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Impacts of Fuelwood Marketing to Sustainable Development in Imo State, Nigeria

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ABSTRACT

Fuelwood and charcoal produced from sawmill wastes and sold at community distribution centres can undercut the present energy cost of fuelwood by 19 to 60 percent and the energy cost of kerosene by over 50 percent. Fuelwood is the dominant energy source for most fuel-consuming jobs done by the rural population, including cooking, keeping warm, heating water for washing, smoking food, and brewing beer. The only non-wood fuels used in significant amounts in rural areas are paraffin for lighting and diesel for commercial maize milling. Secondary fuels such as crop residues, charcoal, and dung are used very little.The marketing of fuel wood in Owerri and its environs, Imo state, Nigeria wasinvestigated to assess the contribution of fuelwood marketing tosustainable development in Imo state. Data for the study were obtained from a total of 50randomly selected respondents through structured questionnairesand personal observation. Descriptive statistical tools such as frequency,percentages and tables were used to analyze variables such as age, gender,marital status, education, tribe, experience and type of institution. The results revealed that majority (86%) ofthe marketers were females, 44% had only primary education while 36% had 11 to 20 yearsof the business experience. Transportation, season and government policy are the major marketing constraints of fuelwood. It is therefore recommended that government should provide good transportationincentives such as good road networks that will reduce the transaction costs and maketransportation easy for fuel wood marketers.

Keywords: *Fuel wood, Profitability, Marketing, Sustainable Development.*

INTRODUCTION

Forests cover one-third of the Earth's land surface. It is estimated that over one-third of the world's population depends on forest goods and services for the direct provision of food, fuelwood, building materials, medicines, employment and cash income.

Fuelwood (firewood) supplies energy needed to cook, process and preserve food for humans and animals. Its presence is vital to numerous purposes essential to the immediate needs of affected people, speeding up recovery and building resilience to future shock events (Aju, 2014).

Fuelwood is essential resource for the survival of most households in Nigeria because it provides energy to light, heat, and cook. The most prevalent wood fuel species located at the marketing points include *Parkiabiglobosa, Azadirachta indica* and *Anogeissusleiocarpus.* The most preferred wood fuel species are *Balanitesaegyptiaca, Parkiabiglobosa, Azadirachta indica* and *Piliostigmareticulatum* (Aju, 2014).

About 2.8 billion people in developing counties like Nigeria depend on biomass fuels (e.g. Fuelwood, charcoal and animal dungs to meet their energy needs for cooking food (IEA, 2010). Fuelwood plays an important role in ensuring the food security of millions of people and its consumption must be understood in order to address resource shortage and forest decline (Macdonald *et al*. 2001). Natural resources including fuelwood must therefore be carefully managed and monitored to meet current demands and ensure sustainability (Warner, 2000).

The functions performed by forests in human societies and its evolvement is enormousthan any other resource. Wood which is a major forest product that can be used as timber,pulp and paper or fuel wood provides about 3.4 billion cubic meters of timber equivalent

annually in all over the world (FAO, 2004). Fuel wood is a non-timber forest product (NTFP) used for industrial and domestic generation of energy especially in developing countries and felling of trees for fuel wood is now consider as the third most important economic activity of people in forest dependent areas followed by farming and animal rearing (FAO,1990).Several reasons make the use of fuel wood a location and situational specific source of energy and this may range from social, cultural, environment to economical reason (Horgan,2001).

Wood were harvested in developing countries solely for immediate consumption and was mostly carried out by women and children who gathered the dry tree parts such as trunks, branches and shrubs for fuel wood but nowadays, sporadic rise in the commercialization of agricultural sector has brought about widespread harvesting of both dead and live branches and tree trunks by men, women and children (Agyeman *et al.*, 2012 and Awah, 1995). Fuelwood marketing like every other marketing enterprise involves the exchange between a buyer and a seller at a given price in such that the seller meets the total cost and the profit margin (Kalu *et al*, 2009; Browning, 1992; Cleaver, 1985).

