

Effects of Perceived Service Quality on Customers' Preference for Pre-Paid Electricity Metering System in Ekiti State, Nigeria

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Abstract

This paper examined the effects of perceived service quality on customers' preference for pre-paid electricity metering system in Ekiti State, Nigeria. Primary data were collected with the use of structured questionnaire. These were administered on carefully selected sample of 381 electricity customers using pre-paid metering system within Ado-Ekiti metropolis in Ekiti State through systematic sampling technique. Multiple regression was adopted to analyze the extent of influence of perceived service quality on customers' preference. It was deduced from the results that perceived service quality with convenience, tangible and responsiveness positively and significantly affect customers' preference for pre-paid electricity metering system. However, empathy and reliability have negative relationship but have significant effect on customers' preference for pre-paid electricity metering system. The study concluded that electricity customers prefer the pre-paid metering system as a result of perceived service quality.

Keywords: Electricity, Metering System, Service Quality, Pre-paid metering, Customers' Preference.

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I. Introduction

Over the years the nation has been grappling with the perennial power sector problems without permanent solutions. All the facets of processes from power generation to distribution have remained perpetually non / dysfunctional for consumers to enjoy the benefits accruable from this all important sector of the economy because it is the sector that drives productivity and raise the living standards of the people with attendant resultant effects on the Gross domestic product of the nation.

In Nigeria, the case has remained volatile, turbulent and hopeless as it has defied all strategies used in developed economies because of the hydra headed insincerity in the name of corruption which is seriously threatening the existence of the country. The very recent attempt of introducing the pre-payment metering system is equally under serious attack since take-off because the meters are not made available to consumers thereby giving room to corruption in the name of scarcity. Unlike the credit metering/direct billing which system is based on the electricity units (kilowatts) which have already been consumed by the customer, the pre-payment metering system requires the customer to pay for electricity before consuming, allowing electricity users to consume energy only when they have credit in an electricity account because the electricity 'self-disconnects' when credit is exhausted (Casarin & Nicillier, 2009). Globally, there has been increase in the number of customers preferring to use Pre-Paid Meters (PPMs) (Jain, 2011). For instance, in the United Kingdom, there has been a long tradition of offering pre-paid metering as an option. To corroborate this, Kettless (2004) affirms that pre-payment system has been in UK for more than 80 years and that the system was developed as a way of dealing with bad debts. According to Chisanga, (2006), the United Kingdom adoption of PPMs has considerably increased their revenue collection efficiency and reduced overheads, hence leading to increased profitability.

In Africa, electricity pre-payment meters were first introduced to South Africa in the 1980s to effectively extend supply to rural low-income households and geographically dispersed users (Miyogo, Nyanamba & Nyangweso, 2013). Prior to the introduction of PPMs, ESKOM South Africa's energy utility company had observed that servicing rural areas under post-paid billing system implied high administrative costs (Albert, Priscilla, Austine, Lilas & Henry, 2014). Furthermore, several service hiccups were noted such as the absence of postal addresses to which electricity bills could be sent, high illiteracy rates among low-income households resulting in the failure to fully comprehend the post-paid billing system (Tewari & Shah, 2003) and

inability to pay for electricity charges accumulating as a result of using post-paid system (Miyogo, *et. al*, 2013). Since then, the pre-paid electricity billing system has spread to countries such as Argentina, Australia, Ghana, India, Kenya, Nigeria, Sierra-Leone, Turkey and several other countries across the world (Albert, *et. al*, 2014).

