

Impact of Power Sector Reform on Operational Efficiency in Abuja Electricity Distribution Company

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Abstract

Inadequate generation transmission and distribution of electricity constitute major bottlenecks to productivity and industrial growth in Nigeria. Over the years, several reforms have been implemented in the power sector but the challenges persist, and many socio-economic activities are negatively impacted. The problems are exacerbated by inconsistent policies of the government on the management of the power sector and the inefficient capacity of the private operators. This research aims to explore the impact of power sector reform on operational efficiency in Abuja Electricity Distribution Company, involving 50,631 respondents with a sample size of 367 determined using the Krejcie and Morgan table. Data collection utilized a self-structured questionnaire, and analysis employed descriptive statistics like frequency count and mean. The study is anchored on the modernization theory. The findings showed that the power sector reform in Abuja Electricity Distribution Company (AEDC) has revealed challenges related to poor funding, inadequate implementation of reforms, and lack of essential infrastructure. The study recommends establishing a robust oversight mechanism, involving regulatory bodies and industry experts, which is crucial for ensuring the effective implementation of power sector reforms. This oversight can monitor and evaluate the progress, identify bottlenecks, and recommend corrective measures, fostering a more streamlined and efficient execution of reforms. Implementing diverse funding mechanisms, such as public-private partnerships, attracting investments, and securing government support, can bolster AEDC's financial position. This would provide the necessary resources to upgrade infrastructure, invest in advanced technologies, and improve overall operational capabilities.

Keywords: Power, Sector, Reform, Abuja, Electricity.

Introduction

The 21st century has witnessed a fundamental transformation of the global energy landscape, driven by imperatives such as climate change mitigation and the pursuit of cleaner, more sustainable energy sources (Fadare, 2019). Nations are increasingly shifting away from fossil fuel dependency towards renewables, with solar, wind, and hydropower gaining prominence. Innovations in energy storage and smart grid technologies are reshaping the dynamics of power generation and distribution. Power sector reforms globally share common themes aimed at fostering efficiency, competition, and sustainability. Market liberalization, privatization, and the integration of renewable energy sources into national energy portfolios are prevalent

strategies. Nations are recalibrating their regulatory frameworks to accommodate evolving technologies and ensure a seamless transition to a more diversified and sustainable energy mix (Fadare, 2019). The global pursuit of sustainable energy is not without challenges. Striking the right balance between energy security and environmental concerns remains a delicate task. However, the challenges are accompanied by a plethora of opportunities. In Africa, the power sector assumes a paramount role in catalyzing socio-economic development. Access to reliable and affordable electricity is foundational for economic growth, poverty reduction, and improved living standards. However, many African nations grapple with challenges related to energy access, insufficient

infrastructure, and reliance on traditional energy sources (Okibe, & Mokuye, 2021). The African continent exhibits a rich tapestry of approaches to power sector reform, reflecting the unique challenges and opportunities faced by each nation. Some countries have embraced extensive privatization, while others focus on strengthening public utilities. Regional collaboration and the sharing of best practices are gaining prominence as African nations seek collective solutions to common energy challenges. The impact of power sector reforms on African development is nuanced (Okibe, & Mokuye, 2021).

While reforms have attracted investments and improved infrastructure in some cases, challenges persist. Implementation gaps, regulatory complexities, and political uncertainties pose hurdles to the effective execution of reform agendas. Nigeria, as one of Africa's largest economies, grapples with a dynamic energy landscape characterized by a growing population and increasing energy needs. Historically, the Nigerian power sector has faced challenges in meeting demand, resulting in persistent issues of inadequate power supply and distribution inefficiencies (Dahunsi, Olakunle, & Melod, 2021). The Nigerian government has embarked on ambitious power sector reforms, marked by privatization initiatives and the Power Sector Recovery Program (PSRP). Privatizing key entities within the power sector and implementing policy interventions aim to address longstanding issues of inefficiency, financial sustainability, and technical losses. The PSRP, launched in response to sector-wide challenges, outlines a roadmap for comprehensive recovery and improvement (Dahunsi, et al, 2021).

Abuja Electricity Distribution Company, or Abuja Disco, serves central Nigeria from its base in Abuja, Nigeria's capital city in the Federal Capital Territory (FCT). Abuja Disco was established in 1997 following the transfer of the capital from Lagos to Abuja in 1991 (Adelowo, & Fadare, 2023). Abuja Disco has a franchise for distribution and marketing comprising

Minna, Suleja, Lokoja, and Lafia Districts. Despite past investments in expanding the electricity infrastructure, demand in the Disco's service zone far exceeds supply. The increase in population continues to add to the demand as a result of the growing population of the Federal Capital. Abuja Disco distributes has an average distribution of 204, 150 KW of electricity per annum, and it has been ranked fourth among the 11 discos for both sales of electricity, purchased/distributed (Adelowo, & Fadare, 2023). It is against this backdrop that this study examined the impact of power sector reform on operational efficiency in Abuja Electricity Distribution Company

Theoretical Framework (Classical Modernisation Theory)

This has been defined as a theory (Reyes, 2001a) that uses a systematic process to move underdeveloped countries to a more sophisticated level of development. It is a US and European-centric normative model of development. The focus of Modernization Theory is cultural change directed at institutional structures in non-industrialized countries.

