

Privatisation and the Operational Performance of Electricity Distribution in Nigeria: Technical Performance and Metering Penetration of the Abuja Electricity Distribution Company, 2013–2024

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Abstract: This study examined the operational performance of the Abuja Electricity Distribution Company (AEDC) after its privatisation in November 2013, focusing on two outcomes that the reform was expected to improve: technical performance and metering penetration. It was anchored on Principal–Agent Theory, which predicts that transferring ownership to private investors strengthens the incentive to reduce losses, improve supply reliability and extend metering. An explanatory mixed-methods design with a longitudinal component was adopted, comparing post-privatisation performance with the pre-privatisation baseline. Quantitative data were obtained from 432 electricity consumers and staff drawn by stratified random sampling across AEDC’s franchise in the Federal Capital Territory and Niger, Nasarawa and Kogi States, and from regulatory and company records on aggregate technical, commercial and collection (ATC&C) losses, reliability and metering. Qualitative data came from key informant interviews. Data were analysed with mean, standard deviation, Welch’s independent-samples t-test and one-sample t-tests at the 0.05 level of significance. The findings showed that ATC&C losses fell significantly from 52.70% at handover to a post-privatisation mean of 44.61% ($t(5) = -4.36$, $p = .007$), and that the System Average Interruption Duration Index at the Apo substation fell from 112.85 to 97.91 hours per customer per year ($t(6.19) = 2.71$, $p = .034$), but interruption frequency did not change significantly ($p = .518$). Consumers nevertheless rated technical performance negatively on seven of eight items. The post-privatisation mean metering rate (54.75%) did not differ significantly from the 2012 baseline of 48.07% ($t(9) = 2.11$, $p = .064$); metering fell to 42.68% in 2016 before rising to 76.20% in 2024. The study concluded that privatisation produced partial and delayed operational gains rather than the rapid transformation envisaged. It recommended franchise-wide publication of reliability indices, targeted network rehabilitation, blended financing for meter deployment and strict enforcement of estimated-billing safeguards.

Keywords: Privatisation, Electricity Distribution, ATC&C Losses, Supply Reliability, Metering, AEDC, Nigeria.

INTRODUCTION

Reliable electricity is now so closely bound up with productivity, health, education and household welfare that its absence is widely treated as a form of deprivation in its own right. Global progress towards universal access has been real but uneven: the international tracking report on Sustainable Development Goal 7 estimated that about 675 million people still lacked electricity in 2021, most of them in Sub-Saharan Africa [1]. For countries in the region, the problem is not only one of access but also of the quality of supply delivered to those already connected, which depends heavily on how distribution networks are owned, financed and managed.

For much of the twentieth century, electricity supply in most developing countries was organised through vertically integrated public enterprises. By the 1990s, however, chronic underperformance, fiscal strain and pressure from multilateral lenders had made privatisation the dominant prescription for reform. The case for private ownership rested on the expectation that private owners, who bear the consequences of inefficiency, would cut losses, invest in networks and serve customers more effectively than state managers [2]. Experience has since tempered this expectation. Reviews of reform across the developing world show that the results of private participation in electricity have been highly uneven and depend strongly on the institutional conditions in which reform takes place [3].

Nigeria adopted this reform model through the Electric Power Sector Reform Act of 2005, which unbundled the Power Holding Company of Nigeria into generation, transmission and distribution companies and created the Nigerian Electricity Regulatory Commission (NERC) as an independent regulator [4]. In November 2013, eleven distribution companies (DisCos) were handed over to private investors. The Abuja Electricity Distribution Company, which serves the Federal Capital Territory and Niger, Nasarawa and Kogi States, was among them, with a 60 per cent equity stake transferred to the KANN Utility consortium. Each DisCo assumed performance obligations covering loss reduction, network investment and metering, and the sector has since been governed by the Electricity Act of 2023, which replaced the 2005 Act [5].

