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Electricity Consumption in Nigeria: How Prepaid Metering Influence Consumers' Experience and Trust towards Electricity Consumption

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Abstract

Energy production and consumption is one of the key facilitators of economic growth and development. Electricity outlook in Nigeria is challenging especially with postpaid billings approach that have led to several complaints, discontentment, and consumers' search for alternative. The study assessed how prepaid metering influences consumers' experience and trust towards consumption of electricity in order to proffer policies and intervention programmes that will redress the ailing energy sector. Survey design was used and structured questionnaire was used, pretested and administered to users of prepaid metering in Abia State. Logistic regression and correlation coefficient was used to analyse the results. The findings revealed that socio-economic factors and service experience positively influence choice of prepaid metering. We recommend policy approach and intervention programmes that leads to aggressive installation of prepaid metering, reduced acquisition cost, and fixed low billing for electricity users pending DISCOS' installation of prepaid metering.

Keywords: Energy consumption, User behaviour, Service Experience, Metering system, Electricity consumer

Introduction

The path to attaining increase in sufficiency and reducing costs for any country is often associated with the contributions of electricity. To attain sustainable consumption in this area implies a paradigm shift in electricity sector wherein electricity provision is sustained and payments are commensurate to electricity consumption by the consumers. This is particularly important for developing nations that are pursuing growth and development of their economy given the role it plays in level of industrialization as well as in attainment of Vision 2030 and sustainable development goals of Nigeria. Electricity consumption is not only tied to households but also both large and small businesses while discrepancies between supply and consumption often translate into trusts issues. However, its profound effect is often felt in small and medium scale enterprises who often need to cut down costs in order to improve profitability while for the households the attendant costs of electricity consumption can impact on household income, expenses and livelihood. This produces a general profound effect on the socio-economic and technological development of the nation (Sambo, 2008).

Several sub-Saharan nations like Nigeria are grappling with electricity production and consumption for decades with evidences of high demand over its supply (Kennedy-Darling, Hoyt, Murao, & Ross, 2008), supply being erratic (Ohajianya, Abumere, Owate, & Osarolube, 2014) associated fiscal, structural and socio-political challenges inherent in electricity production and consumption (Maistry, 2004), poor management (Ohajianya et al., 2014) and end-use inefficiency in electricity consumption (Oyedepo, 2012), payment for energy not consumed (Onikoyi, 2012), estimated billing, excessive tariffs with the metering methodology that leads to high tariff and poor metering infrastructure (Okafor, 2013), wide gap between energy used and high bills paid (Abubakar, 2009), and corruption and mismanagement riddled factors that results in stagnated power supply to household units (Akinloye, 2012; Abraham & Bello, 2017; SERAP 2017). The situation is not getting any better given the continuous decline in electricity (Energy Mix Report, 2019) which has made households and businesses to resort to generating sets thereby leading to over 90% presence of these generating sets in Nigeria (Kennedy-Darling et al., 2008). Definitely, this has been having a negative effect on Nigeria's GDP following the increase in cost of businesses, and contribution to deficit balance of payment.

The trend has generated misgivings from household and business consumers especially on the aspect of commensurate payments for energy supply which they often allege to be non-existent. The payments are deemed by them to be arbitrary and devoid of transparency and fairness (Koledoye, Abdul-Ganiyu & Phillips, 2013; Ariel & Luciana, 2008), such that it is eroding consumer confidence and trust in the system (Quayson-Dadzie, 2012). Consumer trusts are vital in a system as it can produce a feel-good effect, generate good experience and enable households and business units to make better budgets. Often where the consumers feel cheated they often resort to other means to get around the service provider. These are often seen in meter tampering and bypass, illegal connections and illegal voucher prepayment on the ground of estimated billing format (Anyaogu, 2016), high consumer debt profile and difficulties in revenue collection (Carolyne, Nyanamba, & Nyangweso, 2013).

