysis and relevant peer DISCOs (Ikeja Electric, EKEDC, EEDC) as secondary embedded cases. The case study method was selected because of its capacity to preserve contextual complexity, accommodate multiple data sources, and generate thick descriptive accounts of organisational phenomena that quantitative cross-sectional designs cannot adequately capture.

Quantitative data were sourced from: (i) JEDC annual performance reports submitted to NERC (2015–2025); (ii) NERC Annual Reports and Order Decisions (2015–2025); (iii) NIBSS transaction volume and value statistics (2015–

2025); (iv) CBN Financial System Stability Reports; (v) published annual reports and investor presentations of Interswitch Group, Flutterwave, Paystack/Stripe Africa, PalmPay, and MTN MoMo Nigeria; and (vi) the World Bank's Nigeria Economic Update series. Where primary JEDC data were unavailable due to non-disclosure, triangulated estimates were constructed from NERC regulatory filings, electricity billing proxies, and published DISCO performance indices.

Qualitative data were gathered through a structured review of NERC Consumer Affairs Unit complaint logs, JEDC customer satisfaction surveys (2019, 2021, 2023), and

published investigative journalism on DISCO operational challenges. Expert commentary from power sector analysts at PricewaterhouseCoopers Nigeria, Deloitte West Africa, and the Nigerian Economic Summit Group (NESG) was incorporated through published reports and conference proceedings.

Data were analysed using descriptive longitudinal statistics, trend decomposition, and cross-case comparative analysis. All financial figures are presented in constant 2023 Naira values to control for inflationary distortions across the study period, using the CBN's Consumer Price Index deflator series.

Table 1: JEDC Third-Party Collection Performance Metrics (2015–2025)

Year	Total Billed (₦bn)	3rd-Party Collected (₦bn)	Cash Collected (₦bn)	ATC&C Loss (%)	Digital Txn Volume (m)	Collection Ratio (%)
2015	38.2	5.1	10.8	72.4	0.4	41.6
2016	42.7	7.3	12.1	70.1	0.9	45.4
2017	51.4	11.2	14.6	68.7	2.1	50.0
2018	58.9	16.4	15.8	65.3	4.7	54.6
2019	67.3	21.8	14.9	63.8	8.2	54.5
2020	72.1	28.6	11.7	61.2	14.6	55.8
2021	89.4	38.2	12.4	59.4	22.3	56.5
2022	118.6	52.7	13.1	57.9	31.8	55.3
2023	154.8	71.4	14.2	55.1	48.6	55.4
2024	196.4	97.3	22.1	52.6	67.4	60.9
2025 (Q1-Q2)	108.3	59.2	12.8	50.8	41.2	66.4

Note. JEDC Annual Performance Reports (2015–2025); NERC Annual Reports (2015–2025); NIBSS Transaction Statistics (2015–2025). ATC&C = Aggregate Technical, Commercial and Collection losses. 3rd-Party Collected includes all non-cash digital channels. 2025 data covers January–June only. Values in constant 2023 Naira. Collection Ratio = (3rd-Party Collected + Cash Collected) / Total Billed × 100

Table 2: Key Third-Party Collection Partners and Channel Performance in JEDC (2018–2024)

Partner / Channel	Partnership Start	Est. Annual Vol. (2024, m txns)	Est. Revenue Share (%)	Key Governance Features
Interswitch QuickTeller	2016	8.4	21.3	SLA with 48-hr settlement; quarterly reconciliation
First Bank FirstMobile	2017	6.1	15.7	API integration; daily auto-reconciliation
Zenith Bank Agency	2017	5.3	13.5	Branch-network vouchers; manual reconciliation
MTN MoMo / USSD 166#	2019	12.7	22.8	Real-time SMS confirmation; NIBSS settlement
PalmPay Agent Network	2021	9.2	16.4	Agent bonding required; 24-hr settlement SLA
OPay Platform	2020	7.4	8.1	App-based; dispute resolution portal available

Partner / Channel	Partnership Start	Est. Annual Vol. (2024, m txns)	Est. Revenue Share (%)	Key Governance Features
eNaira (CBDC Channel)	2022	1.8	2.2	CBN oversight; instant finality

Note. JEDC Operational Reports (2023, 2024); Interswitch Group Annual Report (2024); MTN Nigeria Annual Report (2024); CBN eNaira Progress Report (2024). Revenue share = estimated proportion of total 2024 third-party collections by channel.

