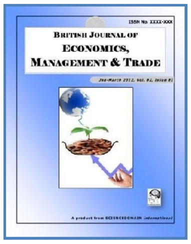

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Estimating Household Willingness to Pay for Improved Electricity Supply in Lagos Metropolis

G. K. Babawale[1*] and A. O. Awosanya[2]

[1]Department of Estate Management, University of Lagos, Nigeria.
[2]Bluebird Capital Limited, Lagos, Nigeria.

Authors' contributions

This work was carried out in collaboration between both authors. Author AOA originated and designed the study, performed most of the statistical analysis and wrote the first draft of the manuscript as part of his Msc. Project under the supervision of author GKB. Author GKB restructured the work for a journal article under the present title, beef up the literature review section and the concluding analysis/recommendation. Both author read and approve the final manuscript including analysis and manuscript.

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ABSTRACT

Nigeria's per capita electricity consumption is one of the lowest in Africa; with the residential sector being the worst hit. The supply from the state owned Power Holding Company of Nigeria (PHCN) is often erratic forcing most households to resort to the use of generators with its attendance noise and air pollution besides other adverse consequences. The study employed non-market valuation techniques (conjoint analysis, contingent method, and multivariate analysis) to assess the Willingness-to-pay for improved electricity supply using two housing estates within Lagos metropolis as case study. The study reveals the attributes of electricity supply services that give the highest utility, and also the Willingness-to-pay bids of the residents of the two estates. These results were combined and tested for sustainability based on the current cost of generating and maintaining electricity by wind turbines which is considered as one of the most cost-effective options available. Simple 'payback' analysis shows that the very low Willingness-to-pay bids of the residents of the two estates would barely support completely deregulated private sector participation. By implication, electricity supply to the estates under reference (including similar and estates of inferior socio-economic characteristics in the metropolis) would continue to be provided by the state-owned Power Holding Company of Nigeria (PHCN) at the existing subsidized rates.

**Corresponding author: Email: gkbabs@yahoo.co.uk;*

Keywords: Conjoint analysis; contingent method; power supply; sustainability; willingness-to-pay.

1. INTRODUCTION

Sub-Saharan Africa is in the midst of a power crisis, marked by insufficient generating capacity, unreliable supplies, high prices, and low rates of access to the electricity grid [1]. The region's capacity for generating power is lower than that of any other region in the world, and growth has generally stagnated. The average price of power in Sub-Saharan Africa is double that of other developing regions, while supply is unreliable [2]. Because new household connections in many countries are not keeping pace with population growth, the electrification rate, already low, is actually declining [2]. The World Bank reckons that 500 million sub-Saharan Africans are without what it calls "modern energy" [3].

Nigeria in particular is facing increasing electricity supply and demand dilemma. In spite of the slow growth in economic activities in recent years, the demand for electricity in Nigeria has continued to increase [4,5]. Nigeria's electricity market, dominated on the supply side by the state-owned Power Holding Company of Nigeria (PHCN) has been incapable of providing minimum acceptable international standards of electricity service reliability, accessibility and availability.

Nigeria's per capita electricity consumption lags behind other African countries. Indeed, Nigeria's per capita energy consumption is 4 times less than the African average and about 19 times less than the world average [6]. Table 1 reveals cross country comparison of energy output. From the table, South Africa with a population of 44.3 million has electricity supply of 30,020 MW which is 12 times what Nigeria with over 160 million has; Egypt with a population of about 77.5 million has 14,250 MW capacities, approximately 6 times higher than Nigeria's [8,7]. Getting electricity in Nigeria requires eight procedures, takes 260 days and costs 873.9% of income per capita, while the country is ranked 178th out of 185 economies on the ease of getting electricity supply [9].

Table 1. Conventional energy supply (2004)

Country	Supply (MW)
South Africa	30,020MW
Egypt	14,250MW
Algeria	6,188MW
Libya	4,710MW
Morocco	3,592 MW
Nigeria	3,500 MW

Source: Okeh (2007)

In Nigeria, the residential sector accounts for a greater proportion of the country's electricity consumption with a peak demand of 2,000 GWH per day thereby making it the worst hit sector [10]. With rising population and consequent increase in household sizes across the country, the demand for electricity continues to grow and more power stations would be required to meet both the existing shortage and the increases. The need for more power stations in the country has long been recognized, but most of the attempts at improving supply since the 1970s have not yielded the desired results. High cost of electricity production has been identified as one of the challenges facing the country's power sector [6].

Given the limited and dwindling resources available to the government at various levels, the ongoing reform in the Nigerian power sector is anchored on deregulation. Past experiences have also shown that direct government involvement in procurement has often been marred by ineptitude and inefficiency. The roadmap for the transformation of the power sector is therefore hinged on private sector participation. However, the sustainability of private sector participation is hinged on appropriate pricing and tariff setting. Presently, there is limited knowledge on how much consumers are willing to pay for improved electricity services in the study area.

One popular means of assessing the sustainability of power/electricity supply has been through Willingness-to-pay studies. If people are willing to pay the full costs of a particular service, then it is a clear indication that the service is valued (and therefore will most probably be used and maintained) and that it will be possible to generate the funds required for sustaining and even replicating the project [11,12]. If cost is not recovered through tariffs they must be funded through tax system or declining services will lead to higher cost of self-provision [13]. History has shown that public subvention cannot be relied upon in times of constrained budgets as this will leave insufficient funds for new investments in operations and maintenance. In the absence of measures of public subsidies, private investment in infrastructure particularly electricity requires that the tariffs reflect the full cost of provision including profit margin as an incentive for the investors [14]. Sustainable energy planning should be done on the basis of cost-effectiveness, continuous availability, unrestricted supply, and satisfactory regard for the environment [15].

Most environmental goods and services cannot be priced in the market. Hence, resort is made to environmental valuation techniques such as the contingent method and the conjoint analysis. The study is therefore a deviation from the usual supply side management approach to infrastructure provision and management. Electricity consumption is a derived demand and Willingness to pay (WTP) is an expression of the demand for a service. It is a strong pre-requisite for cost recovery because it is a measure of user satisfaction of a service and of the desire and capability of users to contribute to its functioning [16]. Studies in Willingness to pay for improved electricity supply have been carried out in a number country, developing and developed [17,18,19,20,21,22,23,24,25,26]. Similar studies have also been carried out across Nigeria [27,28,29]. However, none of these previous Nigerian studies has considered the areas covered by this study, and none has used the approach adopted for this study.

The study is divided into four sections. The introductory section is followed by the history and current state of energy crisis in Nigeria. The third section concentrates on the study methodology and the statistical tools employed for data analysis. The fourth section includes data analysis and discussion of the results as well as the concluding remarks.