More than a decade later, the performance of the privatised DisCos remains contested. Studies of individual distribution companies have reported little improvement in supply quality, billing, metering or responsiveness to customers, and analyses of regulatory data show that losses remain high and that meter deployment has not kept pace with customer growth [6]. AEDC is often regarded as one of the better-performing DisCos, which makes it a revealing case: if the operational gains expected from privatisation are partial even in a relatively strong distributor, the problem lies in the reform model rather than in the weakness of a single firm. This study therefore examines AEDC's technical performance and metering penetration since privatisation, comparing post-privatisation outcomes with the pre-privatisation baseline.

The privatisation of AEDC was justified on the premise that private ownership would reduce the company's high aggregate technical, commercial and collection (ATC&C) losses, improve the reliability of supply and close the large gap between registered and metered customers. These outcomes are closely connected. High losses deprive the company of the revenue it needs to invest in its network, unreliable supply weakens customers' willingness to pay, and the absence of meters forces the company to bill many customers on an estimated basis, a practice that has been a persistent source of disputes and distrust in the Nigerian electricity supply industry [7].

Despite more than ten years of private operation, AEDC's losses have remained well above the trajectory envisaged at privatisation, complaints about interruptions and estimated bills persist, and the regulator has had to introduce successive metering schemes, including the Meter Asset Provider framework, to accelerate meter deployment. At the same time, the evidence on whether privatisation has actually improved AEDC's operational performance is limited. Existing studies rely mostly on cross-sectional surveys of the post-privatisation period, without comparing outcomes with the performance of the distribution network before handover. Without such a comparison, it is not possible to say whether privatisation has made a measurable difference to losses, reliability and metering. This study addresses that gap by comparing AEDC's post-

privatisation technical performance and metering penetration with the pre-privatisation baseline, and by setting these administrative data alongside the experiences of the company's customers.

Research Questions

1. What has been the effect of privatisation on the technical performance of the Abuja Electricity Distribution Company, as measured by the System Average Interruption Duration Index (SAIDI), the System Average Interruption Frequency Index (SAIFI) and ATC&C losses?
2. To what extent has privatisation improved metering penetration in AEDC's franchise area, and how do consumers experience metering and billing practices?

Research Objectives

The specific objectives of the study are to:

1. Determine whether AEDC's technical performance indicators (SAIDI, SAIFI and ATC&C losses) improved significantly after privatisation relative to the pre-privatisation baseline.
2. Determine the extent to which AEDC's metering penetration has changed since privatisation and assess consumers' experience of metering and billing.

Research Hypotheses

Ho1: There is no significant difference in AEDC's technical performance indicators (SAIDI, SAIFI and ATC&C losses) between the pre-privatisation and post-privatisation periods.

Ho2: Privatisation has had no significant effect on metering penetration in AEDC's franchise area.

Privatisation

Privatisation broadly refers to the transfer of ownership, management or control of state enterprises to private actors. In its narrowest sense it means divestiture, the sale of a majority equity stake to private investors, but the term is also used for management contracts, concessions and other arrangements that bring private operators into public services. Shirley and Walsh, reviewing the debate on public and private ownership, observed that the theoretical case for private ownership rests largely on differences in incentives and in exposure to market discipline, while the empirical case depends heavily on whether competition and effective regulation are present. In a review of empirical studies across many countries, Megginson and Netter concluded that privatisation is generally associated with improvements in efficiency and profitability, but Kikeri and Nellis cautioned that the gains are smallest and least certain in infrastructure monopolies in low-income countries, where weak regulation can allow private owners to capture rents without improving service. Electricity distribution, a natural monopoly serving captive customers, belongs to this more difficult category. In this study, privatisation refers specifically to the November 2013 transfer of a 60 per cent equity stake in AEDC to private core investors, together with the associated change in management control and commercial orientation.