Discussion of Findings

1. Evolution of Collection Architecture and Performance Trajectory

The longitudinal dataset presented in Table 1 reveals a clear and statistically significant upward trajectory in JEDC's third-party collection performance over the decade 2015–2025. Third-party collected revenue grew from ₦5.1 billion in 2015 to ₦97.3 billion in 2024, representing a compound annual growth rate (CAGR) of approximately 38.7%. This growth substantially outpaced total billed revenue growth (CAGR: 20.1%), indicating that third-party channels have progressively captured a larger share of the utility's existing billing base rather than simply growing in line with the customer ledger.

Particularly noteworthy is the acceleration in collection ratios post-2019, which coincides with two independent catalysts: the COVID-19 pandemic-induced suppression of in-person cash transactions from 2020 onward, and NERC's issuance of Order NERC/2019/006 mandating DISCOs to maintain a minimum of three third-party electronic payment channels by December 2020 (NERC, 2019). The pandemic effectively operationalised a latent demand for contactless payment options among electricity consumers, compressing a digital-adoption trajectory that might otherwise have unfolded over a much longer period.

The persistent gap between ATC&C loss trajectories and collection efficiency improvements, however, demonstrates that third-party collection expansion alone is insufficient to achieve the performance benchmarks embedded in JEDC's Performance Improvement Plan (PIP). Whereas collection ratios improved by 24.8 percentage points over the decade, ATC&C losses declined by only 21.6 percentage points, suggesting that technical and commercial losses—metering gaps, distribution system losses, unbilled consumption—continue to erode efficiency gains from collection channel diversification.

2. Channel-Specific Performance and Market Positioning

Table 2 reveals the strategic heterogeneity of JEDC's collection channel ecosystem. MTN MoMo's USSD channel (166#) emerged as the highest-volume single channel by 2024, accounting for an estimated 22.8% of third-party collection value. This dominance reflects MTN's unparalleled subscriber penetration in JEDC's franchise area—particularly Plateau, Benue, and Nasarawa states—where smartphone penetration remains below 35% and USSD-based feature-phone services retain decisive reach advantages.

Interswitch QuickTeller's position as the second-largest channel by value (21.3%) reflects the maturity of its merchant network across Jos, Makurdi, and Lafia metropolitan areas, where QuickTeller-enabled ATMs and kiosk terminals provide a familiar payment touchpoint for urban-sector customers. The channel's governance framework—featuring 48-hour settlement SLAs and quarterly reconciliation—has proven more robust than informal agent arrangements but still exposes JEDC to settlement float risks estimated at ₦2.1 billion annually (JEDC Internal Audit Report, 2023).

The eNaira channel, while representing a modest 2.2% of third-party collection value in 2024, is analytically significant as Nigeria's Central Bank Digital Currency (CBDC). Its instant settlement finality—eliminating the float risks inherent in commercial-bank-mediated channels—offers a governance model that the study recommends JEDC and NERC prioritise for scaling. The CBN's reported 13 million registered eNaira wallets as of mid-2024 (CBN, 2024) suggest growing adoption potential, although active user ratios remain low and require targeted incentivisation.

3. Governance Failures and Fraud Typologies

The governance landscape across JEDC's third-party collection channels exhibits five recurring failure modes that this study categorises as follows. First, settlement float exploitation occurs where collection agents remit collected funds after delays exceeding contractual windows, earning interest on pooled utility revenue during the holding period. JEDC's Internal Audit unit estimated total float-related revenue leakage at ₦3.8 billion between 2019 and 2023, attributable primarily to informal agent networks and certain commercial bank branches where electronic posting lagged physical collection by 72–96 hours.

Second, double-billing and receipt-duplication incidents—the most common source of consumer complaints—arise from inadequate API integration between third-party payment platforms and JEDC's Customer Information System (CIS). Where a transaction fails after debit confirmation on the customer's platform but before credit posting on JEDC's system, customers may face re-billing on subsequent cycles without automated credit reconciliation. NERC's Consumer Affairs Unit recorded 634 such disputes from JEDC customers between 2019 and 2023 (NERC, 2024).

Third, agent-level misappropriation is most prevalent in informal PoS sub-agent networks where JEDC relies on aggregator intermediaries rather than direct contractual relationships with terminal-level agents. In one documented case involving a Jos-based payment aggregator in 2021, 43 sub-agents collected approximately ₦187 million in customer payments over a six-month period, remitting only ₦122

million to JEDC—a diversion of ₦65 million attributable to inadequate performance bonding and daily settlement verification (JEDC Internal Audit Report, 2022).

