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Economic analysis of firewood marketing in Uyo capital city, Akwa, Ibom state, Nigeria

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Abstract

This study ascertained the profitability and determining factors influencing firewood marketing in Uyo Capital City. The study used structured questionnaires and interview schedules to collect its data. The questionnaires were randomly administered to 75 firewood traders in the markets (Itam market, Akpan Andem market and Afaha market) being 67% of the population frame. Data obtained were analysed using descriptive statistics, budgetary technique, profitability analysis and regression analysis. The result showed that majority of the respondents were female (92%), were above 30 years of age (83%), were literate (93%), married (73%) and had a household size of 1-5 persons (53%). Also, majority of the traders (72%) had been in the trade for more than 10 years, were engaged at full-time (76%) basis, 63% belonged to an association, started the trade with their personal funds (88%). The trade was profitable with a mean income of $94 (₦34105.20) monthly. The regression coefficient (R^2) indicated that the income determinants accounted for 56.5% of the variations in the receipts from firewood sales. Mode of engagement and scale of operation had significant and positive effect on revenue ($p<0.05$), while household size was negative and significant ($p<0.10$), Educational status, age of trader and cost incurred was positive and significant ($p<0.01$) respectively. Majority of the firewood (84%) traded in the study area was bought from Ibiono and the most species commonly traded was from the family Fab*aceae*, while the species *Dactyladenia barteri* (Hook.f. ex Oliv.) was the most traded as firewood in the study area. The study recommends evaluation of the production and regeneration of the firewood species especially *Dactyladenia barteri* (Hook.f. ex Oliv.) under different management regimes across the state and in particular Ibiono, which serve as the major source of firewood for Uyo Capital City.

Keywords: Firewood, Marketing, Profitability, Uyo Capital City, Nigeria

Özet

Bu çalışma, Nijerya'nın başkenti Uyo'da yakacak odununun pazarlanması üzerinde etkili faktörleri ve kârlılığı belirlemeyi hedeflemiştir. Çalışma, yapılandırılmış anketler ve belirli tarihlerde yüz yüze yapılan görüşmelerden elde edilen veriler kullanılarak gerçekleştirilmiştir. Anketler, yakacak odun pazarında faaliyet gösteren tüccarların % 67'sini oluşturan (Itam, Akpan Andem ve Afaha pazarları) 75 kişiye rastgele yapılmıştır. Elde edilen veriler üzerinde; tanımlayıcı istatistik, bütçeleme teknikleri, kârlılık ve regresyon analizleri yapılmıştır. Elde edilen sonuçlara göre, cevap verenlerin çoğunluğu kadın (%92), 30 yaşın üzerinde (%83), eğitimli (%93), evli (%73) ve 1-5 kişilik hane sayısına sahip (%53) kişilerden oluşmaktadır. Ayrıca, tüccarların çoğu (%72) 10 yıldan fazladır bu işi yapmakta, tam zamanlı (%76) çalışmakta, ortaklığa sahip (%63) ve ticarete kendi maddî imkânlarıyla (%88) başlamıştır. Aylık 94$ (34105.20₦) (₦ Nijerya para birimi Naira) kazanılması kârlı bir gelir olarak kabul edilmektedir. Belirleme katsayısı (R^2) satışların %56.5'inin yakacak odunundan elde edildiğini göstermektedir. Sözleşme türü ve işlem büyüklüğü gelir üzerinde artı yönde ve anlamlı bir etkiye sahip ($p<0.05$) iken, hane halkı büyüklüğü eksi yönde anlamlı bir etkiye ($p<0.1$) sahiptir. Eğitim seviyesi, tüccarın yaşı ve maliyet artı yönde ve anlamlı bir etkiye ($p<0.01$) sahiptir. Pazara sunulan yakacak odununun çoğu (%84) Ibiono'dan alınmakta ve alınan türlerin çoğu Fabaceae familyasına aittir. *Dactyladenia barteri* (Hook.f. ex Oliv.) ise araştırma alanında en çok ticareti yapılan tür olarak karşımıza çıkmaktadır. Başkent Uyo'nun yakacak odun ihtiyacının karşılanması için *Dactyladenia barteri* (Hook.f. ex Oliv.) türünün özellikle Ibiono'da ve genel olarak tüm eyalette çeşitli yönetim biçimleri uygulanarak yetiştirilmesi ve üretilmesi bir öneri olarak sunulmaktadır.

Anahtar kelimeler: Yakacak odunu, pazarlama, kârlılık, Uyo, başkent, Nijerya

Introduction

Forests are widely recognized as a source of various essential goods and services (DWAF, 2005). In addition to the physical contribution to the environment, forests also provide ecological, economic, social, religious and cultural benefits (Mainagwa, 2010).According to Nzeh and Eboh (2007), forests contribute directly and indirectly to rural household livelihoods through the generation of income and employment from the sale and exchange of gathered and unprocessed non-timber forest products such as firewood. The term non- timber forest products (NTFPs) emerged as an umbrella to recognize the products derived from these various forest resources as a group (Ibrahim *et al.*, 2016). The list of NTFPs is inexhaustible specific as they include plants used for firewood, handicrafts and carvings, plants used for firewood, condiments, fodder, chemicals, medicines and even shade (Ogboho, 2014; Ibrahim *et al.*, 2016). The term firewood or fuelwood consists of any unprocessed woody biomass used to fuel a small fire, most often for cooking or warmth (Boucher et al., 2011).

Fuelwood is the fourth largest energy source providing about 13% of the total energy consumption globally (Magembe and Makonda, 2016). It is consumed mostly by the low income and middle income households as well as operators of cottage and small scale industries and commercial enterprises. Most of these fuelwood comes from forests mainly in the form of wood and charcoal. However, wood with higher density is better suited as fuelwood because it has high calorific value (Magembe and Makonda, 2016)

In Nigeria, Among all the tree products utilized as fuel, firewood is the most utilized of them (Ezema, 2001). The rural population traditionally relies on these fuelwoods for both home consumption and for sales to the urban sector. It is estimated that 70–79% of households use fuelwood as a main source of energy (Hafeez 2000; Ayotebi, 2000; Chukwu, 2001; Abebaw, 2007).