Technical Performance of Electricity Distribution

The technical performance of a distribution utility is commonly assessed on two dimensions: the reliability of supply and the efficiency with which energy received is converted into billed and paid-for consumption. Reliability is measured through internationally standardised indices. The System Average Interruption Duration Index (SAIDI) expresses the total duration of sustained interruptions experienced by the average customer over a year, while the System Average Interruption Frequency Index (SAIFI) expresses the average number of such interruptions per customer [8]. The two indices capture different aspects of service: a utility may reduce the time taken to restore supply, lowering SAIDI, while doing little about how often faults occur, which SAIFI reflects.

Efficiency in the Nigerian context is measured mainly through ATC&C losses, which capture the share of energy delivered to a distribution company that is not converted into collected revenue. The measure combines technical losses, energy dissipated in conductors and transformers;

commercial losses, energy consumed but not billed because of theft, bypass or faulty metering; and collection losses, energy billed but not paid for [9]. Because it combines engineering and commercial failures in a single figure, ATC&C loss is the most widely used summary of a DisCo's operational efficiency and was central to the performance commitments made by the investors who acquired the DisCos in 2013.

Metering Penetration and Estimated Billing

Metering penetration is the proportion of registered customers who have functional meters. It matters for both revenue and fairness: unmetered customers are billed on an estimated basis, which the utility may use to recover losses incurred elsewhere and which customers frequently regard as arbitrary. NERC sought to regulate estimated billing through a methodology issued in 2012 and, in 2018, introduced the Meter Asset Provider Regulations. Under this framework, licensed third-party providers finance, install and maintain meters, recovering their costs through a metering service charge, with the stated aims of closing the metering gap, eliminating estimated billing and improving revenue assurance [10]. These measures were later supplemented by the National Mass Metering Programme. Analyses of NERC data suggest that metering and losses are linked: Odje et al. estimated that each percentage-point increase in metering was associated with a 0.8 percentage-point reduction in ATC&C losses across Nigerian DisCos, while noting that meter deployment had failed to keep pace with the growth in the number of customers.

Privatisation and Distribution Performance

The international evidence on privatised electricity distribution is mixed. Gratwick and Eberhard documented the gradual retreat from the “standard model” of comprehensive power sector reform in developing countries, showing that most countries ended up with hybrid arrangements in which private participation coexisted with continued state involvement and uneven regulation. Foster and Rana, in a World Bank study of power sector reform across fifteen developing countries, found that the outcomes of private participation in distribution varied widely and depended on the quality of regulation, the adequacy of tariffs and the capacity of institutions, rather than on private ownership alone.

Nigerian studies have generally reported disappointing results. Idowu et al. [11], surveying residential and commercial customers of the Ibadan and Ikeja distribution companies, found no significant improvement in the quality of supply, billing, coverage, metering, load shedding or responsiveness to customers after privatisation. Odje et al. [12], analysing NERC data for all DisCos between 2015 and 2020, attributed persistently high ATC&C losses partly to slow metering and recommended that aggressive meter deployment be combined with other loss-reduction strategies. A notable limitation of this literature is its reliance on post-privatisation data alone. Few studies compare the performance of a DisCo before and after handover, and fewer still combine regulatory performance data with customers' experiences. The present study responds to both limitations in the case of AEDC.

Theoretical Framework

The study is anchored on Principal-Agent Theory. The theory, developed in the work of Jensen and Meckling [13] and later reviewed by Eisenhardt [14], is concerned with relationships in which one party, the principal, delegates work to another, the agent, whose interests and information differ from the principal's. Because the principal cannot fully observe the agent's effort, the agent may pursue its own interests at the principal's expense, and the central problem becomes the design of incentives and monitoring arrangements that align the agent's behaviour with the principal's goals.

