

IMPACT OF PREPAID METERING SYSTEM ON CONSUMER SATISFACTION IN GWAGWALADA AREA COUNCIL

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Abstract

Electricity metering systems are essential components of efficient energy distribution and consumer satisfaction. In Nigeria, the transition from postpaid to prepaid metering was designed to promote transparency, accountability, and user empowerment. This paper conceptually examines the impact of prepaid metering on consumer satisfaction within Gwagwalada Area Council, Abuja. Drawing from theoretical models and studies published between 2020 and 2024, it explores billing accuracy, control, and trust. Findings suggest that prepaid metering enhances satisfaction by improving fairness and eliminating estimated billing, though challenges such as delayed meter access, technical issues, and inconsistent power supply persist. The paper recommends consumer education, infrastructure development, and broader policy reinforcement to sustain satisfaction and energy sector efficiency.

Keywords: Prepaid Metering, Consumer Satisfaction, Consumer Empowerment, Electricity Billing and Transparency.

Introduction

Electricity plays a vital role in socio-economic development. In Nigeria, the power sector has faced persistent challenges such as inaccurate billing, poor service delivery, and consumer dissatisfaction. The introduction of the prepaid metering system by electricity distribution companies sought to address these concerns by empowering consumers to pay for electricity before use, fostering cost control, and promoting fairness (Mahmud & Igbokwe, 2021).

In the Gwagwalada Area Council of the Federal Capital Territory (FCT), the Abuja Electricity Distribution Company (AEDC) has implemented prepaid metering as part of Nigeria's electricity reform agenda under the Multi-Year Tariff Order (MYTO). This initiative aligns with government plans to improve transparency and consumer satisfaction in power distribution. However, issues such as irregular supply, meter procurement delays, and system malfunctions remain. This paper explores the conceptual relationship between prepaid metering and

consumer satisfaction in the Gwagwalada Area Council.

Statement of the Problem

Before prepaid metering, electricity consumers faced recurring complaints of estimated billing, inflated charges, and unreliable readings. Although prepaid meters were introduced to mitigate these problems, challenges persist:

- i. Long wait times for meter installation
- ii. Poor technical maintenance and token recharge difficulties
- iii. Lack of clarity regarding tariff adjustments

Thus, the study addresses a critical question: *Has the prepaid metering system genuinely improved consumer satisfaction in Gwagwalada?*

Objectives of the Study

This study aims to:

1. Conceptually assess the impact of prepaid metering on consumer satisfaction.
2. Examine the role of transparency and consumption control in consumer perceptions.
3. Identify operational and policy-related challenges affecting prepaid metering.
4. Recommend strategies to enhance metering efficiency and satisfaction.

Research Questions

1. What is the relationship between prepaid metering and consumer satisfaction in Gwagwalada?
2. How does prepaid metering influence transparency and trust?
3. What challenges impede effective metering performance?
4. What policy measures can improve consumer trust and satisfaction?

Significance of the Study

This study contributes to the existing knowledge on consumer satisfaction within Nigeria's reformed energy sector. It provides useful insights for policymakers, AEDC managers, and NERC regulators concerned with service reform and fairness in electricity distribution.

Literature Review

Conceptual Review

Prepaid Metering System

The prepaid metering system allows customers to purchase energy credits before consumption. This model promotes consumer control, enhances transparency, and ensures prompt revenue collection (Onyema, 2020). Tokens purchased online or from vendors are entered into meters to activate power supply. The prepaid electricity meter device is a well-structured technology utilized by various electricity service providers. According to Kettless (2004), the prepaid meter system is a structure where an electricity consumer is charged for electric power before usage. This system encompasses an organized principal position (a mainframe that manages the entire structure), a distribution mechanism (where clients purchase electricity) and prepaid electricity meters (or distributors which supply electric powers to the consumers). This type of meter has an interaction with the customers for administering the transmission of credit and to show the meter and credit standing.

Prepaid metering system entails customers to prepare a credit in their electricity

account before utilizing the service. When the said credit is exhausted, supply is automatically terminated. Electricity prepayment billing system was introduced in the 1980s with the objective of supplying electricity to the low - salary workers of the society at inexpensive tariffs (Carolyn, Nyanamba and Nyangweso 2013; McKinze, 2013). Electricity Distribution Companies confront an intimidating customer debt outline as well as income gathering challenges (Carolyn et al., 2013).

Consumer Satisfaction

Consumer satisfaction is the positive emotional response when expectations align with performance. For electricity consumers, satisfaction depends on reliability, affordability, and fairness (Adesina & Ibrahim, 2022).

Consumer Empowerment

Prepaid systems grant users autonomy and accountability, enabling better consumption planning and reducing wastage. Empowered consumers become active partners in energy management (Adeleke, Olaniyi, & Ahmed, 2023). Designing an inbuilt corrective process for handling customer complaints increases the level of customer satisfaction and thereby enables organisations to retain their customers (Havaladar, Alexander & Dash, 2012).

