



Level of Renewable Energy Usage among Urban Agricultural Processing Industries in Ibadan Metropolis, Oyo state, Nigeria

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ABSTRACT

Renewable energy sources are widely used to generate environmental friendly energy with the aim of reducing the effects of climate change. Therefore to promote use of environmental friendly energy in the country, there is need to determine the level of renewable energy usage among agricultural entrepreneurship with a view to encouraging its utilization. This study therefore examined the awareness on the use of renewable energy to generate clean energy by agricultural processing industries in Ibadan metropolis, Oyo state. Multi-stage sampling techniques were used to select eighty eight (88) respondents in the study area. Data were collected with the aids of interview schedule and analyzed with both descriptive and inferential analysis. The result obtained shows that the level of awareness of renewable energy was high as 60.98% of the respondents were aware of renewable energy as alternative source of energy to fossil fuel. The result further revealed that significant relationship between Age of the respondents ($P=14.783$, $X^2=0.002$) and awareness to renewable energy as well as Education of the respondents ($P=7.527$, $X^2=0.023$) and awareness to renewable energy. The study concluded that renewable energies are environmentally friendly that will hopefully alleviate environmental degradation to a minimum level. It is therefore recommended that government should engage in campaigns on important of renewable energy implementation and urban industries should be mandated to pay for amount of emissions emitted to the environment in order to discourage them from using fossil fuel.

Keywords: Renewable energy, Entrepreneur, Industries, Agricultural activities, Environment

Introduction

Energy has been a major driver for human and technological development globally (Seuny, 2012). It is believed that larger percentage of the energies generated globally are been supplied to industries to aid production. Intergovernmental Panel on Climate Change (IPCC) 2007 estimated that urban areas which include industries and households are responsible for up to 76 percent of global energy use. In most of the developed countries, the food processing industry provides an important link between the farmers and the consumers (Seuny, 2012). Therefore, the industries are vital to assure a uniform supply of foods throughout

the year. Operations such as sterilization, freezing and drying assist in minimizing product losses during handling and storage. During the last several decades, introduction of mechanization to achieve high processing capacity has caused the food industries to depend more heavily on energy obtained mostly from petroleum products, coal as well as wood fuel. Agricultural industry requires energy for a variety of equipment, such as gas-fired ovens, dryers, steam boilers, electric motors, refrigeration equipment, heating, ventilation and air-conditioning systems. According to Sayin *et al.*, (2005) industries producing and processing food systems are energy



intensive and fossil-fuel based, and thus contributes significantly to climate change. The problems of conventional energy in industries can be solved by giving full attention to renewable energy source which will give rise to a clean environment and reliable energy for development in Nigeria. Renewable energy such as solar energy, wind, hydro, thermal, biogas renewable fuel are energy sources that are safe and fundamental for industrial development. Reddy, (1997) reported that renewable energy sources, in contrast to fossil fuels, are environmentally friendly, ubiquitous, self-replenishing, infinite, and consequently considered world-wide as the way of the future.

Most businesses groan under intense pain due to overhead cost incurred in providing alternative infrastructure like power. Agricultural processing industries are also affected due to perishable nature of agricultural produce. Agricultural entrepreneur depend so much on energy to power machine to process their farm produce. Although, energy from fossil fuel has been a major source of power used in Industries, it is also has its toll on the environment. According to Sergey, (2013) fossil fuels frequently engender environmental damage through their production and use, including habitat loss, water pollution, soil erosion and other deleterious effects. All these contribute to climate change which is a major concern in the world today (Sergey, 2013). Energy used by industries under the control of urban entrepreneurship is far more than household usage due to the nature of the work and machines used for their production. Industries worldwide are regarded as contributory factors to greenhouse gas emission and global warming. In 2013, direct industrial greenhouse gas emissions accounted for approximately 21% of total U.S greenhouse

gas emission, making it the third largest contributor to U.S greenhouse gas emissions, after the electricity and transportation sectors (Zamorano, 2005). Nearly 50% of all global power is generated by renewable energy sources, according to a book published by the IEA, (2002). The power generation from renewable are the second largest power source after coal (39%) and ahead of nuclear (17%), natural gas (17%) and oil (8%) while wind power grew fastest at 52% overtaking bio power (Omer, 2008). It is therefore germane to investigate the level of renewable energy usage among urban agricultural processors with the aim to encouraging its use by studying their awareness in the study area. The study identified the level of usage of renewable energy in various agricultural processing activities as well as relationship between selected socio economic characteristics and the awareness to use of renewable energy in the study area.

Methodology

Area of Study

This study was carried out in Ibadan metropolis, Oyo state, Nigeria. Ibadan metropolis is categorized into urban and semi urban and lies between latitude 7°25' N and longitude 3°5' E. It is situated close to the boundary between forest and derived savanna which makes it a meeting point for people and products. Ibadan is regarded as the largest indigenous city in tropical Africa. Ibadan lies mostly on lowlands which are punctuated by rocky outcrops and series of hills (Onwuemele, 2012).

