International Journal of Science and Technology (STECH)
Bahir Dar- Ethiopia
Vol. 6 (2), S/No14, August, 2017: 36-52
ISSN: 2225-8590 (Print) ISSN 2227-5452 (Online)
DOI: http://dx.doi.org/10.4314/stech.v6i2.3

Energy Efficiency and Sustainability: Evaluation of Electricity Consumer's Behaviour towards Electricity Usage and Energy Conservation

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Abstract

Energy sustainability, conservation and use have become a more predominant trend globally. In view of the important nature of the energy sectors and the effect it has on national development of any country, there is a growing concern about energy consumption and waste, particularly about electricity consumer's attitudes, behaviour and practices with respect to energy sustainability. Employing the context of cognitive, affective and behavioural components (ABC/Tricomponent Model of Attitude), this work presents the results of a systematic survey and analysis of electricity consumer's attitudes, behaviours and practices towards energy use and sustainability. Using the

random sampling method, the perception questionnaires were administered to respondents across the various streets chosen. The results indicate that although there is some level of awareness with regards to the need for energy sustainability and efficient practices, most consumers did not engage in such practices even among the highly educated. Taking consumer's knowledge and use of energy saving devices as a case in point, of the 990 respondents, 78% affirmed to having this knowledge while 11% asserted to not knowing, with another 11% having no knowledge of either energy saving devices or its ability to conserve energy. Furthermore, of the 78 % respondents who asserted to being in the know, only 50.8 % actually used such devices while the remaining 49.2% did not despite being fully aware. Significant also is the fact that for respondents who did not have knowledge of electrical energy conservation, 71% indicated their willingness to learn more about the issue. The study therefore recommended that it is necessary to promote efficient use of electricity in order to benefit various stakeholders and it also submitted that there are energy-related attitudes and energy-saving behaviour that could be practiced and performed at little or no cost.

Key Words: Energy efficiency, Energy conservation, Electricity usage, Consumer's behaviour, Sustainability, Energy saving devices

Introduction

The current impact of fossil fuel consumption on our climate, leading to climate change, global warming and other related emissions has prompted several energy conservation researches. Without doubt, energy efficiency and sustainability has become the key driver of sustainable development in many economies in the world. The recent 'energy and economic crises' faced in Nigeria and some other oil rich countries of the world resulting from the fall in prices of crude oil and cases of instability in some parts of those region has more than before made the adoption of sustainable energy management practices in homes and public buildings necessary. In Nigeria for instance, the current state of energy has been described in many studies as worrisome (Akorede, et al., 2017; Udochukwu et al., 2016; Udoakah & Umoh, 2014) and indications are that as the nation's population continues to increase, the energy situation may get worst unless urgent efficient measures are put in place to ensure energy security and sustainability.

According to Herring (1996), historically two strategies have always been adopted to reduce energy consumption in times of fuel shortage: 'energy efficiency' and 'energy conservation'. Mohammed *et al*., (2010) viewed electrical energy efficiency as the adoption of technology that requires the use of less energy to perform the same function or more while electrical energy conservation is considered to be the behaviour that is necessary in utilizing less energy. Inferring from both definitions, Choong et al.,

(2009), came to the conclusion that technology and behavioural approaches are two common techniques in electrical energy management practices.

Unlike rocket science, it is obvious from the aforementioned that improvements in energy conservation and efficiency are generally achieved by adopting a more efficient technology or production process or by the application of commonly accepted methods to reduce energy losses. As simple as this may seem to sound, experience has shown that most energy users are either ignorant or take for granted some of these commonly accepted energy use and conservation methods. As observed by Schiflman and Kanuk (1992), attitudes constitute a big component of consumer behaviour. Hence, attitudes towards energy use, conservation and efficiency can therefore be largely studied and understood in the broad context of consumer behaviour concepts in the marketing discipline, which is a subset of the extensive field of human behaviour. Consumer behaviour itself according to Schiflman and Kanuk (1992) referred to "the behaviour that consumers display in searching for, purchasing, using, evaluating and disposing of products and services that they expect will satisfy their needs and wants".

Electricity customers go through this process as they seek to satisfy their energy needs. They make decisions related to acquiring connection to the power grid, when to use the power, how to use it, how to buy it and when to stop using it. However, unlike some other goods and services, the decision on how and when to use may not totally be decided by the one who purchased it as Schiflman and Kanuk (1992), argued thus; "the person who makes a product purchase is not always the user or the only user of the product in question. Nor is the purchaser the person who makes the product decision. But can always influence the usage of the products". This is true of the end users of electricity in most commercial or even domestic facilities, hence the need for energy use and efficiency awareness among all classes of energy users.