2. REVIEW OF LITERATURE

2.1 Infrastructure and Economic Growth

Cities have played a key role in the evolution of the global economy. Cities are generators of enormous wealth and act as the powerhouse of the national economy. The strength of a nation's economy, the contact point of international economies, the health of our democracy and the vitality of the humanistic endeavors, all are dependent on whether or not the city works [30]. It is also axiomatic that infrastructure is the engine driving the modern cities. The contribution of infrastructure to economic development in general, and to residential properties in particular, is enormous since it provides good neighborhood quality, encourages investment, enhances accessibility, facilitates information flows and helps in achieving highest and best use [31]. For instance, manufacturing, petro-chemical, iron and steel industries; breweries, petroleum refineries, hospitals, schools, barbing saloon, tailoring and welding workshops, to mention but a few, require regular supply of electricity for effective performance of their activities. Besides their direct value as an item in the “consumption basket” of households, infrastructural services are also a means to acquiring other goods and services. The direct and indirect consumption benefits from electricity, for example, include extra hours of study time due to electric lighting, the availability of new forms of entertainment (e.g. cinema, television) and access to labor saving appliances, among others [14].

Unfortunately, the level of deficiencies and the degree of deterioration of infrastructure in Nigerian cities is alarming and worrisome due to inability of government to meet up its social responsibilities to the people [32]. Of the constraints to infrastructural development, funding is pivotal and universal. The depression of the late 80s and 90s which has not abated, has led to substantial reduction in local, state and federal government revenue resulting in abandoned projects, decay and total neglect of infrastructure. At an estimated average cost of US$1.5 million needed to add a Mega Watt of electricity, Nigeria would need a whopping US$150 billion (N18 trillion) to generate additional 100,000MW required for full industrialization of the economy by 2020 based on a growth rate of 13% as projected by the Energy Commission of Nigeria [33]. Previous attempts at improving the funding of infrastructure including electricity supply in Nigeria such as the establishment of Urban Development Bank have made but insignificant change as the bank itself faced funding problem. In the prevailing circumstances of dwindling funds and increasing demand, creative and innovative solutions are required to address the power supply problem in Nigeria.

2.2 History and Current State of Electricity Supply in Nigeria

Electricity generation in Nigeria began in 1896. The Nigeria Electricity Supply Company (NESCO) commenced operations as an electric utility company in Nigeria in 1929 with the construction of a hydroelectric power station at Kurra near Jos. By an Act of Parliament in 1951, the Electricity Corporation of Nigeria (ECN) was established, while the Niger Dams Authority (NDA) was established in 1962 with a mandate to develop the hydropower potentials of the country. The ECN and NDA were merged in 1972 to form the National Electric Power Authority (NEPA), which, as a result of unbundling and reform in the power sector, was renamed the Power Holding Company of Nigeria (PHCN) in 2005 [33]. PHCN is the primary source of electricity supply to nine out of every household in Lagos; while secondary sources include private generator (60%), local lamp (37%), solar energy (2%) and battery (1%) [34].

Nigeria’s primary energy resources are in excess if her domestic energy requirement such that Nigerians should not experience supply inadequacy on account of quantum of deposit [35]. Nigerian energy resources include gas, crude oil, coal, solar, nuclear, and hydro [36]. However, only four of these resources namely: coal, crude oil, natural gas and hydro, are presently been utilized.

Nigeria’s power sector currently has less than 8,000 MW of installed capacity, and less than 6,000 MW of available capacity, with only about 4,000 MW of regular powers going through the grid. The country currently has 14 generating plants, which supply electric energy to the

National Grid. Of the 14 generating plants, 3 are hydro and 11 are thermal (gas/steam). Seven of the fourteen generation stations are over 20 years old. The national grid is made up of 4,889.2km of 330kV lines, 6,319.33km of 132kV lines, 6,098MVA transformer capacity at 330/132kV and 8,090MVA transformer capacity at 132/33kV. The double-digit transmission and distribution losses are extremely large by international standards and are among the highest in the world. The system losses are five to six times what obtain in well-run power systems [33].

Nigeria has made efforts to increase foreign participation in the electric power sector by commissioning independent power projects (IPPs) to generate electricity and sell it to PHCN. Thus, in April 2005, Agip's 450-MW plant came online in Kwale in Delta State. Other IPPs at various stages of completion include the 276-MW Siemens station in Afam, Exxon Mobils 388-MW plant in Bonny, ABBs 450-MW plant in Abuja, and Eskoms 388-MW plant in Enugu, among others. The government has also approved the construction of four thermal power plants at Geregu, Alaoja, Papalanto, and Omotosho, with a combined capacity of 1,234 MW.
In the 1970s, the industrial sector was the leading consumer of electricity, accounting for over 50 percent of the total, followed by residential consumers. However, since the 1980s, the residential sector has taken over the lead accounting, on the average for over 50 percent of the total (Fig. 1).

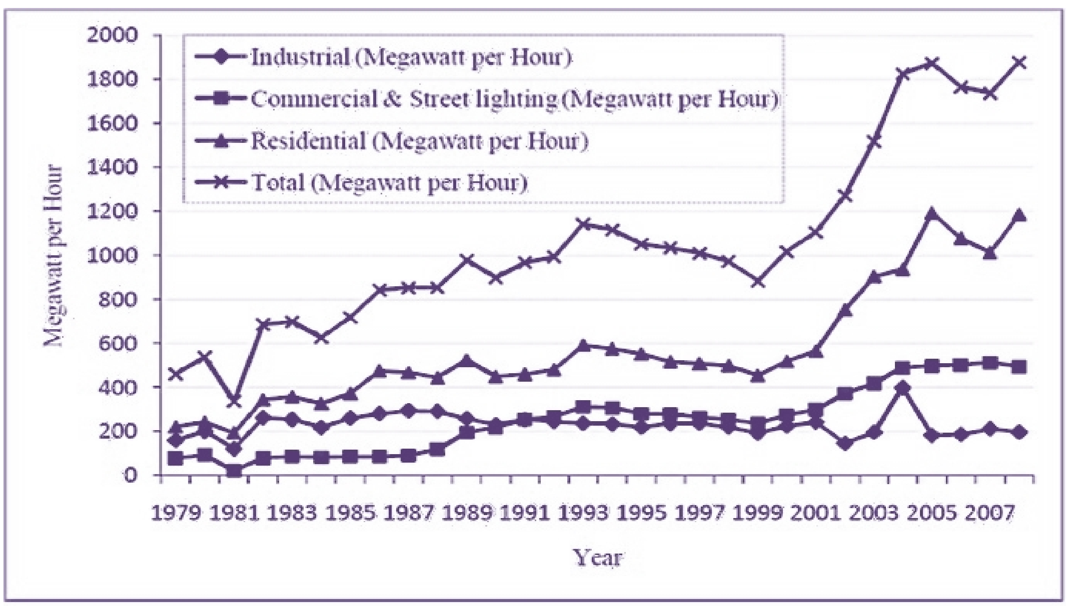

Fig. 1. Electricity consumption pattern in Nigeria (1979-2007)
Source: CBN, 2009: Johnson et al. [5]