Fuel wood is major business in the urban and peri-urban centers in Nigeria. Fuel wood 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). Marketing of firewood is simple, basically from producers to consumers in most cases except in few cases where urban firewood 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 fuelwood sellers but institutions such as hospital, schools and prisons and also industries such as blacksmiths are among the highest fuelwood consumers (Larinde and Olasupo, 2011).

There are diverse reasons for choosing wood as a source of energy. For many users the choice depends on the availability and affordability of other energy options (Horgan, 2001).In the past, wood harvesting in developing countries was mainly for domestic consumption, and it was mostly women who gathered the dry branches and trunks of trees and shrubs for fuelwood (Awah 1995). Today the situation has changed, as increased commercialization of the sector has led to the widespread harvest of both dead and live branches and trunks by men and women (Awah 1995). Fuelwood is harvested, processed, marketed and consumed exclusively by forest dependent communities, moving from collectors through wholesalers and retailers to consumers. Firewood is forest product with little sophistication in length of processing and marketing, the products reach the final consumers more or less directly. The fuelwood sector employs many men, women, and children in both rural and urban areas, offering both temporary and permanent employment opportunities. It is important economically because it offers an immediate source of income to the exploiters (Larinde and Kehinde, 2004).

The use of fuel wood has been on the increase due to increase in cost and scarcity of alternative sources, particularly Kerosene (Paul, 2008). In addition, firewood is consumed in large quantities in most parts of rural Africa. In fact much has been known about the use, effect and exploitation of fuel wood but barely little is known about its marketing(Taru and Ndaghu, 2013). Salisu (2008) showed that the efficient functioning of the market system is based on a number of conditions. These include the existence and efficiency of certain legal and institutional foundations that guarantee private property, a well developed infrastructure that ensures reliable access to transportation and communication at minimum cost, and ready information about quality that must be symmetric(Taru and Ndaghu, 2013). As identified by Taru and Ndaghu (2013), the problems of firewood marketing include lack of uniform measures, high transport cost

and storage problems among other problems. Sometimes the problem of transportation compels the firewood harvesters to sell their products in the rural areas at low prices instead of conveying the commodity to the urban areas where the price will be relatively higher. This could affect market performance of the good (Osuji, 1980). Over time people have come to the realization of trading firewood as a sort of business but little is known about the profitability of the business. In Uyo Capital City, there is little or no available data on the amount of firewood sold.

Findings from this study are expected to provide information on firewood sources, cost and returns and marketing channels of firewood in Uyo Capital City of Akwa Ibom State, thus bridging the information gap that existed in addition to providing a baseline data that can stimulate further research in the area.

Materials and Method

Study area

Uyo Capital City (UCC) is the seat of both Akwa Ibom State Government and the Uyo Local Government Area (L.G.A.). The Uyo Capital City Development Authority is charged with the responsibility of physical development of the city, while the Uyo L.G. Council takes care of the day-to-day administration of the town. Uyo is a city and local government area in south-south Nigeria and is the capital of Akwa Ibom State, it is located on Latitude: 5° 03' and 4.57" N and Longitude: 7° 56' and 0.60" E. Its metropolis sprawls into the adjoining local government areas of Itu, Ibiono Ibom and Uruan Local Government Areas (Uwem *et al.*,2015).Uyo Capital City is bounded in the North by Itu and Uruan L.G.A. and on the South by Uruan L.G.A. and encompasses parts of other L.G.A. like Uruan, Itu, Ibesikpo Asutan, Nsit Ibom and Etinan. It is about 5km radius from the center of the city (Ibom Connection). Uyo has a relatively high mean annual rainfall of more than 2500mm and a mean annual temperature of 27° C. People residing in the city engage in several occupations which range from the civil and public services, industrial and commercial business to farming in parts of the urban area.

Sampling and data collection method

The target population for the study were firewood traders in Uyo capital city, Akwa Ibom State. The sampling technique involved a purposive selection of three market areas in Uyo L. G. A. The three markets chosen were Itam market, Afaha market and Akpan Andem market. This is because they are the major market areas where firewood traders are found in Uyo Capital City. There were 78, 27 and 20 respondents in Itam market; Afaha market and Akpan Andem market respectively, making a total of 125 respondents in the study area. Selection of the firewood sellers was done using simple random sampling to select 60% of the population frame in each market giving a total of 75 sample respondents.

Primary data for the study were obtained using structured questionnaire and oral interviews. The structured questionnaires were pre-tested to identify problems with the drafted questionnaire. Copies of the restructured questionnaires after pre-test were administered on the respondents in each of the selected study areas. A total of 75 copies of the structured questionnaire were administered and all were completed and returned for analysis.

Data analysis

Data collected during the study were analyzed using descriptive statistics, budgetary technique, profitability analysis and regression analysis. Descriptive tools such as tables, frequency tables, percentage and means were used to examine the sources of firewood and species traded in the study areas and alsodemographic characteristics of firewood traders.

To determine the structure of the costs and returns associated with firewood marketing, budget analysis was employed. The budgetary analysis focused on Gross Margin (GM) which is the differences between the Total Revenue (TR) and the total variable cost (TVC). To obtain Net Return (NR), Gross Margin (GM) was deducted from Total Fixed Cost (TFC) as used by Nelson (2015). The explicit form of the equation is given as:

GM = TR – TVC - - - - - - - - (Eq. 1);

Where,

GM = Gross Margin (Naira/Bundle);

TR = Total Revenue was obtained by adding the revenue from direct sales of firewood valued at the prevailing market prices in naira;

TVC = Total Variable Cost comprised expenses on transportation, rent, cost of labour, cost of rope, cost of firewood and market tax.

