ANALYSIS OF STRUCTURE, CONDUCT AND PERFORMANCE OF CHARCOAL MARKET IN OYO STATE, NIGERIA

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ABSTRACT

This study was carried out to analyze the structure, conduct and performance of charcoal market in Oyo state with the hope of making recommendations for improved marketing system of the product in the face of scarcity of alternative energy sources. Multistage sampling technique was employed to select respondents. Data were obtained from 150 charcoal marketers in the study area by the use of interview schedule. The Data collected were subjected to descriptive and inferential statistics. The results revealed that average age of respondents was 46 years, 88.0 percent of them were married, 86 percent were female while the average household size was 6. Analysis further revealed that 12.6 percent of the respondents had no formal education while the average charcoal marketing experience was 5.8 years among respondents. The market structure was found to be perfectly competitive. The regression analysis employed in hypothesis testing revealed that selling price of charcoal, cost of packaging material, quantity sold, cost of purchase, and depreciated fixed cost are variables affecting marketing efficiency in the study area. The study concluded that charcoal marketing is profitable with net returns of #149.90 per bag sold. There is however the need to improve on charcoal market performance in the study area.

Key words: Structure, Conduct, Performance, Charcoal marketing, Efficiency, Hefindahl index

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INTRODUCTION

Fuel is any material that stores energy that can later be extracted to perform mechanical work in a controlled manner. Fuel contains energy, mostly heat that can be released and then manipulated. The first use of fuel was the combustion of wood or sticks by Homo erectus near 2 million years ago (Wikipedia, 2012). Prior to the discovery of petroleum, firewood and coal had been the main sources of energy, which were used for domestic cooking, home heating and driving turbines in trains. The emergence of charcoal in Nigeria in the early 1940s had alleviated the problems of fuel shortage as well as promoted full utilization of forest resources. Throughout the majority of human history fuels derived from plants or animal fat were the only ones available for human use. Charcoal, a wood derivative, has been used since at least 6,000 BC for smelting metals.

Globally, the use of wood fuels has been growing in line with population growth, so that the annual growth in demand is between 3 and 4 percent, depending on the country (Amous, 2000).From history before the invention of electricity, coal has been the major source of energy for driving engines and turbines. Electricity cannot meet all needed energy by the teeming population especially in the village setting. Thus, other substitutes should come in. It is estimated that approximately 2.5 billion people in developing countries rely on biomass fuels to meet their cooking needs. For many of these countries, more than 90 percent of total household fuel is biomass. Without new policies, the number of people that rely on biomass fuels is expected to increase to 2.6 billion by 2015, and 2.7 million by 2030 (about one-third of the world's population) due to population growth (International Energy Agency, 2006).

Many studies had been carried out on various sources of energy generation and their contributions to the national economy. In the literature on household energy demand and choice, it has been argued that households with low levels of income rely on biomass fuels, such as wood and dung, while those with higher incomes consume energy that is cleaner and more expensive, such as electricity. Those households in transition—between traditional and cleaner (and more efficient) energy sources—consume what are called transition fuels, such as kerosene and charcoal. While this is a simpler version of the "energy ladder hypothesis," it is also presented in the literature with more elaborate intermediate steps (Hosier and Dowd 1987; Barnes and Floor 1999; Heltberg, 2005).

In recent times, one of the major problems facing Nigerians is the inadequate / scarcity of energy sources, especially for domestic cooking. In the urban areas, the use of petroleum products was very common. A related concept is fuel switching, where it is argued that introduction of superior fuels will phase out traditional fuels as households will switch to the former (Fawehinmi and Oyerinde, 2002). However, the present economic instability and low production of petroleum products have made the sources of energy non- available to users. The prices are increasing almost on a daily basis. Thus, the search for alternative sources of energy would help. According to the International Energy Agency (2006), while rural households rely more on biomass fuels than those in urban areas, well over half of all urban households in sub-Saharan Africa rely on fuel wood, charcoal, or wood waste to meet their cooking needs. Urban women interviewed during household energy surveys in Ethiopia, Chad, Madagascar, Mali, Niger and Senegal did not like to cook with wood because thy found it difficult to kindle, awkward, dangerous for children, smoky and messy (Madon, 2000). Charcoal is perceived to lack most of these negative effects, and is priced more competitively than LPG and kerosene' which are still too expensive for many people (Foster, 2000). There is no doubt that many households are now shifting attention to the use of charcoal as an alternative source of domestic energy.