The Nigerian energy industry is probably one of the most inefficient in the world in terms of meeting customers' needs. Currently, the average daily power generation is below 2,700MW, which is far below the peak load forecast of 8,900MW for the currently existing infrastructure [36]. Nigerian energy crisis is in generation, transmission and distribution. These include insufficient funding of power station, obsolete equipment, inadequate generation availability, overloaded transformers, bad feeder pillars, substandard distribution lines, poor/obsolete communication equipments, poor billing system, unwholesome practices/poor customer relations by staff, low staff morale and lack of regular training [33]. The energy crisis is manifested in blackouts and brownouts. Getting a faulty transformer fixed in most cases is a nightmare, not to talk about replacing one that has been declared 'dead'. More often than not, residents are forced to contribute money to buy transformers, when as a matter of fact, transformers should be provided by the respective PHCN companies. Consumers are confronted with 'crazy' monthly electricity bills irrespective of whether there was power supply or not.

According to a household survey conducted by the Lagos State Central Office of Statistics [34], 85% of sampled households experience power interruption daily; 10% experience it few times a week; 3% experience it few times a month; while 2% do not experience interruption at all. It was also revealed that 48% of the households enjoy between 1-5 hours of electricity supply per day; 30% enjoy supply less than 1 hour per day; 15% are supplied for between 6-10 hours per day and only 2% claimed that to have electricity between 21-24 hours per day. The analysis of the results showed that 90% of the household connected to PHCN supply are dissatisfied with the performance of the authority. Given the epileptic supply, households have to incur extra cost in fueling and maintaining their private generators to augment supply. The use of generators comes with negative externalities such as noise and fumes, beside the running costs and the very hazardous practice of storing petrol meant for the generators in small containers in the homes.

3. STUDY AREA

This first leg in a series of study of different parts of the metropolis covers two residential housing estates - the LSDPC known as Ojokoro Estate and Millennium Estate, within the same neighborhood in Ifako Ijaiye Local Government area of Lagos. These estates are located at the peri-urban area of the North-west of Lagos metropolis. Buildings in two estates possess similar structural characteristics; the number and mix of accommodation provided are however different. Millennium Estate is comprised of 480 housing units made up of one-bedroom, two-bedroom, and three-bedroom flats, while Ojokoro Estate is made up of 1080 units of two-bedroom, and three-bedroom flats. Lagos metropolitan forms a larger part of Lagos State, one of the 36 states making up the Federal Republic of Nigeria.

Lagos State, South-West Nigeria is the smallest of Nigeria's 36 states in terms of land size. Lagos metropolis accounts for 37% of the land mass of Lagos State but hosts about 85% of the population of the state giving an average population density of 20,000 persons per square kilometer. The metropolis' current population is estimated at 17 million which confer on it the status of a mega city and is projected to be the third largest city in the world by the year 2015. In spite of the fact that the seat of the Federal Government has moved from Lagos to Abuja, Lagos metropolis has remained the nerve centre of the nation's commercial, industrial, and property investment activities. Lagos metropolis has the most active property market with the highest average property value and stock of investment [37]. In 2005, Lagos state accounted for 11.7% (N 1, 700.97 billion) of the national GDP second to the oil-rich River state. The state commands 65% of Nigeria's commercial activities, 60% of national industrial investment and foreign trade, 40% of manufacturing value added, 48% of building and construction activities, and 55% of wholesale and retail trade.

4. METHOD OF RESEARCH

4.1 Data Collection

The primary focus of this study is to estimate Willingness-to-pay for improved electricity services in Lagos metropolis using two medium-income housing estates developed by the Lagos State Development and Property Corporation (LSDPC) which were thereafter sold to the public some years ago. Primary data was collected through self-administered questionnaires. Systematic random sampling technique was adapted whereby a flat or household in every three blocks is sampled in Millennium Estate; and a flat in every four blocks in Ojokoro Estate, in proportion to the number of blocks in each estate. The study population is all households in the two estates approximated to the number of accommodation units in the estates. The choice of households as the study population is based on the fact that households are the major consumers of urban services; and the state of the infrastructure particularly electricity supply therefore impacts more on households than any other group.

The questionnaire has three sections. The first section deals with household socio-economic characteristics. The second section addresses households' current use of electricity and their Willingness-to-pay bids; while the third section presents profiles of electricity service attributes that the respondents are made to rank. The questionnaires were administered on the heads of households or their spouses as either or both are more likely to be involved with matters relating to family income and expenditure including expenditure on electricity supply. However, in few cases where neither the household head nor the spouse could be reached, questionnaires were administered to any adult member of the household considered sufficiently informed to provide reliable information.

5. DATA ANALYSIS AND DISCUSSIONS

5.1 Household Socio-economic Characteristics

Table 2 summarizes the socio-economic characteristics of sampled household heads in each of the two estates under reference. From the table, majority of the sampled household heads, 83% in Millennium Estate and 77% in Ojokoro Estate, are male. Household heads are also well educated with 54% and 47% having a minimum of HND/B.Sc. degree in Millennium and Ojokoro, respectively; and none is without any form of formal education. Household size of between 5 to 10 members is predominant in the two estates, 91% in Millennium and 87% in Ojokoro. Approximately 64% of the households are in paid employment in Ojokoro Estate and 49% in Millennium Estate. Others are self-employed.

Approximately 48% of the respondents in Millennium Estate earn over N100, 000 per month. Millennium Estate is a relatively new, modern estate affordable to only the middle or high income earners. For Ojokoro Estate, majority of respondents (40%) earn between N50, 000 and N100, 000 per month. Ojokoro Estate is an older estate. At the time it was built and allocated to the public, low-income earners were the target. Thus, it is often referred to as Ojokoro Low-income Estate. However, with passage of time, and given the present economic realities, low-income earners can hardly afford any of the accommodation units in the estate.