Modernization Theory explains inequality within or between states by identifying different values, systems, and ideas held by different nation-states (Martinussen 1997, pp. 61-66, 167- 172). Modernization Theory emerged in the late 1950s when it appeared as a North American political scientist's reaction to the incipient failure of many of the prescriptions of development economists (Rapley 2002, p. 15). While Modernization Theory stresses the importance of political development in the progress and climactic improvement of a nation's economic standing, it also acknowledges social and cultural reforms. Applying modernization theory to the study of power sector reform and operational efficiency in the Abuja Electricity Distribution Company (AEDC) involves examining how societal development and technological advancements contribute to changes in the power sector. Modernization theory

suggests that economic development positively influences other aspects of society. In the context of AEDC, one would analyze how economic growth in the region impacts the demand for electricity, investment in infrastructure, and the company's ability to implement modern technologies for operational efficiency.

Modernization theory emphasizes the role of technology in driving societal progress. Assessing how AEDC adopts and integrates modern technologies in its operations, such as smart grid systems, advanced metering, and data analytics, can provide insights into the company's efficiency improvements. Modernization theory predicts that as societies modernize, institutions change to adapt to new challenges. Examining how AEDC responds to regulatory reforms, market-oriented mechanisms, and shifts in governance structures provides a lens into the institutional transformations within the power sector.

Modernization theory suggests a correlation between education levels and societal development. Studying the educational background and skill sets of AEDC staff can offer insights into how a well-educated workforce contributes to operational efficiency through better management practices and technical expertise. Modernization theory recognizes cultural shifts as societies modernize. Analyzing the cultural factors influencing consumer behavior, expectations, and acceptance of new technologies in Abuja can provide a nuanced understanding of how cultural dynamics impact AEDC's operations. Modernization theory links political stability to societal progress. Evaluating the political landscape and stability in Abuja and Nigeria more broadly can help understand how political factors influence AEDC's decision-making, regulatory environment, and long-term planning. Modernization theory suggests that as societies modernize, there is increased social mobilization and participation. Examining how AEDC engages with the community, addresses social concerns, and involves consumers in

decision-making processes can shed light on the social dynamics of power sector reform.

Research Methodology

Research Design

A survey research design was employed. This was chosen because the researcher gathered and analyzed data from a limited number of subjects deemed representative of the entire population.

Population of the Study

The population of this study are staff and customers of Abuja Electricity Distribution Company. The population was drawn from consumers of electricity in the areas under survey. This was obtained through a distribution database in the Asokoro business unit and the Suleja business unit. Asokoro business unit has twenty-eight thousand one hundred and seven (28,107) household consumers while Suleja business unit has thirty-two thousand, five hundred and twenty-four (22,524) household consumers. The total population of the study is sixty thousand, six hundred and thirty-one (50,631) household consumers from the two areas selected. These categories are considered appropriate for their knowledge of personnel matters.

Sample Size

The total sample size of the study from Asokoro, Abuja, and Suleja is three hundred and eighty-one household consumers. The researcher determined the sample size based on a table indicating that for a population of 50,631, the appropriate sample size is 381. This aligns with Krejcie and Morgan's recommendation, as cited by Kenpro (2012).

Sampling Technique

The research study adopted the stratified and simple random sampling in grouping areas. Two selected areas represent the strata. Simple random sampling is then applied in each stratum for data collection.

Method of Data Collection

The method of data collection procedure adopted was direct face-to-face whereby questionnaires were distributed personally by the researcher. The questionnaire was structured to elicit information from the organization's staff and electricity consumers. Respondents rated each item on a four-point scale (Strongly Agree, Agree, Disagree, Strongly Disagree).

Method of Data Analysis

Tools used for analyzing collected data included mean scores, frequency tables, and

simple percentages.

Data Presentation and Analysis

This section presents the results of data obtained on the respondents in frequency counts and percentages. A total of three hundred and eighty-one (381) questionnaires were administered during the data collection of this study. However, only 367 (96. were duly responded and returned, while the remaining fourteen (3.7%) were either damaged or more than one option was indicated by the respondents.