By the late 2000s, pre-payment systems were very popular in India and some under-developed countries (Estache, Antonio, Viven, Wodon&Quentein, 2010). In pursuit of solving this perennial problem and attain efficiency, the power sector had witnessed the metamorphosis process from the erstwhile Electricity Corporation of Nigeria (ECN) to National Electricity Power Authority (NEPA), to the defunct Power Holding Company of Nigeria (PHCN) which brought in the dimension of appointing selected (discos) and introduced digital pre-paid meter in 2006 which operation is similar to the loading of a recharge card in the Global System for Mobile communication (GSM) handset (Ogujor&Otasowie, 2010)). Such a system has been introduced in Kenya (Jain, 2011). Some 123,000 PPMs had been installed throughout the country (Kenya) by June 30, 2012 with a majority of them fitted in Nairobi households. The installation project was slowed down to address pertinent issues such as consumer education, logistics and faulty meters. However, the expectations have not come true for all customers, there have been complaints by some customers that pre-paid system is not as sufficient as the former method. Accordingly, Jain (2011) believes that faulty gadgets, poor knowledge on how to use the new technology and confusing billing irked some customers. Several households using PPMs across the country elicited mixed reactions. While some users testify that the meters save electricity costs, others have expressed dissatisfaction, citing various concerns. Therefore, the objective of this study is to determine effectiveness of perceived service quality on customers' preference for pre-paid electricity metering system.

Purpose of the Study

The purpose of the study is to determine effectiveness of perceived service quality on customers' preference for pre-paid electricity metering system.

Research Questions

1. What are the perceived service qualities that affect customers' preference for pre-paid electricity metering system?

Hypothesis

H₀₁: Perceived service quality does not significantly affect customers' preference for pre-paid electricity metering system

II. Literature Review

Perceived Service quality

According to Kotler and Keller (2006), service is any act or performance that one party can offer to another that is essentially intangible and does not result in the ownership of anything. Service quality is the totality of features and characteristics of a service that bear on its ability to satisfy stated or implied needs. More importantly, as adopted from Parasurama, Zeithaml, and Berry (1998); Rosen and Karwan (1994), the following constructs are used as parameters to measure perceived service quality, and these are i. Reliability, ii. Responsiveness, iii. Assurance, iv. Empathy, v. Tangible, and vi. Convenience. Considering these parameters as identified by Azodo (2014) and Moyo (2012), the power sector of Nigeria is marked by its poor service quality characterized by erratic nature, frequent interruption, total blackout, insufficient power supply. Wastage challenges encountered between the generation and distribution points, especially where installed capacities are far below transmitted plays pivotal role in the quantity and quality of accessible power in Nigeria (Babatunde&Shuaibu, 2009). Kazeem (2013) revealed that Nigeria has one of the highest transmission losses in the world with a record of 35% loss. There have been several plans and projections to address the power insufficiency in the country; unfortunately, the nation has never met any of her past energy demand projections (Azodo, 2014). Different administrations in Nigeria had witnessed this inadequate power generation and distribution challenges (Uzoma, Nnaji&Nnaji, 2012).

According to the surveillance report of the World Bank on countries with electricity access deficit revealed that Nigeria is the second worst in electricity shortage; where 82.4 million's population of 160 million people lack access to sustainable electricity (Tokede&Okonji, 2013). It was estimated that the supply shortfall is about 80% of the country's potential electricity demand (Gnansounou, 2008). The total installed capacity from both thermal and hydro electricity generating plants in Nigeria in 1999 was 5,860MW and an available capacity of 5,400MW while the effective capacity was about 1,600MW. The associated challenges of electricity (with respect to poor service quality) in Nigeria have been attributed to usage of obsolete technology, poor maintenance culture, old and insufficient installation capacity, infrastructural decay, vandalism of electrical installations, fire incidents, poor funding, low tariffs, huge debts owed the electricity industry, irregularity of stream flow, power loss experienced from generation to distribution points due to distance of generation point to

the distribution and inaccurate forecast of electricity consumption determinants and patterns especially from its regional perspective (Oseni & George, 2012; Asaolu & Oladele, 2006). Coupled with all these rigors, Azodo (2014) argued further that the sector is characterized with poor quality of service delivery as a result of instability of supply from connection to national grid, non-quick response to fault clearing by the personnel, poor customer relationship of the staff, irrational pricing of electricity and wrong billing, rigors in getting the bills paid as a result of poor banks services and/or non-proximity to paying centers, wrong disconnection of customers among others. Notwithstanding, customers are still unfairly billed and forced to pay for the service not rendered, this has made the adoption of PPM a better option for customers.

