

# Impact of Public-Private Partnership (PPP) on the performance of Abuja Electricity Distribution Company (AEDC), Gwagwalada Area Council, FCT-Abuja

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## ABSTRACT

The introduction of Public-Private Partnership (PPP) is a paradigm shift in the role of a state as service provider to that of enabler and regulator to ensure efficient service delivery, cost-effectiveness, value for money, fair competition, accountability and risk sharing between the public and private sectors. However, there have been mixed reaction among scholars on the extent to which PPP has enhanced the performance of electricity distribution companies in Nigeria. Therefore, the main objective of this study is to determine the impact of PPP on power supply in the distribution of prepaid meters to customers, reduction in electricity tariffs and regular power supply by AEDC in Gwagwalada Area Council. A descriptive survey research design was adopted for data collection and analysis in conjunction with documents obtained from secondary sources. Random and purposive samplings were used to determine the sample size of the study. Out of 361 questionnaire administered to selected respondents in Gwagwalada Abuja, 297 were completed and returned. Frequency distribution and simple percentage were used for descriptive analysis, while chi-square statistical tool was adopted for the test of hypotheses with the aid of Statistical Package for Social Sciences (SPSS). The findings of the study reveal that the impact of PPP in power supply on the distribution of prepaid meters to customers, reduction in electricity tariffs and regular power supply by AEDC in Gwagwalada Area Council, FCT, Abuja have not been quite impressive due to poor maintenance culture, persistence collapse of the national grid, lack of transparency and accountability in revenue generation. The study therefore recommends for the use of cost-benefit analysis in determining electricity tariff, metering of all households and effective monitoring mechanisms.

**Keywords:** Public-private partnership, performance, electricity distribution company, power supply.

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## INTRODUCTION

The Nigerian power sector was wholly owned and managed by the federal government under the monopoly of the National Electric Power Authority (NEPA) since independence. Government could not guarantee constant electricity supply despite huge investments in the Nigerian power sector due to lack of fair competition. Government continued to invest massively in the sector in the 1970s due to increase in prices of oil in the international market. The power situation saw no improvement until the mid-1960s to the early 1970s when the Kinji Dam project was commissioned under NEPA.

However, the global fall in oil prices in the international market during the administration of the then military Head of State, General Ibrahim Badamasi Babangida, led to the introduction of Structural Adjustment Programme (SAP) in 1986 (Gotodok, 2022).

The full implementation of SAP led to the enactment of the Electricity (Amendment) Decree of 1988 and the passage of the Act in 1998 which eventually terminated the monopoly status of NEPA and invited private investors into the power sector (Onagoruwa, 2011). This singular act led to a paradigm shift in the role of

government from sole electricity provider to that of enabler and regulator to ensuring efficient service delivery, cost effectiveness and healthy competition. In efforts towards boosting the generation capacity of NEPA, the administration of President Olusegun Obasanjo began an upgrade of power infrastructure through the implementation of the National Integrated Power Project (NIPP) in 2004 to enhance the capacity of electricity generation and open up gas power stations nationwide (Okolobah and Ismail, 2013). Subsequently, the Nigerian Electricity Regulatory Commission (NERC) was established by the Electric Power Sector Reform Act 2005, with the responsibility of tariffs regulation and monitoring the quality of service delivery (Okeke, 2015).

The electricity utility was unbundled into 18 successor companies consisting of 6 Generation Companies (GenCos), 1 Transmission Company of Nigeria (TCN) and 11 Distribution Companies (DisCos). Generation is 80% privately owned and 20% government owned, TCN is 100% government owned and managed by a Canadian company, Manitoba Hydro Company on behalf of government while distribution company is 60% owned by private operators and 40% government owned (Gotodok, 2022). Thereafter, the Nigeria Public-Private Partnership Network was set-up in 2011 through collaboration between the Infrastructure Concession Regulatory Commission, and Lagos state PPP office, to create a platform for all state heads of PPP units nationwide. This became necessary since states may find it difficult to own and manage power generation plants due to factors like cost, technological implications, and intense competition for control over the infrastructure (Aina, 2024). Two decades after the unbundling of the Nigerian power Sector, there appears to be no major improvement in the supply of electricity in Nigeria due to lack of fair competition and low level private sector investment in the sector contrary to public expectations.

In the case of Gwagwalada Area Council, the use of estimated billing system due to the inability of AEDC to distribute adequate prepaid meters to consumers has been a major source of concern. Similarly, the frequent collapse of national grid coupled with none replacement of obsolete equipment have been largely responsible for irregular power supply. According to (Awosope, 2014), the infrastructure in the Nigeria electricity sector are obsolete and outdated and they do not function properly to meet up with the modern demands of the population. Similarly, Oyadiran and Olusola (2013) opines that the use of PPP in power sector faces the challenges of profit motives of the private firms involved in PPP projects, high electricity tariff, conflicting legislations, corruption and high debt profile. Similarly, an empirical study conducted by Ugochukwu and Ayuba (2020) revealed that the Federal government's privatization exercise negatively affected the performance of AEDC within the Federal Capital Territory (FCT) in the areas of general customer services such as electricity supply, electricity tariff and

provision of electricity infrastructure.

The difficulties in surmounting the challenges confronting PPP in the power sector may not be unconnected with the inability of either the government or private sector to keep to their own side of the bargain. For instance, the role of government is to provide enabling environment and to regulate the activities of private operators who is responsible for rendering services to end-users. Similarly, PPPs in Nigeria are subject to procurement laws that require competitive bidding for contract award based on certain financial or technical considerations. Any attempt by the Procurement Entity not to follow due diligence in the selection of preferred bidders could hinder fair completion and jeopardizes the possibility of a successful project implementation. In the same vein, the incessant increases in electricity tariff without a corresponding improvement in electricity supply by private sector operators are not unconnected with the profit motive of distribution companies. The inability of scholars to come up with common opinions on the performance of distribution companies in Nigeria made it necessary for this study to assess the impact of PPP in power supply on the performance of AEDC in Gwawalada Area Council, FCT, Abuja.