Marketing is also considered as the collection of all business activities involves in the transferring of commodities from the point of production to the final consumers. Marketing of fuel wood is simple, basically from producers to consumers in most cases except in few cases where urban fuel wood sellers come to buy in bulks. Large number of prepared- food vendors such as restaurants, vendors of barbecue (Suya) and party event outfit that served at celebrations and bakeries are regular customers of fuel wood sellers but institutions such as hospital, schools and prisons and also industries such as blacksmiths are among the highest fuel wood consumers (Larinde and Olasupo, 2011). The destruction of trees and natural ground covers were reported to alter the water retention capacity of soil which therefore reduce the productive capacity of soil. This then led to poor farm yield and made some farmers to resort to alternative activities like fuel wood marketing (Orosanye,2003) but the farmers had little or no fore-knowledge on the profitability of this new venture and possible constraints they are likely to encounter along the way.

Fuelwood is an ancient energy source and is likely to be used by many, in both rural and urban areas, for decades to come (Nakada*et al.*, 2014; OECD/IEA, 2015). This is especially the case in Africa, where charcoal use in urban centres is increasing and alternative energies are not yet sufficiently available (Mwampamba *et al*., 2013). Global wood charcoal production trebled between 1964 and 2014, increasing from 17.3 to 53.1 million tonnes. Of the current global production, 61 percent occurs in Africa, primarily to satisfy cooking fuel demand from urban and peri-urban households (Doggart and Meshack, 2017). Fuelwood dependence varies largely among regions of the world and between urban and rural areas, reflecting different levels of development and the availability of alternative energy sources. In most regions, fuelwood l dependence has declined or remained steady over time.

About two billion people use fuelwood and charcoal as their main source of energy for cooking and heating their homes in the world (CIFOR, 2009).It is estimated that over 70% of the Nigerian population lives in the rural areas and use fuelwood for cooking and heating. Rural households in developing countries, including Nigeria collect food, firewood, medicinal plants and construction materials directly from the forest. The factors that condition a household's economic reliance of forest resources vary depending on the resource endowment of the household, the household's demographic and economic characteristics and other factors such as markets, prices and technologies (Babulo*et al.*, 2008).

Forest resources represent a common heritage and tend to be shared by a great majority of people (Nkem *et al.*, 2007). People have realized a business in fire wood selling. When driving along the major roads of the country especially those of the rural areas, one is welcomed by piles of fuelwood on the roadside. As a result of the high rate of unemployment in the country, many people are joining the fuelwood business as a source of income. These leads to an increase in the demand for fuelwood from the forest and people end up cutting standing trees that are not dry and deforestation is encouraged.

In highly populated areas ensuring access to natural resources including fuelwood can be relatively challenging. During protracted crises, camps for refuges and internally displaced person (IDPs) are often established in locations where natural resources are already scare, and where limited access to dwindling resource poses the risk of increased food insecurity and social conflict. Interest in the "fuelwood crises"

facing the world's poor has been widespread since the late 1970s (Souss an, 1988 and Akinnifesi *et al.,* 2011). Firstly the problem was over stated. In the extreme, analysts (foresters, economists and others) in many countries made fallacious projection of rapid total destruction of the biomass resources.

These are associated mainly with the drive to open up great land frontiers through government -sponsored urbanization projects such as road construction, giant hydroelectric power schemes and other development infrastructures (Tyler 1990). Environmental compact resulting from unsustainable extraction, collection and the uses of fuelwood can be long lasting and causing damage. Sustainable natural resource management can reduce this impact and ensure a sustainable fuel supply in tandem with reforestation fuelwood can be supply through a variety of tree and forest systems, such as mixed forest plantations, such as agro-forestry or multiple cropping systems (FAO, 2000). Man is helped or hurt by the ecosystem condition of the environment. Therefore, there ought to be some ethics concerning the environment. Ethical considerations are important to environmental resource exploiters and end-users in order to protect and preserve the ecosystem. Ecosystem governance is a policy that advocates environmental consciousness and sustainability as the ultimate considerations for controlling all human environment - based activities (Adnan, *et al.,* 2012). Governance encapsulates and emphasizes whole system management by government, civil society and business.