Most people may not on their own be able to take steps to conserve energy unless they are properly educated on the need and methods of doing so. For instance, while Yen and Wai (2010) observed that employees or staff awareness on electrical energy conservation plays a crucial role in reducing utility bills and is a solution to energy savings, Oyedepo (2012), asserted that about 30 to 40 % of electricity generated is being lost due to utilization. This he attributed to ignorance and lack of enlightenment of electricity consumers on energy management. Also, according to the International Energy Agency (IEA), improved energy efficiency in buildings, industrial processes and transportation could reduce the world's energy needs in 2050 by one third, and help control global emissions of greenhouse gases. It is in view of this that this study which aims to investigate consumer's behaviour towards energy use and assess their awareness of energy efficient activities that could help in efficient energy use and conservation is conducted. Specific objectives are: To establish awareness, comprehension and knowledge of customers on efficient use of electricity in lighting (i.e. cognitive component); to ascertain the liking and preference for energy efficiency

in lighting among customers (i.e. affective component); and to determine intentions, behaviour, and trials by customers on efficient use of electricity in lighting (i.e. conative component). It is hoped that the results of this study, would not only ensure efficient practices, but would also lead to energy availability, security, conservation and sustainability which in turn will engender national development.

Literature Review

Several studies have been carried out on electricity consumption around the globe. For instance, McClaren (2015), researched on energy-related attitudes and energy-saving behaviours that are no- or low-cost and relatively simple to perform. The study relied on two data sources: a longitudinal but cross-sectional survey of 4,102 U.S. residents (five biennial waves of survey conducted between 2002 and 2010) and a 2010 cross-sectional survey of 2,000 California residents. These two surveys contained data on two no- and low-cost behaviours: changing thermostat setting to save energy (no-cost behaviour) and compact fluorescent light bulbs (CFLs) installation behaviour (low-cost behaviour). Results from these analyses revealed four important patterns. First, a relationship between the pro-environmental attitude and the two behaviours (thermostat-setting and CFL installation behaviour) was weak but persistent across time; second, financial factors such as income moderated the pro-environmental attitude and CFL installation relationship; third, most people reported changing thermostat settings to save energy or having one or more CFLs in their homes and fourth, thermostat-setting and CFL installation behaviour have multi-factorial influences. Similarly, Mohan and Sil (2014) examined the evaluation of electricity consumption and development of household energy performance in Mumbai, India. The findings of their study revealed that if the appliances are replaced with the energy saving components, then the consumption would reduce by 46% on an average. The maximum reduction was observed by replacing fans and lights with energy saving equivalents. In order to validate the energy performance of households in a data set, household energy performance index (HEPI) was developed. Based on their evaluation, it was concluded that replacing old appliances with energy efficient ones helped reduce power consumption without reducing the hours of usage and frugally using electricity will further reduce the consumption and protect the environment. Also, using two models, (discrete choice energy conservation models and a Tobit approach), Mutua and Kimuyu (2015), investigated the household energy conservation in Kenya. The first model predicted the odds that a household would conserve a specific domestic energy source while the second model explored the determinants of actual household energy savings where the amount of energy saved in monetary terms was the dependent variable. Analysis of the result showed that more than 60% of the households using electricity engage in some conservation measures. Further analysis showed that household location, fuel prices, household head characteristics (gender, education level and type of employment), property rights over dwellings, perception of cleanliness and

affordability, and awareness of fuel conservation regulations are all key determinants of the likelihood of conserving energy and the consequential savings in monetary terms.

With respect to Nigeria, Ubani (2009) determined the electricity consumption pattern in south-south geopolitical region of Nigeria. The results showed that there were significant differences in electricity consumption pattern amongst the six states that constitute the geopolitical region. River state had the highest mean consumption rate, followed in descending order by Delta, Edo, Akwa Ibom, Bayelsa and Cross River states. The study recommended a strategic and systematic distribution of electricity to ensure adequate supply in the region. In a related study, Kadiri and Alabi (2014) investigated the household energy consumption pattern in Offa City, Kwara State. The aim was to determine their consumption pattern and also identify the different sources of energy available for domestic use. Using the simple random sampling method, questionnaires were administered to about 800 households and the results collated and analysed. The results of the analysis showed that charcoal was the predominant fuel source while household size and income earning significantly impacted the standard of living of resident in that community. In another study, Irimiya et al., (2013), noted that there was a great opportunity to change a person's behaviour towards electrical energy savings through awareness and again, through proper electrical energy management practices, it was possible to save 70% to 90% of energy and cost for lighting, fan and pump systems; 50% for electric motor and 60% in areas such as heating and cooling. Furthermore, the Community Research and Development Centre (CREDC); survey 2009, identified the following habits as reasons for energy wasting in the country: dominant use of incandescent light bulbs, putting on lights to advertise goods, switching on outdoor lighting during the day, proliferation of private water boreholes, industrial activities in residential areas, setting appliances on standby mode, simultaneous use of multiple appliances in public buildings, leaving appliance on when not in use, multiple use of inefficient heating equipment, purchase of second-hand appliances in fear of buying a new but substandard product. Such use habits the study noted can be overcome by making people aware of their actions and the effect it has on the environment and energy system.