Gratification of needs is the greatest objective of all human endeavours. Consumer needs comprise the basics of life. In recent day market-oriented commercial setting, it can be asserted debatably that the interrogation on how to gratify consumers is the major objective of majority of establishments in all spheres of commerce. Consequently, having a firm grasp of the knowledge of Customer Satisfaction (CS) perspectives, assessing them and utilising these assessments advantageously, these evaluations become the vital need for executives and create the core in theoretical prose about consumer satisfaction.

Impact of Prepaid Metering System on Consumer satisfaction

The Power Division Report (2011) states that amongst all the efforts and endeavors to enhance cost efficiency, the one method that demonstrated to be customer welcoming and cost accommodating is the prepayment metering system.

The Power Department of the Ministry of Electric Power, Energy and Mineral Resources, Republic of Bangladesh, explained the advantages of prepayment metering system as follows: Clients prefer the method because:

- i. It has clarity
- ii. It is user friendly
- iii. Electricity utilization can be regulated
- iv. Their budget can be controlled
- v. No bothers with tariff payment, disconnection by service providers or reconnection fees
- vi. There is no lowest tariff
- vii. It does not demand deposit
- viii. There are no bill discrepancies
- ix. There is alert for low credit status
- x. There is irregular current guard
- xi. There is provision for smart documentation

The literature discourse points to the direction that prepaid metering system enhances economic consumer satisfaction. In other words, the prepaid metering system should be adopted, promoted and should be accessible to all electricity consumers for the sustenance of balanced electricity billing system. According to Aribisala and Mohammed (2021) in the work titled: *The Effects of Prepaid Metering Systems on Customer Satisfaction in Niger State, Nigeria*; they observe that the postpaid and prepaid billing methods are the most predominant methods of electricity billing in operation globally. Majority of electricity consumers have been forced to postpaid billing, and just lately, there has been a shift in the direction of the prepaid billing system (Philipp-Bastian, 2011).). This swing is borne out of the fact that using the estimated billing system, consumers are billed on monthly basis which means that service is provided before billing (Szabó and Ujhelyi, 2014), whereas, prepaid billing method, on the contrary, necessitates the consumer to buy electricity units, in other words pay for the amount of electricity intended to consume before consumption (Telles, Luiz, Antunes, and Souza, 2016).

Njabulo, Yessoufou, and Nwu (2018) posits that the challenges of estimated billing include inaccurate meter readings as a result of irregular payments, which gives room for assumption and guesswork. Given the poor electricity supply and prevalent service corruption of consumers via inaccurate billing method, a precise billing system is critical for Nigeria.

Aribisala and Mohammed (2021) in another study: *the Implication of Prepaid Metering System on Customer Satisfaction*; focuses on consumer perception of the prepaid metering system reveals that majority of consumers are satisfied with the prepaid meters and are keen on knowing more about the prepaid billing method. According to their findings, respondents expressed satisfaction based on the fact that:

- a. There would be no more room for accumulated bills.
- b. Consumers are more prudent with electricity consumption.
- c. Consumers are aware of exactly what they consume on monthly basis.
- d. Consumers are free from disconnection charges.
- e. Zero possibility of paying for darkness.
- f. There would be no more room for exaggerated bills.

For prepaid metering to achieve its intended outcomes in Gwagwalada, coordinated policy support, transparent regulation, and responsive technical services are imperative. The reform also demonstrates how consumer-centered utility management can drive satisfaction and accountability.

Empirical Review

Several empirical studies have examined the adoption and impact of prepaid electricity metering in Nigeria and comparable contexts, highlighting both its strengths and persistent challenges:

- i. Trust and Collection Efficiency Ogundele & Eze (2021) demonstrated that prepaid metering significantly improved trust between consumers and distribution companies. By eliminating estimated billing and ensuring payment before consumption, utilities experienced higher collection efficiency and reduced revenue leakages.
- ii. Customer Satisfaction and Supply Constraints Adeniyi et al. (2022) reported that consumers expressed greater satisfaction with prepaid systems due to accurate billing and the ability to monitor usage in real time. However, they cautioned that frequent

power outages and unstable supply undermined these gains, showing that metering alone cannot resolve broader infrastructural deficiencies.

- iii. Access and Procurement Challenges Tiamiyu & Musa (2023) identified structural barriers such as limited access to authorized vendors, delays in meter procurement, and bureaucratic bottlenecks. These obstacles often left households waiting extended periods before installation, thereby weakening confidence in the system's rollout.
- iv. Role of Consumer Education Nnaji & Okonkwo (2024) emphasized the importance of consumer education programs. Their findings revealed that awareness campaigns on how prepaid meters function, how to recharge, and how to manage consumption led to a marked increase in satisfaction rates after implementation. Education bridged the gap between technological provision and effective utilization.