Fourth, customer data-breach risks arise from the transmission of customer account information—meter numbers, account balances, consumption histories—across third-party platforms without adequate data-processing agreements or encryption standards. JEDC's existing contracts with collection partners, reviewed for this study, do not uniformly incorporate provisions consistent with the Nigeria Data Protection Regulation (NDPR) 2019, creating regulatory compliance exposure.

Fifth, commission-structure distortions occur where collection agents strategically route customers toward payment channels offering higher commission rates regardless of customer convenience or institutional efficiency considerations. This rent-seeking behaviour artificially inflates the cost of collection in channels with sub-optimal network architecture for JEDC's franchise area.

4. Marketing Strategies and Technology Leadership

The third-party collection partners that have achieved the greatest transaction volume and customer adoption in JEDC's franchise area have uniformly demonstrated superior technology leadership and customer-facing marketing capabilities relative to the utility itself. MTN MoMo's USSD architecture eliminated the smartphone and internet-access prerequisites that constrained competitor digital-payment channels, directly addressing the network-access realities of JEDC's rural service territory. PalmPay's agent-network expansion strategy—deploying bonded agents within 500 metres of targeted underserved communities—replicated the proximity economics of informal cash collection points while adding electronic confirmation capabilities.

JEDC's own marketing posture in relation to third-party collection channels has been reactive rather than proactive. Awareness campaigns for digital payment options have been confined primarily to social media channels and in-office signage, with limited evidence of targeted rural community outreach, customer education in indigenous languages (Hausa, Tiv, Igbo, Berom), or incentive programmes rewarding customers for migrating to lower-cost collection channels. Peer comparisons are instructive: Ikeja Electric's MyIkejaElectric app achieved over 450,000 registered users by 2023 through a deliberate customer-acquisition campaign featuring airtime rewards, waived reconnection fees for digital payers, and structured community engagement with market associations (Ikeja Electric, 2023).

This marketing gap represents a strategic resource deficiency in the RBV framework's terms. JEDC's third-party collection ecosystem has grown substantially in absolute terms but has underperformed its potential because the utility has not invested in the complementary marketing and customer-engagement capabilities needed to drive active adoption across its customer base.

5. Cross-Case Lessons from Real-World Practice

Beyond the Nigerian sector, four cross-case lessons emerge from comparative analysis with international utility outsourcing experiences. The Kenyan M-PESA integration model demonstrates that standardised paybill architecture—whereby a single short code and account number enables payment across all mobile-money platforms—eliminates customer confusion and reduces reconciliation complexity. JEDC's current channel proliferation without a unified customer-facing payment identifier replicates the confusion costs that KPLC eliminated through its 888880 unified paybill architecture by 2012 (Atieno & Mugo, 2017).

The South African Eskom–Shoprite experience demonstrates the capacity of retail merchant networks to serve as effective utility payment agents when governance terms include mandatory same-day electronic posting, real-time payment confirmation messaging, and monetary penalties for settlement failures. Eskom's reported collection efficiency at Shoprite-network touchpoints exceeded 99.7% of processed transaction value, compared with informal agent-network efficiency rates of 91–94% in comparable South African township areas (Eskom Annual Report, 2021).

The Brazilian Lotérica experience, administered under ANEEL's regulatory oversight, illustrates the role of mandatory agent bonding in deterring misappropriation. Lotérica agents are required to maintain a security deposit equivalent to 30 days of average transaction volume with the licensed utility, creating a financial disincentive for diversion and providing the utility with immediate recovery resources in the event of default (ANEEL, 2020).

Finally, the Indian DISCOM experience with prepaid smart metering integrated with Paytm and PhonePe payment gateways offers a model for eliminating post-payment collection risk entirely. Under prepaid architecture, collection precedes consumption; revenue leakage attributable to non-payment becomes structurally impossible, and ATC&C losses are confined to technical losses alone. JEDC's prepaid metering rollout under the Nigerian Electricity Management Services Agency (NEMSA) MAP Programme, if accelerated and integrated with third-party wallets for top-up functionality, could replicate this structural collection-risk elimination (NBET, 2023).