Methodology

The survey method was employed in this research and the residents of Uyo metropolis who either own houses or stay in rented properties and are solely responsible for the use and payment of their electricity bills constituted the universe. The instrument used was the questionnaire. Using the random sampling method, the perception questionnaires were administered to respondents across the various streets chosen.

In order to have as representative a sample as possible, the selection of roads and streets within the metropolis was done to ensure a good geographical spread taking into consideration certain demographic features. The city plan of Uyo the Akwa Ibom State

capital may be described as circular. The city has major trunk roads which lead to the city center while all other minor roads and streets are connected to the major roads. The sample areas within the Metropolis considered were; Aka Road, Nwaniba Road, Ikot Ekpene Road, Abak Road, Abak Road Housing, Ikpa Road, Urua Ekpa Road, Vision Road, Faith Road, Gospel Street, Ikot Abasi Street, Udo Umana Street, Nkemba Street, Udoette Street, Brooks Street, Ekpanya Street, Afaha Ube, Ekpri Nsukara Offot, Ekemba Nsukara Offot and Use districts of Uyo giving a total of twenty (20) roads/streets within the metropolis.

After a decision on how to draw the sample was concluded, the questionnaire distribution was divided among the twenty (20) sample areas to give fifty (50) respondents from each area totalling one thousand (1000), comprising of both male and female gender. Each street or area was handled by a team of research assistant made up mostly of 2015/16 graduating students of Electrical/Electronics Engineering Department, trained by the researcher. The exercise which lasted between August 20 and 28, 2016 was closely supervised by the researcher who had to go round the various areas and streets within the period the questionnaires were administered.

Results and Discussions

Upon retrieval of the questionnaires, data sorting and analysis was done. As envisaged, not all respondents returned their questionnaire. Hence, a total of 990 questionnaires representing 990 respondents were gathered for use as the required data to be analyzed. Descriptive statistics were used to summarise and analyse the data which is presented in the context of cognitive, affective and behavioural components (ABC/Tricomponent Model of Attitude).

Demographic Profiles of Respondents

In this section, data on the general demographic characteristics of respondents such as gender, literacy level, and occupation are analysed and presented.

The total sampled population comprised 524 male and 466 female respondents totalling 990 respondents, of which number, 446 male and 404 females were literate and 78 male and 62 females were illiterate respectively. Additionally, the sampled population comprised of 201 male and 150 female public servants, 152 male and 198 female traders, 48 male and 52 female farmers, 123 male and 66 female students. Figure 1 and 2 shows a further breakdown of the literacy level and occupation of both the male and female respondents from all the sampled areas respectively.

Figure 1: Literacy Level of Respondent

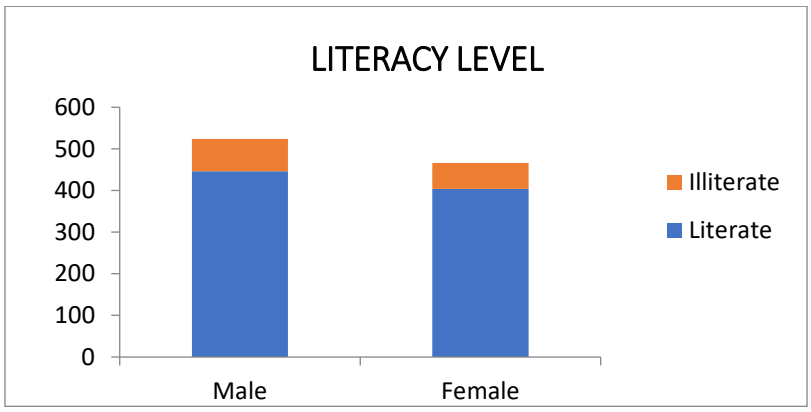
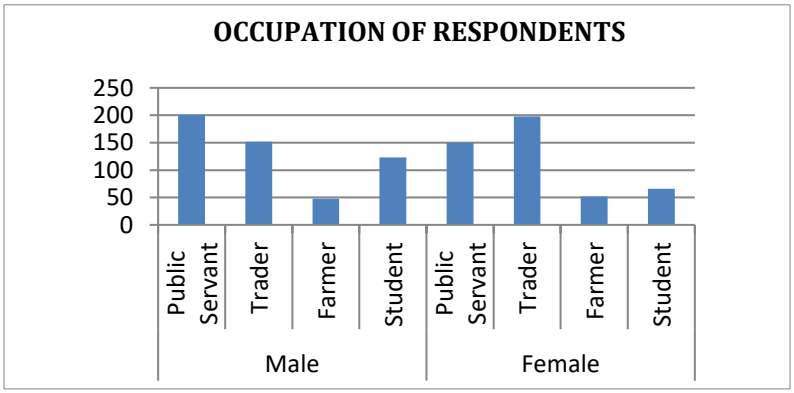