Table 2. Household socio-economic characteristics

	Millennium estate		Ojokoro estate	
	Frequency	**%**	**Frequency**	**%**
Gender of household head				
Male	173	83.17	212	77.09
Female	35	16.83	63	22.91
Total	**208**	**100.00**	**275**	**100.00**
Level of education of household head				
Primary	2	0.69	14	5.09
Secondary	31	14.90	76	27.64
ND/NCE	47	22.60	44	16.00
HND/Degree	113	54.33	130	47.27
PhD	15	7.21	10	3.64
	-	-	1	0.003
	208	**100.00**	**275**	**100.00**
Household size				
Less than 5	14	6.73	27	9.82
Between 5 and 10	89	90.87	240	87.28
Above 10	5	2.4	8	2.9
Total	**208**	**100.00**	**275**	**100.00**
Employment status of household head				
Employed	101	48.56	177	64.36
Unemployed	62	29.81	51	18.55
Self employed	45	21.63	47	17.09
Total	**208**	**100.00**	**275**	**100.00**
Household head’s monthly income				
Less than N18,000	21	10.10	13	4.73
Between N18,000 and N35,000	17	8.17	79	28.73
Between N18,000 and N35,000	31	14.90	23	8.36
Between N50,000 and N100,000	40	19.23	110	40.00
Over N100,000	99	47.60	49	17.82
Total	**208**	**100.00**	**275**	**100.00**

Table 3 shows that 9% of the sampled households in Millennium Estate resides in one-bedroom flat, 48% in two-bedroom flat, and 44% in three-bedroom flat. In Ojokoro Estate, it is 57% in two-bedroom flat, and 43% in three-bedroom flat. The study sample therefore cut across all categories of available accommodation in the two estates. Majority of households in the Millennium Estate (56%) are tenants; while in Ojokoro Estate (58%), majority are owner-occupiers.

Table 3. Respondents' dwelling characteristics

Type of dwelling	Millennium Estate		Ojokoro Estate	
	Frequenc	%	Frequenc	%
1-Bedroom flat	18	8.65	-	-
2-Bedroom flat	99	47.60	157	57.09
3-Bedroom flat	91	43.75	118	42.91
Total	**208**	**100.00**	**275**	**100.00**
Tenure type				
Home Owner	91	43.75	159	57.82
Renter	117	56.25	116	42.18
Total	**208**	**100.00**	**275**	**100.00**

Source: Field Study

According to the statistics in Table 4, electricity supply to the two estates is highly irregular. According to the respondents, power supply In Millennium Estate is characterized by load shedding (59%) and malfunctioning or lack of transformers (33%). For Ojokoro Estate supply is characterized by broken down transformers (43%), load shedding (28%), and faults from the power station (18%). As a result of all these, the two estates suffer frequent power outages.

Table 4. Regularity of electricity supply

	Millennium Estate		Ojokoro Estate	
	Frequency	%	Frequency	%
Regularity of electricity supply				
Very Regular	-	-	-	-
Regular	-	-	-	-
Irregular	176	84.62	168	61.09
Very irregular/unreliable	36	15.38	107	38.91
Total	**208**	**100.00**	**275**	**100.00**
Causes of irregular electricity supply				
Bad Transformer	69	33.17	118	42.90
Load shedding	123	59.13	77	28.00
Problem from power station	-	-	48	17.45
Uncertain	16	7.69	32	11.64
Total	**208**	**100.00**	**275**	**100.00**
Most frequently encountered problem with electricity supply				
Frequency blackout	208	100	275	100
Power fluctuation	-	-	-	-
Low current	-	-	-	-
Excess current	-	-	-	-
Total	**208**	**100.00**	**275**	**275**

Source: Study Field, 2012

From Table 5, both estates enjoy a maximum of 15 hours of electricity supply a day on the average and a minimum of as low as below 5 hours. Overall, Ojokoro estate enjoys more supply than Millennium estate. In spite of the poor supply, electricity bills appear to be outrageous while the Millennium estate which enjoys lower supply pays more than Ojokoro estate, on the average. A common complaint by electricity consumers in Nigeria is that electricity bills are arbitrary as the meters are rarely read.

Table 5. Electricity supply and cost

	Millennium Estate		Ojokoro Estate	
	Frequency	**%**	**Frequency**	**%**
No. of hours electricity is supplied/day				
1-5 hours	164	78.85	13	4.73
6-10 hours	-	-	114	41.45
7-15 hours	-	-	148	53.81
16-20 hours	-	-	-	-
17-24 hours	**44**	**21.15**	-	-
Total	208	100.00	275	100.00
Average electricity bill/month				
N100 – N500	-	-	-	-
N 501 - N 1,000	-	-	-	-
N1,001 - N 2,000	-	-	157	57.09
N2,001 – N3000	-	-	117	42.55
N3,001 - N5000	208	100	-	-
Above N5,000	-	-	-	-
Total	**208**	**100.00**	275	**100.00**

The use of alternative source of power, that is, private generator is common to both estates as reported on Table 6. On Millennium Estate, 44.23% of the households uses generator for between 1 and 3 days in a week. In Ojokoro Estate, 37.02% uses electricity generators in 1 to 3 days in a week. About 54% of the respondents in Millennium Estate claims to spend between N2, 001 and N5, 000 weekly; while 36% spends between 500 and N2, 000 to run their generators. For Ojokoro Estate, 50% spends between N2, 001 and N5, 000 a week and 12% spends between N500 and N2, 000 weekly.

5.2 The Method of Analysis

The study employed the contingent method, conjoint analysis, multivariate analysis and the 'payback period' analysis. Contingent valuation model is based on a hypothetical market situation, which elicits the prices of goods and services which cannot be priced in the market place. It is referred to as contingent because the results are dependent or contingent upon a devised hypothetical market. It is based on the assumption that a properly designed survey can elicit responses comparable to those arising under actual situations. Contingent method entails asking people of either their maximum Willingness-to-pay (WTP) for an increase in environmental quality, or their Willingness-to-accept compensation to forgo such an increase. The binomial logistic regression is one of the various forms of the discrete choice models. The model statistically relates the choice made by an individual to the attributes of that person and the attributes of the alternatives available to the choice maker. The selected attributes of the sampled households and their a priori expectations are as shown in Table 7.

Table 6. Frequency of use and cost of private generator

	Millennium Estate		Ojokoro Estate	
	Frequency	**%**	**Frequency**	**%**
Frequency of use of private generator				
Daily	77	37.02	53	19.27
1-3 days a week	92	44.23	87	31.64
4-6 days a week	21	10.10	53	19.27
Once in a long while	9	4.33	72	26.18
Not at all	9	4.33	10	3.64
Total	208	100.00	275	100.00
Cost of running private generator/week				
N500 – N2,000	74	35.58	33	12
N 2,001 - N 5,000	112	53.85	137	49.82
N 5,001 - N 10,000	13	6.25	42	15.27
Above N10,000	9	4.33	63	22.91
Total	208	**100.00**	**275**	**100.00**

Source: Field study

Table 7. Variables employed in the model to estimate willingness-to-pay

S/No	Variable definition	Variable code	Variable measurement	Expected sign
1	Willingness to pay: Dependent variable	WTP	Dummy: 1 indicating willingness to pay; otherwise.0.	
2.	Monthly Household Income	HHINCOM	Measured in Naira(N)*	+
3.	Household size	HHSZ	Number of persons in the household	?
4.	Education level of household head	EDN	The number of years spent in school by household head	+
5.	Age of household	AGE	Age of household head in number of years	?
6.	Employment status of household head	EMPLOY	Dummy: 1 if household head is employed; otherwise 0.	+
7.	Number of days using private electricity generator	GENDAYS	Days in number	?
8.	Number of hours using generator/ week	GENCOST	Measured in Naira (N)*	+
9.	Number of hours electricity supplied/day.	ELECTHOUR	Number of hours	-

**1US$ = N165*

Conjoint analysis is a survey procedure that is used to derive the values of particular attributes of goods and services. Information is collected about individual’s choices between different goods that vary in terms of their attributes or service levels. With this information, it is possible to derive values for a particular attribute or service. If price is included as an attribute in the choice scenarios, value can be defined in terms of dollar (or any other currency), which can be used with the valuation approach [38]. There are three different conjoint approaches: conjoint rating, conjoint ranking, and paired comparison.