NR = GM – FC - - - - - (Eq. 2);

Where,

NR= Net Return

GM = Gross Margin (Naira/Bundle);

FC = Fixed Cost comprised expenses on axe, wheel barrow and machete/cutlass,

Also, profitability ratio such as profitability index (PI), rate of return on investment (RRI),rate of return on variable cost (RRVC) as well as the operating ratio (OR) were used in determining the profitability of firewood marketing as described by Azeez *et al.*, (2014) is given as:

PI= п/TR - - - - - - - - (Eq.3);

RRI = (п/TC) x 100 - - - - - - (Eq. 4);

RRVC = (TR-TFC/TVC) x 100 - - - - - (Eq. 5);

OR = TVC/TR - - - - - - (Eq. 6);

Where,

PI = Profit Index, Π = Profit, TR = Total Revenue, RRI= Rate of Return on Investment (RRI), TC =Total Cost, RRVC = Rate of Return on Variable Cost, TVC = Total Variable Cost, TFC= Total Fixed Cost and OR Operating Ratio.

The regression tool was employed to identify the factors affecting receipts from firewood trade. The regression analysis helps one to understand how the typical value of the dependent variable changes when any one of the independent variables is varied, while the other independent variables are held fixed. The a priori expectation of the variables used in the model is indicated in table 1. The implicit form of the regression equation as used by Nelson (2015) is given as:

$$\mathbf{Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 - - - - b_{11}X_{11} + \mu} \quad \textbf{(Eq. 7);}$$

Where,

Y= total revenue from the sales of firewood in naira ($);

a = constant, bi, where i =1, 2...11 were the regression co-efficient of X variable.

X_1 = Age of respondent in years

X_2 = Marital status (Married = 2, Single =1);

X_3 = Educational status (years in school);

X_4 = Years in business;

X_5 =Transportation cost in naira ($);

X_6 = Labour in man days;

X_7 = Rent paid in Naira ($);

X_8 = Gender (male = 0, female = 1);

X_9= Household size;

X_{10} = Engagement (part-time = 0, full-time =1); and

X_{11}= Purchase cost ($)

μ = factors that were not adequately accounted for but contribute to total revenue.

Table 1: An *a priori* expectation of variables

Dependent Variables	Explanatory Variables	Expected Signs	Explanations of the relationship
Output (Y)	Marital Status	+	Output is related to marital status. This means that the more the firewood traders are married with the responsibility of more family members to cater for, the more output will increase.
	Educational Status	+	Output is related to education. This means that the more the firewood traders are educated, the more output will increase.
	Age of Respondents	+	Output is related to age of respondents. This means that the younger the firewood trader, the more output will increase.
	Years in business	+	Output is related to years spent in firewood trade. This means that the more the years spent in the firewood trade, the more output will increase.
	Transportation cost	-	Output is related to amount spent on transportation. This means that the higher the cost of transportation, the more output will decrease.
	Labour	-	Output is related to labour. The more the man days are being paid for, the more output will decreases.
	Household size	+	Output is related to household size. The more the members of the family, the more output will increases.
	Purchase cost	+	Output is related to purchase cost of firewood. This means that the higher the amount spent on purchasing firewood, the more output will increase.
	Engagement	+	Output is related to time spent in business. This means that the more time spent in firewood trade, the more output will increase.
	Gender	+	Output is related to gender. Increase in more male traders will result in increase in output.
	Rent	-	Output is related to rent. As less rent is paid by the firewood trader, output will increased

Result and Discussion

Demographic characteristics of respondents

The result in Table 1 shows that majority (92%) of the firewood traders in the study area were female with only 8% accounting for the male. In the individual markets sampled, the female traders accounted for 94%, 88% and 83% of the respondents in Itam market, Afaha market and Akpan Andem market respectively (Table 2). More than 80% of the sampled traders (81%, 87% and 83% in the three markets respectively) were above 30 years of age. In total, 32% of the respondents were within the age class of 41-50 years, followed by those between 31-40 years (28%), while respondents who were aged below 30years (17%) were the least in number (Table 2). This implied that firewood trade in the study area was dominated by older matured women with only few younger women involved in the trade. This observation was in line with the observation of Adeyemi and Ibe (2014) who also reported that only few youthful women were engaged in the business in Owerri North and West local government areas of Imo State. Age, according to Ndaghu *et al.* (2011), plays a critical role in firewood trade, the more energetic an individual is, the higher the possibility of him or her to perform better than the very young or very old marketers. This result also collaborated the finding of Afolabi (2001) and Ikurekong *et al.* (2009) who reported that age of marketers had positive impact on the business aggressiveness and flexibility in marketing activities.

Also, this study tends to portray the influence of age in the selection of trade considering that majority of the firewood traders were older compared to a higher rate of younger people involved in ornamental trade in the same study area (Nelson, 2015). The dominance of older women in the firewood trade may be due to the fact that majority of them in this category lack sufficient money for a better business, as the trade could be started with a minimal budget compared to ornamental trade that would require a sizeable amount of capital (Nelson, 2015).

Also, the predominance of female in the firewood trade was in line with the observation of (Futmina, 2016) who noted that as high as 88% of the fuelwood traders in Minna, Niger State were female. Also, Observation from the study shows that the male counterparts were more involved in harvesting and transportation of the firewood to locations, where the firewood were marketed as well as to the points of consumption, while the children and youth help in cutting the firewood billets to appropriate sizes and loading them to vehicle for delivery. However, the observation varied with that of Ndaghu *et al*. (2011) who reported male dominance in the firewood trade in Yola. A similar case has been reported by Ikurekong *et al*. (2009) and Muregerera (2008) who noted that firewood collection was done mostly by women in subsistence level as they tended to concentrate more on cutting and picking of the fallen dead woods compared to their male counterparts, while the male dominated the large commercial firewood marketing and other agricultural activities that were labour demanding (Kwaghe, 1999; Ani, 2004; Fidelia, 2005).

