FACTORS INFLUENCING ACCESS TO RENEWABLE ENERGY BY RURAL FAMILIES: A CASE OF SOLAR LANTERNS PROJECT IN ISIOLO COUNTY, KENYA

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ABSTRACT

In developing countries, lighting is generally thought to rank among the top three uses of energy. Adaption of renewable energy sources is typically not placed in the context of a specific fuel choice. Solar Technology would provide the solution to the evident energy gap but this tends to be negligible in most developing countries. There has been a lot of criticism, from various quarters, on the way the Isiolo County solar lanterns project are managed. The purpose of the study was to establish the factors influencing access to solar lanterns project by rural families in Isiolo County, Kenya. The study was guided by the following objectives; to establish the influence of community involvement, alternative sources of energy, availability of information and family income level on access to solar lanterns project by rural families in Isiolo County, Kenya. The study was grounded on resource dependence theory and public participation theory. The study adopted a descriptive research design. The target population for this study composed the community leaders, county government officials and the rural residents in Isiolo County. A sample population of 145 was selected from the target population of 234 with a 95% confidence level and an error of 0.05. The study selected the respondents using stratified random sampling technique. Primary data was obtained using self-administered questionnaires. The questionnaire was made up of both open ended and closed ended questions. The drop and pick method was preferred for questionnaire administration so as to give respondents enough time to give well thought out responses. After data cleaning, descriptive statistics such as frequencies, percentages, mean score and standard deviation was estimated for all the quantitative variables and information presented inform of tables. The qualitative data from the open-ended questions was analyzed using conceptual content analysis and presented in prose. Inferential data analysis was done using multiple regression analysis. The study found that community participation had a greater influence on access to solar lanterns project. It was found out that communication satisfaction, involvement in projects management and public dialogue influence access to solar lanterns project in a great extent. The study findings showed that knowledge on solar energy, experience and information sharing influence access to solar lanterns project in a great extent. It was further indicated that leadership style, strategic agility and commitment influence access to solar lanterns project in a moderate extent. It was also found that formal education, accessibility to information, training and capacity building was found to influence access to solar lanterns project greatly. It was also revealed that that proximity grid electricity, affordability and availability of alternative energy sources influence access to solar lanterns project greatly. The study findings found that there is a great influence of family income level on access to solar lanterns project. The results indicated that household expenses influence access to solar lanterns project in a great extent. The study recommended that Government of Kenya and especially the Ministry of Energy should provide training and education to increase the availability of information and

awareness on the use of solar energy. The study recommends Government should consider zero rating tax on Solar equipment so as to influence lower pricing thus making it more affordable for purchase and installation of solar system. The study recommends that there should be timely release of funds as a way to ensure completion of projects within the stipulated time. Finally, the study concluded that community participation had the greatest influence on access to solar lanterns project followed by alternative sources of energy in Isiolo County, Kenya, followed by availability of information then family income level had the least influence on access to solar lanterns project.

Key Words: *access, renewable energy, rural families, solar lanterns project, Isiolo County, Kenya*

INTRODUCTION

Energy is not regarded as a basic necessity, but it is a basic ingredient in the successful satisfaction of almost all basic human needs (Yuko, 2004). The level and intensity of energy use is an important indicator of a country's economic growth. The main sources of energy are divided into two main categories: conventional and renewable energy sources. Conventional sources such as energy from non-renewable resources have numerous challenges that include pollution and global warming; this has made countries change policies to encourage adoption of greener technologies in renewable energy sources.

Renewable energy can in general terms be defined as energy that can be derived from resources which are naturally replenished on a human continuance, for instance sunlight, biogas, wind, hydropower, tides, waves and geothermal heat. Renewable energy sources can substitute conventional energy sources in four distinguishable areas: electricity generation, hot water/space heating, motor fuels, and rural (off-grid) energy services (World bank, 2014). Fossil fuel which includes coal, oil and natural gas led world economic growth, but these fuels release of carbon dioxide (CO2) into the earth atmosphere, and are the main drivers of global warming and climate change (Stern, 2006). The increased concern over influence related to energy use and global warming hints that there will be more reliance on renewable energy sources in future which includes wind, solar, geothermal, hydro, biogas, wave and tidal.