The target population of the study was agricultural processors in selected Local Government area in Ibadan metropolis. Multi stage sampling technique was used to select the sampled population. First stage was purposive selection of Ibadan metropolis due to concentration of



agricultural processing industries in the area. Second stage was simple random sampling technique used to select processing industries in three Local Government Areas (Oluyole, Ibadan Southwest and Ido LGAs) from the lists which were collected from Agricultural Development Programme (ADP) offices in the selected local government. Sampling frame was determined from the lists and 82 respondents were randomly selected for the study based on the level of processing activities in the industries. Data were analyzed with both descriptive and inferential analysis

Results and Discussion

Table 1 shows that 79.3% of the respondents in the study area were male while 20.7% were female which signifies that more males were into agricultural business than female basically because of the intensive energy requirements nature of the work. This affirms the finding of Aluko *et. al.* (2018) who reported more male in agricultural entrepreneur than women in the similar studies on agricultural enterprises in rural areas of Nigeria. Also 2.4% of the respondents are under the ages of 20 years,

41.5% are within the range of 21-30 years, 31.7% are within the range of 31-40 years, while 24.4% are within the range of 41-50 years, This result indicates that more adult were involved in agricultural entrepreneur than the youth, this support the findings of Brixiova *et al.*, (2015) that adult are into entrepreneurship than the younger people in Africa. More so, Majority (64.6%) of the entrepreneur were married while 34.1% were single and 1.2% of the respondents were widow/widower respectively. In the area of education, it was revealed that 56.1% of the entrepreneur had tertiary education, 25.6% had secondary education, and 6.1% with primary education, 7.3% had no formal education while 4.9% attended adult education classes. This can be suggested that educational level of the respondents could enhance the awareness and adoption of renewable energy which will make entrepreneurs to have opportunity to develop their business. This is in line with the study of Mehrara *et al.*, (2015) which stated in their findings that statistically significant results show that education is positively related to renewable energy consumption

Table 1: Socio-Economic Characteristic of Respondents in Ibadan Metropolis on Renewable Energy Awareness

Variable	Frequency	Percentage
Sex		
Male	65	79.3
Female	17	20.7
Total	82	100.0
Age		
Under 20	2	2.4
21-30	34	41.5
31-40	26	31.7
41-50	20	24.4
Total	82	100.0
Marital Status		
Single	28	34.1
Married		64.6
Widow/Widower	1	1.2

Total	82	100.0
Education		
No Formal	6	7.3
Primary	5	6.1
Secondary	21	25.6
Tertiary	46	56.1
Adult Education	4	4.9
Total	82	100.0

Table 2 reveals that majority (96.3%) of the respondents strongly agreed that it is important to know about renewable energy. This implies that the interest and awareness in renewable energy was high among the respondents in the study area. Furthermore, on issues pertaining to generating of renewable energy with fermentation of organic waste, it was revealed that 95.1% of the respondents strongly agreed that it was possible to generate energy through the process. Also, more than half (56.1%) strongly agreed that renewable energy could be used to power machine on the farm. Exactly 89.0% of the entrepreneurs strongly agreed that they are capable of producing renewable energy without any assistance. This could be attributed to the high level of education among the respondents in the study area. This implies that the respondents in the study area with their education believed that the use of renewable energy could militate against the adverse effect of fossil fuel on the environment. This supported the findings of Agpak and Ozcicek, (2017), who reported that in

highly educated societies, environmental awareness and social acceptance of renewable energy is expected to be high and so is demand for renewable energy. The interest of the entrepreneurs on renewable energy could be regarded as a major factor towards awareness of respondents on use of renewable energy as alternatives sources of energy with 91.5% strongly agreed to the statement. This is in line with the IEA (2002) study which reported that nearly one-fifth of all global power is generated by renewable energy sources. Furthermore, 75.6% strongly agreed and believed that renewable energy are money saving source of energy while 95.1% of the respondents agreed that they could generate income through renewable energy in the study area. This implies that with supply of power on the farm for production, the income of the respondents is expected to improve. This corroborates the findings of Sergey, (2013) that awareness and provision of necessary needs are the solution to the prevailing problems among urban entrepreneur on issues relating to renewable energy.

Table 2: Awareness to Embrace Renewable Energy by Respondents in Ibadan Metropolis

Statement	Strongly Disagree	Agreed	Undefined	Disagree	Strongly Disagreed
Do you think it is important to know about renewable	79(96.3)	0(0.0)	3(3.7)	0(0.0)	0(0.0)



energy					
Are you aware that organic waste can be used to produce energy	78(95.1)	0(0.0)	3(3.7)	1(1.2)	0(0.0)
Are you aware that renewable energy can be used to power your machine	46(56.1)	0(0.0)	21(25.6)	3(3.7)	12(14.6)
Are you capable of producing renewable energy without any assistance	73(89.0)	0(0.0)	9(11.0)	0(0.0)	0(0.0)
Are you aware that renewable energy are used as alternative source of energy	75(91.5)	0(0.0)	5(6.1)	0(0.0)	2(2.4)
Are you aware that people are currently using renewable energy	65(79.3)	0.(0.0)	8(9.8)	1(1.2)	8(9.8)
Are you aware that renewable energy are money saving	62(75.6)	0.(0.0)	3(3.7)	11(13.4)	6(7.3)
Are you aware that you can generate income through renewable energy	78(95.1)	0(0.0)	0(0.0)	3(3.7)	1(1.2)