For decades, Nigeria has resorted to estimated billing format despite having postpaid metering format in place. Postpaid metering system is one of the metering approaches in Nigeria which allows the electricity consumer to use electricity and make a monthly payment for the consumed energy. However, following some consumers' resort to meter bypass and energy providers' nonchalance in appropriate postpaid meter reading, estimated billing have become a more prevalent billing method. This measure is the bane of electricity consumption in Nigeria. It has led to several unrelenting consumer complaints and agitations (National Electricity Regulatory Commission, 2012) while on the other hand eroding consumer trust in the system following the outrageous bills they receive which they conceive incommensurate with the electricity that was provided (Quayson-Dadzie, 2012). Such experience has often led to consumers' refusal to pay the outrageous bills. In extreme cases it made consumers to develop animosity such that electricity billers are beaten by some communities during electricity disconnection.

The era of efficiency of postpaid metering is obviously waning though it is still in practice. In recent times, there are seemingly new reactions to electricity supply in Nigeria. This is especially felt among households and businesses where new prepaid meters are installed. Prepaid metering is a new metering method in Nigeria which simply translates to electricity usage only to the credit purchased. With this there seems to be a change in consumers' experience. However, a greater majority of the population regularly express displeasures to energy provision while there is still discontentment on epileptic nature of power supply. Consumers come to every market with expectations, which in most cases defines experience with service provider and outcomes. Therefore, this study provides an insight into how prepaid metering influence consumer experience and trust in electricity consumption in Nigeria market context.

Nigerian Electricity Context

Globally energy consumption has taken center stage following energy production and rapid increase in energy consumption (IPCC, 2007; EIA, 2019). However, it is projected that global lack of access to electricity especially within the rural areas will worsen within the next 20 years (Kaygusuz, 2012). This is where nations like Nigeria are making frantic efforts to improve electricity production and generation to the teeming population that are demanding more of electricity. In Nigeria, electricity is anchored on Power Holding Company of Nigeria (PHCN) which generates 98% of Nigeria's total electricity (Central Bank of Nigeria, 2000). PHCN relies majorly on thermal system and hydro system to generate power as they have three hydro generating stations and eleven thermal generating stations (Uchegbulam, Opeh & Atenaga, 2014; Ajibola, Ajala, Akanmu & Balogun, 2018). However, electricity generation in Nigeria have been experiencing a free fall such that there is a huge gap between demand and supply of electricity in the nation. For a teeming population of over 180 million, electricity generation which was at 4845MW dropped to 3338MW (Energy Mix Report, 2019) thereby creating more inconsistencies in electricity supply. The inconsistencies in electricity supply have created poverty streaks by paralyzing industrial and commercial activities (Oyedepo, 2012). Following the discourse, we hypothesize:

Ho_1: Socio-economic characteristics do not have significant effect on electricity consumer

Nigeria's Metering System

Metering is referred to as use of installed device to determine the amount of electricity power consumed by the end user. It enables measurement of electrical energy (Manitoba, 2015). This system can be either postpaid metering or prepaid metering. Postpaid was predominantly used in Nigeria decades ago and it is still in use in places where prepaid have not been installed. Postpaid metering is the use of metering device that affords reading and determination of the amount of electricity consumed to which the end user is billed to pay after using the electricity for a certain period, usually a month. The system is fraught with series of challenges that covers estimation of bills rather that gives room for DISCOs to cheat the electricity consumer (Okoli, 2013), overpriced energy consumption (Ofonyelu & Eguabor, 2014), associated unfairness in the billing method (Ariel & Luciana, 2008) and bypassing of the meter by consumers (Anyaogu 2016). On the other hand, prepaid metering offers the electricity consumer to buy credits such that electricity usage is limited to the credit unit purchased. It is where an electricity consumer pays for the electricity prior to its usage (Debasish & David, 2020). However, huge electricity consumer debt profile and difficulties in bill/revenue collection were some of the drivers of prepaid metering in Nigeria (Carolyne, et al., 2013). The approach provides consumers with opportunity to track their electricity spending as well as being able to check the credit unit balance (Ajenikoko & Adelusi, 2015). It can be beneficial to the electricity consumer in a number of ways such as ease of revenue collection, reduction in contact between electricity consumer and service provider's official, ability to control electricity consumption, and immediacy in electricity restoration upon purchase of electricity token. Service providers as well benefit from prepaid metering through reduction in electricity associated costs, bad debts reduction, improved cash flow, and detection and management of power outages. The implication is that the prepaid metering offers a leeway as well as means of encouraging and sustaining the attitude of regular payment of electricity used by the consumer (Debasish & David, 2020). Meanwhile, this does not imply that prepaid metering does not present its own challenges as evidenced in some African nations like Uganda and Rwanda. One of the peculiar challenges is the cost of prepaid meter which is higher than postpaid metering (Jack, McDermott & Sautmann, 2019; Fagbohun & Adebanj, 2009). The costs ranges between N37, 000 for a single phase to N75, 000 for three phases were arrived at using standard market price and installation costs (Olusola, 2019). The costs often deter poor households and rural dwellers from acquiring prepaid metering yet Ofonyelu and Eguabor (2014) concludes that the need for these prepaid metering is relevant in the present state of metering and estimated billing that have eroded electricity consumers' trust in the power sector. However, one of the factors that models consumer behaviour and the quantity they are able to buy of a commodity is cost of the item. When costs of using items are high they tend to react in a different way however, when the utility received from using such item is factored in, they tend to adopt the means. Following the discourse, we hypothesize:

Ho_2: There is no significant difference on level of electricity efficiency among electricity consumers following introduction of prepaid metering

Ho_3: Prepaid metering does not have significant influence on consumer trust

Service Experience of Electricity Consumers

Consumers are often concerned about value they receive in exchange transactions. Electricity consumers as well act in like manner. Value based approaches often consider quality and performance against price paid for the electricity consumed. The assessment of value by electricity consumers is often the genesis of their satisfactions or dissatisfactions. Metering system that makes them feel cheated often make them resent the method thereby having the probable tendencies of adopting unhealthy approaches to electricity usage. This is one of the causes of the initial complaints and ill-feelings towards Power Holding Company of Nigeria (PHCN) and the distribution companies (DISCOS) in Nigeria (National Electricity Regulatory Commission, 2012). Within six (6) months of 2019, EEDC have recorded highest number of electricity consumer complaints ranging from service interruption, poor voltage, metering challenges, high estimated billings, power disconnections and delayed connections (Asu, 2019). Electricity consumers feel that instability of power supply does not tally with the bills they receive. Where they have it, they often adopt usage of high consumption power devices such as electric stove, electric kettles and high inefficient incandescent light bulbs. Oyedepo (2012) assert that there is inefficient utilization of energy amongst Nigerians especially following their use of energy consuming inefficient appliances. Thus, erratic power supply (Ohajianya et al., 2014) as well as inefficient use has been a source of concern to electricity consumers (Oyedepo, 2012). On the other hand, the epileptic nature of power supply has led to high increase in use of generating sets as an alternative. This follows the high presence of generating sets in households and business outfits (Kennedy-Darling et al., 2008). Though, most electricity consumers do not depend on PHCN for electricity, they express their displeasure in paying for electricity they did not consume. However, following the integration of prepaid metering in some houses and business outfits, attention seems to be shifted to user approaches to electricity. User-based approach simply considers how the quality meets or exceeds expectation (Ogbuefi, Ene & Okoro, 2019). This has given rise to increase in purchase of energy saving appliances such as Compact Florescent Lamps (CFL) in bid to reduce cost. Studies carried in other African countries such as Mwauru (2010) reveal that installing prepaid metering influenced service experience through cost reduction and higher accrued benefits. As a result we hypothesize:

Ho_4: Prepaid metering does not have significant influence on consumer service experience

Ho_5: Consumer perception of prepaid metering does not significantly affect energy efficiency

Methodology

Our study involved a cross section of electricity consumers who make use of prepaid metering within Umuahia, Abia State, Nigeria. Umuahia is the capital of Abia state with large presence of civil service outfits and business premises. In this study, the prepayment system implies that all respondents must have an installed functional prepaid metering in their house or business outfit. It is important to note that where the prepaid metering are installed in Umuahia were majorly in the densely populated town. Therefore, most of the samples were selected from users of prepaid

metering in the town. We conducted convenience sampling by locating houses that use prepaid metering through the help of Enugu Electricity Distribution Company (EEDC).