Additionally, with increasing energy prices, more attention is being shifted to further exploration of renewable energy sources as an alternative to fossil fuels. As a result, academics and industries from various parts of the world have begun to envision renewable energy driven future in the pursuit of a sustainable energy system (IPCC, 2007). Renewable energy comes from natural resources such as sunlight, wind, rain, tides and geothermal heat. About 16% of global energy consumption comes from renewables: 10% is from traditional biomass, which is used mainly for heating and 3.4% from hydroelectricity. New renewables such as small hydro, modern biomass, wind, solar, geothermal, and bio-fuels account for about 2.8%. There has been

a rapid growth in new renewables because of increased uptake of the relevant technologies (UNEP, 2011).

Approximately 80 % of all energy consumed in the world is utilized by the first twenty large economies commonly referred as G20 in 2010 (Schmidt and Haifly, 2012). According to this statistic this group of countries is important in shaping renewable trend since this is where most energy demands are happening. Overall about 16% of world energy consumption comes from renewables; with 10% from traditional biogas, used majorly for heating and about 3.4% from hydroelectricity. New renewable energy sources including small hydro, modern biogas, solar, wind, geothermal, and bio-fuels contribute about 2.8% (UNEP, 2011).

The world has witnessed a rapid growth in new renewables due to increased uptake of the relevant technologies. Investments in renewable energy have increased by 32% in 2010, to a record US$211 billion. The increase in investments was as a result of wind farm development in China and small scale solar photovoltaic (PV) installations in Europe (UNEP, 2011). World annual percentage increase for 2008 depicts significant achievements with all forms of grid connected solar PV capacity growing by 70%, wind power grew by 29%, solar hot water gained by 15%, and small hydro increased by 8% (El-Ashry, 2009). Additionally, Renewable energy Global Status Report (2009) gives a ranking of the top five renewable energy investor economies together with rankings of top five states depending on their investment and capacity of renewable energy until 2008. It shows that countries with emerging economies such as Brazil, China, Indonesia, India, Philippines and Turkey are investing significantly in different sources of renewable energy.

Global investments in renewable energy increased by 32% in 2010, to a record US$211 billion mainly because of wind-farm development in China and small-scale solar PV installations in Europe (UNEP, 2011). Africa achieved the largest percentage increase in investment in renewable energy among developing regions excluding the three big economies. In 2008, India accounted for 17.7% of the global population but was the fifth-largest consumer of energy, accounting for 3.8% of global consumption. India's commercial energy supply is dominated by coal and oil (most of it imported), with renewable energy contributing less than 1% overall and accounting for approximately 10% of installed capacity.

As in many countries that are experiencing high economic growth, its power-generating capacity is insufficient to meet current demand, and in 2009–2010, India experienced a generation deficit of approximately 10% (84TWh) and a corresponding peak load deficit of 12.7%, i.e. over 15 GW. As a result of frequent electricity shortages, the Indian economy lost about 6% of Gross Domestic Product (GDP) in FY2007–2008. To meet its current goals of economic growth, by 2017 India will need to increase its installed generating capacity to over 300 GW. In recent years, control over generating facilities has shifted to federal government and private entities, including those that have set up captive power plants for their industrial facilities. The private sector dominates the generation of renewable energy (Arora et al., 2010).

African continent is gifted with huge renewable and non-renewable energy sources. Some estimates show that the continent has 1,750TWh potential of hydroelectric power and 14,000 MW of geothermal energy potential. It receives enough solar radiation throughout the year, and several studies have confirmed the availability of immerse wind energy resources in several areas of the continent. Nevertheless, these energy endowments are largely underutilized (Daly, 2012). For example, only about 5% of the continent's hydroelectric power potential has been exploited, whereas the same figure for geothermal is 0.6%. Energy poverty in Africa remains a serious impediment to human and economic development in many parts of the continent.