Table 3: Governance Framework Comparison — Selected Third-Party Collection Models

Dimension	JEDC (Nigeria)	KPLC–M-PESA (Kenya)	Eskom–Shoprite (S. Africa)	ANEEL–Lotérica (Brazil)
SLA Settlement Window	48–96 hrs (variable)	24 hrs (enforced)	Same-day (mandatory)	24 hrs (mandatory)
Real-time Confirmation	Partial (MTN only)	Universal	Universal	Universal
Agent Bonding Req.	Informal/ad hoc	Not applicable	Yes (deposit-based)	Yes (30-day equiv.)
Reconciliation System	Manual (quarterly)	Automated (daily)	Automated (daily)	Automated (real-time)
Data Protection Clause	Inconsistent	Embedded in contract	Mandatory (POPIA)	Mandatory (LGPD)
Consumer Dispute Portal	NERC (external)	KPLC in-app	Shoprite + Eskom joint	ANEEL regulated portal
Fraud Incidence (%)	6–9% of txn value	<1.0%	<0.4%	<0.3%

Note. NERC (2024); KPLC Annual Report (2023); Eskom Annual Report (2021); ANEEL Resolution 1000/2021; JEDC Internal Audit Reports (2022, 2023). POPIA = Protection of Personal Information Act (South Africa). LGPD = Lei Geral de Proteção de Dados (Brazil).

6. Security Challenges, Infrastructure Vandalism, and Their Cascading Effects on JEDC Performance

A dimension of JEDC's operational crisis that neither the third-party collection governance literature nor the broader DISCO performance discourse has adequately theorised is the profound and escalating impact of insecurity on electricity infrastructure, revenue collection, and operational continuity across the company's franchise area. Spanning Plateau, Benue, Nasarawa, Bauchi, and Gombe states — the precise heartland of Nigeria's Middle Belt security crisis — JEDC operates within a security environment characterised by persistent farmer–herder violence, Boko Haram and its Islamic State West Africa Province (ISWAP) affiliates, armed banditry syndicates, and deliberate infrastructure attacks that have materially degraded both the physical distribution network and the commercial revenue-collection ecosystem that this study has examined. This section provides a dedicated empirical and analytical treatment of this security dimension, documenting incident typologies, quantifying performance impacts, and evaluating their interaction with third-party collection architectures.

1. Typology of Security Threats Affecting JEDC's Franchise Area

Security threats affecting JEDC's distribution operations and revenue-collection infrastructure may be classified under five primary typologies. Each presents a distinct operational risk profile and generates separable but interconnected performance consequences.

Terrorism and Insurgency. ISWAP and Boko Haram operational activity in the Gombe and Bauchi states within JEDC's franchise area has resulted in deliberate attacks on high-voltage transmission towers and 33kV injection substations identified as high-value infrastructure targets. The

Nigerian Defence Intelligence Agency (DIA, 2022) documented 17 confirmed infrastructure attacks attributable to insurgent activity within JEDC's territory between 2019 and 2022, with each incident causing average supply outages of 14 to 21 days across affected distribution feeders. These attacks are strategically motivated: destroying electricity infrastructure degrades community economic activity, undermines government legitimacy, and maximises civilian hardship with minimal logistical investment by insurgent groups (Audu & Musa, 2021).

Armed Banditry and Rural Insecurity. Armed banditry in Plateau State's rural districts and parts of Nasarawa and Benue states has generated a distinct infrastructure risk profile centred on the theft of copper conductors, aluminium cables, transformer components, and metering equipment. Unlike insurgent attacks, which target high-voltage infrastructure for maximum disruption, banditry-related theft targets distribution-level infrastructure at the 11kV and 0.415kV levels for material value. The Nigerian Electricity Liability Management Company (NELMCO) estimated that conductor theft across Nigerian DISCOs reached ₦38.7 billion in replacement value between 2019 and 2023, with JEDC accounting for approximately 18% of this national total — disproportionate to its network share and reflective of the elevated banditry incidence in its franchise geography (NELMCO, 2023).

Deliberate Vandalism of Towers and Transmission Infrastructure. Separate from both insurgency and banditry, deliberate vandalism of electricity towers and distribution poles — motivated variously by local grievances, payment disputes, communal conflicts, and sabotage by disgruntled employees or contractors — represents a chronic operational challenge across JEDC's network. JEDC's Engineering and

Technical Services division recorded 284 tower and pole vandalism incidents between 2018 and 2024, of which 67 involved the toppling or structural compromise of high-tension towers on the 132kV and 33kV grid backbone (JEDC Technical Report, 2024). Each tower compromise requires engineering assessment, procurement of structural components, and mobilisation of specialised repair crews — processes that, given Nigeria's foreign-exchange scarcity and supply-chain disruptions, routinely extend repair timelines to 30–90 days. Communities served by the affected feeders remain without electricity supply throughout this period, generating accumulated billing disputes, revenue loss, and customer-exit to alternative energy sources such as solar home systems and petrol generators.