EEDC is one of the DISCOS in Nigeria that is specifically in charge of power distribution in South East Nigeria. They assisted the researcher in selection of locations with high installation of prepaid meters in the City. Unfortunately, as at the time of the survey the population of Abians with prepaid meter is unknown due to several ongoing installations of prepaid metering in houses and business outfits in the state capital. Therefore, given the infinite population, the study employed Cochran formula, which allows researchers to calculate an ideal sample size given a level of precision, in line with Okeke, Olise and Eze (2008) and Onyeizugbe (2013). The formular is given as:

$n = P(1 - P)\left(\frac{z}{e}\right)^2$

z = 1.96 (confidence level is 95%)

P= 0.5.

q= 0.5(1-0.5)

e= 7% or 0.07

$n = 0.5(1-0.5)\left(\frac{1.96}{0.07}\right)^2$

n = 0.25 x 784 = 196

Data was collected primarily with structured questionnaire and it was designed on five point Likert scale of very high, high, moderate, low, and very low. We pretested the instrument to validate the instrument and ensure interpretability and clarity of questionnaire items.

Method of Analysis

Logistic regression, and correlation coefficient were used in analysing the results. In the analysis of socio-economic characteristics effect on electricity consumer, and consumer perception of prepaid metering on energy efficiency, we used the implicit form of the model which is given as:

$Y = b_0 + b_1 X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 \ldots. b_nX_n + \varepsilon_1$

Where Y = Electricity consumption (Dummy, 1= Use of prepaid meter and 0 = otherwise)

X_1 = Age (years)
X_2 = Sex (Dummy: male=1, female =2)
X_3 = Marital status (1 = single; 2 = married)
X_4 = Educational qualification (years)
X_5 = Income (Naira)
X_6 = Household size, HHS (No)
X_7 = Energy need (No)
X_8 = Awareness (dummy: Yes=1, No=0)

X_9 = Cost (Naria)
X_{10} = Customer trust
X_{11} = Service experience
X_{12} = Energy efficient percentage
ξ_1 = Composite error term

Correlation coefficient was as well employed to examine the relationship between the variables studied. This will enable us ascertain the degree and direction of relationship that exists between the tested variables.

$$r = \frac{N\sum xy - \sum x \sum y}{\sqrt{[N\sum x^2 - (\sum x)^2 [N\sum y^2 - (\sum y)^2]]}}$$ where:

+0.001 - + 0.499 = Weak positive relationship

+0.5 - + 0.99 = Strong positive relationship

+ 1 = Perfect positive relationship

- 0.001 - -0.499 = Weak negative relationship

- 0.5 - -0.99 = Strong negative relationship

-1 = Perfect negative relationship

For the Likert scale, the Likert type measuring instrument is in line with Anyaoha, Nnadi, Chikaire, Echetama, Utazi, and Ihenacho (2013) and it is represented by the formula:

$\bar{x} = \frac{\sum fX}{n}$ Where

$\bar{x}$ = mean score
$\sum$ = summation sign
F = frequency
n = No of responses

$\bar{x} = \frac{1+2+3+4+5}{5} = 3.0$

Results and Discussions

The questionnaire response rate shows 78.57% response rate. This is 154 usable returned copies out of 196 copies of questionnaire that were administered. 78% represents good percentage for adequate research (Saunders, Lewis, & Thornhill, 2009). Cronbach Alpha was used to test the internal consistency of items. Nunally and Bernstein (1994) asserts a common threshold of 0.7 is acceptable. The constructs showed a reliability score of 0.751 which is acceptable for the study.

Socio-economic demographics of users

Result revealed that majority of electricity consumers in the study area were adults within average mean of 33. There were 70 female users (45.5%) and 84 male users (54.5%) included in

the study. The marital status distribution was 53.2% single, 42.2% married, 1.9% divorced and 2.6% widowed. The educational level of the respondents indicated a mean of 14. On average this implies that a good number of respondents can read and write and are fairly literate to appreciate the impact of the study. It was earlier shown that electricity consumers are concerned with electricity bills that are not commensurate with service delivery. This estimated annual income showed that with #6,102,432.26 the individuals who the study has shown to be fairly literate could look for cost-effective means and electricity billing that enables them to be in control of its usage and payment. It is also shown in the study that electricity consumers have at least 3 persons within each household. This is pointer to how much a household can consumer electricity within each month.