Africa as a region continues to face critical challenges in its energy sector characterized by inadequate access to modern energy services, low purchasing power, poor infrastructure, low investments and over reliance on traditional biogas to satisfy their basic energy requirements. Comparing Africa with other parts of the globe, the lack of access to energy is most pronounced in the continent. In most Sub-Saharan countries access to the electricity grid is less than 1% (Daly, 2012).

Recent trends show that by 2020 still over 60% of Sub-Saharan Africans will not have access to electricity. In spite of the environmental, social and health challenges associated with its use, traditional biogas still remains the major source of energy for the majority of the poor. Biogas accounts for about 70-90% of primary energy supply in some economies and about 86% of energy consumption. Moreover, adoption of renewable energy is limited due to high initial transition costs (Love, 2012). There are however distinct variations within the continent, with biogas energy accounting for only 5% of energy consumption in Northern Africa and 15% in South Africa.

Africa is endowed with vast renewable and non-renewable sources of energy. It is estimated that the continent has 1,750TWh potential of hydropower and 14,000 MW of geothermal potential. The continent receives abundant solar radiation through the year, and recent studies have confirmed the availability of abundant wind energy resources along some of the coastal and specific inland areas of Africa. With respect to non-renewable energy, coal resources are available in abundance in Southern Africa. At the end of 2007, the continent had over 117 billion barrels of oil of proven oil reserves and over 14.6 trillion cubic meters of proven gas reserves. However, these energy endowments remain largely underutilized. Africa attained the biggest gain in investment in renewable energy sources among developing countries excluding South Africa. Africa total investment rose from US$750 million to US$3.6 billion, majorly due to strong performance in Egypt.

Kenya as a country is aspiring to become energy secure, with only about 6% of the rural population with access to grid electricity. Decentralized renewable energy systems have enormous potential in meeting immediate energy requirements for isolated institutions, businesses and households in remote areas (Wanjiru & Ochieng, 2013). Prohibitively high connection costs and low incomes among majority of people in developing countries such as

Kenyans accelerate low access to energy in spite of the government efforts under the rural electrification programme (Love, 2012). For instance, the cost of rural electrification is estimated to be between US$ 30 to US$ 40 per kWh, compared to an amortized life-cycle cost of solar and battery operated systems of US$ 1 to US$ 2 per kWh (Kiplagat, Wang & Li, 2011).

Even though Kenya has vast renewable energy resources including solar, wind, bio-fuel, biogas, geothermal and hydropower, their application has been limited. The expansion of the renewable energy is being catalyzed by the increasing demand and price of electricity, growing world oil and gas costs and environmental pressure. Biogas energy makes over 70% of total energy consumption in Kenya. Petroleum and electricity, account for approximately 22% and 9% respectively (Mwakubo et al., 2007). The Kenyan energy sector is characterized by the heavy dependence on biogas, low access to modern energy, frequent power outages, over dependence on hydroelectricity and high reliance on imported oil. Renewable energy sources adoption is, hence, significant means to meet the challenges of increasing demand and dealing with the related environmental pressure.

According to Kimuyu, Mutua and Wainaina (2012), installed electric power capacity in Kenya was 1,412.2MW as of December, 2010. This installed capacity could not to meet demand; therefore, the government contracted 60MW of emergency power to bridge the deficit. This was necessary so as to meet the increasing demand and cut down on load-shedding, especially during peak periods. Hydroelectric power is the leading source, accounting for 51.55% of total installed capacity. Thermal (petrol), geothermal, co-generation and wind contribute 33.2%, 13.38%, 1.84% and 0.36% respectively. Therefore, renewable energy accounts for approximately 67.1%, thus Kenya power generation is now majorly 'green'. Solar energy technologies harness the energy of direct solar irradiance to create electricity using photovoltaics cells and concentrating solar power to create thermal energy to meet direct lighting requirements as well as to produce fuels that might be used for transport and other purposes which might include heating and cooling (Hemmen, 2011).

Kenya has a high solar energy potential since it receives daily insolation of between 4-6kWh/m2. Solar use in Kenya is majorly for photovoltaic systems, drying and water heating. The Solar photovoltaic systems are used mainly in telecommunication, lighting and water pumping. Currently the country has installed capacity of approximately 4 MW. In addition, the country currently has approximately 140,000 solar water heating systems installed. Currently in Kenya, most renewable energy systems technology is available although market penetration is notably low and existence of these technologies is rarely known by potential users (Mwakubo et al., 2007).