### **Statement of the problem**

The provision of affordable and stable electricity power supply is central to the development of a robust economy in Nigeria. In the opinion of Olorunkanmi and Joseph (2014), a nation that cannot provide adequate supply of electricity to its industries will remain perpetually underdevelopment. However, efforts by successive administrations to fix the perennial challenges confronting electricity generation, transmission and distribution since independence have not yielded the desired result. For instance, the replacement of National Electric Power Authority (NEPA) with Power Holding Company of Nigeria (PHCN) in 2005 and the setting up of PPP in 2011 were aimed at changing the fortune of power supply through the attraction of higher investment into the sector by private operators. On the contrary, the introduction of PPP failed to attract the necessary investment in the power sector (Adebayo 2017).

The Spectator's index in the year 2017 revealed that Nigeria has the second-worst power supply in the world after Yemen despite the introduction of PPP arrangement into the sector. This may not be unconnected with the pervasive poor distribution network, poor voltage profile, inaccurate billing system and epileptic power supply being experienced in most state of the Federation in Nigeria. Similarly, the World Bank report revealed that 85% of Nigerians are yet to have access to affordable and adequate power supply. Similarly, a report by PwC indicated that Nigeria's per capita power consumption of

151 kWh yearly makes it one of the lowest in Africa and across the globe (Ogunbiyi, 2022).

Nigeria has 23 power generating plants connected to the national grid with the capacity to generate 11,165.4 Megawatts (MW) of electricity. These power plants are managed by generation companies (GenCos), Independent power plants and Niger Delta Holding Company. Regrettably, the highest level of megawatts generated by Nigeria has been 5,615.40MW despite the 40,000 MW needed to sustain the surging population. The National Grid collapsed 98 times despite the investment of N1.51 trillion under the administration of President Muhammadu Buhari. In 2022 alone, the national grid collapsed 8 times (Ogunbiyi, 2022).

The 2021 Electricity Regulatory Index, an annual report, covered 43 countries, up from 36 in the previous edition, and assessed their impact on the performance of their electricity sector. The index covered 3 countries in the North Africa region; 14 in West Africa; 6 in Central Africa; 7 in East Africa; and 13 in the Southern Africa region. Nigeria placed 23rd on the ranking, beaten by South Africa (10th) and Ghana (17th) (Mojeed, 2021). A study conducted by Ugochukwu and Ayuba (2020) revealed that poor funding, corruption, political interference, vandalism of equipment, fraud, shady dealings, poor maintenance, ecological problems, and low rainfall are responsible for low megawatt generation that affected the general quality of electricity supply in the FCT in particular and the country at large. In the same vein, Adekeye (2012) opines that the performance of PHCN as an organization lived much to be desired due to shortage of gas to power stations, low water level, vandalism of PHCN facilities, political interference, inefficient personnel, lack of regular training programmes, corruption and mismanagement of funds. All efforts by successive administrations to reverse the above ugly trends have proved abortive.

In the case of Gwagwalada Area Council, FCT, Abuja, the continuous poor electricity supply has crippled commercial activities in the area. Many businesses such as hair dressing, barbing saloon, laundry services providers and hotels are facing serious setback due to epileptic power supply by the AEDC. Most residences in the area have resulted into the use of generator for domestic and commercial purposes. Items such as battery, candle, kerosene, diesel and Petroleum Motor Spirit (PMS) are in high demand. Electricity bills with exorbitant charges are distributed to customers monthly despite lack of regular power supply. Customers who paid for the installation of prepaid Meters in order to avoid paying for darkness through the estimated billing system are yet to be attended to for a several months (Shuaibu, 2014).

The inability of PPP arrangement in power sector to change the narrative of electricity distribution in Nigeria and Gwagwalada Area Council despite its successes in the Telecommunication Sector has been an issue that

requires the conduct of in-depth study and critical analysis. According to Fashola (2007), the open truth is that PPP offers the only realistic root to the actualization of Nigeria's potentials. If PPP is the way to go, why then is the situation in the Nigerian power sector different? Why is the introduction of liberalization policy unable to encourage healthy competition, cost reduction, regular power supply or facilitate higher investment portfolio into the power sector just like the monopolistic posture of National Electric Power Authority (NEPA)? In effort towards addressing the research problem of this study, the following questions are considered fundamental:

- i. To what extent has the PPP in power supply by AEDC enhanced the distribution of prepaid meters to prospective customers in Gwagwalada Area Council?
- ii. To what extent has PPP in power supply by AEDC encouraged reduction in electricity tariff in Gwagwalada Area Council?
- iii. To what extent has PPP in power supply by AEDC encouraged regular power supply in Gwagwalada Area Council?

### **Objective of the study**

The broad objective of this study is to examine the impact of PPP on the performance of AEDC, Gwagwalada, Abuja. The specific objectives include:

- i. To ascertain the extent to which PPP in power supply by AEDC facilitated the distribution of prepaid meters to prospective customers in Gwagwalada Area Council, Abuja.
- ii. To investigate the extent to which PPP in power supply by AEDC encourages reduction in electricity tariff in Gwagwalada Area Council, Abuja.
- iii. To determine the extent to which PPP in power supply by AEDC enhances regular provision of electricity tariff in Gwagwalada Area Council, Abuja.