This fact, on the part of suppliers of charcoal, could exert various pressures on handling, packaging, transport and sales with adverse antecedent effect on market prices. In addition, poor storage facilities coupled with improper handling and transportation stress, cause losses leading to reduced market margins and poor returns. Thus, the better the marketing situation of a product, the more the desire for higher production and supply among the producers and marketers (Ugwumba, 2009). It generates the strategy that underlies sales techniques, business communication, and business developments. It is an integrated process through which companies build strong customer relationships and create value for their customers and for themselves. Marketing is used to identify the customer, to satisfy the customer, and to keep the customer as the focus of its activities (Kotler, 2008).

Efficient market is one where the market price is an unbiased estimate of the true value of the investment. All it requires is that errors in the market price be unbiased. Marketing efficiency relates to the movement of produce from the producers to the consumers at the lowest

cost possible that is consistent with the services desired by the consumers and that they are able to pay for. A reduction in marketing cost per unit of output may be desirable but when it reduces consumers' satisfaction, it may not be an improvement in marketing efficiency. Market conduct refers to the price and other market policies pursued by sellers, in terms of their aims and of the way in which they coordinate their decisions and make them mutually compatible (Kotler, 2008; Wikipedia, 2010). Concerning the marketing of charcoal, a past related study concluded that major markets for charcoal in Nigeria are mainly in the urban centers and region of the country such as Lagos, Oyo, Akwa Ibom, Cross River and Benue States (Hassan, 1992). According to her, the marketing channel of charcoal in Nigeria is from producers to retailers and later to the consumers. She concluded that the issue of wholesaling is restricted due to the system of operations, the producers served as wholesaler as well.

The problem therefore centers on whether the supply side is adequately equipped to meet up with the obvious rising demand for the product. The study consequently answered the following questions: What are the socioeconomic characteristics of charcoal marketers? What are the structure and conduct of charcoal marketing? What are the cost and returns to charcoal marketing? Is the marketing system efficient? What are the challenges to charcoal marketing?

The main objective of this study is to analyze the marketing situation of charcoal in Oyo state of Nigeria. In order to achieve this general objective, the following specific objectives were considered. To:

1. describe socio-economic characteristics of charcoal marketers in the study area
2. investigate charcoal marketing structure and conduct in the study area
3. estimate the cost and returns to charcoal marketing in the study area
4. examine the marketing efficiency of respondents in the study area
5. identify the challenges to charcoal marketing enterprise in the study area.

The hypothesis of the study stated in the null form was that there is no significant relationship between selected market variables and marketing efficiency of respondents.

METHODOLOGY

The study was conducted in Oyo state of Nigeria. Oyo State is located in the South-Western part of Nigeria. It is located between latitudes $7^0 3^|$ and $9^0 12^|$ north of the equator and longitudes $2^0 47^|$ and $4^0 23^|$ east of the Meridian. Temperature is 27^OC. Oyo state consists of thirty-three (33) local government areas (LGAs). Multi-stage sampling technique was employed in this study. In the first stage, twenty percent (20%) of the LGAs were randomly selected, namely, Oorelope, Lagelu, Egbeda, Ogo Oluwa, Atisbo, Afijio, and Surulere LGAs. In the second stage, purposive sampling technique was employed to sample twenty five charcoal marketers in each of the seven LGAs. Simple random technique could not be employed in the second stage because there was no complete list of charcoal marketers in any of the selected LGAs. Purposive sampling technique was therefore employed. The data used for this study came mainly from primary sources. The primary data were collected using well-structured interview schedule. The instrument was designed to collect information based on objectives of the study. Twenty five (25) charcoal marketers were interviewed in each of the seven local government areas .However, twenty five copies of the completed interview schedule were found not to be useful during collation for data analysis because of inconsistent responses and ambiguous figures supplied by respondents. The study therefore made use of a total of one hundred and fifty (150) respondents. Data collected were analyzed using the descriptive, budgetary, herfindahl index, marketing efficiency and regression analyses.

Specification of Models

Descriptive analysis involved the use of tables, frequency counts and percentages. This was used to analyze objectives 1 and 5 of the study.

The herfindahl index (HI)

$$HI = Si^2$$

Where Si = Market share for respondent i, calculated as: $Si = \frac{q_i}{q}$

Where q_i = quantity (in bags) of charcoal sold per month by respondent i

q = total quantity (in bags) of charcoal sold per month by all respondents.