In addition, very few studies have sought to investigate determinants of renewable energy adoption in Kenya. For instance, Lay et al. (2012) found that family income and education influence adoption of solar home systems (SHSs) but the authors did not thoroughly investigate the influence of household characteristics and other economic factors on adoption of SHSs.

Although Kenya has vast renewable energy resources such as solar, wind, biomass, bio-fuel, geothermal and hydropower, their use has been limited. Expansion of the sector is being catalysed by the growing demand and cost of electricity, increasing global oil and gas prices and environmental pressure. In Kenya, biomass accounts for over 70% of total consumption. The other sources are petroleum and electricity, which account for about 22% and 9% respectively (Mwakubo et al., 2007).

As evidenced by good government policy and energy planning that aim to ensure a sustainable energy mix, Kenya's move towards renewable energy has been broad-based. Investment has grown from virtually zero to more than US$1.3 billion, including funding for wind, geothermal and small hydro capacity of 724MW, and for the production of 22 million litres p.a. of ethanol. Geothermal was the highlight, with the local electricity-generating company, KenGen, securing debt finance for additional units at its Olkaria project (UNEP, 2011). With the new financing arrangement, the company will add 280MW of power to the grid in the next three years. At household level, adoption of solar is still too low.

STATEMENT OF THE PROBLEM

In developing countries, lighting is generally thought to rank among the top three uses of energy, with cooking and television, and space heating being of even greater importance (World Bank 2010). In addition, the adaption of renewable energy sources is typically not placed in the context of a specific fuel choice. Yet only in this specific context can renewable adoption of fuel switching be adequately understood. In Kenya, solar household systems seem to be used to a significant extent for lighting (Jacobson, 2006). Less than 44% of the population and 5% of the rural population in Kenya has access to lighting (World Bank, 2010). Adoption of Solar Technology would provide the solution to the evident energy gap but this tends to be negligible in most developing countries. Though the renewable energy sector is not relatively new, its growth in the country is at a low pace as compared to the other developing countries (SREP, 2011). Most of the Rural Population use Kerosene for lighting and Charcoal or firewood for cooking. These have caused many health problems because of the smoke emitted and also due to burns caused by the open flames. There are some solar lanterns project problems that should be stressed particularly; project risk estimation and risk management, project management – operation management communication. Be that as it may, notwithstanding the quantifiable advantages management, generally couples of open organizations have consummated the practice (Mateen, 2016). Several studies have been done in relation to access to renewable energy such as; Gitone (2014) who did a study on determinants of adoption of renewable energy in Kenya. Keriri (2013) assessed factors influencing adoption of solar technology in Lakipia north constituency, Kenya. However, none of the studies reviewed established factors influencing access to solar lanterns project by rural families in Isiolo County, Kenya. This study will therefore bridge this gap by answering the question; what are the factors influencing access to renewable energy focusing solar lanterns project by rural families in Isiolo County, Kenya?

PURPOSE OF THE STUDY

The study determined the factors influencing access to renewable energy by rural families in Kenya by undertaking a case of solar lanterns project in Isiolo County in Kenya.

OBJECTIVES OF THE STUDY

1. To establish how community participation influence access to solar lanterns project by rural families in Isiolo County, Kenya.
2. To evaluate the influence of alternative sources of energy on access to solar lanterns project by rural families in Isiolo County, Kenya.
3. To determine the influence of availability of information on access to solar lanterns project by rural families in Isiolo County, Kenya.
4. To determine the influence of family income level on access to solar lanterns project by rural families in Isiolo County, Kenya.

THEORETICAL ORIENTATION

Resource Dependence Theory (RDT)

This theory was developed by Pfeffer and Salancik, (2003). In employing this theory to this study, the researcher looks at factors influencing access to renewable energy. Further, the author argues that the solar lanterns projects under study are dependent on resources, these resources ultimately originate from the environment of such as donors, the environment to a considerable extent contains other organizations, the resources one organization needs are thus often in the hand of other organizations, resources are a basis of power, legally independent organizations can therefore be dependent on each other Jakachira (2013).