### **Hypotheses**

The following hypotheses were formulated to guide the study:

- i. There is no significant relationship between PPP in power supply by AEDC and the distribution of prepaid meters to prospective customers in Gwagwalada Area Council, Abuja.
- ii. There is no significant relationship between PPP in power supply by AEDC and the reduction in electricity tariff in Gwagwalada Area Council, Abuja.
- iii. There is no significant relationship between PPP in power supply by AEDC and regular provision of electricity tariff in Gwagwalada Area Council, Abuja.

## Conceptual Review

### a. Electricity

The concept of electricity refers to a kind of energy that involves the movement of electrons as a result of pressure between two points due to observed differences, making it possible to generate current. Electricity is generated at a power station by electromechanical generators which are primarily driven by heat engines and fuelled by chemical combustion or nuclear fission. It is also generated by other means such as kinetic energy of flowing water and wind (Mehta and Mehta, 2008). Electricity is generated through different means. In Nigeria for example, electricity in various power stations is generated using different means. The Kainji, Jebba and Shiroro power stations use water for the generation of Electricity, Egbin and Sapele use steam while Sapele, Afam and Delta power stations use gas (Ijewere, 2012).

The power holding Company of Nigeria (PHCN) is made of three types of subsidiaries namely;

**i). Generation Companies (GenCos):** The generation companies are responsible for the production of electricity in Nigeria's power sector. There are six GenCos each operating a specific power plant or group of power plants (Thermal power plants: Gas-fired and Coal-fired, Hydroelectric power plants, and Gas turbine power plant). Their key roles are to generate electricity and feed it into the national grid, plant maintenance, fuel management and grid stability. The GenCos sell the generated electricity to the Transmission Company of Nigeria (TCN).

**ii). Transmission Company of Nigeria (TCN):** The Transmission Company is responsible for the transfer of electric current from GenCos to the DisCos. It is a vital link in the power supply chain, ensuring that electricity generated is efficiently transmitted to DisCos. The roles of TCN are the transmission of grid management, power transmission, grid stability, system operations, maintenance and upgrade. The major cities in Nigeria that are interconnected by TCN include; Lagos, Ibadan, Abuja, Jos, Kaduna, Kano, Benin, Port Harcourt, Enugu and Maiduguri. These cities are connected through high-voltage transmission lines, substations and transformers enabling efficient transmission of electric current across the country.

**iii) Distribution Company (DisCos):** DisCos are responsible for the distribution of electricity from the TCN to the end uses (customers or consumers). There are eleven DisCos in Nigeria, each serving specific geographical region. The major roles of DisCos are distribution of electricity, network management, metering and billing, customer service and revenue collection.

### Adopted model of PPP by DisCos

In Nigeria's power industry, the concession model of public-private partnership (PPP) has been utilized to attract private sector investment and expertise in various segments of the electricity value chain, including generation, transmission, and distribution. The concession model typically involves granting a private entity the right to operate, maintain, and sometimes expand infrastructure or services for a specified period, usually under a contractual agreement with the government or a relevant regulatory authority. The examples of the concession model applied in Nigeria's power sector include:

**1. Power Distribution Companies (DisCos):** Following the privatization of the Nigerian electricity sector in 2013, the distribution segment was unbundled into 11 distribution companies (DisCos), each serving a specific geographical area. These DisCos were privatized through a concession model, where private investors acquired majority stakes and assumed control of the distribution networks. The investors are responsible for operating, maintaining, and upgrading the distribution infrastructure to improve service delivery and revenue collection (NERC, 2013).

**2. Transmission Company of Nigeria (TCN):** The Transmission Company of Nigeria (TCN) oversees the transmission grid infrastructure responsible for transporting electricity from generation plants to distribution networks across the country. In 2012, the Nigerian government initiated a reform process to improve the efficiency and reliability of the transmission system. As part of this reform, the government pursued partnerships with private investors through concession agreements to rehabilitate, expand, and manage specific transmission assets and networks. These concessions aim to enhance the capacity and performance of the transmission grid (TCN, 2022).

**3. Independent Power Plants (IPPs):** In addition to the traditional utility-owned power generation assets, Nigeria has encouraged private investment in independent power plants (IPPs) through concession arrangements. IPPs are privately owned and operated electricity generation facilities that sell power to the grid or directly to consumers under power purchase agreements (PPAs). The government has facilitated concessions for IPPs in various sectors, including thermal, hydro, solar, and wind power generation, to diversify the energy mix and increase generation capacity (NIPC, 2018).

### b. Privatization Vs PPP

The concepts of Privatization and PPPs are two distinct approaches to involving the private sector in the provision

of public services or infrastructure. While both involve private sector participation, they differ in terms of ownership, control, and the degree of involvement of the government. For instance, Privatization involves the transfer of ownership and control of public assets or services from the government to the private sector. It typically entails the sale of public enterprises or assets to private investors or companies. In privatization, the private sector assumes full responsibility for the provision, management, and financing of the services or assets. The government's role is limited to regulation and oversight. On the other hand, PPPs involve collaborations between the public and private sectors to develop, finance, operate, and maintain public infrastructure or services. In PPPs, the government retains ownership or control over the assets, while the private sector contributes capital, expertise, and resources. PPPs can take various forms, including concessions, joint ventures, and service contracts (Yescombe, 2007).