Environmental governance often employs various systems of governance to capture the diverse elements and natural resources (e.g. unregulated exploitation of fuelwood) that are involved (Kombat and Wätzold, 2019). Hence an eco-tax is levied to control activities which are harmful to people and the natural environment. It is often intended to promote environmentally friendly economic and social activities through economic incentives. Policy can avert environmental degradation through human activities (Kombat and Wätzold, 2019).

Despite its socio-economic significance, fuelwood is often negatively portrayed, notably due to its association with negative environmental and health impacts. In SSA, wide dependence on fuelwood harvested from forests and woodlands could significantly deplete these natural resources. In addition fuelwood consumption using inefficient stoves has been said to be responsible for much of the region's total household greenhouse gas emissions (Kebede*et al.,* 2010). Furthermore, indoor pollution caused by fuelwood burnt in inefficient stoves and poorly ventilated kitchens is often said to be a major cause of respiratory diseases (Karekezi, 1994). There are complex relations between the various fuelwood value chain interventions, which comprise supply and demand activities.

These activities include tree management or production; wood harvesting and processing, firewood and charcoal transportation, marketing and consumption in both rural areas and urban centres. However, most of the existing literature examines environmental, socioeconomic, or health impacts from a sector-specific perspective. Thus inter-relationship of these factors has been under-examined.

To shed light on such interrelated impacts, a team from the Center of International Forestry Research (CIFOR) and World Agroforestry Centre (ICRAF) held an inception workshop in March 2013 to brainstorm research questions on the subject and produced a draft framework with an aim of undertaking a systematic review. From the original 13 the team was expanded to 23 researchers who were organised in three groups to continue formulating review questions around fuelwood demand, supply and policy and legal frameworks. It is some members of this team and other new members that produced and published the systematic map protocol as well as revise the conceptual framework to emphasize links between supply and demand aspects of fuelwood value chains.

The framework recognizes that there are a number of contextual factors that may influence environmental, socioeconomic, and health impacts: fuelwood policy frameworks, the socio-economic status of the populations involved, as well as the type and baseline conditions of the ecosystem being exploited (Fig. 1) (Cerutti*et al.,* 2015). This framework also suggests that it is the actions of these actors that bring about environmental (degradation, regeneration, carbon emissions etc.), socio-economic (employment, income, assets etc.), and health impacts (pollution, illness).