Educationally, 93% of the respondents had formal education. This result showed that literacy level among the marketers was high. According to Velde (2005), education helps to attract private capital. The high literacy rate in the study area implied that the traders possessed the ability to outsmart their competitors as they could easily access market information and use of more efficient technology that would enhance their output or sales to help them increase their productive capacities. this was in agreement with Christiansen *et al*. (2003) that households with higher education were less likely than others to fall into poverty, and more likely to escape from it, and far more likely to benefit from growth.

Tables 2 further indicates that majority (53%) of the respondents were married and had a household size of 1-5 persons. According to Taphone (2009), married people had more responsibilities such as the provision of foods, education and health and well-being of their spouses and children. This could be the reason why the business was dominated by the married people unlike the case for the singles who probably had no other people to take care of beside themselves.

Table 2: Demographic characteristics of respondents

Variables	Itam market	Afaha market	Akpan Andem market	Total
Gender				
Male	3 (6)	2 (12)	2 (17)	7 (8)
Female	44 (94)	14 (88)	10 (83)	68 (92)
Total	47 (100)	16 (100)	12 (100)	75 (100)
Age				
< 30	9 (19)	2 (13)	2 (17)	13 (17)
31 – 40	12 (26)	5 (31)	4 (33)	21 (28)
41 – 50	15 (32)	6 (37)	3 (25)	24 (32)
> 50	11 (23)	3 (19)	3 (25)	17 (23)
Total	47 (100)	16 (100)	12 (100)	75 (100)
Level of Education				
Non Formal	5 (11)	0 (0)	0 (0)	5 (7)
Primary	19 (40)	4 (25)	5 (42)	28 (37)
Secondary	17 (36)	11 (69)	7 (58)	35 (47)
Tertiary	6 (13)	1 (6)	0 (0)	7 (9)
Total	47 (100)	16 (100)	12 (100)	75(100)
Marital Status				
Single	9 (19)	5 (31)	3 (25)	17 (23)
Married	38 (81)	12 (69)	9 (75)	58 (77)
Total	47 (100)	16 (100)	12 (100)	75 (100)
Household Size				
1-5 persons	27 (58)	7 (44)	6 (50)	40 (53)
6 -10 persons	19 (40)	9 (56)	4 (33)	32 (43)
> 10 persons	1 (2)	0 (0)	2 (17)	3 (4)
Total	47 (100)	16 (100)	12 (100)	75 (100)

( ) = Figures in parenthesis are percentage value

Operation and funding

Firewood trade in Uyo Metropolis appears to be a relatively old business. Results in Table 3 indicated that majority of the traders (62%) had been in the firewood trade for more than 10 years and were engaged in it on a full-time basis (76%) as their major job, while the remaining 24% engaged in the trade on a part-time basis in addition to other jobs. The traders' engagement in the firewood trade could also be attributed to their inability to get a favourable job due to the high rate of unemployment in the state and because they believed that it was profitable. The growth in trade also indicates the economic viability and the support, which the trade offers the households of the traders (Adeyemi and Ibe, 2014). Accordingly, their experience in the business counts, considering the fact that the more the number of years a marketer spends in business the more likely such a marketer would know the intricacies of the business which could possibly enhance the gross margin, thus making him or her stay longer in the business. This is explained in the yearly income level of the traders in Table 3. The result (Table 3) indicates that 36% of the traders had a yearly income of $554 – $830, followed by those who generated $831 - $1107 (25%) and $278 – $553 (17%) annually respectively.

Also indicated in Table 3 was number of firewood traders who were members in the Firewood Traders' Association. The results showed that 63% of the traders belonged to the association. However, this number of members was only obtained in one of the study markets (Itam market). The traders in the other two markets (Akpan Andem market and Afaha Itam) did not belong to any association. This could be attributed to the market structure present in each market. There existed quite a large number of firewood marketers in Itam market due to its strategic location compared to the other two markets. The existence of the association, apart from collecting dues and settling issues that may arise among the traders in that market, discouraged non-members engaging in the trade. Similarly, the lack of association in Akpan Andem and Afaha market could be attributed to the few numbers of firewood traders trading in the products and their preference to operate alone to avoid payments which they considered as unnecessary.

All business ventures require capital for the start-up so as to cover the cost of land/rent, equipment, buildings, supplies, labour, and stock (Nelson, 2015). The result in Table 3 revealed that majority (88%) of the respondents used their personal funds to start the trade. This was in line with the observation of Nelson (2014) who reported 85.71% of the sampled respondents using personal funds in the establishment of their ornamental plant businesses. Also supporting this claim was Gulani and Musa (n. d.) who observed that about 76% of small and medium scale entrepreneurs funded their businesses from their personal accounts. This could be attributed tothe inability of the respondents to acquire credit facilities from the bank as it involved the use of collateral. This observation was in agreement with those of other studies (Olagunju and Adeyemo, 2008; Omonona *et al.*, 2010; Ekwere and Edem, 2014; Asogwa *et al.*, 2014) that the reason for the decline in the contribution of small and medium scale enterprises to the nations' economy was lack of a formal national credit policy and paucity of credit institutions that should assist farmers in the provision of chemicals, fertilizers and other inputs that would improve their economic condition to be self-sufficient and self reliant in food production. This adversely affected their ability to venture into larger scale operations as they could not bear the cost of production from their lean resources. This was, for instance, why only 3%of the respondents engaged in wholesale trade (Table 3). The importance of micro, small and medium scale enterprises cannot be overemphasized. They are known to adapt with greater ease under difficult and changing circumstances because they are typically low in capital intensity and allow product lines and inputs to be changed at relatively low cost (Evbuomwan *et al.*, 2013; Olorunshola, 2003). They also retain a competitive advantage over large enterprises by serving dispersed local markets and produce various goods with low scale economies for niche markets (Evbuomwan *et al.*, 2013; Olorunshola, 2003).