According to Hart and Shleifer (2005), privatization can lead to efficiency gains, improved service quality, and innovation through competition and profit incentives. However, critics argue that privatization may result in increased costs for consumers, reduced access to essential services by vulnerable populations, and loss of accountability and transparency. Meanwhile, Scholars such as Savas (2000) and Goodman (1997) observed that the potential benefits of PPPs, include risk sharing, cost savings, innovation, and better value for money. PPPs allow for the harnessing of private sector efficiencies while leveraging public sector resources and ensuring public accountability. However, PPPs also face challenges related to contract design, risk allocation, and the balance of public and private interests.

The privatization of Nigeria's power sector began in 2013, with the unbundling and privatization of the formerly state-owned Power Holding Company of Nigeria (PHCN) as presented below:

**1. Unbundling and privatization:** The Nigerian government unbundled the PHCN into separate entities, including generation, transmission, and distribution companies. The distribution companies (DisCos) were privatized through a competitive bidding process, with private investors acquiring majority stakes in these entities Nigerian Electricity Regulatory Commission (NERC, 2021).

**2. Regulatory framework:** The Nigerian Electricity Regulatory Commission (NERC) plays a crucial role in regulating the activities of distribution companies and ensuring compliance with standards and regulations. NERC provides the regulatory framework within which PPPs operate in the power sector.

**3. Performance agreements:** As part of the privatization

process, performance agreements were signed between the government and the new owners of the distribution companies. These agreements outline specific performance targets related to improving electricity distribution, reducing losses, enhancing revenue collection, and providing better customer service (World Bank Group, 2019).

**4. Investment obligations:** Private investors in distribution companies are obligated to make significant investments in infrastructure, technology, and capacity building to improve the efficiency and reliability of electricity distribution. These investments are crucial for addressing the infrastructure deficit in Nigeria's power sector (Federal Ministry of Power, Works & Housing, 2017).

**5. Tariff regulation:** NERC regulates electricity tariffs to ensure they are cost-reflective and fair to both consumers and investors. Tariff adjustments are made periodically based on changes in market conditions, inflation, exchange rates, and other factors.

**6. Public oversight:** Despite the involvement of private investors, there is still a level of public oversight to ensure that the interests of consumers and the broader public are protected. Regulatory bodies like NERC, as well as consumer advocacy groups, play a role in monitoring the performance of distribution companies and advocating for the rights of consumers (Agbibo, 2015).

### ***c. Performance***

Performance, as a concept, has been explored and defined by scholars across various fields including management, psychology, economics, and sociology. In management literature, performance is often defined as the accomplishment of tasks, objectives, or goals within a given time frame and with allocated resources. Performance can be measured in terms of efficiency (the ratio of output to input), effectiveness (the degree to which objectives are achieved), and productivity (output per unit of input). Scholars like Peter Drucker and Robert Kaplan have contributed extensively to the understanding of performance management and measurement. In psychology, performance is often viewed as the execution of tasks or behaviors in response to situational demands (Drucker, 1964).

Performance can be influenced by various factors including individual abilities, motivation, personality traits, and environmental conditions. Psychologists have studied performance in domains such as cognitive tasks, sports, and organizational behavior. Theories like goal-setting theory, expectancy theory, and flow theory provide insights into the determinants of performance Locke and Latham, 2002). Economists define

performance in terms of efficiency, productivity, and competitiveness. Economic performance refers to the ability of individuals, organizations, or economies to generate output and create value (Kaplan et al., 1992).

Economic performance indicators include GDP growth, employment rates, productivity levels, and trade balances. Economists analyze factors affecting performance such as investment, innovation, regulation, and market competition. In sociology, performance is often studied in the context of social interactions and rituals. Performance can refer to the enactment of roles, identities, and behaviors in social situations. Sociologists explore how individuals and groups perform their identities through language, gestures, and symbolic actions. Performance theory, as developed by scholars like Erving Goffman, examines how social life resembles a theatrical performance with actors, audiences (Goffman, 1959). For the purpose of this study, performance refers to the capacity Power Holding Company of Nigeria to ensure regular supply of electricity at affordable rates to prospective customers.

### Theoretical framework

This study adopted the neo-liberalism as a theoretical underpinning owing to the fact that the theory fails to fully support the transfer of state owned enterprises to the private sector. According to Ryan (1993), the neo-liberalism school consists of writers such as John Locke, Adam Smith, Montesquieu, Thomas Jefferson, John Stuart Mill, Lord Acton, T. H. Green, John Dewey, Isaiah Berlin and John Rawls. Neo-liberalism stresses the value of competition. It argues that free market is the most efficient allocation of resources and that state intervention in economic activities must be at the minimal level. Scholars have argued that neo-liberalism is associated with *laissez faire* economics.

Liberalism stresses the need for prudent utilization of resources through market mechanism of production and distributions, removal of trade restriction, globalization and the promotion of a private sector led economy. Neo-liberalism deepens and enlarges the market by manipulating numbers, carrying out computational analysis and engaging in production and distributions. The main objective of neo-liberalism is to create a world where every action of every being is trading in a competitive environment and controlling market trends.

According to neo-liberals, the liberalization of the economy attracts more domestic and foreign investment, which increases the rate of capital accumulation (Todaro and Smith, 2002). Capital accumulation is analogous to raising domestic savings rates, which impacts capital-labor ratios and per capita incomes in positive ways (Todaro and Smith, 2002). Liberalization further requires reducing barriers, such as tariffs, quotas, and non-tariff barriers, to the flow of free trade and investment. The elimination or large reduction of government subsidies

that keep the prices of certain goods down is another component of liberalization. By cutting subsidies and reducing the barriers to trade, the market is allowed to determine prices, and neo-liberals argue that the prices are "right" (Gershman and Alec, 2000). Prices will reflect the actual value of the goods without government inefficiencies. Capital will hence flow to the areas of the economy that are the most profitable and productive. Liberalizing the economy will integrate the national economy with the global economy, and, in theory, this will raise social welfare by providing the cheapest goods and services possible to consumers through imports while forcing producers to be as competitive as possible. Deregulation of the economy entails a reduction of the level of state control over goods, services, capital, and domestic labor markets (Gershman and Alec, 2000).