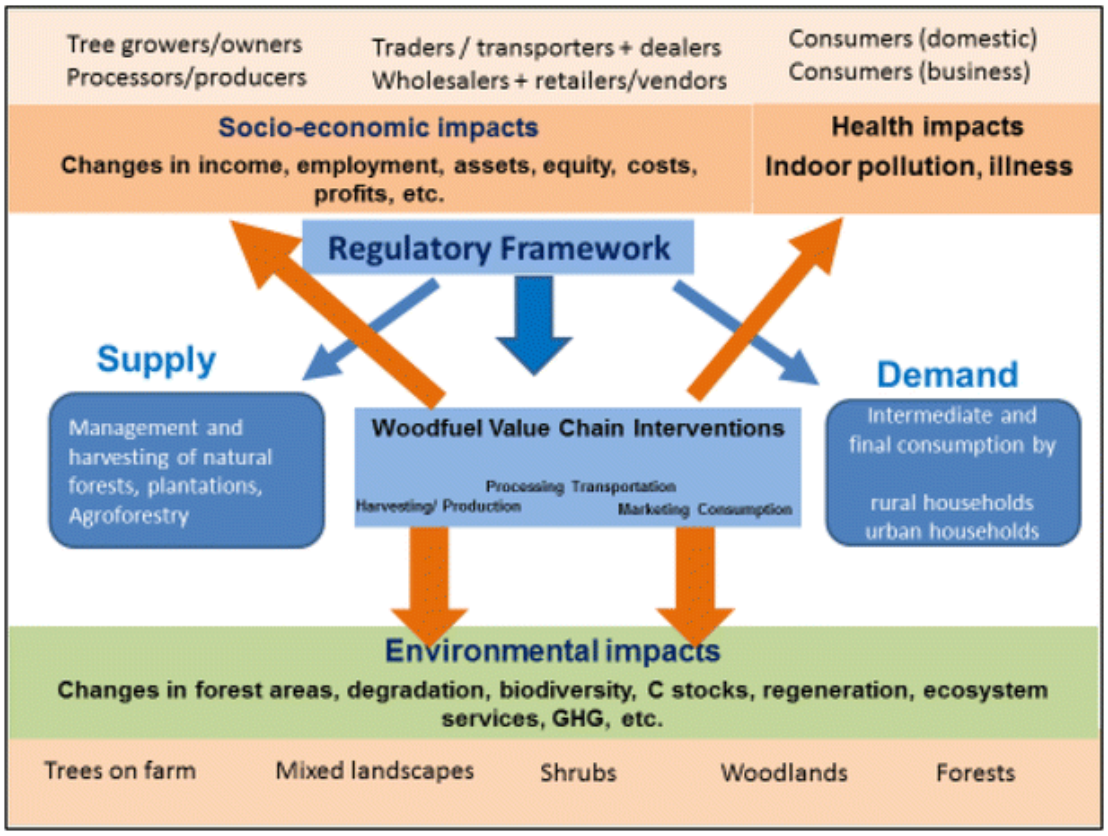

Figure1. *Socio-Economic Impacts of Fuelwood*

The dynamics of environmental conscious demand and supply of fuelwood deserves analysis with special emphasis on ethical argument and eco-tax governance. The essence is to deepen our understanding of its economic and environmental significance. Demand-supply management of fuelwood via tax policy has implications for environmental sustainability. The analysis of fuelwood demand and supply gap will shed some light on the capacity of the environment to satisfy its demand. These underlying assumptions deserve investigation and clarification in the rural and urban societies. The broad objective of the study was to investigate fuelwood marketing system and the need for sustainable development in Nigeria. The specific objectives were to; i. describe the socio-economic characteristic of respondents; ii. describe fuelwood market in the study area; iii. examine the quantity of fuelwood demanded by households; iv. As certain the quantity of fuelwood supplied and sold by marketers; and v. assess the supply-demand gap for fuelwood in rural and urban areas in Imo State

Materials And Methods

The study was conducted in Imo State, Nigeria (Figure 2). It is located in the South Eastern part of Nigeria with a total land mass of about 25,289.40km^2 (State Directorate of Land Survey and Urban Planning, 1995) and has a population of 2.485 million people (NPC, 1991). Imo State lies within the humid tropical ecological zones of Nigeria with relative humidity ranging between 50% and 70% (Meteorology Department, Ministry of Lands and Survey, 1995).

Imo is one of the 36 States of Nigeria and is in the south east region of Nigeria. Owerri is its capital and among the largest towns in the state. Its other notable towns are Orlu, Obowo, Oguta, Mbaise and Okigwe. Located in the south-eastern region of Nigeria, it occupies the area between the lower River Niger and the upper and middle Imo River.

Imo State is bordered by Abia State on the East, River Niger and Delta State to the West, Anambra State on the North and Rivers State to the South.[5] The state lies within latitudes 4°45'N and 7°15'N, and longitude 6°50'E and 7°25'E with an area of around 5,100 sq km.