Table 3: Funding and mode of business operation of respondents in the study area

Variables	Itam market	Afaha market	Akpan Andem	Total
Years in business				
< 5 years	7 (15)	1 (6)	0(0)	8 (11)
6 – 10 years	11 (23)	5 (31)	4 (33)	20 (27)
11 – 15 years	21 (45)	7 (44)	6 (50)	34 (45)
> 15 years	8 (17)	3 (19)	2 (17)	13 (17)
Total	47 (100)	16 (100)	12 (100)	75 (100)
Member of a Firewood Association				
Yes	47 (100)	0 (0)	0 (0)	47 (63)
No	0 (0)	16 (100)	12 (100)	28 (37)
Total	47 (100)	16 (100)	12 (100)	75 (100)
Engagement in Business				
Full time	36 (77)	13 (81)	8 (67)	57 (76)
Part-time	11 (23)	3 (19)	4 (33)	18 (24)
Total	47 (100)	16 (100)	12 (100)	75 (100)
Scale of operation				
Wholesale	2 (4)	0 (0)	0 (0)	2 (3)
Retail	47 (96)	16 (100)	12 (0)	75 (97)
Total	47 (100)	16 (100)	12 (100)	77 (100)
Source of capital				
Family/Individual	39 (83)	15 (94)	12 (100)	66 (88)
Friends/Gift	3 (6)	1 (6)	0 (0)	4 (5)
Loan	5 (11)	0 (0)	0 (0)	5 (7)
Total	47 (100)	16 (100)	12 (100)	75 (100)
Yearly income ($)				
< 277	2 (4)	2 (13)	0 (0)	4 (5)
278 – 553	7 (15)	5 (31)	1 (8)	13 (17)
554 – 830	17 (36)	4 (25)	6 (50)	27 (36)
831 - 1107	12 (26)	4 (25)	3 (25)	19 (25)
1108 - 1383	7 (15)	1 (6)	2 (17)	10 (14)
> 1383	2 (4)	0 (0)	0 (0)	2 (3)
Total	47 (100)	16 (100)	12 (100)	75 (100)

( ) = Figure in parenthesis are percentage value, 1 USD = ₦361.50

Sources of firewood and market location

Tables 4 and 5 present the sources of the firewood marketed and consumed in the study area and the locations of the markets. A great bulk of the firewood (84%) traded in the study area was bought from the markets in the rural area of Ibiono and 16% was obtained directly from farmlands or fallow lands. None of the traders reported obtaining their goods from any forest land or plantation. These facts attest to the impact of urbanization, which seldom results in the depletion of forest lands within the urban centres as a result of infrastructural development and settlement establishments. Considering the pressure or demand for firewood in the urban centre due to the ever expanding market, increasing population and most recently, the removal of the subsidy in petroleum products in the country, there is bound to be serious consequences on the available forest resource, especially wood products.

The desire to balance the demand for firewood in the urban market will imply increasing the supply, thus more exploitation of the forest (protected forest) for firewood. Extraction of wood within these supply areas will clearly affect the forest and the environment. Some of these impacts can be seen in the study areas. The rainfall has become increasingly irregular and biodiversity lost. These communities sometimes experience flooding and droughts which adversely affect the most important sector in the country's economy,

agriculture. These impacts affect not only the environment but the whole social economy. Also, due to increasing economic hardship in Nigeria, many people are finding it increasingly difficult to afford conventional fuels; hence, profit-energy supply pattern compels firewood suppliers to cuttrees indiscriminately from marginal forests, with little regard for environmental consequences (Orimoogunje and Asifat ,2015).

Table 4: Sources of firewood traded in the study area

Sources of fuelwood	Itam market	Afaha market	Akpan Andem market	Total
Forest	0 (0)	0 (0)	0 (0)	0 (0)
Plantation	0 (0)	0 (0)	0 (0)	0 (0)
Farmland/Fallow land	9 (16)	5 (24)	0 (0)	14 (16)
Market	47 (84)	16 (24)	12 (100)	75 (84)
Total	56 (100)	21 (100)	12 (100)	75 (100)

( ) = Figure in parenthesis are percentage value

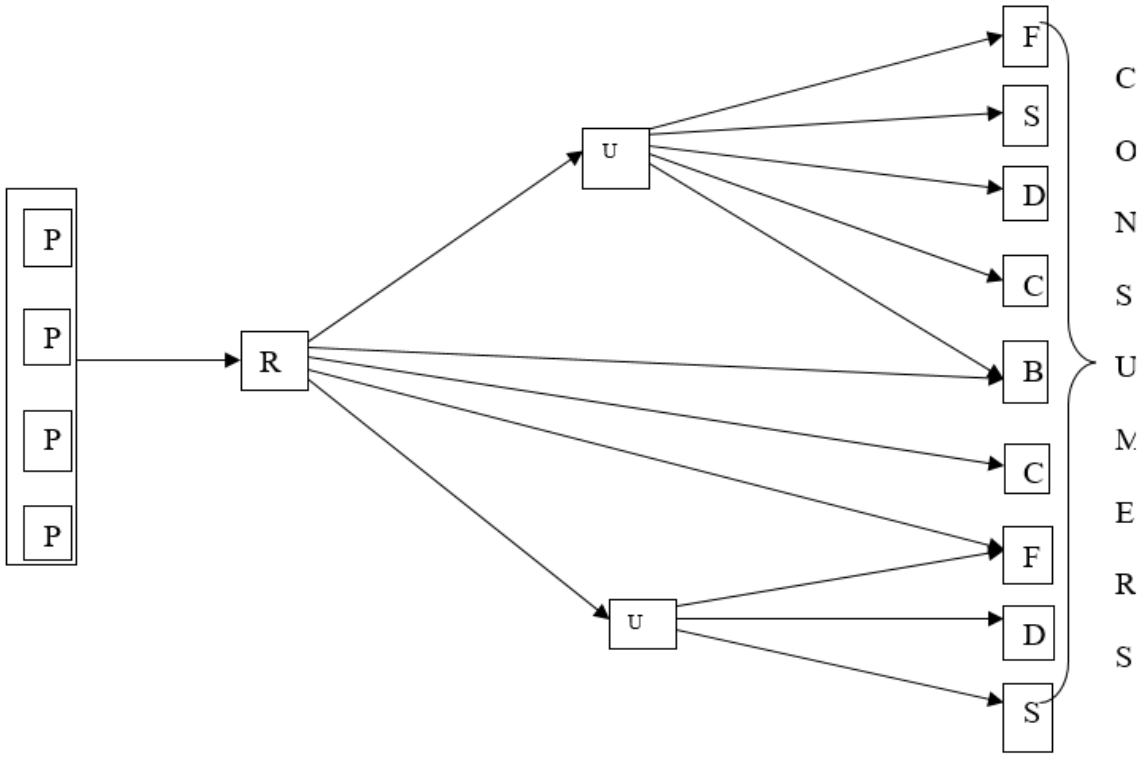
Table 5: Location of firewood markets where the traders purchase their products

