

The Impact of the Pre-Paid meter on Revenue Generation in Nigeria.

Emmanuel A. Ogujor, Ph.D. and Paul O. Otasowie, Ph.D.*

Department of Electrical/Electronic Engineering, University of Benin, Benin City, Nigeria.

*E-mail: Potasowie@yahoo.co.uk

ABSTRACT

Faced with a huge customer debt profile and revenue collection challenges the Power Holding Company of Nigeria (PHCN) introduced the pre-paid meter in 2006 to aid in revenue collection. In this paper, we examine the impact of the pre-paid meter on revenue generation. The electricity bills of consumers located in Ugbowo, Benin City, Edo state Nigeria that was previously on the post-paid billing system and later changed to pre-paid billing system for 15th January, 2007 to 15th January, 2008 and 3rd February, 2007 to 21st January, 2008, respectively were used in the analysis. The total load assessment for a three-bedroom home occupied by a consumer was carried out. Microsoft Excel 2003[®] was then used to analyze the data.

The analysis reveals that while the introduction of the prepaid meter increases the revenue collection, it reduces revenue generation because it is reliability based. Improving power reliability will increase revenue generation in the prepaid scenario. It ensures that the consumer pays only for energy consumed and not the estimated bill in the post paid system as can be seen in the large standard deviation in the units of energy consumed. The number of registered customer in the first and second quarter of 2008 in Nigeria is 4731009 and 4,771,035, respectively, while prepaid meters installed are 93134 and 99317, respectively. The differential in registered customer between the two quarters is 40,026 while differential in installed prepaid meters between the two quarters is 6,183. One would expect that the differentials will at least be equal to the 40,026 newly registered customers. This can be attributed to dwindling revenue due to the dependence of the prepaid system on reliability resulting in the reduction of its installation.

(Keywords: prepaid, post-paid, reliability, meter, power, electricity bill, utilities, revenue collection)

INTRODUCTION

The Nigeria electric power network operator, Power Holding Company of Nigeria (PHCN) has over the years being faced with the problem of revenue collection [1]. This is mostly because electricity bills are sent to consumers after it has been consumed. Consumers are reluctant to pay electricity bills due to estimated bills and unreliable power supply estimated as 0.79 [2]. This low reliability has resulted in the proposition of reliability-base billing equations in [3]. The low reliability of electric power supplies has little or no impact on the network operator because whether there is power or not, the normal estimated monthly electricity bills are sent to consumers in the post-paid method. Therefore, the consumers suffer the cost of generating power for their individual usage and the cost of electricity that was never supplied by PHCN.

Due to the huge debt owed by customers, the network operator introduced a cash collection policy called Revenue Cycle Management (RCM) that involves using private companies in the collection of monies owed [4]. This seems not to yield the expected results; hence PHCN introduced the digital pre-paid meter in 2006 which operation is similar to the loading of recharge card in the Global System for Mobile communication handset. If power is available and the pre-paid meter is loaded with units, the loaded units decreases only when load is connected and stops when power fails. Has the introduction of pre-paid meters aided revenue generation in Nigeria? This is the research question that this paper will address.

MATERIALS AND METHODS

In this work, the electricity bills of a consumer located in Ugbowo, Benin City, Edo state, Nigeria that was previously on the post-paid billing system and later changed to pre-paid billing

system for 15th January, 2007 to 15th January, 2008 [5] and 3rd February, 2007 to 21st January, 2008 [6], respectively, shall be used in the analysis. The total load assessment for the three-bed room occupied by this consumer was carried out and presented in Table 1. The electricity bills sent by PHCN for a period of thirteen months are

shown in Table 2. The pattern of electricity bill payment for thirteen months are shown in Table 3 while the Post-Paid payments for thirteen months are presented in Table 4. Microsoft Excel 2003[®] was then used to analyze these data.

Table 1: Load Assessment of the Customer's Three-Bedroom Apartment.