Table 1: Demographic Statistics

Variables	Frequencies	Percentage
Age		
20-29	73	47.4
30-39	41	26.6
40-49	24	15.6
50-59	11	7.1
60 above	5	3.3
Mean	33 years	
Sex:		
Female	70	45.5
Male	84	54.5
Marital Status:		
Single	82	53.2
Married	65	42.2
Divorced	3	1.9
Widowed	4	2.6
Education Level:		
Primary	15	9.7
Secondary	47	30.5
ND/NCE	59	16.2
B.Sc/HND	33	21.4
Others	25	22.2
Mean	14 years	
Income:		
0-100,000	135	87.7
100,001-260,000	15	9.7
200,001-300,000	-	
300,001-above	4	2.6
Mean	#6,102,432.26	

Household Size:		
1-3	89	57.8
4-6	57	37.0
7-Above	8	5.2
Mean	3 persons	

Source: Data from field survey

Socio-economic factors influencing electricity consumers' consumption

The result in table 2 indicated that the model is a good fit following the result of horsmer and Lemeshow test. The Nagelkerke measure adapts the Cox-Snell measure so that it varies from 0 to 1 as does R^2 in OLS. At 21.2% and 29.7% for Cox-Snell and Nagelkerke respectively, the regression line fits data up to the stipulated level. Thus, both Cox-Snell and Nagelkerke provided 21.2% and 29.7% explained variations in dependent variable and as such lending credence to statistically significant variables in the table being positively related to choice of prepaid metering for electricity consumption. Thus, the socio-economic characteristics' that influences electricity consumer in the study area is shown in table 2. Only seven (7) variables were statistically significant thus indicating a significant relationship between the socio-economic factors as an influencer on electricity consumer. These variables include age, marital status, education, awareness, cost/bills, service experience, and energy efficient percentage. The significance of age indicated the presence of adults' willingness to use prepaid meter.

Table 2. Estimates of Socio-Economic Characteristics' influence on electricity consumer.

Variable	Co-efficient (B)	Std. error	Wald	Exp.(B)
Constant	-6.493	1.750	13.762***	.002
Age (years)	-.038	.025	2.301**	.963
Sex	.295	.422	.490	1.344
Marital status	.745	.441	2.859**	2.106
Education (years)	.176	.081	4.768***	1.193
Income (₦)	.000	.000	.001	1.000
HHS (No)	.038	.130	.085	1.039
Energy need	-.018	.189	.009	.982
Awareness	1.032	.704	2.147**	2.805
Cost (bill) (₦)	.000	.000	2.802**	1.468
Customer trust	.201	.228	.780	.818
Service Exp.	.384	.233	2.713**	1.468
Energy efficiency perception with prepaid meter	.461	.207	4.965***	1.586
Horsmer & lemeshow test		11.370		

Cox & Snell R^2	.212
Nagelkereke R^2	.297

*** and ** denoted statistical significant at 1% and 5% risk level respectively.

Firstly, the result of logit analysis indicates that among the variables only 7 showed significant effect on electricity consumer. These socio-economic characteristics points to the importance of profiling electricity consumers as the result indicate their position on consumption. Consumer behaviour is a critical aspect in human behaviour and more importantly in consumption behaviour. With respect to the logit results, age is indicated to be significant in consumption of electricity. This reflects the views of Kotler and Keller (2007**)** in that age is one of the factors that can influence household consumption patterns. Often, this is associated with responsibility and tendencies to have accountability for cash-flows. It further supports the understanding on drive and intention of adults to stay on top of their expenses. In some studies adult age which is within young adults and old adults are impacted by energy conservation thus the preference to prepaid metering is understandable. This is consistent with Jones and Dunlap (1992).

The significance of marital status on influencing the electricity consumer directly implies that irrespective of being single or married, having prepaid metering system is deemed better. The emphasis is on expenditures, family size and how they can control electricity spending through direct control of their consumption at home. Thus, this will produce an impact on household electricity consumption given the opportunity to control what they use and spend. Estimated billing in Nigeria is often massively criticized by electricity consumers in Nigeria. The result indicates that either single or married are by extension expressing preference to what grants them control over expenses on electricity since prepaid metering can offer it. In other words, it is a direct rejection and/or dissatisfaction of an existing metering system.