Names of Markets	Itam market	Afaha market	Akpan Andem market	Total
Oko Ita - Ibiono	47 (14)	16 (16)	12 (14)	75 (14)
Ikot Ekwere -Ibiono	39 (11)	6 (5)	4 (5)	49 (10)
Ikot Ada Idem - Ibiono	47 (14)	16 (16)	12 (14)	75 (14)
Ikpa Ikot Ubo - Ibiono	42 (12)	16 (16)	12 (14)	75 (14)
Nkwa - Ibiono	47 (14)	16 (16)	12 (14)	75 (14)
Oku Obom - Ibiono	47 (14)	16 (16)	12 (14)	75 (14)
Itukho - Ibiono	32 (9)	9 (8)	11 (13)	52 (10)
Ono Ikot Itiat - Ibiono	23 (7)	4 (4)	7 (9)	34 (7)
Obio Ediene - Ikono	6 (2)	1 (1)	0 (0)	7 (1)
Ikot Idomo - Ikono	8 (3)	1 (1)	2 (3)	11 (2)
Ikot Essen - Uruan	0 (0)	1 (1)	0 (0)	1 (0)
Akpa Utong - Ibesikpo Asutan	1 (0)	0 (0)	0 (0)	1 (0)
Total*	339 (100)	102 (100)	84 (100)	525 (100)

( ) = Figure in parenthesis is percentage value; * values are multiple entries of answers

Firewood marketing channels in the study area

As indicated in Figure 1, an indirect or a two levelmarketing channel exist in the study area. This marketing channel is in accordance with Taru and Ndaghu (2013). All the urban sellers bought either in bulk or retail directly from the retailer at the village market. The urban sellers then retail the product to home users, bakeries, food sellers, suya/chicken joints, and local food processing units in a form that was convenient for them to buy. For bulk purchasers such as bakeries, the consumers could deal directly with harvester, thereby by-passing the middlemen. Middlemen influence the price of the product (Leach and Means, 1988; Minhaj, 1996).



Key

P = Producer (Rural)
RW = Rural Wholesaler
UW = Urban Wholesaler
UR = Urban Retailer
B = Bakeries
C = Caterers
D = Domestic use
S = Soya and Chicken roasting
F = Food Vendor

Figure 1: Firewood marketing channel in Uyo Capital City, Akwa Ibom State, Nigeria

Firewood species traded and most patronized

The result in Table 6 indicates the list of ten commonly sold firewood species in the study area, their uses and characteristics. The species were distributed among nine families. The family Fab*aceae* had four species, followed by Euphorbiaceae and Apocynaceae with two species, while the rest had one species each. The species *Dactyladenia barteri*(Hook.f. ex Oliv.) was the most traded firewood and mentioned by all respondents as the most desirable firewood species. This was attributed to its lighting, burning properties and availability in the market. Species such as *Brachystegia eurycoma*Harms,*Uapaca guinensis* Müll.Arg., *Pentaclethra macrophylla* Benth. and *Dacryodes edulis* (G.Don) H.J.Lam were mostly sold to bakery operators who preferred them because of their sizes and burning properties. However, the findings varied with that of Akpan, Wakili and Akosim (2007) who reported thatthe most common tree species being used as fuel wood for energy include: Marke (*Anogeisus leocarpus),* Tsamia *(Tamarindus indica),* Kadanya *(Vitellaria paradoxa),* Samji *(Ficusplatiphyla), Kiriya (Prosopis africana),* Dorowa *(Perkia biglobossa),* Doka *(Isoberlinia doka),* Taura *(Detariummacrocarpum),* and Kaiwa *(Diosperusmesphiliformis).*in Bauchi State, Nigeria.

Table 6: Species traded, characteristics and users in the study area

Scientific name	Family	Common name	Local name	Major users	Characteristics of species
Dactyladenia barteri (Hook.f. ex Oliv.)	Chrysobalanaceae	Monkey friut	Ukang	Household use, restaurants, food vendors, Bakery	Wood is hard, easily light, produce much heat, charcoal and burn for a long period, does not produce smoke
Alchornea cordifolia (Schumach. and Thonn.) Müll.Arg.	Euphorbiaceae	Christmas bush	Ubom	Household, restaurants	Wood is light and soft, does not produce as much heat.
Anthonotha macrophylla P.Beauv	Fabaceae	African rosewood	Nya	Households	The wood is hard, produces heat
Macaranga barteri Mull.-Arg.	Euphorbiaceae	African nut tree	Akpab	Households	Burns with heat, does not burn for long, produces sparks and burns up quickly
Dialium guineenses Willd.	Fabaceae	Velvet Tamarind	Ukuk	Households	Burns with minimal heat, produces charcoal
Harungana madagascarensis Lam. ex Poir	Clusiaceae	Haronga	Oton	Households	Wood is light in weight and burns with heat
Bombax buonopozense P.Beauv.	Malvaceae	silk cotton tree	Ukim	Households	Burns with minimal heat, does not burn for long
Alstonia boonei De Wild.	Apocynaceae	African nut tree	Ukpo	Households	Burns with minimal heat, does not burn for long
Barteria nigritiana Hook.f.	Passifloraceae	Ant tree	Ekpae-kpang	Households	Burns with heat and produces sparks a
Funtumia elastic(Preuss) Stapf	Apocynaceae	Rubber tree	Eto okpo	Households	Burns with minimal heat
Brachystegia eurycoma Harms	Fabaceae	Achi	Achi	Bakery	Mostly preferred by the bakery's because of its heating quality, ability to sustain heat through its charcoal and does not produce smoke
*Uapaca guinensis*Müll.Arg.	Phyllanthaceae	Sugar plum	Mkpenek	Bakery	The wood produces a good firewood and charcoal
Pentaclethra macrophylla Benth.	Fabaceae	Oil bean tree	Ukana	Bakery	The wood is used as firewood and charcoal
Dacryodes edulis (G.Don) H.J.Lam	Burseraceae	Bush butter tree	Eben	Bakery	The wood is used mainly for fuel