Figure 2: Occupation of Respondents



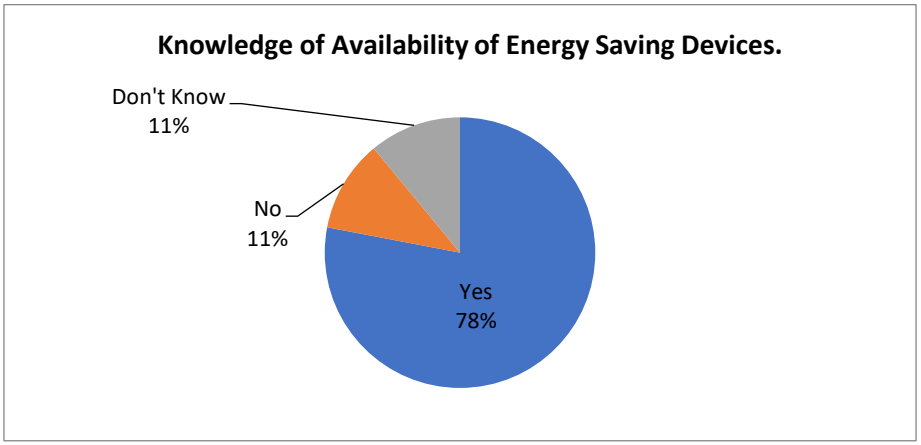
The Cognitive Component of Attitude

The cognitive components measured were electricity consumer's awareness, comprehension and knowledge of energy conservation and efficient use of electricity in lighting. The results of the findings are presented below:

Using a dichotomous question, respondents were asked if they had knowledge of electrical energy conservation and the various means available for electrical energy conservation; of the 990 respondents, 563 (57%) responded by saying they did with a ***yes*** answer and 427 (43%) said they did not with a ***no*** answer respectively. Again, of the 990 respondents, 780 (78%) affirmed to the knowledge that energy saving devices could conserve electrical energy, 105 (11%) asserted to not knowing and 105 (11%)

differed by saying they did not know about energy saving devices or its ability to conserve electrical energy. For the respondents who asserted to being in the know of the fact that energy saving devices could conserve energy, they were further asked, if they actually use such devices, most especially the energy efficient or saving bulbs; 396 (50.8%) admitted that they did use energy saving bulbs while 384 (49.2%) said they did not. Figure 3 depicts respondents' awareness of energy saving devices.

Figure 3: Respondents Knowledge of the Availability of Energy Saving Devices



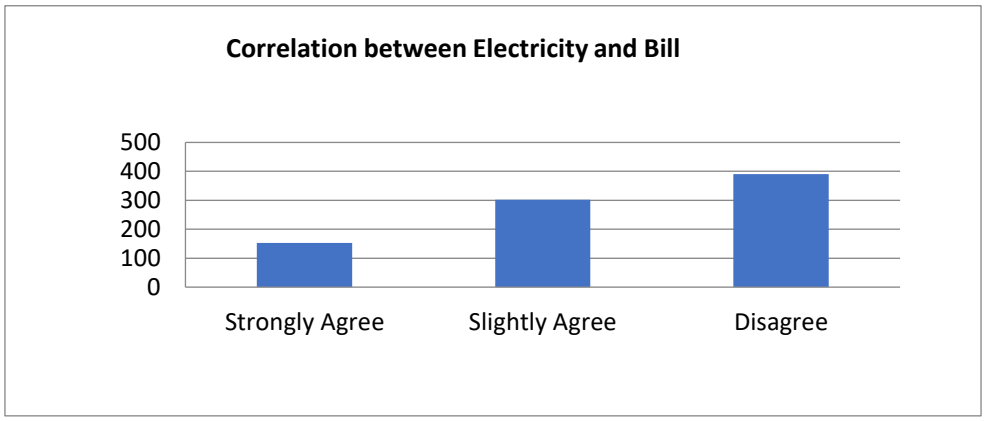
In order to check the electricity consumer's knowledge and use of metering device as a means to conserve energy and promote efficiency and sustainability, the population was again sampled. Out of the 524 (53%) male respondents and 466 (47%) female respondents; 628 (63%) affirmed to having electricity utility billing meters or other associated metering devices, 265 (27%) did not have and 97 (10%) did not know if they had meters or not; this data was gathered from the availability of meter question with the response ***yes***, ***no*** and ***don't know*** respectively. Respondents with postpaid meters, non-meter users and those that did not know if they had meters or not; answered to their receipt of electricity utility bill thus; 792 (95%) respondents asserted to receiving bills, 21 (3%) said they do not receive bills and 13 (2%) respondents said they did not know if they received bills or not for their electricity usage. Furthermore, 136 (16%) respondents ***strongly agreed*** that their bills tally with their daily electricity usage, 164 (20%) ***slightly agreed*** while 526 (64%) ***totally disagreed***.