This was employed to achieve objective 2 of the study.

The budgetary analysis

This involved looking at the total revenue, gross margin and net returns.

Total variable cost (TVC) = cost of purchase, transportation cost, labour cost, and cost of packaging materials.

Total Fixed Cost (TFC) = Cost of stall, rent on transaction land, cost of tables/ benches.

Total Cost (TC) = TVC + TFC.

Total Revenue (TR) = Value of gross sales i.e price x quantity.

Net Return = Total revenue minus Total cost i.e. TR - TC.

Gross Margin = Total Revenue minus Total Variable Cost = TR- TV.

Profit = Gross margin minus Total Fixed Cost = GM- TFC.

This was used to achieve objective 3 of the study.

Marketing efficiency / inefficiency analysis

For this research study, marketing efficiency was determined by percentage of total marketing cost to the total revenue i.e

$$\frac{TC \times 100}{TR}$$

A very low percentage signifies that the marketing system is efficient while a high percentage signifies that the marketing system is inefficient. This is a measure of market performance.

This achieved objective 4 of the study.

Inferential statistical analysis

Regression analysis was employed for the hypothesis testing i.e. to determine the relationship between selected market variables and marketing efficiency of respondents.

The implicit form of the regression model was specified as follows:

$Y = (X_1 + X_2 + \text{----------} X_{10})$.

Y= Marketing efficiency

X_1= Selling price of charcoal (#)

X_2 = Transportation cost (#)

X_3 = Cost of packaging material (#)

X_4 = Labour cost (#)

X_5= Quantity of charcoal sold per month (bags)

X_6 = Cost price of charcoal purchase (#)

X_7 = Depreciated cost of fixed variables (#)

X_8= Charcoal marketing experience (years)

X_9=Years spent in school (years)

X_{10}=Age (years)

RESULTS AND DISCUSSION

Table I shows that only few (4.0 %) of the respondents charcoal marketers fall below 21 years of age. Majority of them (68%) are middle-aged (21 -40 years), while the remaining 28 percent of them are above 40 years of age. Average age was 46 years. This result shows that both young and elderly people are found in the business of charcoal marketing. Data analysis further revealed that 88.0 percent of the • respondents are married, 8.0 percent are single while 4.0 percent are widowed. Marital status is therefore no barrier to involvement in the business. Gender analysis revealed that 86.0 % were female.

Data analysis revealed that 12.6 percent of the respondents had no formal education while the remaining 87.5 percent received some level of formal education. This result indicates that both educated and illiterate people engage in charcoal marketing. On the issue of household size, 85.8 percent of the respondents claimed to have 4-6 household members, 5.8 percent claimed 7-9 members of household while 4.7 percent each claimed less than 4 as well as 10 and above respectively. The average household size was 6. The table shows that the business could be done either as a full time or part time occupation. The data revealed that 30.0 % of the respondents are full time charcoal marketers while the remaining 70 percent of them combine the business of charcoal with other occupations like teaching, farming hairdressing e.t.c.

Result of findings further revealed that 12.0 % of the respondents have less than one year of charcoal marketing experience. Majority of the respondents (48.0 %) joined the business within the range of last five years. Twenty eight percent of the respondents fall within the range of 6-10 years marketing experience while 12.0 percent recorded charcoal marketing experience of 10 years and above. Average was 5.8 years.

TABLE 1: Socio-economic characteristics of respondents , n = 150

Age (years)	**Frequency**	**Percentage**
<2I	06	4.0
21 -30	48	32.0
31-40	54	36.0
41-50	12	8.0
51-60	30	20.0
Marital Status		
Single	12	8.0
Married	132	88.0
Widow	06	4.0
Gender		
Male	21	14.0
Female	129	86.0
Household Size		
<4	7	4.7
4-6	130	86.6
7 -9	06	4.0
10 and above	7	4.7
Marketing experience		
< 1	18	12.0
1-5	72	48.0
6-10	42	28.0
10 and above	18	12.0
Primary Occupation		
Charcoal Marketing	45	30.0
Teaching	30	20.0
Farming	34	22.6
Artisans	41	27.4

Years spent in formal school		
0	19	12.6
1- 5	48	32.0
6-10	54	36.0
11-15	23	15.4
> 15	06	4.0
Total	**150**	**100**

Source: Field survey, 2012.

Structure of charcoal market

In order to determine the market structure of charcoal in the study area, the herfindahl index was computed making use of total sales per month.