The payback period decision rule focuses on how long it takes an investor to recover his initial capital outlay; the longer the time, the riskier the investment is considered to be, and vice versa. As a time concept, payback period is particularly useful in assessing certain time-related risks.

5.2 Preference for Electricity Service Attributes

5.2.1 Conjoint analysis

To minimize the confusion that may likely arise if respondents were to evaluate too many profiles, only the four most important attributes were selected namely: monthly electricity consumption, hours of electricity supply per day, preferred type of meter and expected monthly bill. Each attribute was considered on two levels as shown in Table 8.

Table 8. Selected attributes of electricity service

S/no.	Attributes	Description	Levels
1.	Consumption	Monthly electricity consumption	500 kWh 1000 kWh
2.	Hours	Hours of supply per day	16 hours 24 hours
3.	Metering	Preferred type of meter	Prepaid metering Post-paid metering
4.	Bill	Expected monthly bill	N2,000 N,4000

Having unbundled electricity service into 4 attributes on two levels each, 11 different profiles were generated. The total number of possible combination of the four attributes at the chosen levels is 2 X 2 X 2 X 2=16. In this case, the SPSS algorithm generated a fraction of the full concept i.e. eleven profiles. The number of profiles is greater than the minimum number of profiles required which is given by the total number of levels minus total number of attributes plus 1 [39]. Going by this principle and given the selected attributes and their levels in this study, this minimum number is computed as 5. The 11 profiles generated for this study is therefore considered to be more than sufficient. The respondents were made to rank these 11 concept cards which represent different aspects of electricity services as shown in Table 9.

Table 9. Orthogonal array of attributes and levels

Profile	Consumption	Hours of supply	Metering option	Expected bill
A	1,000 KWh	24 Hours	Post-paid metering	N2,000
B	1,000 KWh	16 Hours	Pre-paid metering	N4,000
C	500 KWh	16 Hours	Pre-paid metering	N4,000
D	1,000 KWh	16 Hours	Post-paid metering	N4,000
E	1,000 KWh	24 Hours	Pre-paid metering	N2,000
F	1,000 KWh	24 Hours	Pre-paid metering	N4,000
G	500 KWh	24 Hours	Post-paid metering	N2,000
H	1,000 KWh	24 Hours	Post-paid metering	N4,000
I	500 KWh	16 Hours	Post-paid metering	N2,000
J	1,000 KWh	16 Hours	Pre-paid metering	N2,000
K	500 Kwh	16 Hours	Post-paid metering	N4,000

The tolerance level of respondents in conjoint studies is between 12–30 concept cards and 6–8 product attributes, depending on the motivation and product awareness of the respondents [40]. This study has used only 11 profiles which is within the tolerance threshold. The number of respondents (483) is adequate. It has been suggested that between thirty and sixty respondents is adequate for investigational work and for developing hypotheses about a market [41]. Given the attributes selected in this study, the overall preference or total utility of a combination (R) of a profile can be expressed by the following mathematical expression:

R = U consumption *i* + U hours *j* + U metering *k* + U billing *l* + constant

Where: U consumption *i* = utility level i of preferred level of consumption
U hours *j* = utility level jof the number of hours of consumption
U metering *k* = utility level k of the type of metering system preferred,
U billing *l* = utility level l of the amount expected as monthly bill

Regression analysis was used to determine the marginal utility of each of the selected attributes among the 483 sampled residents of both estates. Weights were attached to each rank to make them continuous. Since there are 11 profiles, the most preferred profile received 11 points; the second most preferred received 10 points, the third 9 points, down to the last, the least preferred, which received 1 point. These weights were taken as the dependent variables while the independent variables were expressed as dummy variables: 1 if available at certain level, and 0 if not available**.** The result of the regression is shown in Table 10. The model has an adjusted R^2 of 0.472 with an F-value of 44.61 which provides enough grounds to reject the hypothesis (null) that the explanatory variables jointly lack sufficient explanatory power.

Table 10. Regression Results

Variable	Coefficient	t-value
Constant	4.337	2.321
1,000 Kilowatt hour	1.863	5.116
16 hour Supply	1.220	3.425
24 hour Supply	1.538	2.423
Prepaid metering	0.081	2.308
N2, 000 Bill per month	0.720	3.721
Adjusted R2	0.472	
F-value	44.610	

The regression coefficient of each variable represents the marginal utility derivable from the respective attribute. For example, provision of 1,000 kilowatt hour in a bundle added 1.863 to the total utility while 16-hour and 24-hour supply of electricity adds 1.220 and 1.538, respectively. From this regression, incorporating prepaid metering to service bundle increases total utility by 0.081. Setting utility bill at N2, 000 also increases total utility by 0.720. It is evident from this analysis that the attribute of electricity supply services that gives the highest utility is the availability of 1,000 kilowatt hour to households; while 24-hour and 16-hour supply is second and third, respectively. From the results in Table 11, the first three profiles have 24 hour connection in their mix which goes to reiterate the significance of this attribute.

Table 11. Total utility and order of preference

Profile	Consumption	Hours of supply	Metering option	Expected bill	Total utility	Rank
A	1,000 Kwh	24 Hours	Post-paid metering	N2,000	4.121	2nd
B	1,000 Kwh	16 Hours	Pre-paid metering	N4,000	3.164	4th
C	500 Kwh	16 Hours	Pre-paid metering	N4,000	1.301	11th
D	1,000 Kwh	16 Hours	Post-paid metering	N4,000	3.083	6th
E	1,000 Kwh	24 Hours	Pre-paid metering	N2,000	4.202	1st
F	1,000 Kwh	24 Hours	Pre-paid metering	N4,000	3.482	3rd
G	500 Kwh	24 Hours	Post-paid metering	N2,000	1.538	9th
H	1,000 Kwh	24 Hours	Post-paid metering	N4,000	1.944	7th
I	500 Kwh	16 Hours	Post-paid metering	N2,000	1.940	8th
J	1,000 Kwh	16 Hours	Pre-paid metering	N2,000	3.157	5th
K	500 Kwh	16 Hours	Post-paid metering	N4,000	1.220	10th

5.2.2 Contingent valuation

It is important to determine average household expenditure on electricity per month as a basis for comparing Willingness-to-pay bids. Average payment for electricity in a month for Millennium Estate falls within the range N3, 000 to N5, 000 as each flat on this estate receives uniform electricity bills of N4, 600 per month. The situation varies for Ojokoro Estate where the pre-paid metering system is installed. The average electricity bill per month is lower as the respondents claim to pay between N1, 000 and N3, 000. Payment per Kilowatt-hour of electricity used combined with frequent outages is responsible for the lower figures. Households incur additional expences on private generator for the low amount spent on electricity from the public mains.