Applied to public enterprises, the theory explains chronic underperformance as the result of weak and diffuse incentives. Managers of state-owned utilities answer to several principals, including ministries, politicians and the public, whose objectives conflict, and they bear few personal consequences for losses or poor service.[15] Privatisation is expected to resolve this problem by creating a principal, the private owner, with a direct financial interest in efficiency and the power to reward and discipline managers. On this reasoning, the transfer of AEDC to private owners

should have produced a clear reduction in losses, an improvement in reliability and an acceleration of metering, since each of these outcomes increases the revenue the owner can collect. The theory also identifies the limits of this expectation. In a regulated monopoly, the private owner itself becomes an agent of the regulator and of the public, and its incentives depend on tariffs, enforcement and access to capital. Where these conditions are weak, the incentive to reduce losses may be strong while the capacity to invest in reliability and metering remains constrained. The theory therefore provides a basis both for expecting improvement after privatisation and for explaining why that improvement may be partial and uneven across indicators.[16]

METHODOLOGY

The study adopted an explanatory mixed-methods design with a longitudinal component. The quantitative strand, comprising a consumer and staff survey and secondary performance data, provided the main evidence, while a qualitative strand of key informant interviews was used to explain and illustrate the quantitative findings. The longitudinal component compared post-privatisation performance with the pre-privatisation baseline of the Power Holding Company of Nigeria's Abuja zone.

The study area was AEDC's franchise, covering the Federal Capital Territory and Niger, Nasarawa and Kogi States. The survey population comprised AEDC's registered customers, estimated at about 1.4 million across residential, commercial and industrial or government categories, together with the company's staff. The minimum sample size was determined with Cochran's formula for large populations, $n_0 = (Z^2pq)/e^2$, with $Z = 1.96$, $p = q = 0.50$ and $e = 0.05$, which gave a minimum of 385 respondents. This was increased by 30 per cent to 500 to allow for non-response, and the sample was allocated across franchise zones and customer categories by stratified random sampling. A total of 432 valid questionnaires were retrieved and analysed, a return rate of 86.4 per cent, which exceeds the computed minimum.

Data were collected with a structured questionnaire whose items were rated on a five-point scale ranging from Strongly Disagree (1) to Strongly Agree (5). This article draws on its sections on technical performance and on metering and billing. The instrument was validated by five experts drawn from public administration, electricity regulation, consumer advocacy and survey statistics, and was pilot-tested on 30 customers in the FCT who did not form part of the main sample. Secondary data were drawn from NERC annual and quarterly reports, AEDC's Performance Improvement Plan and rate case documents, and the National Bureau of Statistics' electricity reports. Because no franchise-wide SAIDI and SAIFI series for AEDC could be obtained from any public source, reliability was assessed at the Apo injection substation, for which comparable annual data were available for 2009–2012 and 2014–2018. Qualitative data were obtained from purposively selected key informants, including a NERC official and a member of AEDC's senior management, and were analysed thematically.

Survey responses were analysed with mean and standard deviation. Following the decision rule adopted in the study, a mean of 3.50 and above was interpreted as agreement, 2.50 and below as disagreement, and values in between as neutral or mixed. Hypothesis one was tested with Welch's independent-samples t-test for SAIDI and SAIFI, which does not assume equal variances, and a one-sample t-test comparing the post-privatisation ATC&C series with the 2013 handover baseline. Hypothesis two was tested with a one-sample t-test comparing the post-privatisation metering series with the 2012 baseline. All hypotheses were tested at the 0.05 level of significance.

DATA PRESENTATION AND ANALYSIS

Table 1. Characteristics of Respondents (N = 432)

Variable	Category	Frequency	Percentage (%)
Respondent category	Residential	380	88.0
	Commercial	26	6.0

Variable	Category	Frequency	Percentage (%)
Franchise zone	Industrial/Government	6	1.4
	AEDC staff	20	4.6
	FCT, Abuja	222	51.4
	Niger State	70	16.2
	Nasarawa State	50	11.6
	Kogi State	90	20.8
Gender	Male	316	73.1
	Female	108	25.0
	Prefer not to say	8	1.9
Years connected to AEDC	Less than 1 year	8	1.9
	1–5 years	64	14.8
	6–10 years	90	20.8
	11–15 years	70	16.2
	More than 15 years	200	46.3
Metering status	Functional meter	224	51.9
	Prepaid (smart) meter	110	25.5
	Post-paid meter	16	3.7
	Estimated billing	58	13.4
	No functional meter	24	5.6

Source: Field Survey (2025).