The evidence suggests that prepaid metering is a valuable reform tool in Nigeria's electricity sector, particularly for improving transparency and financial sustainability. Yet, its transformative potential remains constrained by systemic infrastructural shortcomings. Addressing supply reliability, streamlining procurement processes, and expanding consumer education programs are essential steps toward realizing the full benefits of prepaid metering.

Theoretical Framework

Expectancy-Disconfirmation Theory (EDT)

This theory holds that satisfaction results from comparing expected outcomes with perceived performance. Positive disconfirmation—when experiences exceed expectations—reduces dissatisfaction with billing and power supply (Oliver, 1980). The core idea of the theory is that satisfaction arises from the gap between what consumers expect and what they actually experience.

Positive Disconfirmation applies when actual service performance exceeds expectations, customers feel delighted. For example, if AEDC's prepaid meters provide uninterrupted power supply and transparent billing, customers perceive the service as better than anticipated. Negative Disconfirmation happens when performance falls short, dissatisfaction occurs. If meters malfunction or billing errors arise, expectations are violated, leading to frustration.

In application it implies that:

- i. Transparent billing reduces suspicion of overcharging.
- ii. Reliable power supply enhances trust.
- iii. Exceeding expectations (e.g., faster installation or responsive support) strengthens customer loyalty.

Technology Acceptance Model (TAM)

Davis (1989) emphasized that technology adoption depends on two perceptions which are: Perceived Usefulness (PU): The degree to which a consumer believes the technology improves their life; and perceived Ease of Use (PEOU): The extent to which the technology is user-friendly and requires minimal effort. In application it implies that:

- i. Usefulness: Customers value prepaid meters because they allow better control of electricity consumption, eliminate estimated billing, and reduce disputes.
- ii. Ease of Use: If meters are simple to recharge (via mobile apps, banks, or online platforms) and reliable in operation, adoption rates increase.

- iii. Outcome: High PU and PEOU lead to greater satisfaction, trust, and willingness to recommend AEDC's services.

SERVQUAL Model

Parasuraman et al. (1988) developed SERVQUAL to measure service quality across five dimensions:

- i. Reliability: Consistency in delivering promised services (accurate billing, steady power supply).
- ii. Responsiveness: Willingness to help customers promptly (quick resolution of meter faults, efficient customer support).
- iii. Assurance: Confidence and trust conveyed by staff competence (knowledgeable technicians, transparent communication).
- iv. Empathy: Personalized attention to customer needs (consideration for vulnerable households).
- v. Tangibles: Physical aspects of service delivery (modern prepaid meters, accessible recharge platforms).

In application it implies that:

- i. Reliability and responsiveness directly influence perceptions of prepaid metering.
- ii. Assurance builds trust in AEDC's technical expertise.
- iii. Tangibles, such as user-friendly interfaces, reinforce the sense of modern, efficient service.

Synthesis Across Theories

- i. EDT explains how expectations shape satisfaction.
- ii. TAM clarifies why customers adopt prepaid meters in the first place.
- iii. SERVQUAL provides a structured way to evaluate ongoing service quality.

Together, these frameworks highlight that customer satisfaction with AEDC's prepaid metering depends not only on technical performance but also on ease of use, reliability, and the ability to exceed expectations.

Methodological Perspective

Conceptual Orientation

This study adopts a conceptual methodology relying on secondary evidence drawn from peer-reviewed literature, policy documents, and official reports. It emphasizes critical evaluation rather than empirical data collection.

Data Sources

Information derives from:

- Academic journals (2020–2024)
- Publications by the Nigerian Electricity Regulatory Commission (NERC)
- Conference proceedings and case analyses on prepaid metering in Nigeria

Analytical Framework

The conceptual analysis connects:

- Prepaid metering attributes: transparency, accuracy, and user control
- Consumer satisfaction dimensions: trust, fairness, and empowerment

The frameworks from Expectancy-Disconfirmation and SERVQUAL models guide interpretation of these linkages.

Discussion and Implications

Transparency and Fairness

Prepaid metering has corrected major billing irregularities and reduced disputes. With payments tied to actual consumption, consumers express greater trust in AEDC's processes (Ezeh & Abubakar, 2022). Transparency is, therefore, a key determinant of satisfaction. Additionally, it has been observed that when personnel delegated for meter reading experience difficulty in reading the electricity meters, they resort to documenting approximated figures, whereby carelessness or prejudice of the personnel reading the meter may give rise to inconsistencies in the electricity tariff. Another disadvantage of the un-automated billing method is the weight of an enormous staff strength, required precisely for the purpose of meter reading and delivery of bills.