Table 12 shows the Willingness-to-pay for improved electricity services for residents of the two estates. Out of the 208 households sampled in Millennium Estate, only 38% are willing to pay for improved supply while the remaining 62% believed that they are already paying too much given the poor level of electricity being supplied. They are therefore less willing to pay for any proposed improvement. For Ojokoro Estate, 64% of the sampled households are willing to pay more for improved supply. Though this estate also receives poor supply; the estate is served with prepaid meters which guarantee relatively efficient and transparent billing.

Table 12 further shows that residents of Millennium Estate are willing to pay between N4, 000 and N6, 000 per month. Majority of Ojokoro Estate residents are also willing to pay the same range of between N4, 000 and N6, 000. The mean Willingness-to-pay for households in Millennium Estate is N4, 936, with a standard deviation of N611.676; giving the coefficient of variation of 12%, a moderate dispersal around the mean. The mean Willingness-to-pay for Ojokoro Estate residents is N5, 057.47 with a standard deviation of N612. 61, while the coefficient of variation is also a moderate 12%.

Table 12. Willingness to pay for improvement in electricity services

	Millennium Estate		**Ojokoro Estate**	
	Frequency	**%**	**Frequency**	**%**
Willingness to Pay				
Yes	79	37.98	176	64.00
No	129	62.02	99	36.00
Total	208	100.00	275	100.00
WTP (Bid) amount				
N500 – N1,500	-	-	-	-
N1, 501 - N 2,500	-	-	-	-
N 2,501 - N 4,000	-	-	24	13.64
N4,001 - N6,000	79	-	152	86.36
N6,000+	0	-	0	0
Total	**79**	**100.00**	**176**	**100.00**

Source: Field Study

5.2.3 Determinants of Willingness-to-pay for improved electricity supply

It is common in contingent valuation studies to use multivariate techniques in determining how the socio-economic characteristics of the respondents and other variables affect the WTP bids. The purpose of this kind of analysis is two folds. First, if the WTP bids are correlated with the variables suggested by economic theory; this increases the reliability that the bids are indeed the reflections of the respondents' preferences and not just random occurrence. Second, models of the determinants of the respondents' WTP bids can be used to predict how changes in socio-economic and other variables can affect the demand for the good/service.

The estimated Binomial logistic regression model for the two estates is presented on Table 13 with Cox and Snell R^2 of 0.735 and 0.702 for Millennium Estate and Ojokoro Estate, respectively. These results suggest that, at least, 70% of the Willingness-to-pay decision is explained by the selected explanatory variables.

Table 13. Regression analysis results: determinants of willingness-to-pay

WTP bid	Millennium Estate			Ojokoro Estate		
	B	Wald	Exp(B)	B	Wald	Exp(B)
Intercept	2.006	3.824		4.810	6.101	
HHINCOM	0.142	3.443	1.153	0.033	2.290	1.034
HHSZ	0.744	4.926	2.104	0.120	3.158	1.128
EDN	0.115	2.788	1.122	0.111	4.009	1.117
AGE	0.005	1.801	1.005	0.021	2.210	1.021
EMPLOY	0.018	2.224	1.018	0.029	3.989	1.029
GENDAYS	0.073	3.257	1.076	0.120	2.117	1.128
GENCOST	0.019	1.649	1.019	0.217	1.091	1.242
ELECTHOUR	-0.012	2.019	0.988	-0.019	3.661	0.981

Source: Field Study

The odds ratios are converted into probability by taking the antilog of the coefficients as shown by the exponential beta column i.e. exp (B). The antilog for HHINCOM in Ojokoro Estate is 1.153 which can be interpreted as an increase in household income by one N1, 000 is more than one time likely to increase willingness to pay for improved electricity. In the same vein an increase in household size by 1 is more than two times likely to increase the willingness to pay for improved electricity. An improvement in the level of education the household head, an increase in the age of the household head and the status of the household head as being employed are likely significant determinants of the willingness to pay for improved electricity supply. The number of days private generators is used in a week and the associated cost of running of the generators are likely determinants as well. The number of hours electricity is supplied from the public source (ELECTHOUR) met the a priori expectations. That is, the more the number of hours electricity is supplied from this source, the less the chances that households in the estate are ready to pay for improved electricity supply.

The determinants of willingness to pay for improved electricity supply for the Millennium estate are similar to those for Ojokoro Estate. Household income, household size, level of education, and the age of the household head are likely to influence the decision of household head to pay for improved supply of electricity. For both estates, the more the number of the days that households are made to use their generators due to irregular supply from the public mains the greater the willingness to pay for improved supply. The costs of running generators also influence the willingness to pay.

6. VIABILITY APPRAISAL - ELECTRICITY GENERATION FROM WIND TURBINE

Though this study is not so much concerned about the appropriate technology to drive the required improvement in electricity supply in the estates under consideration; for the purpose of demonstrating sustainability under a private sector-driven electricity supply however, the payback analysis is carried out. For this purpose, it is assumed that this private sector-driven initiative employs any one of the well known, relatively simple and cost-effective technology - the Wind Turbine. A wind turbine is a device that converts kinetic energy from the wind (wind energy), into mechanical energy by a process known as wind power which may be used to generate electricity (wind turbine) or drive machinery (windmill). The desire to reduce environmental impacts of conventional energy resources has rekindled interest in renewable energy production across the world. Wind turbine produces clean, quiet, renewable and non-polluting energy [4]. While researches have been undertaken to assess the feasibility of this renewable source of energy in Nigeria [4,41,42] by determining wind speed patterns and potentials, no study has considered its viability to date. Though previous studies have suggested that the northern part of the country offers more potential than the south due to its higher wind speed; the mean wind speed in the south west which is between 3.0 m/s (maximum) and 1.3 m/s (minimum), is sufficient to support small scale electricity generation built on slow running high torque turbines with multi-blade [4,43].