Type of Load	Power Rating(W)	Quantity	Demand Factor	Actual Power(W)
Medium size Deep Freezer	130	1	0.5	65
Washing Machine	280	1	0.5	144
Microwave Oven	1000	1	0.5	500
Electric Pressing Iron	1000	1	0.5	500
Air-Conditional	1170	1	1.0	1170
Refrigerator	500	1	0.5	250
Ceiling fan	100	5	0.7	350
Incandescent Bulb	60	23	0.7	966
Sony 21" Television	100	1	0.5	50
Sharp 14" Television	80	1	0.5	40
Sony Music System	100	1	0.5	50
DSTV Receiver	50	1	0.5	25
DVD Player	50	1	0.5	25
			Total	4135

Table 2: The Post-Paid Electricity Bills Sent by PHCN for a Period of Thirteen Months.

Due Date of Bill Payment	Energy Consumption (kWh)	Total Amount owed (₦)
15/01/2007	180	6535.3
15/03/2007	204	4798.9
15/05/2007	212	3731.1
15/06/2007	142	2464
20/09/2007	97	3868.1
15/11/2007	76	7358.3
15/01/2008	760	7961.9
Total	1671.00	36717.60
Mean	238.71	5245.37
Standard deviation	235.59	2066.93
Median	180.00	4798.90

Table 3: The Pattern of Post-Paid Electricity Bill Payment for Thirteen Months [5].

Date of Payment	Amount Paid (₦)	Amount Owed (₦)
03/02/2007	2000	4535.3
18/04/2007	3000	1798.9
21/05/2007	2000	173.1
28/08/2007	2000	464
10/10/2007	3000	868.1
13/12/2007	4000	3358.3
21/01/2008	2000	5961.9
Total	18000.00	17159.60
Mean	2571.43	2451.37
Standard deviation	786.80	2219.67
Median	2000.00	1798.90

Table 4: The Pre-Paid Payments for Thirteen Months [6].

Date of Payment	Amount (₦)	Total kWh Bought
28/04/2008	1391.05	347.8
08/09/2008	1909.52	477.4
05/01/2009*	1400	350
Total	4700.57	1175.20
Mean	1566.86	391.73
Standard deviation	296.79	74.20
Median	1400.00	350.00

On 05/01/2009* the customer bought 858.1 units at a cost of ₦ 3432.38 but as of 27th March, 2009 when these data were collected he had used 350 units at a cost of ₦1400. This is why these values are shown in Table 4. It should also be noted that there are 100 units that comes with a newly installed pre-paid meter which the customer pays in first recharge.

DATA ANALYSIS AND RESULTS

Using Microsoft Excel 2003[®], the total, mean, standard deviation, and median values of the data in the Tables 1, 2, 3, and 4 were calculated and presented in the last four rows of each table.

DISCUSSION

It is obvious in from the tables that the revenue that accrued PHCN from this customer in the pre-paid era is less than the revenue in post-paid era. This is due to the fact that the pre-paid system is reliability based. If the reliability of power was to be 0.9, since no power system has a reliability of 1, the total revenue will be $4.135 \times 24 \times 30 \times 13 \times 4 \times 0.9 = \text{₦}139,332.96$ against **₦4,700.57** and **₦36,717.60** in the pre-and post-paid system, respectively. Thus, the pre-paid system ensures that customers are properly billed. There is no debt in pre-paid system; hence no need for sharp practices in the disconnection of defaulters coupled with the huge human and material resources coupled with dangers associated with disconnection exercise.

The standard deviation of the energy consumed the post paid from the mean is large. This indicates the arbitrary allocation of units in estimated bills. The cost of energy consumed is higher in the pre- than in post-paid system. This suggests that if power is available all of the time, the pre-paid consumers will generate more revenue, which in turn, will influence the consumer to willingly embark on energy saving methods that will reduce the power demand, losses and wastage on the power system.