The economy of the state depends primarily on agriculture and commerce. One of the primary agricultural productions is the production of palm oil.

The Orashi River has its source in Imo State (named after a powerful Nigerian family with the family name Imo). Imo River, being the major river in the state, drains through Abia

State, where it is joined by Aba River from the north, and Akwa Ibom State into the Atlantic Ocean. Otamiri River and its 9.2 km length tributary, Nworie River, flow in the state.

There are other rivers and creeks in the state including Onas Creek in Ohaji/ Egbema, Okitankwo River in Umudi, Oramurukwa River in Emekuku/Emii/Ulakwo and Ohia and Efuru Rivers in Okigwe.

The state has several natural resources including crude oil, natural gas, lead, Calcium Carbonate and zinc.

Profitable flora including iroko, mahogany, obeche, bamboo, rubber tree and oil palm. Additionally white clay, fine sand and lime stone are found in the state.

Imo State major towns include Emekuku Isu, Okigwe, Oguta, Orlu, Atta Ikeduru, Akokwa, Mbaise, Mbaitoli, Mbieri, Ohaji/Egbema, Orodo, Nkwerre, Ubulu, Ngor- Okpala, Omuma, Owerri, Mgbidi, Awo-Omamma, Izombe, Orsu, and Amaigbo, Umuowa Orlu, Isu/Umuozu, Iho Dimeze

Agriculture is the primary occupation, but due to over-farming and high population density, the soil has greatly degraded.

The rainy season begins in April and lasts until October, with annual rainfall varying from 1,500mm to 2,200mm (60 to 80 inches).

An average annual temperature above 20 °C (68.0 °F) creates an annual relative humidity of 75%. With humidity reaching 90% in the rainy season. The dry season experiences two months of Harmattan from late December to late February. The hottest months are between January and March. With high population density and over farming, the soil has been degraded and much of the native vegetation has disappeared. This deforestation has triggered soil erosion which is compounded by heavy seasonal rainfall that has led to the destruction of houses and roads.

One primary source of revenue for Imo State Government is from palm oil production contributed by both large scale and small scale production.

Data collected were analyzed using budgeting technique and gross margin analysis:

Gross margin (G.M) = G I – TVC (1),

Where: G M = Gross margin; G I = Gross Income; T V C = Total Variable Cost.

RESULTS OF RESEARCH

The results in table 1 revealed that none of the respondents were less than 30 years old and 12% were between 31 and 40 years while 44% were between 41 and 50 years. Moreover, 44% were greater than 50 years old. This revealed that fuel wood market in the study area is a business for the adults both in their mid and late years. It therefore serves as a business which the aged can fall back on when they are no more capable of jumping up and down for survival.

At the same time, it accommodates adults in their mid-years that are still active and able to go to the forest and bushes in felling and collecting the wood; and also in bringing the wood out to cities, towns and villages. These groups of adults are usually found at the producer/ feller levels while the aged occupies the retailers' level. It was observed that none of the fuel wood marketer used for the study was less than 30years because most young ones are not yet aware of the profitability of the business but consider white collar job as the ultimate.

This support Afolabi (2009) stated that this age distribution can have positive as well as negative impacts on the business aggressiveness of the marketers. It was also observed from the study that 86% of fuel wood marketers were females while only 14% were male. This therefore shows that fuel wood market is a business for both male and females. Though the business is a rigorous business which is supposed to be dominated by the male gender but recent development in the business has made a clear way for the female gender to make wave in the business. It was found from the study that the male gender handled the rigorous part; as they are the ones that go to the forest, identify the trees that are ready for harvest, fell them, cut them into desired sizes, packed, tight and load them into the vehicles while the females transported them to the markets for sales and distribution.