With regards to the how often respondents had power supply (how frequent supply is) in the different sample areas, with their response graded on ***very often***, ***often***, ***rare*** and ***very rare***. Data gathered from this showed that, out of the total 990 respondents, 59 (6%) asserted to a very often supply of electricity, 387 (39%) affirmed to an often supply, 427 (43%) said they rarely receive supply of electricity, and 117 (12%) respondents said it's usually very rare before they have power supply. Using a 5-point

scale, consumers were asked how satisfied they were with the quality of electricity they receive on a daily basis; ***5*** represented a well illuminated room with an averagely low voltage supplying in the range of 230VAC to 200VAC and ***1*** representing an extra low voltage supply in the range of 100VAC to 80VAC with a poorly illuminated room. This additionally was meant to gather data on the ability of the electricity supplied to power household electrical appliances with considerable ease and less stress. For this, of the total sample population, (990 respondents), 40 (4%), 201 (20%), 396 (40%), 278 (28%), and 75 (8%) respondents ranked the quality of their supply as; ***5***, ***4***, ***3***, ***2***, and ***1*** respectively. On the average, the graded response for the quality of electricity supplied was 2.85.

In relation to electricity consumer behaviour, it was asked if respondents think their lifestyle and behaviour towards electricity conservation and consumption affects the overall quality of electricity received by other consumers; 449 (45%) said ***yes*** it does, 263 (27%) gave a ***partial*** response while 278 (28%) respondents asserted to a ***no*** response. With respects to a direct correlation between the amount of electrical energy used and the amount of money paid as electricity bills, respondents answered to the options; ***strongly agree***, ***slightly agree*** and ***disagree.*** Of the 846 respondents that were post-paid meter users and non-meter users; 153 (18%) said they strongly agree, 302 (36%) said they slightly agree and 391 (46%) respondents said they disagree; that there is a direct correlation between the amount of electrical energy used and the amount of money paid on bills respectively. This is captured in Figure 4.

Figure 4: Correlation between Electricity Consumed and Bills Paid



Power wastages both on the part of the consumers and on the transmission and distribution lines go a long way in determining if electrical energy is conserved or not. Power losses generally affect the quality of electrical energy reaching the end user. This also has a spill over effect on the consumer conservation motives. Of the 990 respondents in total, 239 (25%) asserted that wastages affect the quality of electricity

received with a ***yes*** response, 378 (38%) said ***partially*** and 373 (37%) said that wastages do not affect the quality of electricity received with a ***no*** response. Additionally, it was asked if respondents believe wastages on their part as consumers of electrical energy affects the amount of money paid on their bill. 393 (40%) said that wastages affect the amount of money paid on their bills with a ***yes*** response, 274 (28%) agreed ***partially*** while 323 (32%) said that wastages do not affect the amount of money paid on their electricity utility bill with a ***no*** response.

Electricity Distribution Company often decry of electricity theft by consumers. Respondents were asked if they think that electricity theft by other consumers affects the amount of money they pay on their electricity bill. For this, 190 (52%), 68 (19%), and 104 (29%) respondents that were non-meter users (362 respondents) said they ***strongly agree***, ***slightly agree*** and ***disagree*** respectively. Vandalizing of electricity utility company equipment does not only affect the company as a whole but also affects the consumers as it often causes days, months and sometimes years of blackout for which often times could be avoided. Respondents were asked if they think vandalizing electricity utility company's equipment affects the quality of the electrical energy received; for this, 927 (94%) respondents said ***yes*** and 63 (6%) respondents said ***no***. When asked if respondents think that vandalizing equipment affects how often they would receive supply. 929 (94%) respondents said ***yes***, while 61 (6%) respondents said ***no***.