Empirical Review

The research conducted by Karim, Tajibu, and Akhmad (2021) examined the determination of consumer switching barriers to use prepaid electricity systems in the household sector in Makassar, Indonesia. Descriptive analysis was adopted. A snowball sampling technique was used to select 100 participants for the sample. Questionnaires are used to collect data, which is then analyzed using a Likert Scale of 1-5. Factory analysis is used as a tool for analysis. According to the findings of the study, the biggest obstacle that prevents energy users from switching to prepaid systems is habitual use. The second, third, and fourth causes include switching costs, a lack of prepaid system information, and the relationship and reputation of post-paid products.

The study of Aribisala and Mohammed (2021) measures the relationship between the prepaid metering system and customer satisfaction as well as evaluating the level of satisfaction concerning the usage of the prepaid metering system in Niger State, Nigeria. Structured questionnaires were administered to 393 randomly chosen respondents using prepaid meters. Data were analysed using correlation and multiple regression models. The findings showed a significant and positive relationship between the prepaid metering and consumer satisfaction. The satisfaction derived by these consumers in the areas of reliability, affordability, availability, and flexibility has informed their preference for prepaid electricity metering system.

The study of carried out by Tawhida (2018) investigated consumers' perception about prepaid energy meter in Khulna city, Bangladesh. In his study, 100 consumers of different categories like domestic, commercial, small industries were selected in where prepaid meters were already installed for various period of time. Structured questionnaires were administered to the respondents through random sampling method to collect the needed data. The result showed that consumers prefer prepaid energy meter to postpaid. This is because of its usefulness in terms of service quality and attractive features.

In addition, Amhenrior, (2018) conducted research on Assessment of Consumers' Experiences and the Desired Improvements on the use of the Existing Prepayment Meters in Parts of Benin City and Warri in Nigeria. Questionnaire was used to collect data for the study. The data were analyzed to assess the extent to which the recommended improvements were genuinely demanded by the consumers. According to the findings, no current prepayment meters in the areas can be refilled through mobile phone, and the vast majority (97.09%) of the meters in the areas are keypad controlled. In the 76.87% of metered users' homes with current prepayment meters, 66.02% prefer to recharge tokens with mobile devices, and 68.45% wish to be able to get unit balance, time of power failure, and restoration via mobile devices. Some (82.03%) want at least one of these improvements. According to the findings, educational level influences the acceptability of meter improvement. Similarly, Wambua, Kihara, and Mwenemeru, (2015) carried out a research on adoption of prepaid electricity metering system and customer satisfaction in Nairobi County, Kenya. The descriptive research design was used in the study. The population consisted of 1200 KPLC customers whose meters had been switched from a postpaid to a prepaid metering system. The sample size was 138, and 120 respondents returned the questionnaire. The study employed stratified sampling. Inferential statistics were used to determine the relationship between the prepaid metering system and customer satisfaction in Nairobi County. Multiple linear regression was used to analyse the data. The study revealed a relationship between prepaid power metering system adoption and customer satisfaction in Nairobi County, Kenya. The study found that costing, reliability, availability, and flexibility are factors that influence the adoption of prepaid power metering systems and consumer satisfaction. The study revealed a weak positive correlation between the use of prepaid power metering systems and consumer satisfaction.

III. Methodology

Descriptive survey research design was adopted. Questionnaire was administered to a sample of 381 electricity customers of BEDC within Ado-Ekiti metropolis. From the distributed questionnaire, a total of 209 (54.8%) was successfully completed, returned and collated for the study. The questionnaire contained four (4) sections; Section (A) contained respondents' socio- demographic variables as shown in Table 2; Section (B) contained variables relating to perceived product quality as adopted from Garvin (1998) and Vickery, Droge, & Markland (1994); Section (C) contained variables relating to perceived service quality as adopted from Parasurama, Zeithaml, and Berry (1998) and Rosen and Karwan (1994); Section (D) covered variables relating

to customers' preference as adopted from Usman (2013). However, it is worthy of note that the dependent variable in this study is customers' preference while the independent variable is perceived service quality.

Every 21st customer on the BEDC list using pre-paid meter was administered a questionnaire through self-addressed envelope to their respective mail address extracted from the BEDC records. As a follow-up technique, telephone courtesy contact was also made to confirm receipt of the mailed letter, stimulate their commitment in participating in the survey, and ensuring return of the completed questionnaire to the attached address in the letter within 2 weeks.