Percentage (%) in parenthesis

The categorization of the respondent's level of awareness by their mean scores is presented in Table 3. Majority (60.98 %) had high level awareness. It shows that awareness of renewable energy is high

among the entrepreneurs. This implies that sustainability of the environment will improve with more people being aware of the use of renewable energy in their environment.

**Table 3: Categorization of Respondents Level of Awareness on Renewable Energy in Ibadan Metropolis**

Awareness	Frequency	Percentage
Low	32	39.02
High	50	60.98
Total	82	100

From Table 4, It was revealed that majority (84.1%) of the respondent in Agricultural entrepreneurs were involve in cassava processing activities and was ranked first .This implies that entrepreneurs who are into cassava processing in the study area were aware of the important of renewable energy to their business. Also, the findings revealed that meat processing was ranked second with 80.5% of the respondents involved in the activities. This implies that Renewable energy could be very useful to any processing venture due to importance of constant power supply which could be derived from renewable energy to improve the business. This supported the study of Aluko *et al.*, (2018) who reported that the use of animal and crop wastes to boost energy supply in Nigeria becomes an important and readily available option in the country. Also palm kernel processing

venture was ranked third with 79.3% of the respondents. Electricity is highly important in the business and renewable energy will definitely serve as a reliable source of energy to improve the business.

Dairy processing was ranked last with 56.1% of the respondent in the business .This can be attributed to the fact that dairy processing involved huge capital and huge investment which could only be avoided by big company. Generally, the finding implies that agricultural industries especially processing unit are energy intensive and its supply need to be constant for continuity of the business. This finding agrees with work of Pelletier *et al.*, (2011) which reported that processing industries need large amount of for cooking, cooling, and freezing. This contributes an average share of 15%–20% of total U.S. food system energy use.

Table 4: Activities Carried out Among Agricultural Entrepreneur

Activities	Yes	No	Rank
Cassava Processing	69(84.1)	13(15.9)	1
Oil palm Processing	54(65.9)	28(34.1)	9
Vegetable Processing	62(75.6)	20(24.4)	4
Meat Processing	66(80.5)	16(19.5)	2
Dairy Processing	46(56.1)	36(43.9)	10
Fishing Processing	56(66.3)	26(31.7)	7
Cocoa Processing	59(72.0)	23(28.0)	6
Wheat Processing	55(67.1)	27(32.9)	8
Rice Processing	60(73.2)	22(26.8)	5
Palm Kernel Processing	65(79.3)	17(20 .7)	3
Sawmill Processing	59(72.0)	23(28.0)	6



Chi-square analysis on Table 5 reveals significant relationship between Age and usefulness of renewable energy ($P=14.783$, $X^2=0.002$). This suggests that the respondents in the study area are matured enough to understand the usefulness of renewable energy on their business. Furthermore, there was relationship between the respondents education and awareness to renewable energy ($P=7.527$, $X^2=0.023$). This implies that education plays important role on the respondents understanding of renewable energy which could be attributed to knowledge acquired through training and seminar on the subject

matters. It is expected that the higher the level of education of the respondents the more information on renewable energy available to the respondents. This finding is in line with IPPC, (2007) that countries with standard level of education embraced the use of renewable energy for the purpose of environmental sustainability. However, there is no significant relationship between respondent's marital status and level of awareness of the respondents on renewable energy. ($p=2.298$, $X=0.681$). This implies that renewable energy is not marital status based and the level of awareness cut across both married and unmarried.

Table 5: Chi-Square Analysis of Socio-Economic Characteristics and Awareness to use of Renewable Energy

Variables	P-Value	X^2	Df	Decision
Age	14.783	0.002	3	S
Education	7.527	0.023	2	S
Marital Status	2.298	0.681	2	N.S

Conclusion

The importance of energy in every life cannot be overemphasized. Renewable energy are environmentally friendly that will hopefully alleviate environmental degradation to a minimum and availability of environmental-friendly of renewable energy has to be communicated to people so as to keep informed about the awareness to use renewable energy. This recent development offers a number of appealing opportunities to agricultural entrepreneur, in a variety of sectors. It was revealed that awareness of respondents to renewable energy is higher in the study area and age as well as education has significant relationship with the level of awareness of renewable energy in the study area.

There is a need for more research to be done in the area of renewable energy sources in order to reduce over-dependence on fuel-wood as an energy source. Such a strategy will go a long way in ensuring that fewer

trees are cut down and done only when it is absolutely necessary. This will ensure that our forest reserves are restored, the ecological balance maintained and the negative effects of anthropogenic activities will be militated against.

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