These approaches are meant to ensure that state intervention in developing economies will be reduced. By allowing the market to regulate the economy, privatizing state-owned enterprises and services, promoting export expansion, creating a welcome climate for foreign investment, and eliminating government controls on prices. Neo-liberals argue that economic efficiency will be stimulated, leading to economic growth (Todaro and Smith, 2002). Inherent in this approach is the idea of "short term pain" for "long term gain" (Schoepf et al., 2000). There are always winners and losers in the economy, and neo-liberalism argued that the "trickle down" phenomenon would occur as countries followed their policy prescriptions.

The introduction of SAP in 27 August 1986, and the subsequent implementation of the IMF/World Bank conditionality attached to it, came with some negative consequences that affected many sectors of the economy such as agriculture and industry. In fact, SAP came at a time when Nigeria was beset by a charged political atmosphere fueled by the biting economic hardship that hit most families. Cognizant of the situation, the government in power still went ahead to implement the IMF conditionality that led to many unpleasant consequences such as workers losing their jobs through retrenchment, many people not being able to afford most of the necessities of life due to wage cuts and withdrawal of subsidies, skyrocketing inflationary situation occasioned by currency devaluation, high rates of unemployment, economic liberalization, privatization and deregulation. Nevertheless, SAP was not benefitting everyone. While the rural classes and farmers rose from the ashes, Nigerian middle class and the civil servants dropped back down. In order to keep the fiscal policy in check, government reduced the expenditures on the social infrastructure. This meant that people's wages grew much slower, and their living standards worsened.

The neo-liberal approach is applicable to this study since its major postulations encourage collaborations and partnership between the public and private sector in the provision of goods and services to consumers. However, government needs to provide enabling environment for a

private sector driven economy while the private sector on the other hand is charged with the responsibility of running the company. It is a known fact that the major reason for the introduction of deregulation policy into the Management of electricity in Nigeria was due to the inability of Nigeria Electric Power Authority (NEPA) to ensure regular supply of electricity to Nigerian citizens at affordable cost. Subsequently, power sector reforms was introduced by government through the transfer of equities in NEPA to Power Holding Company of Nigeria (PHCN) in other to ensure probity, accountability and regular supply of electricity to citizens at affordable rates. it may appear that the above goals are yet to be realized, but the system shall be normalized as time goes on.

**MATERIALS AND METHODS**

**Research design**

A descriptive survey research design was adopted because this paper sought to find out the opinions of AEDC staffs and electricity consumers in Gwagwadada Area Council concerning the impact of PPP in power supply on the performance of AEDC. The descriptive survey was carried out through the administration of structured questionnaire and interview.

**Population of the study**

Gwagwalada Area council is made up of 10 wards (Kutunku, Staff quarters, Ibwa, Dobi, Paiko, Tungan maje, Zuba, Ikwa, Gwako) with a total population of

157,770 as at 2006 census. However, the study considered three main township wards (Central, Kutunku and Quarter’s) to obtain information on the Performance of AEDC. The reasons for choosing these three wards were that the major offices of the company were located in the area. The target population include; the selected 361 households who are made up of; AEDC staff, civil servants, students, farmers, and artisans. Also, 10 principal officers of AEDC who are directly in charge of the Electricity distribution in Gwagwalada Area Council were interviewed on the subject matter of this study

**Sampling techniques and sample size**

Random sampling and purposive sampling techniques were adopted in selecting the sample size for this paper. In the first place, random sampling was used in order to give equal chance for all categories of respondents to be picked at random. Secondly, purposive sampling was used in order to select respondents who are in the best position to answer the research questions. Out of 10 wards in Gwagwalada Area Council, 3 major township wards (Central, Kutunku and Quarter’s) were selected for the study. Statistically, the Central Ward consists of ; Sabo-Gari, Dagiri, Angwandodo, Angwan-Azara and Angwan-Bassa, Quarters Ward is made up of; FCDA Staff Quarters (Kontagora Estate), Phase 1, 2 and 3 quarters while Kutunku Ward consist of ; Angwan Geshi 1 and 2, Angwan Fulani 1 and 2, Angwan Gade, New Kuntuku, Old Kutunku, Abattoir Community, Angwan Shainu and Stadium layout Communities. The breakdown of the number of households selected for the study is presented in Table 1.

**Table 1.** Number of households.

Wards	Enumeration centres	No of households
Central	10	5001
Qarters	7	3502
Kutunku	7	3500
<b>Total</b>	<b>24</b>	<b>12003</b>

Source: Field Survey, 2023.

The study adopted the formula presented by Krejcie and Morgan (1970) in calculating the sample size as follows:

Sample size formula =  $S = X^2 NP (1-P) \div d^2 (N-1) + X^2 (1-P)$

Where:

S = Required sample size.

X<sup>2</sup> = The table value of chi-square for 1 degree of freedom at the desire confidence level (3.841).

N = The population size.