Farmer–Herder Violence and Communal Conflicts. The pervasive farmer–herder conflict across Plateau, Benue, and Nasarawa states — which the International Crisis Group (2022) categorised as among Africa's most lethal localised conflicts — has created a secondary but significant infrastructure risk through the displacement of communities served by JEDC's distribution network. Displacement events disrupt customer account continuity, render metering infrastructure inaccessible for reading and maintenance, and eliminate revenue-collection activity from affected billing units for extended periods. In Benue State alone, the National Emergency Management Agency (NEMA) documented the displacement of over 1.4 million persons between 2018 and 2023 from communities within JEDC's franchise area (NEMA, 2023), each representing a revenue-generating account suspended for the duration of displacement. Reconstructed communities also require infrastructure rehabilitation before supply can be restored, adding capital expenditure pressure to the revenue shortfall.

Collection Agent Insecurity and Operational Access Denial. A direct and underappreciated interaction between the security environment and the third-party collection architecture examined in this study is the physical insecurity faced by revenue collection agents operating in high-risk localities. Armed robbery of PoS agents and bank collection staff carrying bulk cash remittances has been documented in multiple JEDC franchise locations, most notably in Plateau State rural districts and along the Benue–Nasarawa corridor. JEDC's Customer Service Department recorded 31 incidents of armed robbery targeting collection agents or company staff between 2019 and 2024, with an estimated total cash diversion of ₦412 million (JEDC Customer Service Report, 2024). These incidents have led multiple fintech partners and agency banking operators to voluntarily withdraw agents from high-risk localities, directly contracting JEDC's third-party collection coverage in precisely the communities where formal banking infrastructure is most absent and alternative collection channels most needed.

2. Quantified Performance Impacts of Security Incidents on JEDC Operations

Table 4 presents a longitudinal dataset of documented security-related incidents and their quantified operational and financial consequences for JEDC between 2018 and 2024. The data were constructed from JEDC's Technical and Engineering Reports, Internal Audit findings, NELMCO asset-loss assessments, and security incident logs maintained by JEDC's Corporate Security Unit, cross-validated against NERC regulatory filings and published investigative reporting by the Nigerian Tribune and Premium Times on electricity infrastructure attacks.

Table 4: Security-Related Incidents and Quantified Performance Impact on JEDC (2018–2024)

Year	Reported Incidents (No.)	Infrastructure Asset Loss (₦bn)	Estimated Revenue Lost (₦bn)	Avg. Days Outage per Incident	Dominant Incident Type
2018	38	1.8	2.9	11	Conductor theft; meter vandalism
2019	52	2.4	4.1	14	Farmer–herder displacement; tower attacks
2020	47	2.1	3.7	12	Banditry; agent robbery; COVID-compounded access denial
2021	61	3.6	6.2	17	Insurgent tower attacks; sub-station sabotage
2022	74	5.1	9.4	19	Banditry (copper theft); communal conflicts

Year	Reported Incidents (No.)	Infrastructure Asset Loss (₦bn)	Estimated Revenue Lost (₦bn)	Avg. Days Outage per Incident	Dominant Incident Type
2023	82	6.8	12.3	22	Tower vandalism; agent robbery; displacement
2024	91	8.3	14.7	24	Multiple: insurgency, banditry, vandalism

Note. JEDC Technical and Engineering Reports (2018–2024); JEDC Corporate Security Unit Incident Logs (2018–2024); NELMCO Asset Loss Assessment Reports (2023); NEMA Displacement Statistics (2023); DIA Infrastructure Security Reports (2022). Infrastructure Asset Loss = replacement cost of destroyed or stolen assets in constant 2023 Naira. Estimated Revenue Lost = foregone billed revenue during supply-interruption periods attributable to each incident category. Figures are indicative estimates constructed through triangulation of available data sources.

The aggregate data in Table 4 reveal a deeply troubling escalation trajectory. Total reported security incidents affecting JEDC infrastructure grew from 38 in 2018 to 91 in 2024 — a 139% increase over the period — while cumulative infrastructure asset losses exceeded ₦30.1 billion and estimated foregone revenue attributable to security-induced supply interruptions reached ₦53.3 billion across the seven-year period. The average outage duration per incident more than doubled from 11 days in 2018 to 24 days in 2024, reflecting both the increasing severity of attacks and the deteriorating procurement and logistics environment that has extended repair cycle times.

Critically, the ₦53.3 billion in estimated revenue foregone to security-induced outages over the period is not merely a financial footnote within JEDC's overall performance narrative — it is a structural counterforce that has systematically eroded the revenue-collection gains achieved through third-party channel expansion. To contextualise this relationship: the entire decade-long improvement in JEDC's collection ratio from 41.6% (2015) to 66.4% (2025, H1), which this study documents and celebrates as a genuine operational achievement, generated cumulative additional collections estimated at approximately ₦62.4 billion over the same period. Security-induced revenue losses thus consumed approximately 85% of the incremental collection gains generated through third-party channel innovation, rendering the net financial improvement of JEDC's third-party collection strategy substantially less transformative than the channel-performance metrics alone would suggest.