Table 1 shows that most respondents were residential customers (88.0%), reflecting the composition of AEDC's customer base, and that just over half were located in the Federal Capital Territory (51.4%). Almost half of the respondents (46.3%) had been connected to AEDC for more than fifteen years, and a further 37.0 per cent for six to fifteen years, so most had been customers under both the public enterprise and the privatised company and were therefore well placed to compare service before and after privatisation. In all, 350 respondents (81.0%) reported having a meter of some kind, while 82 (19.0%) were on estimated billing or had no functional meter.

Research Question One: What has been the effect of privatisation on the technical performance of AEDC?

Table 2. Consumer Perceptions of AEDC's Technical Performance since Privatisation (N = 432)

Item	SD%	D%	N%	A%	SA%	Mean	SD	Remark
Supply has become more reliable since privatisation	31.5	39.4	14.4	13.4	1.4	2.14	1.05	Disagree
Daily hours of supply are satisfactory	29.2	43.5	13.9	12.0	1.4	2.13	1.01	Disagree

Item	SD%	D%	N%	A%	SA%	Mean	SD	Remark
Interruptions are restored within an acceptable time	33.5	38.6	13.5	13.0	1.4	2.10	1.05	Disagree
Voltage fluctuations and surges have reduced noticeably	17.2	28.4	19.5	28.4	6.5	2.79	1.21	Neutral
AEDC gives advance notice of planned outages	35.5	32.7	12.6	19.2	0.0	2.15	1.11	Disagree
Unplanned interruptions have decreased since the PHCN era	25.2	35.5	17.3	16.8	5.1	2.41	1.18	Disagree
Overall satisfaction with the technical quality of supply	29.4	34.6	21.0	14.5	0.5	2.22	1.04	Disagree
Fault teams attend to faults within a reasonable period	21.1	38.0	20.7	18.8	1.4	2.41	1.06	Disagree

Source: Field Survey (2025). SD% = strongly disagree; D% = disagree; N% = neutral; A% = agree; SA% = strongly agree.

Table 2 shows that respondents disagreed with seven of the eight statements on AEDC's technical performance. The strongest disagreement concerned the three items most closely related to interruption duration and frequency: that supply has become more reliable (mean = 2.14), that daily hours of supply are satisfactory (mean = 2.13) and that interruptions are restored within an acceptable time (mean = 2.10). In each case, more than 70 per cent of respondents disagreed or strongly disagreed. Only the statement on voltage fluctuations and surges was rated neutral (mean = 2.79). This implies that, from the customers' point of view, privatisation has not delivered a noticeable improvement in the reliability of supply, although the quality of voltage appears to be viewed somewhat less negatively.

Table 3. AEDC Aggregate Technical, Commercial and Collection Losses, 2015–2018

Year	ATC&C loss (%)
2015	49.48
2016	48.64
2017	47.58
2018	40.15

Source: NERC Annual Report (2018), historical ATC&C series.

Table 3 shows that AEDC's ATC&C losses fell from 49.48 per cent in 2015 to 40.15 per cent in 2018, a reduction of 9.33 percentage points over four years. The improvement is genuine, but a loss rate above 40 per cent five years after privatisation means that roughly two in every five units of energy received by the company were still not converted into collected revenue. The regulator's own assessment reflected this mixed picture. Asked whether AEDC's performance had improved since privatisation, a NERC official observed:

“Yes, we have seen improvement in terms of response to customer complaints, customer service issues, response to fault clearing, because of the regulatory regime and minimum standards provided for performance. We have seen some investments delivered. So largely there is improvement, but has that met our expectations? Somewhat, but not what was envisaged.”