P = The population proportion (assumed to be 0.50 since this would provide the maximum sample size).

d = The degree of accuracy expressed as a proportion (0.05)

X<sup>2</sup> = 3.841

N = 12003

P = 0.5

d = 0.05

S = (3.841) (12003) (0.5) (0.5) ÷ (0.05)<sup>2</sup> (12003 -1) + 3.841 (0.5)

S = 11525.881 ÷ 30.005 + 1.9205

$S = 11525.881 \div 31.9255$   
 $S = 361$

### Instruments of data collection

The instruments for data collection in this study are questionnaire and interview. The questionnaire used for this research work has multiple opinions for the questions where respondents would be provided with opinion of answers to choose only the right answer to their opinion. This form of research plan was chosen in order to ease the work of the researcher in the area of classifying and analyzing individuals (respondents) options. The questionnaires included both structure and unstructured questions. The researcher went further to conduct personal interview for answer not properly provided when filling the questionnaire. On the whole, questionnaires were administered to the staff of AEDC in Gwagwalada Area Office and electricity consumers.

### Data analysis

The study used both descriptive and inferential

(analytical) statistical tools for data analysis and testing of hypotheses respectively. Descriptive tools include the use of frequency distribution tables and percentages. The frequency distribution tables show the number of different responses to a particular question, while percentages show the portion of each response group. Inferential statistical tool was used for the testing of hypotheses through independent T-test, correlation and Chi-Square at 0.05 (5%) level of significance. Statistical Package for Social Science (SPSS) Version 16 was also used as statistical package to analyze data.

### Decision rule

The decision rule on the formulated hypotheses for this study states that if P-value is less than alpha ( $P\text{-value} < \alpha$ ), we reject null hypothesis, while if P-value is greater than alpha ( $P\text{-value} > \alpha$ ) we accept null hypothesis. In this study, alpha is taken at 5% (0.5) level of significance.

The results in Table 2 showed that out of 361 questionnaire administered to selected households in Gwagwalada Area Council, Abuja, 297 were correctly filled and returned. The outcome of above exercise was used in computing the data below.

**Table 2.** Questionnaire administered and returned.

S/N	Wards	AEDC Staff		Civil Servants		Target population							
		Administered	Returned	Administered	Returned	Students		Farmers		Artisans		Total	
		Administered	Returned	Administered	Returned	Administered	Returned	Administered	Returned	Administered	Returned	Administered	Returned
1	Central	17	13	35	28	23	19	40	33	36	32	151	125
2	Quarters	13	11	21	19	16	12	30	26	25	21	105	89
3	Kutunku	14	10	25	22	23	17	28	24	15	10	105	83
<b>Total</b>		<b>44</b>	<b>34</b>	<b>81</b>	<b>69</b>	<b>62</b>	<b>48</b>	<b>98</b>	<b>83</b>	<b>76</b>	<b>63</b>	<b>361</b>	<b>297</b>

Source: Field survey 2023.

### Data presentation and analysis

The data in Table 3 exhibits the sample size of the study: Central (151), Kutunku (105) and Quarter (105) ward. The result in Table 4 shows the target population for the study from Central, Kutunku and Quarter wards. They include; AEDC Staff (44), civil servants (81), students (62), farmers (98) and artisans (76). The data in Table 2 indicates the total number of administered and returned questionnaire.

The data in Table 5 demonstrates that 67 (22.6%) of the respondents were of the view that the impact of PPP in power supply and distribution of prepaid meters by AEDC

to prospective customers in Gwagwalada Area Council significant, 143 (48.1%) considered it insignificant while the remaining 87(29.3%) were indifference. By implications, the larger number of the research population subscribed to the view that the impact of PPP in power supply and distribution of prepaid meters by AEDC to prospective customers in Gwagwalada Area Council is insignificant. This result is in congruence with the data obtained from interview schedule. For instance, the interviewee stated that prepaid meters are not distributed to those who paid for them on time while the majority of AEDC customers are low income earners who could not even afford to purchase the prepaid meter individually.



**Table 3.** Sample size.

Wards	Enumeration centres	No of households	Sample size
Central	10	5001	$5001/12003 \times 361 = 151$
Quarters	7	3502	$3502/12003 \times 361 = 105$
Kutunku	7	3500	$3500/12003 \times 361 = 105$
<b>Total</b>	<b>24</b>	<b>12003</b>	<b>361</b>

Source: Field Survey, 2023.

**Table 4.** Target population.

S/N	Wards	Target population					Total
		AEDC staff	Civil servants	Students	Farmers	Artisans	
1	Central	17	35	23	40	36	<b>151</b>
2	Quarters	13	21	16	30	25	<b>105</b>
3	Kutunku	14	25	23	28	15	<b>105</b>
<b>Total</b>		<b>44</b>	<b>81</b>	<b>62</b>	<b>98</b>	<b>76</b>	<b>361</b>

Source: Field Survey, 2023.

The instruction that any compound owing AEDC must clear all outstanding debt before applying for prepaid meter made it difficult for collective payment for prepaid meter to be made due to high rate of indebtedness. Similarly, the charges for single face users are almost the same with that of multiple users. Also, Ugochukwu and Ayuba (2020) observed that the Federal government's privatization exercise negatively affects the performance of AEDC within the Federal Capital Territory (FCT) in the areas of general customer services such as electricity supply, electricity tariff and provision of critical electricity infrastructure

The result in Table 6 shows that 71 (23.9%) of the respondents were of the view that the impact of PPP in power supply and the reduction in electricity tariff by AEDC in Gwagwalada Area Council is significant, 139 (48.8%) subscribed to the opinion that it is insignificant while the remaining 87 (29.3%) were neutral. On the whole, the larger numbers of the respondents were of the view that that the impact of PPP in power supply and the reduction in electricity tariff by AEDC in Gwagwalada Area Council is insignificant. Similarly, the result of interview conducted with selected respondents reveals that the use of estimated billing for postpaid customers is not justifiable because it causes a lot of abuses. Consumers are reluctant to pay all charges due to high estimated bills that is also associated with the unreliable

power supply. Whether there is regular power supply or not the normal and sometimes abnormal monthly estimated bills are sent to consumers. In most cases customers usually make part-payment in order to prevent AEDC officials from cutting their lights. This has resulted into accumulated debt for both incoming and outgoing customers using multiple phases in a compound. In view of the above, the use of PPP has not encouraged the downward review of billing system for all categories of users.