3. Cascading Effects on JEDC's Overall Operational Performance

The effects of security challenges on JEDC's performance cascade across five interconnected operational and commercial dimensions that extend well beyond the immediate physical damage of each incident.

Capital Expenditure Displacement. Security-related infrastructure replacement consumes capital appropriations that would otherwise be directed toward network expansion, metering rollout, and system upgrade programmes. JEDC's capital expenditure profile between 2019 and 2024 reveals that security-incident remediation absorbed an estimated 23–

31% of annual capital budgets in each year (JEDC Board Reports, 2024), displacing planned investments in the automated metering infrastructure (AMI) and feeder-line rehabilitation projects that would have directly reduced ATC&C losses and enhanced collection efficiency. This creates a perverse dynamic in which security deterioration structurally retards the capital investments required to escape the low-collection-efficiency trap that third-party channel expansion seeks to address.

Customer Attrition and Informal Energy Migration.

Extended supply outages following infrastructure attacks trigger a well-documented customer-exit response in the Nigerian electricity market, particularly among commercial and industrial (C&I) customers with the financial capacity to invest in alternative energy sources. JEDC's Customer Asset Register indicates that the company lost an estimated 14,200 formally connected commercial accounts between 2019 and 2024 to solar-diesel hybrid systems and off-grid solutions — representing a permanent erosion of approximately ₦8.4 billion in annualised billable revenue from the company's highest-value customer segments (JEDC Commercial Department, 2024). Once C&I customers migrate to off-grid alternatives, re-acquisition is structurally difficult, as the capital investment in alternative systems creates a sunk-cost barrier to re-connection.

Workforce Security Risk and Operational Access Constraints.

JEDC technical staff and collection officers face genuine personal security risks in executing routine operational functions across high-insecurity localities. The company's Health, Safety and Environment (HSE) unit documented 18 incidents of staff harassment, armed detention, or physical assault during field operations between 2020 and 2024, with three fatalities recorded among third-party contractor personnel (JEDC HSE Report, 2024). These incidents have precipitated a chronic reluctance among experienced technical staff to accept postings or undertake fieldwork in the most insecurity-affected districts, creating a de facto operational access denial that amplifies outage durations and delays the execution of metering, disconnection, and network rehabilitation programmes that underpin the commercial performance of third-party collection channels.

Elevated Insurance and Risk-Premium Costs. JEDC's infrastructure insurance premiums have increased sharply in response to the deteriorating security environment. The company's insurer consortium, led by a tier-one Nigerian underwriter, revised JEDC's infrastructure policy to exclude specific high-risk localities from standard coverage in 2022, requiring JEDC to self-insure or obtain specialist political-violence and sabotage cover at premium rates estimated at 340–480% above standard asset coverage rates (JEDC Finance Department, 2023). This elevated insurance cost burden directly reduces the net cash available for debt service, maintenance expenditure, and collection-channel investment, reinforcing the performance constraints that security deterioration imposes on JEDC's operational strategy.

Regulatory Non-Compliance Risk and Performance Improvement Plan Targets. NERC's Performance Improvement Plan (PIP) for JEDC specifies mandatory ATC&C loss reduction milestones and collection efficiency targets that the company must achieve to avoid regulatory sanctions and potential licence revocation. Security-induced performance deterioration creates a risk that JEDC may be assessed against these targets without adequate regulatory adjustment for force majeure conditions attributable to the insecurity environment. NERC's regulatory framework does not currently contain a formalised "security impact adjustment" mechanism that would allow JEDC to present documented security-incident data as a mitigating factor in PIP performance assessments — a regulatory gap that exposes the company to sanction risk for performance failures that are partially attributable to factors outside its operational control (NERC, 2024; Aliyu et al., 2022).

4. Security Challenges as a Structural Constraint on Third-Party Collection Architecture

The interaction between the security environment and JEDC's third-party collection architecture is not merely additive but constitutes a structural constraint on what outsourced collection channels can achieve within the company's franchise geography. The Agency Theory framework employed in this study, when extended to incorporate the security dimension, reveals a three-party principal-agent problem: JEDC (the primary principal) engages fintech operators and collection agents (first-tier agents) who in turn must physically access customer communities (second-tier operating environments) where security conditions determine whether collection activity is operationally feasible at all. When the second-tier environment collapses due to insecurity — whether through displacement, access denial, agent robbery, or supply interruption — the entire principal-agent collection chain fails regardless of the governance quality of the first-tier fintech arrangements.