In addition by adopting this theory, the researcher also argues that; in as much as organizations are inter-dependent, the theory of Resource Dependence needs a closer examination. Its' very weakness lies in its very assertions of dependence. According to this theory, organization depends on resources for their survival; therefore, for any organization to achieve sustainability, resources are indispensable. For community based organizations to achieve performance, resources are important. The researcher therefore argues that these resources will not only come in the form of financial resources but for project sustainability, other resources of human for example volunteers and land should be considered. This theory addressed research question two which sought to empty the influence of level of income on access to the solar lanterns projects, the theory will explain the important role that funding plays.

Public Participation Theory

Public participation was institutionalized in the mid-1960s with President Lyndon Johnson's Great Society programs (Cogan & Sharpe, 1986). Erick Erickson is a personality theorist who

believes that the most important force driving human behavior and development of personality is the social interaction. He points out that the social environment combined with biological maturation provides each individual with a set of crises that must be resolved. Erick Erickson's human development theory comprises of eight psychosocial stages, and the fourth stage is more relevant to this study. This fourth stage is a period occurring from about six years to twelve years. At this stage the child is expected to learn rudimentary skills via formal education (Baron, Boschee & Jacobson, 2009). The child within the solar lanterns project develops a sense of industry and learns the reward of perseverance and diligence. The child at this stage is ready and willing to learn about how to use tools; machines and methods preparatory for adult work. The child learns to do things well or correctly in comparison to a standard or to others. Society meets these tendencies of the child by creating opportunities for learning and co-operation. Virtues of competence arise during this stage (Sloth-Nielsen, 2014).

The theory underscores the fact that the creation and the ongoing operations of each solar lanterns project are as a result of several actors' activities, who are the stakeholders. The central idea therefore is that a programme/project's success is dependent on how well the organization manages the relationships with key groups such as community in place and others that can affect the realization of the project objectives. This theory gives an understanding of the influence of community participation on access to solar lanterns project.

RESEARCH METHODOLOGY

Research Design

The study adopted a descriptive research design. A descriptive design was concerned with determining the frequency with which something occurs or the relationship between variables (Bryman & Bell, 2011). Thus, this approach was suitable for the study, since the study intended to collect comprehensive information through descriptions which were helpful for identifying variables. Bryman and Bell (2011) asserts that a descriptive design sought to get information that described existing phenomena by asking questions relating to individual perceptions and attitudes.

Target population

According to Sekaran and Bougie (2010), a population is the total collection of elements about which we wish to make inferences. The target population for this study composed the community leaders, county government officials and the rural resident's representatives in Isiolo County as shown in Table 3.1.

Sample Size and Sampling Procedures

Sampling is a deliberate choice of a number of people who were to provide the data from which the study drew conclusions about some larger group whom these people represent. The section focused on the sampling size and sampling procedures. The sample size is a subset of the population that is taken to be representatives of the entire population (Kumar, 2011). A sample population of 145 was arrived at by calculating the target population of 234 with a 95% confidence level and an error of 0.05 using the formula taken from Kothari (2004).

$$n = \frac{z^2.N.\partial_p^2}{(N-1)e^2 + z^2\partial_p^2}$$

Where: n = Size of the sample; N = Size of the population and given as 234; e = Acceptable error and given as 0.05; ∂p = The standard deviation of the population and given as 0.5 where not known; Z = Standard variate at a confidence level given as 1.96 at 95% confidence level.

The sample size fits within the minimum of 30 proposed by Saunders, Lewis and Thornhill (2012).

Sampling Procedures

The study selected the respondents using stratified proportionate random sampling technique. Stratified random sampling is unbiased sampling method of grouping heterogeneous population into homogenous subsets then making a selection within the individual subset to ensure representativeness. The study used simple random sampling to pick the respondents in each stratum.