At the current market price, the cost of generating 1 megawatt of electricity required to serve 100 homes through a wind turbine technology is $2,200,000.00. Therefore, approximately 25 megawatt of electricity is required to serve the 2,500 households in Millennium Estate giving a total cost of $55,000,000.00 equivalent to N9,075,000,000.00 at the current exchange rate of 1US$=N165. Combining this with the revenue projection in Table 14, and using the payback period appraisal technique, it will take approximately 692 years for the investment to break even given the Willingness-to-pay bid of the residents estimated at N13,107,744.0 per annum (net). That is, N9, 075,000,000.00 /13,107,744.00 =692.34. Ojokoro Estate with 1,080 accommodation units/households requires 11 megawatt at a cost of N3, 993,000,000.00 (11 x 2,200,000x 165), which approximates to 78 years payback time for the same reason. That is, N3, 993,000,000.00/51176448 = 78.02.

From Table 15, a WTP of N75, 000.00 per household per month is required to guarantee a payback period of 6 years which may be considered the acceptable minimum given the uncertain political atmosphere and unstable economic policies, both of which tend to exacerbate the downside risks of investments in the country. A monthly expenditure of N75, 000.00 on electricity for domestic use is certainly beyond the financial capability of most Nigerians, except perhaps, the very affluent, which represent but an insignificant proportion of the population and are to be found in more exclusive residential neighborhood like Victoria Island and Ikoyi.

Table 14. Expected receipt based on households' wtp bids

	Mean WTP	Nos. of household	Expected revenue/month (gross)	Maintenance/ transmission cost @20%	Expected revenue/ month(net)	Expected revenue/ year (net)
Millennium estate	N4,936.71	2,500	N2,369,621	N473,924.2	N1,895,696	N13,107,744
Ojokoro estate	N5057.47	1,080	N5,461,560	N1,092,312	N4,369,248	N52,430,976

Table 15. Projection of costs and revenue based on hypothetical WTP bids

No of Households	Cost of Wind Turbines	Mean WTP/ month	Expected gross revenue/ month	Maintenance & transmission cost @ 20%	Expected revenue (net)/ month	Expected revenue (net)/ year	Payback Period
1,080	11 megawatts @ N363,000,000 per megawatt= N3,993,000,000	15,000	16,200,000	3,240,000	12,960,000	155,520,000	26 yrs
		20,000	21,600,000	4,320,000	17,280,000	207,360,000	20yrs
		25,000	27,000,000	5,400,000	21,600,000	259,200,000	16 yrs
		30,000	32,400,000	6,480,000	25,920,000	311,040,000	13 yrs
		40,000	43,200,000	8,640,000	34,560,000	414,720,000	10 yrs
		50,000	54,000,000	10,800,000	43,200,000	518,400,000	8 yrs
		60,000	64,800,000	12,960,000	51,840,000	622,080,000	7 yrs
		75,000	81,000,000	16,200,000	64,800,000	777,600,000	6 yrs
		100,000	108,000,000	21,600,000	86,400,000	1,036,800,000	4yrs
2,500	25 megawatts @ N363,000,000 per megawatt = N9,075,000,000	15,000	37,500,000	7,500,000	30,000,000	360,000,000	26 yrs
		20,000	50,000,000	10,000,000	40,000,000	480,000,000	19 yrs
		25,000	62,500,000	12,500,000	50,000,000	600,000,000	16 yrs
		30,000	75,000,000	15,000,000	60,000,000	720,000,000	13 yrs
		40,000	100,000,000	20,000,000	80,000,000	960,000,000	10 yrs
		50,000	125,000,000	25,000,000	100,000,000	1,200,000,000	8 yrs
		60,000	150,000,000	30,000,000	120,000,000	1,440,000,000	7 yrs
		75,000	187,500,000	37,500,000	150,000,000	1,800,000,000	6 yr
		100,000	250,000,000	50,000,000	200,000,000	2,400,000,000	4 yrs

7. CONCLUSION AND RECOMMENDATIONS

This study investigates Willingness-to-pay for improved electricity supply in Lagos Metropolis using two medium-income public residential estates as a starting point in a series of similar studies intended to cover different types and composition of residential estates/neighborhoods in the Metropolis.

The results showed that Willingness-to-pay for improved electricity services in Millennium Estate is affected by household income, household size, number of days households use their generators within a week, and the cost of running generator. For Ojokoro Estate, Willingness-to-pay is affected by increase in household income, household size, employment status of household head, number of days generator is used within a week, and the cost of running generator. The Willingness-to-pay bid for Millennium Estate is N4, 936, and N5, 057.47 for Ojokoro Estate. The results of conjoint analysis showed that the attribute of electricity supply service that gives the highest utility to the residents of the two estates is the availability of 1,000-kilowatt hour to each household. Viability appraisal based on simple Payback analysis and using the current cost of installation and operating wind turbines showed that it will take approximately 692 years and 78 years to recoup initial capital for Millennium Estate and Ojokoro Estate, respectively. Cost and revenue projections showed that the residents of the two estates need to be willing to pay substantially more in order to make electricity generation from wind turbines a viable option.

One obvious inference from the study is that sustainable electricity supply to the housing estates under reference through private sector participation is presently not feasible. It implies that electricity supply to the estates and other estates of similar (or lower standards) socio-economic characteristics in the metropolis would continued to be provided by the state-owned Power Holding Company of Nigeria (PHCN) at the existing subsidized rates.

The study throws light on cost recovery in electricity supply. The results therefore provide useful inputs into government policy formulation when choosing and designing alternative source of power supply for residential areas of different socio-economic characteristics in the metropolis particularly in the light of the ongoing private-public partnership arrangements for provision of infrastructure. The results also provide private investors in the energy sector the basis for realistic pricing and tariff design for sustainable power projects, especially when considering wind turbine technology option.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. IMF African Power Crisis: Unraveling the Paradoxes. Retrieved May, 2008 from http://www.imf.org/external/pubs/ft/survey/so/2008/CARO52208C.htm
2. Eberhard, A., Foster, V., Briceno-Garmendia, C., Ouedraogo, F., Camos, D, & Shkaratan, M. Africa Infrastructure Country Disgnostic (AICD), Underpowered: The state of the Power Sector in Sub-Saharan Africa, World Bank, UK; 2008.
3. The Economist, Electricity in Africa: The Dark Continent. 2012. Available on: http://www.economist.com/node/9660077