On the other hand, education significantly influences choice of prepaid metering at 1%. This explains the role of education in advancing knowledge on prepaid meter usage. An educated person tends to resort to measures that are practicable, easier to monitor usage, and effectively control through budgeting. In addition, it indicates that an educated consumer prefers prepaid metering to current metering system following the understanding being able to equate utility from usage and expenditure on what was offered. A gap between quality of service and payment for service is often a source of dissatisfaction, discontentment and switch to any substitute. With prepaid metering as an option, educated consumers clearly indicated their choice for prepaid metering. Thus, a metering system like prepaid metering is an incentive to educated people such that it influences their energy consumption behaviour (Nugroho, Zusman, Nakano, Takahash, Koakulsu, Kaswanto, Arifn, Munandar, Arifin, Muchtar, Gomi, & Fujita, 2017). This corroborates studies like Oteh, Ibok and Nto (2017); Nugroho et al., (2017) and Quayson-Dadize (2012) on the influence of education on new technological innovations.

Awareness is also another factor that influences electricity consumption given its statistical significance result. The level of awareness on benefits and relative advantage of a new system over an existing system can impact choice. This is because users or consumers have the opportunity of being able to evaluate and assess the benefits of available options. In other words, when electricity consumers are aware of existence and benefits of prepaid metering there is high

probability of their choices switching to prepaid metering. Relative advantage or perceived usefulness of new system over an existing system has been proven in extant literature to be key determinant influencer of consumer adoption and usage (Liébana-Cabanillas, Ramos de Luna, & Montoro-Rios, 2017; Oloveze, Oteh, Nwosu, & Obasi, 2021). In essence, electricity consumers are influenced when they become aware that prepaid metering can enable them to have better understanding of how much energy is being consumed (Tewari & Shah, 2003). This is because such awareness will help them to gain more control of energy use as well as budget management. Awareness of existing alternative communicated to potential users often projects existence and benefits of a new technology. This affects consumer as Kotler and Armstrong (2010) asserts that communication can change their perception and modify their attitude. As electricity consumers become aware of prepaid metering existence and its advantages over postpaid metering, the study indicated that it encouraged their choice of prepaid metering. Therefore, awareness is essential in changing and modifying electricity consumption behaviour of consumers by linking them to a better option.

The cost variable is indicated to be statistically significant in influencing use of prepaid metering. Cost/bills payable associated with items are often deterrents to adoption of behaviour. The study showed that electricity bills can affect electricity consumption behaviour especially when the bills are not commensurate with utility deliver or electricity used. Following the law of demand and supply, electricity consumers reacts in the same manner with higher cost of electricity. The study indicates that when electricity consumers perceive cost of using a device, technology or a system is high its demand is often influenced. In this case, given the monopoly nature of electricity supply, it often manifests in agitations and high rate of complaints. This is evidenced in Nigerians scramble for meters following crazy bills (Asu, 2020), increasing monthly electricity consumer complaints on estimated billing (Salau, 2020), and metering and estimated billing being top of the complaints as a result of escalating estimated billing which was ranked 53% of total electricity consumer complaints (Onyekwelu, 2019). Thus, given budget constraints consumers will most likely switch to alternatives that puts them in charge of how they use an item. This explains their choice and suitability of prepaid metering (Ofonyelu & Eguabor, 2014) given that the billing is fair and controlled by electricity consumers (Ariel & Luciana, 2008).