Cost of fire wood trade in Uyo Capital City

Table 7 shows the analysis of costs associated with firewood marketing in the study area. For the variable cost, purchase cost accounted for more than 69% with a mean of $160.29/month followed by transportation cost (23.29%; $53.93/month /month), rent (4.76%; $11.01/month) and market tax (1.30%; $3.01/month), while rope was the least variable cost (0.43%; $1.01/month). In the fixed cost, the cost for wheel barrow was the highest ($8.82/month, 62.64%), followed by machete ($3.98/month; 28.27%) while axe was the least fixed cost ($1.28/month; 9.09%).

The mean monthly TVC in the study area was $231.51 amounting to 94.27% of the total cost of firewood, while the mean TFC ($14.08) amounted to the remaining 5.73%. In the total cost, the cost of purchasing firewood was the highest (65.26%), followed by transport (21.96%) and rent (4.48%), while the cost of rope was the least (0.42%).

The high percentage of firewood cost followed by transportation cost in the study was in line with the observation of Taru and Ndugu (2013) in Adamawa State and Ebe (2014) that purchase cost was as high as

78.92% of total costs incurred by wholesalers, followed by transport with 14.83% in Enugu State. It however, contrasted with the finding by Aeez *et al*. (2014) that labour cost accounted for the highest percentage (42.2%) of the total cost incurred in fuelwood trade, followed by purchase cost and transportation cost. The high cost of transportation was attributed to poor condition of roads or inaccessibility of some of the roads especially during the rainy season and, in some instances, scarcity of fuel.

Table 7: Total Cost of Firewood trade in Uyo Capital City, Akwa Ibom State, Nigeria

Variables	Total Cost/year	Mean	Percentage (%)	% of Total Cost
Variable Cost (VC) ($)/Month				
Purchase cost	12022	160.29	69.24	65.26
Transport	4044.81	53.93	23.29	21.96
Labour	170.12	2.26	0.98	0.92
Rent	825.73	11.01	4.76	4.48
Market tax	226.14	3.01	1.30	1.23
Rope	75.1	1.01	0.43	0.42
Total Variable Cost (TVC)	17363.91	231.51	100.00	94.27
Fixed cost (FC) ($)/Month				
Axe	96.01	1.28	9.09	0.52
Wheel barrow	661.82	8.82	62.64	3.59
Machete	298.76	3.98	28.27	1.62
Total Fixed Cost (TFC)	1056.59	14.08	100.00	5.73
Total Cost (TC)(₦)/Month = TVC + TFC				
	18420.50	245.59		100.00

1 USD = ₦361.50

Profitability analysis of firewood trade in Uyo Capital City

The results in Table 8 show that the average total revenue generated from the sales of firewood was $339.95/month, with an average total variable cost of $231.52/month and a mean total gross margin of $108.43/month. The results revealed that the mean estimated total fixed cost incurred by the respondents in the study area was $14.09/month. This cost (total fixed cost) was deducted from the mean total annual revenue to obtain the total net revenue as shown in Table 7. Thus, firewood traders in the area had mean monthly net revenue of $325.86 (Table 8). The profit analysis showed that the net profit for the firewood trader in the study area was ₦$94.34 monthly.

As compared with the findings of Taru and Ndagu (2013) with a profit of $5.90 (₦2,132.91) for fuelwood traders in Adamawa State, the estimated profit of firewood traders in study area was very high. This could be attributed to the level of patronage in the area. According to Azeez *et al*. (2014) and Ebe (2014), the economic benefits and total output values of the enterprise was significant and the income that accrued from it and other fuelwood products were very significant and contributed substantially to households' income of the firewood traders.

Table 8: Total profit of Firewood trade in Uyo Capital City, Akwa Ibom State, Nigeria

Variables	Total	Mean
Gross Margin (GM) (₦)		
Total Annual Revenue (TAR)	25496.27	339.95
Total Variable Cost (TVC)	17363.9	231.52
Total Gross Margin (TAR - TVC)	8132.37	108.43
Net Revenue (NR) (₦)		
Total Annual Revenue (TAR)	25496.27	339.95
Total Fixed Cost (TFC)	1056.60	14.09
Total Net Revenue (TAR - TVC)	24439.67	325.86
Profit (₦)		
Total Annual Revenue (TAR)	25496.27	339.95
Total cost (TVC + TFC)	18420.50	245.61
Total Profit (TC) = (TAR - TC)	7075.77	94.34

Profitability ratio analysis (Table 9) of firewood showed a profit index (PI) of 53.00% of the final selling price received by the retailers, while the remaining 47.00% went to wholesalers and gatherers of fuel wood in the industry. This also indicated that out of every $1 earned; about $0.53 accrued to the marketer as profit after accounting for all costs. Also, with an RRI of 110.59%, a marketer earned $110.59 profit on every naira spent on fuel wood business, while the RRVC of 232.46% indicated that every $1 cost incurred on variable inputs generates about $232.46. Moreover, the operating ratio of 0.37 indicates that every $1spent on total variable cost yielded $0.37 as total revenue. It can therefore be concluded that firewood business in the area was very profitable.