The Affective Component of Attitude

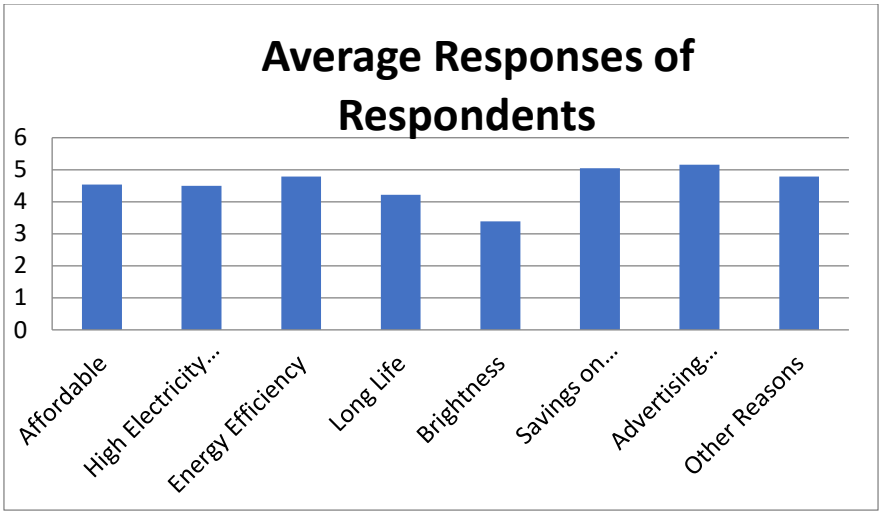
The affective components measured comprised liking and preference for energy efficiency in lighting among electricity customers. The results are presented below.

Respondents were asked notwithstanding if they used energy efficient bulbs or not, which reason they think would influence their decision the most to start using energy efficient bulbs. On a scale of 8, where 8 represents the lowest and 1 represents the highest point on the scale given so as to match the 8 reasons given; respondents were asked to rank according 1,2,3,…,8 starting from the highest for the following reasons that*; the energy efficient bulbs were affordable, the currently experienced high electricity billings, the bulbs were energy efficient, the bulbs had long life span (longevity of life of the bulbs), the produced more illumination (brightness), it gives saving on electricity bills, it is frequently advertised a*nd inclusively other reasons respondents thought would be necessary. With respect to energy efficient bulbs being affordable; 71 (7%), 157 (16%), 133 (13%), 118 (12%), 156 (16%), 133 (13%), 119 (12%) and 103 (11%) respondents graded this; ***1***, ***2***, ***3***, ***4***, ***5***, ***6***, ***7***, and ***8*** respectively with an average of 4.54. For the reason, if high electricity bills would make respondents start using energy efficient bulbs; 118 (12%), 108 (11%), 134 (14%), 130 (13%), 140 (14%), 124 (13%), 133 (13%), and 103 (10%) respondents graded this; ***1***, ***2***, ***3***, ***4***, ***5***, ***6***, ***7***, and ***8*** respectively with an average of 4.50. For the longevity of the life of the bulbs;

137 (14%), 158 (16%), 145 (15%), 114 (11%), 94 (10%), 131 (13%), 115 (11%) and 96 (10%) respondents graded this reason; ***1***, ***2***, ***3***, ***4***, ***5***, ***6***, ***7***, and ***8*** respectively with an average of 4.22. For the fourth reason, if respondents thought that these bulbs are energy efficient; 80 (8%), 95 (10%), 132 (13%), 132 (13%), 140 (14%), 151 (16%), 140 (14%) and 120 (12%) respondents graded energy efficiency; ***1***, ***2***, ***3***, ***4***, ***5***, ***6***, ***7***, and ***8*** respectively with an average of 4.79. If energy efficient bulbs provide brightness which is often termed as illumination; if energy efficient bulbs provide more illumination when compared to conventional bulbs; 288 (29%), 155 (16%), 128 (13%), 122 (12%), 77 (~8%), 87 (9%), 84 (8%), and 49 (5%) respondents graded this reason for using energy efficient bulbs; ***1***, ***2***, ***3***, ***4***, ***5***, ***6***, ***7***, and ***8*** respectively which gave an average of 3.39. The response of respondents to the idea that they would start using energy efficient bulbs to realize savings on electricity bill was; 73 (7%), 91 (9%), 108 (11%), 138 (14%), 101 (10%), 157 (16%), 153 (~16%), and 169 (17%) with a corresponding grading of; ***1***, ***2***, ***3***, ***4***, ***5***, ***6***, ***7***, and ***8*** respectively giving an average of 5.05. With regards to frequent advertisement messages, respondents responded thus; 91 (9%), 86 (8%), 79 (8%), 109 (11%), 134 (14%), 129 (13%), 166 (17%), and 196 (20%) respondents graded this reason for their desire to start using energy bulbs; ***1***, ***2***, ***3***, ***4***, ***5***, ***6***, ***7***, and ***8*** respectively giving an average of 5.16. Apart from the reasons analysed above, respondents were asked if they had other reasons they think would probably make them start using energy efficient bulbs, 111 (11%), 103 (10%), 106 (11%), 136 (14%), 117 (12%), 132 (13%), 94 (10%), and 191 (19%) respondents graded this; ***1***, ***2***, ***3***, ***4***, ***5***, ***6***, ***7***, and ***8*** respectively giving an average of 4.79.