Table 1 Sex Distribution of Respondents

Gender	Frequency	%age
Male	235	64.0
Females	132	36
Total	367	100

Source: Field Survey, October, 2023.

Table 1 depicts the analysis of data collected concerning the gender of the respondent. It shows that 235 representing 64.0 % of the respondents are males and 132 representing

36% of the respondents are females. This translates to mean that the majority of the respondents are males due to the decision-making positions of the males in Nigeria

Table 2. Age Distribution of Respondents

Age (years)	Frequency	%age
12-20	93	25.3
21-30	151	41.2
30-49	69	18.8
50- years and above	54	14.7
Total	367	100

Source: Field Survey, October, 2023.

The result presented in Table 2 shows the distribution of respondents' age. The table reveals that 93 (25.3%) of the respondents were below 30 years; 151 (41.2%) of the respondents were between the ages of 21-30 years; while 69 (18.8%) of the respondents

were between the ages of 30-49 years of age and 54 (14.7%) of the respondents were from 50 years and above. This also indicates that respondents, who were between 21-30 years, old participated more in the study.

Table 3 Marital Status of Respondents

Marital Status	Frequency	%age
Single	167	45.5
Married	191	52.1
Divorced/Separated	7	1.9
Widowed/Widower	2	0.5
Total	367	100

Source: Field Survey, October, 2023.

The result presented in Table 3 shows the analysis of data collected concerning the marital status of the respondents. It depicts that 167 (45.5%) of the respondents were single, 191 (52.1%) of the respondents were married, 1.9% of the respondents were

divorced and separated and 0.5% of the respondents were widowed/ widower. Judging from the frequency distribution table above, the highest frequency is 191 with 52.1%, this translates to mean that the majority of the respondents were married.

Table 4: Educational Attainment of Respondents

Education	Frequency	%age
No formal education	32	8.7
Primary education	31	8.5
Secondary education	138	37.6
Tertiary education	166	45.2
Total	367	100

Source: Field Survey, October, 2023.

Table 4 shows the analysis of data collected concerning the educational qualifications of the respondents. It depicts those 12 respondents representing 3.5% of the respondents not having formal education, 31 respondents representing 8.9% have primary school certificates, 138 respondents representing 39.8% have secondary school certificates; while only 166 respondents representing 47.8% have

tertiary educational qualifications amongst the respondents. Judging from the frequency distribution table 4, the highest frequency is 166 with 47.8%. This translates to mean that the majority of the respondents are literate. The level of an individual's education is believed to influence their perception of power sector reform in Nigeria.

Table 5: Operational Efficiency Changes in Abuja Electricity Distribution Company Following Power Sector Reform

	SA	A	D	SD	Mean (\bar{x})
	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	
(AEDC), reform has led to the upgrading and expansion of the distribution network, introducing modern technologies such as smart grids and advanced metering systems to enhance operational efficiency.	259(1,036) (70.6%)	104(312) (28.3%)	3(6) (0.8%)	1(2) (0.3%)	3.7
AEDC reforms have improved its operational efficiency to remain competitive, offering better services, reliability, and customer satisfaction.	246(984) (67.0%)	64(192) (17.4%)	30(60) (8.2%)	27(27) (7.4%)	3.5
A revised regulatory framework has influenced AEDC's operations by setting performance standards, encouraging transparency, and ensuring compliance.	230(920) (62.7%)	126(378) (34.3%)	9(18) (2.5%)	2(2) (0.5%)	3.6
A focus on consumer engagement and empowerment led AEDC to adopt practices such as demand-side management, improved customer service, and the integration of technologies that allow consumers to actively participate in managing their energy consumption	253(1,012) (69%)	100(300) (27.2%)	9(18) (2.4%)	5(5) (1.4%)	3.6
AEDC has diversified its energy mix. Integrating renewable energy sources leads to improved operational efficiency	266(1,064) (72.5%)	90(270) (24.5%)	6(12) (1.6%)	5(5) (1.4%)	3.7
Average Overall Mean				3.6	

Source: Field Survey, October, 2023.

Table 5 shows the extent of operational efficiency changes in Abuja Electricity Distribution Company following the power sector reform. The sectional mean of 3.6 shows that the respondents agreed that there are various changes in AEDC due to power sector reform in Nigeria. An AEDC Staff at the distribution department of the Asokoro business district of AEDC, Samson Joseph, when asked about the impact of power sector reform on the operations of AEDC, stated: “The power sector reform has introduced several changes, such as new

regulatory requirements and increased competition. Adapting to these changes has added complexity to our daily operations” (October 2023).