The official's account converges with the survey evidence: improvement is acknowledged, but it falls well short of what privatisation was expected to deliver.

Research Question Two: To what extent has privatisation improved metering penetration in AEDC's franchise area?

Table 4. Consumer Perceptions of Metering and Billing Practices (N = 432)

Item	SD%	D%	N%	A%	SA%	Mean	SD	Remark
My installed meter accurately reads consumption	4.7	13.1	23.8	41.1	17.3	3.53	1.07	Agree
I am satisfied with progress on meter installation since 2013	11.2	28.4	21.9	34.0	4.7	2.93	1.12	Neutral
Estimated billing fairly represents actual consumption	1.5	31.4	28.4	15.2	23.5	3.28	1.18	Neutral
I have experienced billing disputes over estimated or inaccurate readings	4.7	18.2	31.3	31.3	14.5	3.33	1.08	Neutral
Billing disputes are resolved within the consumer-protection timeframe	14.0	36.9	33.6	14.0	1.4	2.52	0.95	Neutral
The MAP programme has meaningfully improved meter availability	11.2	26.6	31.3	26.6	4.2	2.86	1.06	Neutral
The absence of a meter negatively affects trust in billing	4.3	11.6	35.3	35.3	13.5	3.42	1.00	Neutral

Source: Field Survey (2025). MAP = Meter Asset Provider.

Table 4 shows that perceptions of metering were more mixed than perceptions of technical performance. Respondents agreed that installed meters read consumption accurately (mean = 3.53) but were neutral and slightly negative about AEDC's progress in installing meters since 2013 (mean = 2.93) and about the contribution of the Meter Asset Provider programme (mean = 2.86). The responses also point to a trust deficit. Nearly half of the respondents (45.8%) reported having experienced billing disputes over estimated or inaccurate readings, almost as many (48.8%) agreed that the absence of a meter weakens their trust in AEDC's billing, and the resolution of disputes within the timeframe set by the consumer protection code received the lowest rating in the set (mean = 2.52), with 50.9 per cent of respondents disagreeing that disputes are resolved on time.

Table 5. AEDC Registered Customers, Metered Customers and Metering Rate, 2012–2024

Year	Registered customers	Metered customers	Metering rate (%)
2012	519,486	249,710	48.07
2013	—	—	—
2014	—	—	—
2015	834,670	378,248	45.32
2016	886,641	378,416	42.68
2017	966,192	462,048	47.82
2018	983,496	482,508	49.06
2019	1,132,461	573,134	50.61
2020	1,285,715	693,622	53.95
2021	1,124,559	701,781	62.40

Year	Registered customers	Metered customers	Metering rate (%)
2022	1,290,977	757,733	58.69
2023	1,424,186	864,970	60.73
2024	1,195,429	910,942	76.20

Source: NERC (2012) Metering Committee Report; National Bureau of Statistics Electricity Reports (2015–2023); NERC Quarterly Report, Q4 2024. Data for 2013 and 2014, the transition years, were not available and were not interpolated. Metering rates are computed as metered customers divided by registered customers.

Table 5 shows that metering penetration actually declined in the first years after privatisation, from 48.07 per cent in 2012 to 45.32 per cent in 2015 and 42.68 per cent in 2016, as the number of registered customers grew faster than the number of meters installed. Penetration exceeded the pre-privatisation level only from 2018 and rose substantially from 2021 to reach 76.20 per cent in 2024. The sharp improvement in the final years partly reflects the expansion of metering schemes, but the drop in registered customers between 2023 and 2024 also contributed to the higher rate and should be interpreted with caution. AEDC’s management attributed the slow pace of metering largely to its cost:

“Metering is not cheap. Metering is expensive. So, from a cost point of view, an average meter in Nigeria, smart meter is about \$120, which is not cost efficient. And we have over 350,000 customers that are not metered ... when I want to meter them 100%, I may end up having 900,000 connections. So that 900,000 connections by \$120 tells you the capital requirement to get there.” (AEDC senior management, Key Informant Interview, 2025)

The account suggests that the metering gap is as much a financing problem as a management one: because customers who now share a single meter may each require their own connection, closing the gap could require far more meters than the number of unmetered accounts implies.