Other reasons for which respondents said they would start using energy efficient bulbs are thus; neighbour used it first, light bulbs in church (worship halls) was changed to energy efficient bulbs, they are more beautiful, attractive and add to aesthetics, mostly everyone has changed to energy efficient bulbs and additionally, after the installation of photovoltaic array, the technician advised them to change to energy efficient bulbs to conserve power from inverter. The average of all the respondent reasons which may influence them to start using energy efficient bulbs is captured in Figure 5.

Figure 5: Respondent Reasons that may likely Influence their Use of Energy Efficient Bulbs



From the chart in Figure 5, using the method for which respondents graded the reasons for which they would start using energy efficient bulbs; respondents graded brightness as the most reason they would want to start using energy efficient bulbs while advertisement messages would be the least reason that would compel them to start using energy efficient bulbs.

Again, for respondents that have heard about energy efficient bulbs and do not use them, they were asked why they would not want to use these bulbs using four reasons; ***they are too expensive***, ***they do not understand the benefits of the energy efficient bulbs***, ***they do not believe in their benefits*** and ***other reasons*** respondents thought made them not use energy saving devices; respondents were asked to respond to at least one reason. 134 (42%) said they were too expensive, 47(15%) said they do not understand their benefits, 46 (14%) said they do not believe in their benefits and 96 (29%) respondents opted for the others option. Other reasons specified by respondents include; original energy efficient bulbs are hard to find, they damage too often, because of their brightness they attract too many insects, they are unreliable.

Also, respondents were asked if they would want to learn about energy efficient bulbs, notwithstanding if they used energy efficient bulbs or not. Of the total respondents from the sample areas, 689 (70%) respondents said *yes*, they would want to learn and 301 (30%) respondents said *no*, they would not want to learn about energy saving bulbs. Additionally, for respondents that did not have knowledge of electrical energy conservation; they were asked if they would like to learn about electrical energy conservation; of the 427 (43%) respondents that did know about electrical energy

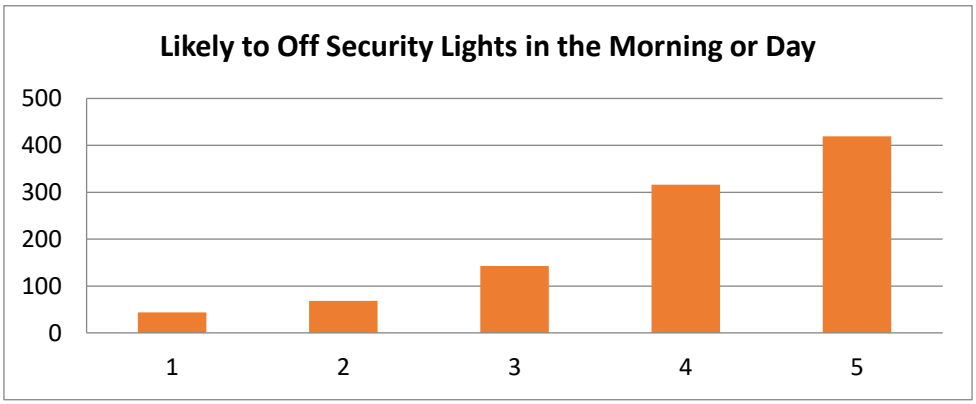
conservation, 305 (71%) respondents said ***yes***, they would like to learn about electrical energy conservation while 122 (29%) respondents said ***no***, they would not want to learn about electrical energy conservation.

The Conative Component of Attitude

The conative components measured comprised intentions, behaviour and trials by customers on efficient use of electricity in lighting. The findings are presented here.

Since conservation of electrical energy often requires that for consumers to record saving on their bills, there has to be conscious effort by such consumers to turn off lighting points and other electrical appliances not currently used by them. To this, still on a scale of 5, respondents were asked how often they perform these conservation actions of switching off electrical appliances and lighting points not in use. With regards to switching off security lights in the morning or during the day; 419 (42%), 316 (32%), 143 (15%), 68 (7%), and 44 (4%) respondents graded their conservation action for this as; ***5***, ***4***, ***3***, ***2***, ***1*** respectively with an average of 4.00. For the conservation action of switching off lights in a room when not in use; 431 (44%), 259 (26%), 205 (21%), 64 (6%) and 31 (3%) respondents graded their conservation action for this as; ***5***, ***4***, ***3***, ***2***, ***1*** respectively still with an average of 4.00; with regards to switching off electrical appliances when not in use; 645 (65%), 180 (18%), 100 (10%), 42 (4%) and 23 (4%) respondents graded; ***5***, ***4***, ***3***, ***2***, ***1*** respectively as their response for this action; the average for this was 4.40. The graph in Figure 6 illustrates the response of the likelihood to turn off security lights by respondents.