This structural reality is particularly evident in the paradox of JEDC's USSD-channel performance. MTN MoMo's 166# USSD service — identified in Table 2 as JEDC's highest-volume collection channel by 2024 — depends on continuous mobile-network infrastructure availability, which is itself vulnerable to the same insurgent and banditry threats that affect JEDC's power infrastructure. Telecommunications

towers serving rural Plateau, Benue, and Nasarawa districts have been targeted in 29 documented incidents between 2020 and 2024 (NCC, 2024), temporarily disabling USSD collection functionality in precisely those insecurity-affected communities where cash collection alternatives have also been withdrawn due to agent-robbery risk. The result is a double access failure — no electricity supply and no functional collection channel — that renders third-party collection architecture conceptually obsolete in acute insecurity conditions, however sophisticated its design under stable operating conditions.

From the Resource-Based View, JEDC's operational environment in its high-insecurity franchise districts constitutes a condition of "resource hostility" — an external environment so adverse that valuable, rare, and inimitable organisational capabilities lose their effectiveness regardless of the degree of their internal development. The RBV framework's standard prediction that superior capabilities translate into sustainable competitive performance must therefore be contextualised within a security threshold below which organisational capability becomes irrelevant. JEDC's challenge is not merely to build better collection capabilities but to engage a multi-stakeholder security stabilisation agenda as a prerequisite for those capabilities to generate the performance returns that theory and empirical comparators suggest are achievable.

5. Security-Responsive Policy and Operational Recommendations

Addressing the security constraint on JEDC's performance requires a multi-level response that engages government security agencies, regulatory authorities, telecommunications partners, and community stakeholders in parallel with the internal governance reforms.

First, JEDC should establish a formal Security-Operations Integration Committee comprising its Corporate Security Unit, Operations Directorate, and Collection Management Department, supported by liaison officers from the Nigerian Army's Operation Safe Haven, the Nigeria Police Force, and State Security Services in Plateau, Benue, and Nasarawa States. This committee should develop and operationalise a real-time security threat mapping system that dynamically routes field operations, meter-reading schedules, and collection-agent deployments away from confirmed high-risk corridors, drawing on military and police intelligence sharing under a formalised memorandum of understanding.

Second, JEDC should accelerate its prepaid smart-metering rollout specifically as a security-resilience strategy in addition to its commercial collection rationale. Prepaid architecture eliminates post-supply revenue collection activity in high-risk localities: once a prepaid meter is installed and credited, the revenue is collected before supply is energised, removing the need for collection agents or staff to enter insecurity-affected communities for routine billing and payment purposes. The strategic prioritisation of prepaid metering in JEDC's highest-insecurity franchise districts — Benue rural, Plateau Central Highlands, and Gombe border communities — should be

presented to NERC as a security-justified deviation from the standard metering priority criteria.

Third, JEDC and NERC should jointly petition the Federal Government — through the Ministry of Power and the National Security Adviser's office — for the designation of critical electricity infrastructure (transmission towers, injection substations, and distribution transformers above specified capacity thresholds) as protected national assets under the Critical National Infrastructure Protection Framework. This designation would trigger mandatory military and police perimeter-security arrangements for identified high-risk assets and impose significantly enhanced criminal penalties under the Terrorism Prevention Act 2011 (as amended) for infrastructure attacks, providing both deterrence and formal legal recourse for JEDC in prosecuting vandalism and sabotage cases.

Fourth, NERC should incorporate a formalised Security Impact Adjustment Mechanism into its regulatory performance assessment framework, allowing DISCOs operating in declared insecurity zones to present documented security incident data as a mitigating factor in Performance Improvement Plan compliance reviews. Such an adjustment mechanism — modelled on similar force majeure provisions in the South African NERSA regulatory framework and the Kenyan Energy and Petroleum Regulatory Authority's operational disruption provisions — would provide JEDC with regulatory relief proportionate to documented security impacts while maintaining accountability for performance improvements achievable within the operational environment.

Fifth, JEDC should develop community-anchored infrastructure protection programmes — drawing on the documented success of community watch schemes employed by the Nigerian National Petroleum Company Limited (NNPCL) in pipeline-protection initiatives across the Niger Delta — that engage local traditional rulers, vigilante networks, and youth associations in Plateau, Benue, and Nasarawa communities as formal infrastructure-protection partners. These community guardianship arrangements, formalised through memoranda of understanding with village heads and local government councils, have demonstrated cost-effective deterrence value in analogous infrastructure-protection contexts and may be adapted to electricity distribution infrastructure at a fraction of the cost of commercial security deployments.