Table 9: Profitability ratio of firewood trade in Uyo Capital City, Akwa Ibom State, Nigeria

Profit Index (PI) = Profit / TR	0.53
Rate of Return on Investment (RRI) = (Profit / TC) *100	110.59
Rate of Return on Variable Cost (RRVC) = TVC / TR	232.46
Operating Ratio (OR) = TVC / TR	0.37

Factors influencing profitability of firewood trade in Uyo Capital City

The influence of various factors on the profitability of firewood marketing was captured by the ordinary least square regression model. The overall goodness of fit (F-value) showed that the model was significant at 1% and that the entire coefficients estimated by the model were not all equal to zero. The R-squared value of 0.565 indicated that about 57 percent of the variations in the profitability index of firewood marketing was brought about by variation in the explanatory variables used in the model. Mode of engagement and scale of operation had significant and positive effect on revenue ($p<0.05$), while household size was negative and significant ($p<0.10$), Educational status, age of trader and Marketing cost incurred during the cycle of the business was positive and significant ($p<0.01$) respectively.

Mode of engagement ($p<0.05$) and scale of operation ($p<0.05$) were also significant with a positive influence on the profitability index. This might simply be due to the fact that the new entrants into the fuel-wood enterprise were more business-minded and effective than the long term actors who saw the business as more of a hobby (Azeez *et al.,* 2014).

The coefficient of the household size was negative and significant at 10 percent. This negative relationship implied that the larger the household size was, the lower the profitability of such household in the business. It was therefore against popular expectation that large household size would provide necessary labour for the enterprise. Such abundant labour was however inefficient in terms of profitability (Azeez *et al.,* 2014). This might not be unconnected with the tediousness of the log splitting which some of the household members may not be able to efficiently handle.

Educational status ($p<0.01$) and age of the trader ($p<0.10$) were positive and significantly influenced the profitability of the trade. The relevance of these two socio-economic factors in influencing profitability of firewood had earlier been established by Ebe (2006) and the supply theory in Samuelson and Nordhaus (2005) who noted that socio-economic variables such as educational attainment, age of suppliers, professional experience and government policy could influence the supply level of fuel wood positively.

The Marketing cost incurred during the cycle of the business was positive, and significant ($p<0.01$), indicating that the higher the marketing cost, the less profitable the business could be. This might be due to increased cost of transportation. This also corroborated the economic theory which held that the cost of doing business should be minimized as much as possible to enhance high profitability (Azeez *et al.,* 2014; Samuelson and Nordhaus, 2005).

Gender ($p >0.10$) of the trader involved in the business had negative coefficient in relation to the profitability of the trade, and was not significant. The other variables transportation, labour, years in business and marital status ($p >0.10$) were also not significant. All these variables that were not significant are of no policy value in respect of influence on profitability of fuel wood enterprises in the study area (Azeez *et al.,* 2014). Therefore, it is valid and of importance to note that whether the residence of an entrepreneur is close to forest or not is not a factor for profitability, but rather, having the right business approach in such a way as to reduce the cost of doing business (marketing cost).

Age ($p < 0.10$) of the trader was positively related to the income of the trade. This is in line with the observation of Anyanwu (2013), Ermias *et al*. (2014), Udeahga (2015) and Jacob *et al*. (2016) that the more energetic a person is, the more the ability to take risk and diversify his/her livelihood strategies and vice versa. Also, a decrease in the productive years of a person is reported to increase the poverty level of a person because elderly persons decline in their strength and productivity as they get older as well as having increased health problems (Igbalajobi *et al*., 2013; Anyanwu, 2013).

The amount spent on rent by the traders accounted for 4.48% (Table 6). According to Parkin and Esquivel (1999), land is one of the major factors in production. All of the respondents in the study area operated their trade on a rented space within the market, without which they were not allowed to operate in the market. Thus, rent is related to location. This observation agreed with the report of Badmus and Yekinni (2011) who also observed that rent constituted a high cost for business establishment in the urban centre of Oyo State, Nigeria.

Table 10: Factors affecting the profitability of firewood trade in Uyo Capital City

Variables	Coefficients	Standard Error	P-value
Intercept	-39589.5	10476.08	0.000356***
Transport	0.557061	0.440428	0.210671
Labour	0.744056	3.22087	0.818067
Rent	-55.75781	14.50192	0.000287***
Engagement	592.176	266.0431	0.029668**
Operation scale	104.0496	45.22619	0.024788**
Years in business	2.779446	48.26729	0.954265
Household size	-2920.57	1510.279	0.057706*
Marital Status	431.3597	419.8737	0.308245
Educational Status	3270.395	1103.188	0.004298***
Age	142.5417	78.8903	0.075641*
Gender	-5.06514	41.56155	0.903395
Purchase cost	-0.697643	0.162584	6.35E-05***

Number of observations = 75, $R^2 = 0.565$, F-Ratio = 6.721***

*** = $p < 0.01$, ** = $p < 0.05$, * = $p < 0.10$

Conclusion and Recommendation

Firewood trade in Uyo Capital City is a profitable business. Most of the firewood traded is obtained from the rural areas precisely from parts of Ibiono Local Government Area and there is a one-level marketing channel in the study area. Age of trader ($p < 0.10$), educational attainment ($p<0.01$) and operation scale ($p<0.05$) are among the factors that influence profitability of the trade in the study area.

In order to be able to assess the impact of vegetation changes, as well as the stability of ecosystems in which the firewood is obtained for trade, there is need to carry out an evaluation of the production and regeneration of these firewood species under different management regimes especially in Ibiono, which serves as the major source of firewood for the urban centre Uyo Metropolis in Akwa Ibom state.

There is need to pay attention to the regeneration and protection of these firewood species e.g. *Dactyladenia barteri*(Hook.f. ex Oliv.), and give special attention for conservation because it is nowadays not easily available in the farmstead or fallow lands surrounding the metropolis. Strengthening agroforestry systems in the study area together with woodlots establishments can, therefore help to minimize the pressure of extracting firewood from the nearby community forests and homesteads.

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