The number of registered customers in the first and second quarter of 2008 was 4,731,009 and 4,771,035, respectively, while pre-paid meters installed were 93,134 and 99,317, respectively [7]. The differential of registered customer between the two quarters is 40,026 while differential of installed prepaid meter between the two quarters is 6,183. One would expect that the differentials will at least be equal to the 40,026 newly registered customers. This can be attributed to dwindling revenue due to the dependence of the pre-paid system on reliability. PHCN did not anticipate this when it introduced the pre-paid system.

The driving force of introducing the pre-paid system was revenue collection. It is apparent therefore, that PHCN must improve power reliability in order to increase its revenue; thereby placing responsibility on PHCN to ensure power supplies are reliable. The customer bears the brunt under the post-paid system as he/she is given an estimated bill. In the second quarter of 2008 only 99,317 were are on pre-paid (mandate) and only 49% were metered [7].

RECOMMENDATIONS

Having discussed the results, we make the following recommendations:

- i. All customers should request pre-paid meters.
- ii. The Nigerian Electricity Regulatory Commission should direct the PHCN to put all new customers in pre-paid meters.
- iii. Due to dwindling revenues from pre-paid meters: generation, transmission, and distribution

networks should be improved to increase power reliability.

- iv. Due to high surges in our power system the surge absorber in the prepaid meter can easily burn out. Thus, there is an urgent need to study the Nigerian Power System surge level in order to design the surge absorbers to fit our environment.
- v. When a loaded unit is exhausted either at night, on weekends, or public holidays, the customer cannot recharge. Thus, we recommend the recharging system should be like the GSM recharging system where units can be bought anytime and anywhere.

CONCLUSION

In this paper, we have been able to show that while the introduction of the pre-paid meter increases the revenue collection, it reduces revenue generation because it is reliability based. Improving power reliability will increase revenue generation in the prepaid. It ensures that the consumer pays only for energy consumed and not the estimated bill in post paid as can be seen in the large standard deviation in the units of energy consumed.

REFERENCES

1. Oseni, T. 2002. "Obasanjo Laments NEPA's Inefficiency". *Nigerian Tribune*. 16 July 2002. 2.987:3.
2. Ogujor, E.A. 2007. "Reliability Assessment of Electric Power Distribution: A Case Study of 2 x 15MVA, 33/11kV Ugbowo Injection Substation". Ph.D. Thesis. University of Benin: Benin City. Nigeria.
3. Ogujor, E.A. and Kuale, P.A. 2007. "Reliability-Based Electricity Billing System". *Journal of Electrical/Electronic Engineering*. 11(1):22-29.
4. Annon, O. 2001. "Management Introduces RCM Project". *NEPA Review*. (July-Sept, 2001):6.
5. Customer's Post-Paid Electricity Bills between 15 January, 2007 and 15 January, 2008. (Name withheld for privacy).

6. Customer's Pre-Paid Electricity Bills between 3 February, 2007 and 21 January, 2008 (Name withheld for privacy).
7. NERC. 2008. "Power Mandate". International Journal produced by Headwoods Limited for the Nigerian Electricity Regulatory Commission. 1(1):2.

ABOUT THE AUTHORS

Emmanuel Ogujor is a Senior Lecturer at the Department of Electrical and Electronic Engineering, University of Benin, Benin City, Nigeria. He is a corporate member of the Nigerian Society of Engineers and also fully registered with the Council for the Regulation of Engineering Profession Nigeria (COREN). He holds a Ph.D. in Electrical Power and Machines from the University of Benin, Benin City, Nigeria.

Paul Otasowie is a Lecturer at the Department of Electrical and Electronic Engineering, University of Benin, Benin City, Nigeria. He is a corporate member of the Nigerian Society of Engineers and also fully registered with the Council for the Regulation of Engineering Profession Nigeria (COREN). He is also a member of the Institution of Electrical Engineers IEEE USA. He holds a Ph.D. in Electronics and Telecommunication from the University of Benin, Benin City Nigeria.

SUGGESTED CITATION

Ogujor, E.A. and P.O. Otasowie. 2010. "The Impact of the Pre-Paid Meter on Revenue Generation in Nigiera". *Pacific Journal of Science and Technology*. 11(1):138-142.