Both face and content validities were adopted and Reliability was estimated; Cronbach Alpha reliability test of the collated data as shown in Table 1. The result shows that the instrument is reliable enough to collect necessary data for the study. Descriptive statistics (such as frequencies and percentages) and inferential such as multiple regression were used to analyse the data.

Table 1: Cronbach's Alpha Reliability Co-efficient

Variables	Measuring scale	No of items	Reliability (Alpha)
Perceived Service Quality	Reliability	5	0.84
	Responsiveness	4	0.76
	Assurance	4	0.78
	Empathy	5	0.72
	Tangible	3	0.69
	Convenience	4	0.76

Source: Field Survey (2022) using SPSS

IV. Results and Discussion

Descriptive statistics

Table 2: Demographic Distribution of Respondents

Variables	Frequency	Percent
Gender Distribution		
Male	133	63.6
Female	76	36.4
Total	209	100.0
Age Distribution		
30-35 Years	44	21.1
36-40Years	37	17.7
41-45 Years	33	15.8
46-50 Years	40	19.1
51-55 Years	50	23.9
56Years and Above	5	2.4
Total	209	100.0
Marital Status		
Single	23	11.0
Married	151	72.2
Divorced	12	5.7
Widow	23	11.0
Total	209	100.0
Educational Qualification		
Informal Education	10	4.8
Primary	14	6.7
Secondary	44	21.1
Tertiary	141	67.5
Total	209	100.0
Customer		
Residential	121	57.9
Commercial	61	29.2
Special	27	12.9
Total	209	100.0

Source: Field Survey, (2022)

From the demographical section and as presented in Table 2, the result revealed that 133 (63.35%) and 76 (36.4%) are male and female respondents respectively; 50 (23.9%) and 40 (19.1%) respondents are of the age bracket of 51-55 and 46-50 respectively; where over 70% (151) were married and 141 (67.5%) have gained tertiary education qualification as at when examined. Furthermore, the demographic result showed that 121 (58%), 61 (29%) and 27 (13%) respondents were of residential, commercial and special users respectively.

From the extracted result, it can then be deduced that major pre-paid meter users in Ado-Ekiti metropolis are matured, married, educated and mostly responsible in footing electric bills in their respective residential apartments. Hence, data collected from this group of people can be reliable and credible in justifying results of the study.

Testing of Hypothesis

H₁: Perceived service quality and customers' preference for PPM

Table 3: Estimated effect of perceived service qualities on customers' preference

Variables	Coeff.	Std. err.	t value	p-value
Convenience	0.608	0.101	6.041	0.000*
Tangible	0.217	0.079	2.739	0.007*
Empathy	-0.264	0.081	-3.270	0.001*
Assurance	0.023	0.102	0.224	0.823
Responsiveness	0.192	0.061	3.138	0.002*
Reliability	-0.304	0.135	-2.253	0.025*
Constant	13.975	1.458	9.586	0.000*
N	= 209			
F	= 14.202			
R	= 0.545			
R-Squared	= 0.297			
Adjusted R Square	= 0.276			

Table 4: ANOVA(b)

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	308.693	6	51.449	14.202	.000(a)
	Residual	731.757	202	3.623		
	Total	1040.450	208			

To evaluate the effect of perceived service qualities on customers' preference for pre-paid electricity metering system, the respondents' scores on six variables -convenience, tangible, empathy, assurance, responsiveness and customers' preference were computed using multiple regression analysis. From Table 3, the R square of 0.297 showed that convenience, tangible, empathy, assurance and responsiveness caused 29.7% variance in customers' preference for pre-paid electricity metering system in Ekiti State; while 70.3% are explained by error term in the regression model. However, considering the coefficient of the independent variables, the result as extracted from Table 3 shows that convenience, tangible, empathy, responsiveness, and reliability are statistically significant with p-value of 0.000, 0.007, 0.001, 0.002, and 0.025 respectively. From all indications, only assurance with p-value of 0.823 is not statistically significant in affecting customers' preference for PPMs.