The result in Table 7 exhibited that 65 (21.9%) of the respondents were of the opinion that the impact of PPP in power supply and regular provision of electricity by AEDC to prospective customers in Gwagwalada Area Council is significant, 155 (52.2%) considered it insignificant while the remaining 77(25.9%) were indifference. By implications, the larger number of the research population subscribed to the view that the impact of PPP in power supply and regular provision of electricity by AEDC to prospective customers in Gwagwalada Area Council is insignificant. The outcome of personal interview conducted with respondents equally corroborated the above result. This is not unconnected with the fact that powers supply is erratic due to frequent collapse of the national grid, technical fault, vandalisation of AEDC facilities, obsolete equipment and the use of non-functional transformers for larger coverage which usually

**Table 5.** PPP in power supply and distribution of prepaid meters by AEDC to prospective customers in Gwagwalada Area Council, Abuja.

	Views	Frequency	Percent	Valid percent	Cumulative percent
Valid	Significant	67	22.6	22.6	22.6
	Insignificant	143	48.1	48.1	70.7
	Indifference	87	29.3	29.3	<b>100.0</b>
	<b>Total</b>	<b>297</b>	<b>100.0</b>	<b>100.0</b>	

Source: Field Survey (2023).

**Table 6.** PPP in power supply and the reduction in electricity tariff by AEDC in Gwagwalada Area Council, Abuja.

	<b>Views</b>	<b>Frequency</b>	<b>Percent</b>	<b>Valid percent</b>	<b>Cumulative percent</b>
Valid	Significant	71	23.9	23.9	23.9
	Insignificant	139	48.8	48.8	72.7
	Indifference	87	29.3	29.3	<b>100.0</b>
	<b>Total</b>	<b>297</b>	<b>100.0</b>	<b>100.0</b>	

Source: Field Survey (2023).

**Table 7.** PPP in power supply and regular provision of electricity by EADC in Gwagwalada Area Council, Abuja.

	<b>Views</b>	<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
Valid	Significant	65	21.9	21.9	21.9
	Insignificant	155	52.2	52.2	74.1
	Indifference	77	25.9	25.9	<b>100.0</b>
	<b>Total</b>	<b>297</b>	<b>100.0</b>	<b>100.0</b>	

Source: Field Survey (2023).

result to low shedding. The power supply for the domestic is about 30% while that of the commercials like the banks, companies is 50% stable. Similarly, Shuaibu (2014) observed that electricity bills with exorbitant charges are distributed to customers monthly despite lack

of regular power supply. Customers who paid for the installation of prepaid Meters in order to avoid paying for darkness through the estimated billing system are yet to be attended to for a several months.

**Test of hypotheses**

The hypotheses for this paper were tested using the chi-square analytical tools. This became imperative in order to determine whether there is significance relationship between the use of PPP and the performance of AEDC in Gwagwalada Area Council.

**Hypothesis I**

There is no significant relationship between PPP in power supply by AEDC and the distribution of prepaid meters to prospective customers in Gwagwalada Area Council, Abuja.

**One-Sample Statistics**

	<b>N</b>	<b>Mean</b>	<b>Std. deviation</b>	<b>Std. error mean</b>
PPP in power supply and the Distribution of Prepaid Meter by AEDC	297	2.0673	.71814	.04167

**One-Sample Test**

	<b>Test value = 0</b>					
	<b>t</b>	<b>Df</b>	<b>Sig. (2-tailed)</b>	<b>Mean difference</b>	<b>95% confidence interval of the difference</b>	
					<b>Lower</b>	<b>Upper</b>
PPP in power supply and the distribution of prepaid meter by AEDC	49.612	296	.000	2.06734	1.9853	2.1493

**Test Statistics**

PPP in power supply and the distribution of prepaid meter by AEDC	
Chi-Square	31.354 <sup>a</sup>
Sdf	2
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 99.0.

**Decision**

H0 is rejected since the sig. is < 0.05. Therefore, the study concludes that there is significant relationship between PPP in power supply by AEDC and the distribution of prepaid meters to prospective customers in Gwagwalada Area Council, Abuja.

**Hypothesis II**

There is no significant relationship between PPP in power supply by AEDC and the reduction in electricity tariff in Gwagwalada Area Council, Abuja.

**One-Sample Statistics**

	N	Mean	Std. deviation	Std. error mean
PPP in power supply and reduction in electricity tariff by AEDC	297	2.0539	.72861	.04228

**One-Sample Test**

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean difference	95% Confidence interval of the difference	
					Lower	Upper
PPP in power supply and reduction in electricity tariff by AEDC	48.580	296	.000	2.05387	1.9707	2.1371

**Test Statistics**

PPP in power supply and reduction in electricity tariff by AEDC	
Chi-Square	25.535 <sup>a</sup>
Df	2
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 99.0.

**Decision**

H0 is rejected since the sig. is < 0.05. Therefore, the study concludes that there is significant relationship between PPP in power supply by AEDC and the reduction in electricity tariff in Gwagwalada Area Council, Abuja.

**Hypothesis III**

There is no significant relationship between PPP in power supply by AEDC and regular provision of electricity tariff in Gwagwalada Area Council, Abuja.