Research Instruments

Primary data was obtained using self-administered questionnaires. The questionnaire was made up of both open ended and closed ended questions. The open-ended questions were used so as to encourage the respondent to give an in-depth and felt response without feeling held back in illuminating of any information and the closed ended questions allow respondent to respond from limited options that had been stated.

Data Collection Procedures

The researcher obtained an introduction letter from the university which was presented to each stakeholder so as to be allowed to collect the necessary data from the respondents. The drop and pick method were preferred for questionnaire administration so as to give respondents enough time to give well thought out responses. The researcher booked appointment with respondent organizations at least two days before visiting to administer questionnaires. The researcher personally administered the research instruments to the respondents. This enabled the researcher

to establish rapport, explain the purpose of the study and the meaning of items that may not be clear as observed by Best and Khan (2003).

Data Analysis Techniques

Data was analyzed using Statistical Package for Social Sciences (SPSS Version 25.0). All the questionnaires received were referenced and items in the questionnaire were coded to facilitate data entry. After data cleaning which entails checking for errors in entry, descriptive statistics such as frequencies, percentages, mean score and standard deviation were estimated for all the quantitative variables and information presented inform of tables. The qualitative data from the open-ended questions was analyzed using conceptual content analysis and presented in prose. Inferential data analysis was done using multiple regression analysis. Multiple regression analysis was used to establish the relations between the independent and dependent variables. Multiple regressions were used because it is the procedure that uses two or more independent variables to predict a dependent variable. The multiple regression model generally assumed the following equation;

$$\boldsymbol{Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon}$$

Where: Y= Access to solar lanterns project; β_0=constant; β_1, β_2, β_3 and β_4 = regression coefficients; X_1= community involvement; X_2= alternative sources of energy; X_3= availability of information; X_4= income level; ε=Error Term

In testing the significance of the model, the coefficient of determination (R2) was used to measure the extent to which the variation in access to solar lanterns project was explained by the variations of the factors. F-statistic were also computed at 95% confidence level to test whether there was any significant relationship between access to solar lanterns project and the determinants affecting it. All necessary diagnostic tests was performed.

RESEARCH RESULTS

Multiple regression analysis was conducted as to determine the relationship between community participation, alternative sources of energy, availability of information and income level against the dependent variable access to solar lanterns project. After running the selected data through SPSS, a statistical model was generated.

Table 1: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.889	0.791	0.783	1.402

From the findings, Table 1 is a model fit which establish how fit the model equation fits the data. The adjusted R^2 was used to establish the predictive power of the study model and it was found

to be 0.783 implying that 78.3% of the variations in access to solar lanterns project are explained by changes in community participation, alternative sources of energy, availability of information and income level.

Table 2: Analysis of Variance (ANOVA)

Model		Sum of Squares	Df	Mean Square	F	Significance.
1	Regression	818.483	4	204.621	101.327	.000
	Residual	216.076	107	2.019		
	Total	1034.559	111			

The probability value of 0.000 indicates that the regression relationship was highly significant in predicting how the community participation, alternative sources of energy, availability of information and income level affected access to solar lanterns project in Isiolo County, Kenya. The F calculated at 5 per cent level of significance was 101.327. Since F calculated is greater than the F-critical (value = 2.871), this shows that the overall model was significant.

Table 3: Regression Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
(Constant)	2.534	0.155		16.348	.000
Community participation	0.889	0.293	0.931	3.034	.004
Alternative sources of energy	0.831	0.344	0.872	2.416	.020
availability of information	0.811	0.239	0.886	3.393	.015
Income level	0.809	0.278	0.861	2.910	.005

The regression equation obtained from this outcome was:

$$\mathbf{Y = 2.534 + 0.889\ X_1 + 0.831\ X_2 + 0.811\ X_3 + 0.809\ X_4.}$$

From the findings the study found that if all independent variables were held constant at zero, then the access to solar lanterns project will be 2.534. From the findings the coefficient for community participation is 0.889 which is significant since p=0.004 is less than 0.05, meaning that a unit change in community participation leads to a 0.889-unit change in access to solar lanterns project. The study also found that a unit change in alternative sources of energy changes would lead to 0.831 units change in access to solar lanterns project. The variable was significant since p-value=0.020<0.05.