The study also revealed that majority of the marketers (48%) were widows, 30% were married, 20% were divorced and only 2% were singles. This therefore suggests that marketing fuel wood plays a vital role in family sustainability especially at grassroots' level. As observed from the study, 68% of single parent depends on the business as their major source of livelihood. Having only 2% of the singles that engaged in the business revealed that there is dearth of awareness on the prospects of marketing fuel wood among the single folks who contributes largest percentage of the unemployed in Nigeria

This is in line with the findings of (Ndaghu *et al.*, 2011) who reported that non-timber forest tree resources have important contribution to the wellbeing of the rural poor. They further declared that non-timber forest tree resources such as fuel wood locust beans provides food, sources of income and raw material for cottage industries that have supplied life sustaining strategies in the communities. It also confirmed Latiff *et al.* (2002) who reported that 80% of the people living in extreme poverty depend on forest resources such as fuel woods as their source of livelihood. The study also showed that 38% of fuel wood marketers had no formal education, 44%had primary education, 16% had secondary education and just 2% had tertiary education. This suggests that education level of the marketers is extremely low and might have adverse effects on the efficiency, profitability as well as adoption of innovations by the marketers.

This agreed with the discoveries of Oluwasola (2010) who declared in his study that low level of education among respondents can have serious implications on their ability to access information, use new technological innovations and even access or procure credits from formal financial information. This supports Sekun made and Oluwatayo (2011) who claimed that the location of most forest resources has great influence on the group of people that engage in its business.28% of the marketers were found to have between 1 to 5 years of business experience. 22% had between 6 to 10 years, 36% had 11 to 20 years while 14% had more than 20 years of business experience.

This finding showed that marketing/ business experience is an important factor to consider in the business. It is thus not a business that anybody can just venture into without adequate experience of the business. This supports the statement of Adeoye *et al.*, (2011) which states that the higher the numbers of years a marketer engage in a particular business, the better he become in the business. The result showed that 16% of the marketers were producers/fellers. 32% were wholesalers, 46% were retailers and 6% serves as both wholesalers and retailers concurrently. This hence indicates that retailers dominate fuel wood market though the wholesalers have better opportunities to make higher returns from their market. This finding supports Afolabi (2009) which stated that retailers usually dominate marketing of agricultural products which may be due to the small capital investment required to start the business atretail level.

Table1. *Socio-economic characteristics of respondents*

Age in years	Frequency	Percentage	cumulative
Percentage			
< 20	0	0	0
20-30	0	0	0
31-40	6	12	12
41-50	22	44	56
<50	22	44	100
Total	50	100	
Gender			
Male	7	14	14
Female	100	43	86
Total	50	100	
Marital Status			
Singles	1	2	2
Married	15	30	32
Divorced	10	20	52
Widow/widower	24	48	100
Total	50	100	
Educational Status			
No Formal Education	19	38	38
Primary Education	22	44	82
Secondary Education	8 1	6	98
Tertiary	1 2	100	
Total	50	100	
Tribe			
Yoruba	48	96	96
Hausa	0	0	96
Ibo	100	2	4

Total	50	100	
Marketing Experience in years			
1-5	14	28	28
6-10	11	22	50
11-20	18	36	86
>20	7	14	100
Total	50	100	
Types of sellers			
Wood feller/ Producers	8	16	16
Wholesalers	16	32	48
Retailers	23	46	94
Wholesaler/ Retailers	100	3	6
Total	50	100	

Source: *Field survey, 2016*

The results in table 2 showed that the total revenue per month is ₦1,914,500 while each marketer arns ₦38,290.00 in a month. The marketing cost incurred was₦1,586,591.00 per month while each marketer incurs ₦ 31, 731.82 per month. The gross margin of marketing fuel wood is therefore ₦327,909.00 per month while each marketers smiles home with ₦6,558.18. The Benefit- Cost ratio was 1.21. Benefit –Cost ratio there foreindicated that for every ₦100 invested in the business, there is a return of ₦21.00. This shows that the business is a profitable venture. This agrees with Larinde and Olasupo,(2011) which stated that fuel wood trade is very profitable as average fuel wood marketer isable to recoup his or her investment with better returns in short period of time.