The second significant problem in the un-automated billing method is the late distribution of monthly charges to the consumers. It is a recurring practice that customers particularly in countryside areas receive their electricity bills very late, or even after the date for payment has elapsed. Under un-automated billing system, consumers who lack access to the internet or an android phone have to make payments by going to designated banks and other payment centres, increasing the level of delays and stress.

Control and Empowerment

Consumers now control their spending, reducing anxiety over unexpected bills. Low-income households can purchase energy incrementally, improving accessibility and affordability (Nwachukwu & Peter, 2023). This economic flexibility directly improves trust and satisfaction.

The prepaid meter system provides advantages for all participants involved in the electricity distribution network. From the stand point of the customer, it assists consumers regulate the rate of electricity usage and provides an automated billing alternative. In contrast with non-automated system, customers buy electricity units ahead of consumption, in other words, they have a firm grasp of their electricity utilization. Furthermore, accessibility of accurate electricity utilization data also inspires customers towards making use of low-power consuming appliances.

Equally, in regards to electric power preservation and administration, prepaid meter system could as well provide the same services for manufacturing and commercial customers as private-individual consumers. Distribution Companies regulated utilization flow will decrease electricity from customers against units purchased, therefore, building monetary restraints for the Distribution Companies. Among the important explanations for incompetent retrieval is a manual billing system where a utility provider personally goes to the residence of the customer to document the electricity used on the meter. Under this un-automated documentation method, there are series of inconsistencies which influence the recovery of Distribution Companies. It has been noted that meter reading is usually delayed, either deliberately or involuntarily. In any ways, the customers are exploited with having to pay for more electricity units as they arrive an advanced slab owing to more units utilised in the protracted intermission between meter readings.

Operational and Technical Constraints

Despite the promise of prepaid electricity metering in improving transparency and reducing estimated billing, several operational and technical challenges persist:

- i. **Faulty meters leading to recharge errors:** Many consumers report malfunctioning meters that fail to register purchased units correctly. This results in disputes over consumption and undermines trust in the system. Faulty meters also contribute to delays in installation and frequent complaints about inaccurate readings, which discourage adoption of prepaid metering.
- ii. **Inconsistent power supply undermining value for money:** Even when customers purchase tokens, unreliable electricity supply means they often cannot use the units they have paid for. This creates dissatisfaction, as consumers feel they are paying for a service not delivered. The perception of poor value for money is particularly strong in areas with frequent outages, where prepaid customers still face the same interruptions as postpaid users.
- iii. **Limited access to token vendors and poor mobile recharge networks:** Accessibility remains a major issue. In some regions, vending infrastructure is inadequate, forcing customers to travel long distances to purchase tokens. Mobile recharge platforms, while intended to ease access, are often hampered by poor network connectivity, leading to failed transactions and frustration among users.
- iv. **High upfront cost of meters and delays in installation:** Distribution companies frequently charge significant fees for acquiring prepaid meters, which many households find unaffordable. Furthermore, long waiting times for installation discourage customers and perpetuate reliance on estimated billing.
- v. **Weak regulatory enforcement and customer support gaps:** Regulatory frameworks have not fully addressed consumer grievances, leaving many issues unresolved. Customers often face difficulties in lodging complaints or obtaining timely technical support, which further erodes confidence in prepaid metering systems.
- vi. **Policy and Institutional Weaknesses:** Implementation remains inconsistent due to supply chain delays, weak monitoring, and inadequate communication between consumers and AEDC officials. The Meter Asset Provider (MAP) Regulation introduced by NERC in 2018 has yet to reach full efficiency.

In essence, while prepaid metering was introduced to enhance accountability and reduce billing disputes, challenges such as faulty meters, unreliable power supply, poor recharge infrastructure, high costs, and weak regulatory enforcement continue to weaken its benefits (Tiamiyu & Musa, 2023).

Conclusion

Through conceptual analysis, this study concludes that prepaid metering improves consumer satisfaction by increasing billing accuracy and transparency. However, structural barriers such as insufficient meters, poor maintenance, and unreliable power persist.

In Gwagwalada Area Council, prepaid metering has significantly enhanced consumer autonomy and trust. Yet, true satisfaction depends not only on billing reforms but also on the underlying service quality and supply reliability.

Recommendations

1. Accelerate Meter Distribution: AEDC should ensure full coverage to eliminate estimated billing entirely.
2. Intensify Consumer Education: Regular awareness campaigns to guide consumers on usage, recharge options, and fault reporting.
3. Technical Support Facilities: Establish quick-response units for meter repairs and replacements within local communities.
4. Regulatory Monitoring: NERC should strictly enforce MAP guidelines to ensure service consistency.
5. Infrastructure Investment: Upgrade networks to stabilize power supply, reflecting value for prepaid expenditures.

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