Another Staff of AEDC, Suleja business district, Emmanuel Silas, opines that: “Power sector reform has impacted our financial stability. Adapting to new tariff structures while ensuring a balance between affordability for consumers and the financial needs of the company has been challenging” (October 2023).

Table 6: The Challenges faced by Abuja Electricity Distribution Company in the Context of the Power Sector Reform

	SA	A	D	SD	Mean (\bar{x})
	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)	
Abuja Electricity Distribution Company (AEDC) faces challenges related to aging and inadequate infrastructure.	280(1,120) (76.3%)	63(189) (17.2%)	18(36) (4.9%)	6(6) (1.6%)	3.7
Power distribution often involves technical losses due to factors like resistance in power lines, as well as non-technical losses, which include issues such as theft and unauthorized connections	276(1,104) (75.2%)	77(231) (21%)	7(20) (1.9%)	7(7) (1.9%)	3.7
AEDC encounters difficulties in aligning its operations with changing regulations, managing reporting requirements, and navigating the complexities of the regulatory environment.	243(972) (66.2%)	107(321) (29.2%)	10(20) (2.7%)	7(7) (1.9%)	3.6
AEDC faces challenges related to revenue collection, tariff structures, and financial management.	263(1,052) (71.7%)	87(261) (23.7%)	13(26) (3.5%)	4(4) (1.1%)	3.7
AEDC encounters challenges in effectively communicating these changes to consumers, managing expectations, and addressing customer concerns	275(1,100) (75%)	61(183) (16.6%)	29(58) (7.9%)	2(2) (0.5%)	3.7
Average Overall Mean					3.7

Source: Field Survey, October, 2023.

Table 6 indicates the challenges faced by Abuja Electricity Distribution Company in the context of the power sector reform. The sectional mean of 3.6 shows that the respondents agreed with the items above. On the challenges faced by AEDC in Suleja, Hamza Aliu, a staff with the organization asserts that: "Aging infrastructure has been a significant challenge. We have faced difficulties in upgrading the distribution network to keep pace with the growing demand and technological advancements" (October 2023).

Buttressing the above, another respondent, Lydia Kuta argued that: Keeping up with evolving regulations has been challenging. There is a need for continuous monitoring and adjustments to ensure compliance with changing industry standards. This according to her has led to unforeseen challenges which include unexpected shifts in consumer behavior and unforeseen technical issues arising from the integration of new technologies (October 2023).

Discussion of Findings

i. The power sector reform has introduced several changes, such as new regulatory requirements and increased competition. This finding is in agreement with an earlier finding by Charles and Mohammed (2022) which showed that a significant relationship exists between power generation, transmission and distribution, and industrial development in Nigeria. Adelowio and Fadare (2023) found that a major reform to the sector is privatization, leading to the unbundling of the Power Holding Company of Nigeria. Some of the measures taken to implement the reforms include staff training and redeployment, organization restructuring, public sensitization, and disengagement of

the rothe production monitoring g mechanisms. Contrastingly, Ajenikoko's (2022) study found that deregulation of the power sector does not affect the efficiency of the Nigerian power sector when the results were compared with the international best practice standards.

ii. The study also found that aging infrastructure has been a significant challenge. This means difficulties in upgrading the distribution network to keep pace with the growing demand and technological advancements. A study by Charles and Mohammed (2022) found that The Nigeria electricity market is yet to efficiently allocate resources and yield favorable outcomes for market participants. The supply side of the market is struggling to find its footing after a promising reform that saw the government-owned utility that failed to deliver reliable power unbundled and mostly sold to private investors. Similarly, Aondona (2020) found that the power sector is characterized by many challenges which include the decay of infrastructure, low connection rates, inadequate generation, ineffective power regulation, high technical losses, and insufficient transmission and distribution facilities.

Conclusion

The result of this study confirmed that deregulation of the power sector did not achieve the desired effect on the efficiency of the Nigerian power sector. There are still power outages as reflected in the responses from the respondents as electricity power supply can be said to have improved despite the reforms in the last two decades. In conclusion, the power sector reform in Abuja Electricity Distribution Company (AEDC) has revealed challenges related to poor funding, inadequate implementation of reforms, and a lack of essential infrastructure. To enhance operational efficiency, it is imperative to address these issues strategically.

Recommendations:

- i. Establishing a robust oversight mechanism, involving regulatory bodies and industry experts is crucial for ensuring the effective implementation of power sector reforms. This oversight can monitor and evaluate the progress, identify bottlenecks, and recommend corrective measures, fostering a more streamlined and efficient execution of reforms
- ii. Implementing diverse funding mechanisms, such as public-private partnerships, attracting investments, and securing government support, can bolster AEDC's financial position. This would provide the necessary resources to upgrade infrastructure, invest in advanced technologies, and improve overall operational capabilities.

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