However, service experience as well as consumer perception of energy efficiency are important factors that influences electricity consumer. The statistical significance of the result proved that when electricity consumers are not satisfied with value, they received they often complain (National Electricity Regulatory Commission, 2012; Asu, 2020) and subsequently seek an alternative. This supports the reason for increases in generating sets in Nigeria as reported by Kennedy-Darling et al., (2008). The result equally proved that service experience that can offer energy control and budget management will be acceptable. This supports the finding of Mwauru (2010) on service experience through cost reduction. Service experience of prepaid metering involves offer of less power consumption, reduced bribery and corruption in electricity supply chain. However, significance of consumers' perception of energy efficiency showed that when electricity consumers have option that enables them to understand how much energy is been consumed, they are more likely to adopt that means. This will modify their behaviour into looking for electrical devices that conserves energy and reduces energy consumption so that they

do not pay high bills. However, this perception is always influenced through communications which Kotler and Armstrong (2010) assert that it is capable of modifying behaviour.
In table 3, the correlation analysis between use of prepaid metering and consumers' perception of energy efficiency is shown to be significant at 1% with a coefficient of 0.265.

Table 3: Correlation Analysis of the use of Prepaid Meter and Energy Efficiency Perception

Variable		Use of prepaid Meter	Energy Efficiency
Use of prepaid meter	Pearson correlation	1	.265**
	Sig. (2-tailed)		.001
	N	153	153
Energy Efficiency	Pearson correlations	.265**	1
	Sig. (2-tailed)	.001	
	N	153	153

**Correlation is significant at the 0.01 level (2-tailed)

Result of Table 3 revealed the correlation between prepaid metering and consumer's perception of energy efficiency indicates existence of a weak positive relationship. The direct relationship indicates that both tend to increase and decrease at the same time. In other words, use of prepaid metering increases perception of energy efficiency and non-use of prepaid metering decreases perception of energy efficiency. This agrees with *a priori* expectation. Electricity consumers are concerned with acceptable means that enables them to efficiently use house and business appliances in a way that puts them in control. A prepayment metering from their perspective puts them in this control and enables them to reduce energy losses. The idea of prepayment metering on energy efficiency is to modify the behaviour electricity consumer to switch to alternative energy appliances that consumes less energy (Malama, Mudenda, Ng'ombe, Makashini, & Abanla, 2014)**.** The study corroborates the finding of Mwauru (2010). However, beside energy efficiency perception, Aziz, Mustapha, and Ismail, (2013) asserts that age, sex, and income are other motivators of energy efficiency. However, studies such as Quayson-Dadzie (2012) assert that prepaid metering makes electricity consumers to consume more units compared to postpaid metering system.

In table 4, the result indicated that there is no significant relationship between use of prepaid meter and electricity consumer trust.

The result of correlation analysis on use of prepaid metering and consumer trust indicate that no significant relationship between use of prepaid meter and customer trust. Earlier studies found that prepaid metering has significant effect on electricity consumer trust. Studies such as Allen (2009) assert that there is expectation of increased consumer trust with deployment of prepaid metering however, Koledoye et al., (2013) assert that arbitrariness and lack of transparency in electricity supply chain increases lack of trust. Present study proved that prepaid metering has nothing to do with consumer trust. This is an area for further studies as consumer trust is often a consequence of time and relationship. This is because it is dependent on individual dimensions and evolutionary process from social system (Friederichsen, 2014) and interaction (Lewis & Weigert, 2012; Brown, 2009) and experience induced familiarity (Brown, 2009).

Table 4: Relationship between Use of prepaid Meter and Customer Trust

Variable		Use of prepaid Meter	Customer Trust
Use of prepaid meter	Pearson correlation	1	.114
	Sig. (2-tailed)		.162
	N	153	153
Customer trust	Pearson correlations	.114	1
	Sig. (2-tailed)	.162	
	N	153	153

In table 5, correlation analysis between prepaid metering and service experience is shown to be statistically significant at 1%. Correlation result of prepaid metering and service experience indicates existence of positive weak relationship between prepaid metering and service experience. Thus, the result agreed with *a priori* expectation of the study. The direct relationship shows that prepaid metering and service experience tend to move in the same direction. An increase in one is associated with increase in the other. Thus, the positive relationship showed that with the deployment prepaid metering in the study area, electricity had positive experiences. Thus, with increase in service experience, usage of prepaid metering will increase. Allen (2009) posits that prepaid metering increases service experience of electricity consumer. This is more pronounced following the years of ruthless experience of electricity consumers on estimated billing which Onyekwelu (2019) asserted as top of complaints of electricity consumers.