4. Adaramola M.S. Oyewole O.M. On wind speed pattern and energy potential in Nigeria. Energy Polic. 2011;39:2501–2506.
5. Johnson, O., Odekoya, A., Umeh, O. Factors Influencing the Usage of Compact Fluorescent Lamps in Existing Residential Buildings in Lagos, Nigeria, International Journal of Energy Economics and Polic. 2012;2(2):63-70.
6. Sambo, A.S. An address by the Director General of Nigerian Energy Commission to the Nigerian Society of Engineers Forum, 2nd April, 2009 Shehu Yaradua Centre. Available:http://www.energy.gov.ng/index.php?option=com_docman&task=cat_view&itemid=&gid=21&orderby=dndate_published&ascdesc=DESC
7. Okeh U. Nigeria: The Country's Electricity Dilemma, Thisday Newspaper. 2007; 21st of August available Online at: allafrica.com/stories/200708220370.html
8. Olise M, Nria-Dappa T. Overcoming Nigeria's Energy Crisis: Towards Effective Utilization of Associated Gas and Renewable Energy Resources in the Niger Delta; 2009.
9. World Bank Doing Business, Smarter Regulations for Small and Medium-Size Enterprises. Washington, DC: World Bank Group. DOI: 10.1596/978-0-8213-9615-5. Licence: Creative Commons attribution CC by 3.0.2013;
10. CBN Central Bank of Nigeria, Nigerian Banking Reform: Recent Actions and Future Prospects, CBN, Nigeria; 2012
11. Mbata, J. N. Estimating Household Willingness-to-pay for Water Services in a Rural Economy: The case of Kanye in Southern Botswana Development Southern Africa. 2006;23(1):43.
12. Devi, J., Sarala, B. J., Karunakaran, K., Anurdha, B. and Devi, K. R. People's Attitude towards Paying for Water, Current Science. 2009;97(9):10 November.
13. Kerfand, M. and Smith, W. Privatizing Africa's Infrastructure, The World Bank, Washington, DC; 1996.
14. Otegbulu AC. A Contingent Valuation Model for Assessing Electricity Demand, Journal of Financial Management of Property and Construction. 2011;16(2):126-146.
15. Akinbami J, Lawal A. Opportunities and Challenges to Electrical Energy Conservation. Fifth Urban Research Symposium and CO_2 Emissions Reduction in Nigeria Building Sector; 2009
16. Brikke, F. & Rojas, J. Key Factors for Sustainable Cost Recovery in the Context of Community-managed Water Supply. Delft, the Netherlands: IRC International Water and Sanitation Centre; 2001.
17. Virgee K. The Willingness-to-pay for Changes in Water, Waste and Electricity Services in Trinidad and Tobago. PhD Thesis submitted to the Department of Civil Engineering, McGill University, Montreal; 2005.
18. Choynowski P. Measuring Willingness-to-pay for Electricity, ERD Technical Notes Series No. 3, Asian Development Bank, Philippines; 2002.
19. Kessides, I. N. Privatizing Infrastructure: Privatizing Regulation and Competition, The World Bank, Washington, DC; 2004.
20. Kessides, C. A framework of Economic Policies for Urban Upgrading, The World Bank, Washington, DC; 2001a.
21. Kessides, C. Contribution of Infrastructure to Economic Development: A Recovery Experience and Policy Implication, The World Bank, Washington, DC; 1995.
22. Kessides, C. The Contributions of Infrastructure to Economic Development: A Review of Experience and Policy Implications. World Bank Discussion Papers. The World Bank. 1993;213.

23. Morrison, M. and Nalder, C. Willingness to pay for improved quality of electricity supply across business type and location. 2009;30(2):117-33.
24. Whittington D. The Challenge of Demand Assessment in Pro–poor Infrastructure Projects, Paper presented at the PPIAF/ADB Conference on Infrastructure Development Private Solutions to the Poor, Asian Development Bank, Manila; 2003.
25. Brook, P. and Irwin, T.C. Infrastructure for people public policy for private provision, World Bank, Washington D.C.; 2003.
26. Kateregga, E. The Welfare costs of Electricity Outages: A contingent Valuation Analysis of Households in the Surburbs of Kampala, Jinja and Entebbe, Journal of Development and Agricultural Economic. 2009;I(1):001-011. Available online at: http://www.academicjournals.org/JDAE
27. Lee KS, Anas A. Manufacturers' Responses to Infrastructural Deficiencies in Nigeria: Private Alternatives and Policy Options. INU Discussion Paper. 1989;50
28. World Bank Privatizing Africa's Infrastructure. World Bank Technical Reference No. 337. World Bank, Washington D.C.; 1996.
29. Shomolu, F. The Power Sector Reform and Urban Transportation", 36th Annual Conference of the Nigerian Institution of Estate Surveyors and Valuers Minna; 27 March-1 April:1-6. 2006.
30. Otegbulu, A.C. Assessment of User Demand Preferences of Urban – infrastructure in Lagos Metropolis Using Contingent Valuation Model, PhD Thesis, School of Postgraduate Studies, Enugu State University of Science and Technology, Nigeria; 2010.
31. World Bank Infrastructure for Development, World Bank Development Report, New York. Oxford University Press; 1994.
32. Ajilowo JO. Patronage Pattern of Rural Dweller to Health Facilities in Owo Region, Nigeria. Unpublished PhD. Thesis submitted to the School of Post Graduate studies, the Federal University of Technology, Akure, Nigeria; 2010.
33. Sambo AS, Garba B, Zarma IH, Gaji MM. Electricity generation and the present Challenge in the Nigerian Power Sector; 2010.
34. COS Digest of Statistics, Lagos Bureau of Statistics, Lagos State Government, Alausa, Ikeja, Lagos; 2010.
35. Adegbulugbe AO, Seriki OA. World Energy Council Conference Proceedings, Culpar Limited, Lagos. 1991;29-35.
36. Ubi P, Effiom L, Okon E, Oduneka A. An Econometric Analysis of the Determinants of Electricity Supply in Nigeria, International Journal of Business Administration. 2012;3(4):72-82.
37. Babawale, G.K. & Koleosho H. A. Real Estate Valuation in Nigeria; Implications in a Globalizing World. Paper Presented at the International Conference on the Built Environmental Innovations, Policy and Sustainable Development. Covenant University, Ota, Nigeria; 2006
38. Bond, S.G. & Hopkins, J. The Impact of Transmission Lines on Residential Property Values: Results of a Case Study in a Suburb of Wellington, New Zealand, Pacific Rim Property Research Journal. 2000;6(2):52-60.
39. Tripathi SN, Siddiqui M. An Empirical Study of Tourist Preference Using Conjoint Analysis. International Journal of Business and Applied Management. 2010;5(2).
40. Oppewal H, Vriens M. Measuring Perceived Service Quality Using Conjoint Experiments, International Journal of Bank Marketing. 2000;18(4):154–169.

41. Orme B. Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research (2nd Ed.), Madison, Wis.: Research Publishers LLC; 2010.
42. Chineke TC. Boosting electricity supply in Nigeria: wind energy to the rescue? Pacific Journal of Science and Technology. 2009;10:553–560.
43. Adekoya LO. Adewale AA. Wind energy potential of Nigeria. Renewable Energ. 1992;2:35–39.

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