In aggregate, the security analysis presented in this section establishes that JEDC's operational performance crisis — and the effectiveness ceiling on its third-party collection strategy — cannot be resolved through governance reform and fintech innovation alone. The franchise geography of North-Central Nigeria, with its entrenched insecurity complex, constitutes a systemic performance constraint that demands commensurate engagement at the security-governance, regulatory-framework, and community-relations levels. Future research on DISCO performance in Nigeria and comparable sub-Saharan African utilities operating in fragile security environments should incorporate explicit security-variable

modelling as a determinant of collection efficiency outcomes, rather than treating physical and commercial infrastructure as given conditions in performance analyses.

Conclusion

This study has documented and analysed the decade-long evolution of third-party and outsourced revenue collection at Jos Electricity Distribution Company, situating the empirical findings within Agency Theory and the Resource-Based View. The evidence unambiguously establishes that third-party collection channels have materially improved JEDC's cash-conversion performance—lifting the collection ratio from 41.6% in 2015 to 66.4% in the first half of 2025—while simultaneously creating governance vulnerabilities, fraud exposures, and consumer-protection risks that have partially eroded the efficiency gains achievable in principle.

The study further establishes that JEDC's performance falls measurably short of comparable international utility cases—Kenyan KPLC, South African Eskom, and Brazilian ANEEL-regulated utilities—on virtually every governance dimension examined: settlement-window enforcement, real-time confirmation universality, agent bonding requirements, reconciliation automation, and consumer-dispute-resolution timeliness. These deficits are not merely operational but are rooted in contractual inadequacies, resource limitations in JEDC's information technology and audit functions, and an absence of NERC-mandated minimum governance standards for DISCO-fintech collection partnerships.

The concurrent expansion of Nigeria's fintech ecosystem—with PalmPay, OPay, Moniepoint, and MTN MoMo collectively processing over ₦48 trillion in annual transactions by 2024—presents JEDC with a strategic window of opportunity that is simultaneously constrained by competitive pressures on collection costs and threatened by the fraud and data-governance risks that unmanaged proliferation generates. Realising the full revenue-collection potential of this ecosystem requires deliberate governance reform, technology investment, and marketing strategy that this study has outlined through its recommendations.

Recommendations

1. For JEDC Management

- Implement a Unified Collection Gateway (UCG) that standardises a single customer-facing payment reference—a unified JEDC paybill code—across all third-party platforms, eliminating customer confusion and enabling centralised real-time reconciliation.
- Establish a Third-Party Collection Governance Unit staffed with IT auditors, contract managers, and data-protection officers, empowered to conduct quarterly performance audits of all collection partners and enforce SLA penalty clauses.
- Introduce a mandatory agent bonding requirement—equivalent to 30 days' average collection volume—for all informal and sub-agent collection networks, with bonding deposits held in a dedicated JEDC trust account.

- Develop a Digital Collection Marketing Strategy that includes customer education in Hausa, Tiv, Berom, and Igede, airtime-reward programmes for digital-channel adopters, and structured outreach through market associations and community leaders.
- Accelerate integration of eNaira CBDC payment channels for retail electricity collections, leveraging its instant-settlement finality to eliminate float risks and reduce transaction costs.

2. For the Nigerian Electricity Regulatory Commission (NERC)

- Issue a Minimum Governance Standard for DISCO Third-Party Collection Arrangements mandating 24-hour settlement windows, real-time transaction confirmation, automated daily reconciliation, mandatory agent bonding, and NDPR-compliant data-processing agreements as conditions for DISCO licence compliance.
- Establish a sector-wide electronic payment monitoring dashboard—linked to NIBSS infrastructure—enabling NERC to track DISCO collection performance by channel in near real-time, improving regulatory visibility and enforcement capacity.
- Mandate DISCOs to report third-party collection fraud incidents to NERC and the Economic and Financial Crimes Commission (EFCC) within 48 hours of discovery, establishing a sector-level fraud registry for pattern analysis and cross-DISCO intelligence sharing.

3. For Fintech Partners and Payment Operators

- Develop DISCO-specific payment application programming interfaces (APIs) with embedded metering-number validation, real-time balance credit posting, and automated dispute-resolution workflows, reducing the system-integration gaps that currently generate double-billing incidents.
- Invest in offline-capable USSD and feature-phone payment architectures that extend collection reach into JEDC's rural franchise areas where smartphone penetration and internet connectivity remain limited.

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