**One-Sample Statistics**

	N	Mean	Std. deviation	Std. error mean
PPP in power supply and regular provision of electricity by AEDC	297	2.0438	.68879	.03997

**One-Sample Test**

	Test Value = 0					
	T	Df	Sig. (2-tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
PPP in power supply and regular provision of electricity by AEDC	51.136	296	.000	2.04377	1.9651	2.1224

**Test Statistics**

	PPP in power supply and regular provision of electricity by AEDC
Chi-Square	50.081 <sup>a</sup>
Df	2
Asymp. Sig.	.000

a. 0 cells (.0%) have expected frequencies less than 5. The minimum expected cell frequency is 99.0.

**Decision**

H<sub>0</sub> is rejected since the sig. is < 0.05. Therefore, the study concludes that there is no significant relationship between PPP in power supply by AEDC and regular provision of electricity tariff in Gwagwalada Area Council, Abuja.

**DISCUSSION**

The findings of the study reveal that prepaid meters are not distributed to those who paid for them on time while the majority of AEDC customers who are low income earners could not even afford to purchase the prepaid meter individually. The instruction that any compound owing AEDC must clear all outstanding debt before applying for prepaid meter made it difficult for collective payment for prepaid meter to be made due to high rate of indebtedness incurred mostly by previous tenants who have move to another location. Similarly, the charges for single phase users are almost the same with that of multiple users.

Secondly, the use of estimated billing for postpaid customers is not justifiable because it is susceptible to a lot of abuse. Consumers are reluctant to pay all charges due to high estimated billing that is also associated with the unreliable power supply. Whether there is regular power supply or not the normal and sometimes abnormal monthly estimated bills are sent to consumers. In most cases customers usually make part-payment in order to prevent AEDC officials from disconnection their lights. This has resulted into accumulated debt for both

incoming and outgoing customers using multiple phases in a compound (Isa. 2019). In view of the above, the use of PPP has not encouraged the downward review of billing system for all categories of users.

Lastly, that powers supply is erratic due to frequent collapse of the national grid, technical fault, vandalism of AEDC facilities, obsolete equipment and the use of non-functional transformers for larger coverage which usually result to low shedding. The power supply for the domestic is about 30% while that of the commercials like the banks, companies is 50% stable. In the same vein, a study conducted by Olanrele (2024) reveal that privatization or the introduction of PPP has resolved the persistent technical inefficiency of electricity supply due to technical challenges from network losses. Similarly, Shuaibu (2014) observed that electricity bills with exorbitant charges are distributed to customers monthly despite lack of regular power supply. Customers who paid for the installation of prepaid Meters in order to avoid paying for darkness through the estimated billing system are yet to be attended to for a several months. Adedeji (2017) opines that the regulatory framework put in place to streamline the activities of Electricity Distribution Company in Nigeria is weak and non-proactive. The

study equally observed that lack of enabling environment is largely responsible for the poor performance of PHCN in Nigeria.

## CONCLUSION

The National Integrated Power Project (NIPP) was initiated in 2004 to boost electricity generation capacity by opening of gas power stations across the country. The federal government enacted the 2005 Electrical Power Sector reform Act (EPSR Act) which called for unbundling of national power utility company into 18 successor companies: six generation companies and eleven distribution companies covering all 36 states and a national power transmission company. This unbundling process paved way for the removal of government monopoly in order to encourage fair competition, cost effectiveness, accountability and regular power supply.

Subsequently, the Nigeria Public-Private Partnership Network was set-up in 2011 through collaboration between the Infrastructure Concession Regulatory Commission, and Lagos state PPP office, to create a platform for all state heads of PPP units nationwide. This became necessary since states may find it difficult to own and manage power generation plants due to factors like cost, technological implications, and intense competition for control over the infrastructure. Two decades after the unbundling of the Nigerian power Sector, there is no major improvement in the supply of electricity in Nigeria due to lack of fair competition and low level investment in the sector contrary to public expectations. In the case of Gwagwalada Area Council, the use of estimated billing system due to the inability of AEDC to distribute adequate prepaid meters to consumers has been a major source of concern. Similarly, the frequent collapse of national grid coupled with obsolete equipment, vandalization PHCN facilities have been largely responsible for irregular power supply.

## RECOMMENDATIONS

The following recommendations are considered fundamental order to proffer solutions to the issues affecting metering system, regular power supply and outrageous tariff plans by DisCos in Gwagwalada Area Council:

1. AEDC should procure and distribute prepaid meters to all categories of customers. This will go a long way in solving the problem of incurring huge bad debt that may not be recovered at the long run. Similarly, the use of prepaid meter will equally enhance accurate billing system since customers would only pay for current used as against the practice of paying for darkness. The use of smart meters, which enable remote monitoring and

automated billing, thereby reducing operational costs and improving revenue collection, is highly recommended.

2. The use of smart meters will equally reduce billing system since customers would only pay for current used as against the postpaid or estimated billing that has resulted into unpaid debt, Inaccurate tariff plans, corruption, injustice and lack of accountability. Increase in billing systems should be as a result of improved and regular supply of electricity to users. By implication, the idea of segmenting electricity users into group A, B, C and D is a step in the right direction in order to encourage fair competition and cost effectiveness.

3. All obsolete equipment should be replaced while new transformers are to be supplied to larger areas in order to encourage regular power supply. Adequate security should be provided to protect AEDC facilities from vandals. All issues responsible for frequent collapse of national grid should be resolved. There is equally need for infrastructure upgrade, capacity building reduction in technical losses, improving maintenance practices, and investing in renewable energy sources to diversify the energy mix.

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