The co-efficient of convenience at p= 0.000 showed that convenience has a positive effect on customers' preference for pre-paid electricity metering system. This finding conforms with Alam and Shahriar (2012) that the introduction of pre-paid billing system for electricity at households are claimed to be an addition to convenience of subscribers, especially by excusing the hassles of bills payments associated with the post-paid system. Among the other benefits of pre-paid system from the findings include user control over electricity consumption, freedom from discrepancies regarding to billing etc. The study therefore concluded that these conveniences brought by the pre-paid billing system have significantly resulted into higher satisfaction level of the subscribers compared to those on the post-paid system. The co-efficient of tangible at p= 0.007 showed that tangible has a positive effect on customers' preference for pre-paid electricity metering system. This confirmed that the service provider's physical facilities and the materials associated with the service are visually appealing. The finding corroborates Lee, Lee, and Yoo (2000) that tangibles appeared to be a more important factor in the facility/equipment-based industries, whereas responsiveness is a more important factor in the people-based industries. Although, coefficient of empathy showed a negative effect of -0.264, however, it was significantly at p=0.001, hence, it showed that the service provider may not actually know the customers' specific needs until they are explained, yet the service provider is easily accessible and the vending centre(s) are easily located. The finding is in line with Yee, San, and Khoon (2011) as it provides a platform for Malaysia automobile makers to understand consumer behaviour and how it affects their purchase decision.

Similarly, the co-efficient of responsiveness at p= 0.002 indicated that responsiveness has a positive effect on customers' preference for pre-paid electricity metering system. The implication of this is that service providers are ready to assist the customers as regards the prompt resolution of their complaints. This supports Miyogo, et. al. (2013) that electricity pre-payment meters' acceptance and adaptation in the low-income rural and geographically dispersed areas in South Africa was a factor of the electric service providers' correspondence and responsiveness in providing quick and adequate resolutions to customers' complaints. Meanwhile, the co-efficient of reliability value of p= 0.025 implied that the customers see their billing system as accurate and error free while they are being kept informed about the progress of their complaints. As affirmed in the work of Mburu and Sathyamoorthi (2014), customers embraced the pre-paid billing system and they recognized the benefits of conversion to pre-paid model. The authors stressed further that such benefits which

majorly influence customers' preference for pre-paid model include lower cost of electricity with PPMs, fairness to customers, health and safety, reliability of the meters and user friendliness. Increased Revenue to service providers, effective demand/readiness by consumers to pay for electricity supply leading to Reduction in the incidence of illegal connections by consumers which allows for constant supply as overloading of electricity lines brought about by wrong/illegal connections by illegitimate consumers will be checkmated

In addition, Table 4 as present above shows a high and positive relationship between the examined independent variables of perceived service qualities on the dependent variable - Customer Preference for PPM with f-value of 14.202 at significant level of .000. In lieu of this, it can then be deduced that there is significant effect of perceived service quality on customer preference for PPM, therefore, the hypothesis 2 is hereby rejected.

V. Conclusion and Recommendations

It was concluded through the study that, based on perceived service qualities, customers are affected in their preferences for PPMs. This implies that customers make their informed choices based on how convenient it serves them, the tangibility, reliability, and responsiveness of the service provided, and the empathy to be satisfactorily served and allows for rise in living standards through the fostering of small/medium scale businesses thereby promoting self reliance and raising of entrepreneurs

It is recommended that the management of BEDC Electricity Plc, should make prepaid meters available to numerous customers at an affordable rate because of the underlying advantages associated with it.

The service provider should embark on research about the expectations of customers regarding the shape of PPMs and the required level or height at which they could be fixed to enhance customers' convenience while loading cards. It should embark on major infrastructural changes from obsolete and dilapidated ones as well as endeavour to introduce the use of latest technologies to drive service delivery of electricity and generation and distribution processes while at the same time motivate their workers in terms of living wages and allowances in order to get the best out of them.

It is also recommended that customers should monitor their electricity consumption properly in order to really enjoy the benefits of having PPMs. They should also be conscious of their electricity usage by embarking on the use of energy-saving gadgets.

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