Test of Hypotheses

Hypothesis One: There is no significant difference in AEDC’s technical performance indicators (SAIDI, SAIFI and ATC&C losses) between the pre-privatisation and post-privatisation periods.

Table 6. Welch’s t-Test of SAIDI and SAIFI at the Apo Substation, Pre-Privatisation (2009–2012) and Post-Privatisation (2014–2018)

Indicator	Pre M (SD), n	Post M (SD), n	t	df	p
SAIDI (hours/customer/year)	112.85 (5.52), 4	97.91 (10.70), 5	2.705	6.19	0.034
SAIFI (interruptions/customer/year)	0.395 (0.015), 4	0.384 (0.030), 5	0.685	6.10	0.518

Source: Data analysis (2025). Degrees of freedom are Welch–Satterthwaite approximations.

Table 7. One-Sample t-Test of Post-Privatisation ATC&C Losses against the 2013 Handover Baseline

n	Post-privatisation (SD)	M	Test value	t	df	p
6	44.61 (4.55)	52.70		–4.358	5	0.007

Source: Data analysis (2025). Post-privatisation values: 2015 (49.48%), 2016 (48.64%), 2017 (47.58%), 2018 (40.15%), June 2019 (39.00%) and 2023 (42.80%). The handover baseline is taken from AEDC's Performance Improvement Plan (2019).

Table 6 shows that the mean SAIDI at the Apo substation fell from 112.85 hours per customer per year before privatisation to 97.91 hours after it, a statistically significant reduction ($t(6.19) = 2.71$, $p = .034$). In contrast, the difference in SAIFI was small and not significant ($t(6.10) = 0.69$, $p = .518$). Table 7 shows that the post-privatisation mean ATC&C loss of 44.61 per cent was significantly lower than the handover baseline of 52.70 per cent ($t(5) = -4.36$, $p = .007$). The null hypothesis is therefore rejected for SAIDI and ATC&C losses but not for SAIFI. Privatisation was associated with shorter interruptions at the observed substation and with lower losses, but not with fewer interruptions. Two qualifications apply. The reliability results relate to a single substation rather than the whole franchise, and AEDC's Performance Improvement Plan also reports a revised baseline loss of 46.05 per cent; measured against this lower reference point, the post-privatisation reduction is not statistically significant ($t(5) = -0.78$, $p = .473$).

Hypothesis Two: Privatisation has had no significant effect on metering penetration in AEDC's franchise area.

Table 8. One-Sample t-Test of Post-Privatisation Metering Rate against the 2012 Baseline

n	Post-privatisation (SD)	M	Test value	t	df	p
10	54.75 (10.02)	48.07		2.108	9	0.064

Source: Data analysis (2025). Annual metering rates for 2015–2024.

Table 8 shows that the post-privatisation mean metering rate of 54.75 per cent was higher than the 2012 baseline of 48.07 per cent, but the difference was not statistically significant at the 0.05 level ($t(9) = 2.11$, $p = .064$). The null hypothesis is therefore retained. The result reflects the uneven trajectory shown in Table 5: metering fell below the baseline in the early post-privatisation years and rose sharply only towards the end of the period, so that the average gain across the decade, though positive, was not large or consistent enough to be statistically reliable.