It was also discovered from the study that transportation is the number one constraint in marketing fuel wood. The result in table 3 showed that 30% of the marketers complained that there is poor road network linking major sources of fuel wood zones to the markets and as a result, marketers find it difficult to convey their goods to the markets. Similarly, there were no stand- by vehicles navigating the fuel wood source-zones and the few available ones were expensive to use. This hence leads to increase in marketing cost and majority of them could not afford it.

Latiff *et al.* (2002) declared transportation as a major challenge to agriculture in Nigeria. The result also revealed that season of the year is another constraint to profitability of marketing fuel wood. 28 percent of the marketers agreed that fuel wood market is highly seasonal. It was discovered that fuel wood commands high price in wet season compared to dry season because fuel wood is not always available in wet season due to the in-accessibility of most forests and park lands in wet season. Most vehicles do break down on the way. More-over, the fuel woods from the forest in wet season are always wet and unsuitable for immediate use. The marketers that have sheds or store house(s) to keep the fuel wood that are obtained in dry season are usually the 'king' as they monopolize the market in wet season.

Table2. *Profitability Analysis of Fuel wood*

	Amount (₦)
Total Revenue (TR)	1,914,500.00
Average Total Revenue (ATR) per month	38,290.00
Total Variable Cost (TVC)	1, 586,591.00
Average Variable Cost (AVC)	31,731.82
Gross Margin (GM)	327,909
Average Gross Margin	6,558.18
Benefit Cost Ratio (TR/ TVC)	1.21.

Source: *Field survey, 2016*

Table3. *Constraints in fuel wood marketing*

Constraints	Number of respondents	Percentage of respondents	Cumulative Percentage
Transportation	15	30	30
Season	14	28	58
Government Policy	12	24	82
Capital set up	8	16	98

Market fluctuation	12	100	
Total	50	100	

Source: *Field survey, 2016*

Instability in government policy as well as government insincerity in implementing the policy is another major constraint to fuel wood markets. It was discovered from the result that instability in government policy as well as government insincerity in implementing the policies prevents the marketers from accurately predicting and effectively preparing for the business activities. Government incessant closing down of forests, park lands and games reserves also prevents the marketers from obtaining the best from the business. Furthermore, most forest guards will not perform their duty effectively unless the marketers give them extra money. It was also found that the capital set up for the business was enormous for average Nigerian based on the recent economic situation of the country while market fluctuation was the least constraint to marketing fuel wood.

CONCLUSION AND RECOMMENDATIONS

The study revealed that 56% of the marketers belong to the active segment of the population while the remaining 44% belong to the aged group. Analysis also showed that86% of the marketers were females while the remaining 14% of them were males. Results showed that 38% of the marketers has no formal education, 44% had just primary education, 16% secondary education while 2% has tertiary education. as 50% of the marketers claimed to has between 11 to more than 20 years marketing experience, 22% has 6-10 years' experience and 28% has 1-5 years' experience.

This also revealed that people are gaining entry into the market on a regular basis. The study also revealed that fuel wood market is dominated by retailer which accounted for 46% of the sellers such as wood fellers/ producers (16%), wholesalers (32%), whole salers/retailers (6%) of the marketers. The profitability analysis showed that an average marketer incurred an average variable cost of ₦31,731.82 per month but earned average revenue of ₦38,290.00 per month which indicates that an average marketers earned₦327,909 as gross margin per month. The study revealed that the Benefit-Cost Ratio was 1.21. Transportation, season and government policy are the major marketing constraints of fuel wood. It is therefore recommended that government should provide good transportation incentives such as good road networks, sound vehicles, and so on that will make the business easy for fuel wood marketers. Moreover, government needs to review the forest policy based on the condition of the present market conditions so that much people can benefit from the income generating opportunities that fuel wood offers.

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