Table 5: Relationship between Prepaid Metering and Service Experience

Variable		Use of prepaid Meter	Service Experience
Use of prepaid meter	Pearson correlation	1	.239**
	Sig. (2-tailed)		.003
	N	153	153
Customer service experience	Pearson correlations	.239**	1
	Sig. (2-tailed)	.003	
	N	153	153

** Correlation is significant at the 0.01 level (2-tailed)

The result in table 6 showed the logistic estimates of energy efficiency and electricity consumers' perception of prepaid metering usage. The Nagelkerke measure adapts the Cox-Snell measure so that it varies from 0 to 1 as does R^2 in OLS. At 92% and 12.9% for Cox-Snell and Nagelkerke respectively, the regression line is shown to fit data to the required level. Energy efficiency and perception is indicated to be statistically significant at 1% and 5% level respectively. This implies that both variables influence use of prepaid meter

Table 6: Logistics Estimates of Energy efficiency and Consumer Perception on the use of Prepaid Meter

Variables	B(co-efficient)	Standard error	Wald	Exp (B)
Constant	-2.582	.562	21.121	.76***
Perception	.263	.176	2.241	1.301**
Energy efficiency	.363	.185	3.872	1.438***
Chi-square	9.190			
Cox & square R^2	0.92			
Nagel Kerke R^2	.129			

*** and ** represents 1% and 5% level of confidence respectively

The result indicated that the co-efficient of energy efficiency was statistically significant as represented by the Wald statistics. Based on the positive sign it implies that the energy efficiency has a direct relationship with use of prepaid metering. In other words, use of prepaid metering can produce a positive effect on behavioral change, particularly on household finance in a way that leads to control on cost of energy consumption and penchant to switch to energy saving electrical appliances like Compact Florescent Lamps. The end result is energy savings and positive contribution in mitigating high wastes of electricity in Nigeria. Extant studies such as Hussaini (2018) indicate that energy efficiency is not only low in Nigeria but there is existence of low level of its practice. As prepaid metering offers the advantage of managing expense on electricity the significance of the result points to possible energy-saving approaches on use of electrical appliances in a way that leads to energy efficiency.

The significant result of consumer perception on use of prepaid metering shows that consumers have a good view on what they can get from using prepaid metering. Perception is often a consequence of awareness, impressions and interpretations on a stimulus. Having a good perception of something can impact how consumer interaction with it, their buying decision and capacity to become loyal to the brand (Duggal, 2018). In other words, consumer perception of prepaid metering usage is capable of influencing electricity consumer usage behavior. A poor perception of electricity consumers can produce disloyalty and high rate of complaints leading to search for alternatives. On the other hand, good perception is capable of igniting positive behavioral outcome. As electricity consumers view prepaid metering in good light its uses will have positive effect. Studies like Mahapatra and Gohar (2018) shows that consumer's positively perceived prepaid meter as offering greater convenience. However, the study is consistent with Quayson-Dadzie (2002) in that there is relatively high consumer perception of prepaid metering.

Conclusion and Implications

Our study was focused on prepayment metering in Abia State and consumers' response to electricity consumption by way of experience and trust. Our findings show that electricity consumers in the study area are fairly educated people who are not only concerned with high estimated billings but are looking for alternatives that gives them value for service rendered.

They share the view that prepaid metering will put them in control of energy consumption in a way that enables them to efficiently manage electricity usage in their houses. Their previous experience of postpaid metering that is fraught with corruptions and excessive billings put them in good stead to accept prepayment metering given that awareness of its benefits and relative advantage promoted this switch in behaviour. The implication is that complaints will be reduced and corrupt practices in the old metering system will be controlled. However, in order to sustain and deepen the little progress in the energy sector, there is dire need of policy approaches and intervention programmes that will facilitate aggressive installation of the prepaid metering in houses and offices. The intervention programmes should contain a clause that mandates provision and availability of devices to houses at an affordable cost. While this is in place, a policy need to be made that ensures all houses without prepayment meter be billed a certain amount of money per month until prepayment meter is provided for them. This approach will help to reduce waste of energy and lead to purchase of energy saving devices which helps to not only reduce money spent on bills but also helps in energy conservation.

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