The study further found that a unit change in availability of information would lead to 0.811 units change in access to solar lanterns project. The variable was significant since p-value=0.015<0.05. Finally, the study revealed that income level would lead to 0.809 units

change in access to solar lanterns project if all other variables are held constant and the variable was significant since p-value=0.005<0.05.

Finally, community participation had the greatest influence on access to solar lanterns project followed by alternative sources of energy in Isiolo County, Kenya, followed by availability of information then income level had the least influence on access to solar lanterns project. All variables were significant since their p-values were less than 0.05.

CONCLUSIONS

The study concluded that community participation has a greater influence on access to solar lanterns project. It was deduced that communication satisfaction, involvement in projects management and public dialogue influence access to solar lanterns project in a great extent. The results further revealed that community contributions and involvement in decision making influence access to solar lanterns project in a moderate extent.

As per the findings it was concluded that alternative sources of energy influence access to solar lanterns project greatly. Further it was deduced that proximity grid electricity, affordability and availability of alternative energy sources influence access to solar lanterns project greatly. It was also deduced that Kerosene influence access to solar lanterns project in a moderately. However, it was also concluded that Charcoal influence access to solar lanterns project lowly

It was concluded that there is a greater influence of availability of information on access to solar lanterns project. From the results, it was deduced that formal education, accessibility to information, training and capacity building was found to influence access to solar lanterns project greatly. However, it was also inferred that interpersonal skills influence access to solar lanterns project lightly.

It was finally concluded that there is a great influence of family income level on access to solar lanterns project. The results inferred that household expenses influence access to solar lanterns project in a great extent. In addition, it was also deduced that assets and taxes paid influences access to solar lanterns project moderately.

RECOMMENDATIONS

This finding suggests the need for government and other stakeholders to create awareness and sensitize the learned people regarding the benefits of adopting solar energy. This would ultimately increase adoption of solar energy among the educated people.

The study recommends that Government of Kenya and especially the Ministry of Energy should provide training and education to increase the availability of information and awareness on the use of solar energy. This can be done through seminars, workshops and public barazas where members are invited for training and demonstration on the use and benefits of solar energy.

The study further found that there is high cost of the solar equipment and the fact that most of the people did not have regular income and therefore had very low chances of accessing loans meant that they were unable to afford solar equipment. The study thus recommends Government should consider zero rating tax on Solar equipment so as to influence lower pricing thus making it more affordable for purchase and installation of solar system. This would be of assistance especially for the people living in the rural areas. Alternatively, the government could arrange for a plan that allows households to pay an agreeable small amount of money per month in a bid to increase the use of solar energy

The Community used other sources of Energy, which were mostly wood based. The county Councils need to get involved as energy solution providers regardless of the availability of alternative/substitute of other sources of energy. Solar power will eventually help the councils achieve better forest cover as communities turn to solar and use less wood-based fuel. The community should be encouraged to harness solar technology since it is cheaper and easily accessible compared to other sources of energy given that the community comes from a remote area where the sun is abundant.

The Grid Electricity in most of Isiolo is far from the community settlements and the likelihood of majority of the people living here getting grid electricity in the near future is slim. This means that Kenya Power needs to identify the opportunity provided by the gap in Isiolo and indeed in Kenya and import, sell and install solar systems that provide more than just lighting as the opportunity is there to assist other Kenyans who are not served by the Grid Electricity to access better energy solutions.

The study recommends that there should be timely release of funds as a way to ensure completion of projects within the stipulated time. In order to create a sense of ownership and ensure sustainability of the solar lanterns projects, project implementers need to build in community participation in their project designs, implementation and other decision-making processes.

To be able to implement effective and sustainable projects that are evidence based, solar lanterns project implementers also need to ensure that monitoring is an integral part of their projects and that lessons learnt are properly documented and used to inform future projects.

The government also needs to support and provide incentives for investments in alternative power sources. This need to be seen as complementing solar lanterns project efforts to improve and increase accessibility while at the same time promoting the use of renewable energy as opposed to fossil generated electricity

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