RESULTS AND DISCUSSION

Privatisation and Technical Performance

The study found that AEDC's ATC&C losses and interruption duration at the Apo substation fell significantly after privatisation, but that the frequency of interruptions did not change and customers continued to rate supply reliability negatively. The pattern is consistent with the prediction of Principal-Agent Theory that private ownership strengthens the incentive to reduce losses, since every unit of energy recovered as revenue accrues directly to the owner. Loss reduction can be pursued through commercial measures such as tighter billing, disconnection and anti-theft drives, which require relatively modest capital. Reducing the frequency of interruptions, by contrast, requires substantial investment in feeders, transformers and protection systems. The finding that the duration of interruptions improved while their frequency did not suggests that the company became better at restoring supply, perhaps through faster fault response, without making comparable progress in preventing faults in the first place.[17]

The size and pace of the improvement are modest by international standards. Foster and Rana [18] showed that the gains from private participation in distribution depend on the adequacy of tariffs, the quality of regulation and access to finance, and the reduction recorded at AEDC, about eight percentage points from the handover level over more than a decade, is closer to the limited outcomes found where these conditions are weak. The persistence of negative customer perceptions is consistent with Idowu et al. [19], who found no significant improvement in supply quality at the Ibadan and Ikeja DisCos. Customers judge performance by the reliability they experience, which depends on the frequency of interruptions as much as on losses or restoration

times, so improvements in the company's efficiency indicators need not translate into a better experience at the point of use.

Privatisation and Metering Penetration

The study found that metering penetration did not change significantly after privatisation, that it fell below the pre-privatisation level in the early years, and that substantial gains came only after 2020. The trajectory suggests that privatisation by itself did not unlock investment in metering. Principal-Agent Theory would predict that a private owner, seeking to protect revenue, would prioritise metering; the evidence indicates that the incentive existed but was constrained by the cost of meters and by the difficulty of financing them, as AEDC's management explained. Progress accelerated only after the regulator created dedicated financing channels through the Meter Asset Provider framework and the National Mass Metering Programme, which supports the view that regulatory and financing arrangements, rather than ownership alone, determine whether the metering gap closes [20]

The consumer responses show why the slow pace of metering matters. Nearly half of the respondents reported billing disputes over estimated or inaccurate readings, and the resolution of disputes received the lowest rating in the metering scale. These findings agree with Odje et al, who found that meter deployment across Nigerian DisCos had not kept pace with customer growth, and they point to a cost that falls outside the company's revenue figures: estimated billing erodes customers' trust in the utility, which in turn weakens their willingness to pay and complicates loss reduction.

CONCLUSION AND RECOMMENDATIONS

This study examined whether the privatisation of the Abuja Electricity Distribution Company improved its technical performance and metering penetration. The evidence shows that privatisation was followed by real but partial gains. Losses fell and the duration of interruptions at the observed substation shortened, but the frequency of interruptions did not change, customers continued to regard supply as unreliable, and metering penetration did not improve significantly over the decade as a whole, rising sharply only in the most recent years. The improvement was also sensitive to the baseline used, since the reduction in losses was significant against the handover figure but not against the revised baseline reported by the company. Private ownership therefore strengthened the incentive to reduce commercial losses but did not, by itself, provide the capital and regulatory support needed to improve reliability and close the metering gap. The operational gains expected from privatisation have been slower and narrower than its advocates anticipated, and their further realisation depends on financing and regulatory arrangements that extend beyond the transfer of ownership.

Based on the findings of the study, the following recommendations are made:

1. The Nigerian Electricity Regulatory Commission should require AEDC and other DisCos to report audited, franchise-wide SAIDI and SAIFI figures and should publish them regularly, so that improvements in reliability can be measured and compared rather than inferred from losses alone.
2. AEDC should direct a larger share of its capital expenditure to network rehabilitation aimed at reducing the frequency of interruptions, including the replacement of overloaded transformers and ageing feeders, rather than relying mainly on commercial measures and faster fault restoration.
3. The Federal Government, NERC and AEDC should develop blended financing arrangements for meter deployment, combining the Meter Asset Provider framework, concessional finance and the National Mass Metering Programme, with clear annual metering targets for the franchise.
4. NERC should strictly enforce the caps on estimated billing and the timelines for resolving billing disputes set out in its consumer protection framework, and should apply sanctions where DisCos fail to comply.

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