Figure 6: Response of respondents with regards to turning off Security Lights



For the 164 prepaid meter respondents who acknowledge the use of energy saving bulbs, in line with the conservation of electrical energy by consumers, they were asked if they have realised savings on either their prepaid card or electricity bills since they started using energy efficient bulbs and other energy saving devices. 121 (74%)

respondents said ***yes***, they have realized savings from energy saving bulbs and 43 (26%) respondents said ***no*** they have not; of the 121 (74%) respondents that said they have realized savings from their use of energy bulbs; 24 (20%), 39 (32%), 17 (14%), 6 (5%), 4 (4%), and 31 (25%) respondents from all the sample areas said the realize; below 5%, between 5-9%, between 10-30%, between 10-30%, between 40-60%, more than 60%, savings on their bills respectively.

An unstructured question was used to ask respondents to suggest other means of electrical energy conservation. Their responses included; none, uninterrupted power supply (UPS), avoiding unnecessary lighting points (need for better illumination calculations in lighting installations), smart sockets, switching changeover to neutral position when leaving the house, researching into using low energy; pressing iron, electric heater, and refrigerator. Using energy saving appliances, switching off some electrical appliances when using some heavy appliances like; iron, freezer, pumping machine, electric cooker and inclusively the use of Inverters and smart television sets. Respondents were asked, if they actually practice any of these measures they suggested; 138 (14%) respondents said ***yes***, they do actually practice these measures of conservation of electrical energy they suggested while, 852 (86%) respondents said ***no*** they do not practice any of these measures they suggested.

Conclusion

The aim of this work was to investigate consumer's behaviour towards energy use and their awareness of energy efficient activities that could help in efficient energy use and conservation. The results of the evaluation which was carried out among residents of Uyo metropolis have been presented in the context of cognitive, affective and behavioural components (ABC/Tricomponent Model of Attitude), in line with the objectives of this study. Clearly, results obtained from the study have shown that low energy efficiency or waste of energy is not only as a result of poor or wrongly designed infrastructure and processes but also the consequence of consumer's lack of awareness of the issue and a lackadaisical attitude towards energy use and conservation on the part of those who are aware.

Key among the findings is the fact that even when customers asserts to the knowledge of energy efficient devices and its advantages, a good number still did not subscribe to using them. For instance, of the 990 respondents, 78% affirmed to knowing that energy saving devices could conserve electrical energy, 11% asserted to not knowing and another 11% differed by saying they did not know about energy saving devices or its ability to conserve electrical energy. However, for the 78 % respondents who asserted to being in the know of the fact that energy saving devices could conserve energy, only 50.8 % actually used such devices while the remaining 49.2 % did not despite being fully aware of the benefits and associated savings such practice could attract. Significant also is the fact that for respondents who did not have knowledge of

electrical energy conservation, 71 % indicated that they would be willing to learn more about the issue. It was also observed that notwithstanding if consumers used energy efficient bulbs or not that the three primary attributes that would likely influence their decision the most to start using energy efficient bulbs are: Brightness of energy efficient bulbs, Long Life and High Electricity Bills.

The study therefore recommends that it is necessary to promote efficient use of electricity in order to benefit various stakeholders such as customers, electricity companies and governments. Such can be achieved through increased or frequent public sensitization and award of energy incentives by electricity companies. Energy efficient message should be feasibly engraved in all consumers' monthly bills and at all points where such bills are paid. Also, the electricity companies should engrave such messages in all their utility vehicles and also have in their team energy efficient experts who would be responsible for educating electricity consumers on energy related behaviours and activities that would promote energy efficiency and sustainability. Such discussions could be initiated either at the point of electricity bills distribution or during the teams' power disconnection patrol. The government on her part should either establish or create an Energy Efficiency and Conservation Department or Agency. The role of such Department or Agency among others would be to develop energy efficiency and conservation policies.

Lastly, from the study, it is obvious that there are energy-related attitudes and energy-saving behaviours that could be practiced and performed at little or no cost. For instance, turning off lights and appliances when not in use (no cost) and replacement of incandescent lamps with energy saving lamps (little cost). These practices, if adhered to by electricity consumers would not only ensure energy availability, but also lead to energy security, conservation and sustainability which in turns engender national development.

Acknowledgement

The authors appreciate the 2015/16 graduating students of Electrical/Electronics Engineering Department (Power Option) for their willingness to assist with the questionnaire distribution.

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