Herfindahl index is calculated as follow:

The herfindahl index (HI)

$$HI = \sum Si^2$$

Where Si = Market share for respondent i, calculated as: $Si = \frac{q_i}{q}$

Where qi = quantity (in bags) of charcoal sold per month by respondent i

q = total quantity (in bags) of charcoal sold per month by all respondents.

For this study, number of respondents is 150, therefore:

The herfindahl index (HI) = ΣS_i^2

$= S_1^2 + S_2^2 +$ ---------- $+ S_{150}^2$

$= 0.34$

The highest value obtainable here is 1. A low herfindahl index (0.34) obtained here revealed that the concentration ratio for charcoal marketers is low, thus the market structure of charcoal tends toward perfect competition, which is characterized by (1) The product sold is homogenous, (2) There is no barrier to entry in to the business, and (3) There are many buyers and sellers in the study area.

Structure of market determines the conduct of sellers and buyers within the marketing system. A post data collection analysis shows that the charcoal marketing system tends towards 'a perfectly competitive market because there is no restriction to entry and exit into the market. The marketing system is highly personalized and loyalty exists between retailer and their customers. Some of the charcoal sellers sell directly to the retailers while a large number sell directly to consumers.

Budgetary (Cost and Returns) Analysis per bag of charcoal

Result presented in table 2 showed that purchase of charcoal takes up 90.20 % of the total cost, transportation is responsible for 3.44 % of the total cost. Depreciated fixed cost (stall +rent on transaction land + tables/ benches) for charcoal marketing is only 0.84 % of the total cost.

TVC (Charcoal purchase + Transportation cost + Labour cost + Cost of packaging material)

= 99.16 % of TC

FC (Depreciated cost of stall + Tables /benches + Transaction land rent)

= 0.84 % of TC

From analysis of data, the following results were obtained.

(1) Total Revenue per bag = N876. 00

(2) Total Variable cost per bag = N720. 00

(3) Gross Margin per bag of charcoal sold = N876. 00 – N720.00 = Nl56. 00

(4) Total Fixed Cost per bag = N6.10

(5) Profit per bag of charcoal sold =N156. 00 –N6.10 = N149.90

TABLE 2: Cost Component per Bag of Charcoal Transacted

Cost Item	Cost incurred per bag (#)	Percentage share of total cost (%)
Charcoal purchase	655.00	90.20
.Transportation	25.00	3.44
Labour	10.00	1.38
Stall	3.00	0.41

Tables/benches	2.00	0.28
Land rent	1.10	0.15
Packaging material	30.00	4.14
Total	726.10	100.00

Source: Field Survey, 2012

Marketing Efficiency/Inefficiency Analysis:

$$\frac{TC \times 100}{TR}$$

$$= \frac{72610}{876}$$

$$= 82.89\ \%$$

The high percentage obtained suggests that charcoal marketers are not efficient in discharging their marketing functions / services in the study area. The result signifies that the respondents are only 17.12% (100-82.89) efficient. There is therefore a need for improvement in marketing efficiency of the marketers.

Problems Facing Charcoal Marketers in the Study Area

The following problems were identified among respondents, arranged in order of importance according to their submission.

Finance: The respondents complained that their initial take-off capital is by personal savings, which at times are usually small. They have no access to loans from banks to run their business. This tends to limit the size of the business and the level of returns to the respondents

Adulteration of Product: Adulteration of product was also identified as one of the problems of charcoal marketing. Sometimes the charcoal is mixed up i.e. both small and big pieces, those that will easily ignite and the ones that will not are packed together and sold at the same price with those that have the correct packaging. This makes the sale of such bags difficult and hence, shortage to the marketers.

Price of Related Energy Sources: The price of related commodities such as kerosene affects the sale of charcoal negatively or positively. For instance, when the price of kerosene drops the sales for charcoal also drop.

Unfavourable Weather Condition: During rainy season, the marketers run into the problem of how to protect the charcoal from getting wet since the charcoal is normally kept outside. Also, it makes the production activities more difficult because drying process will take a longer time.

Effect of the Bad Feeder Roads: Bad feeder roads linking production centers of charcoal to points of sale increases cost of transportation and affects adversely the marketing efficiency of marketers.

Effect of the local government internally generated revenue workers: The respondents claimed that there is also the problem of unlawful or illegal collection of money from the marketers by the local government workers.

Inadequate Marketing Facilities: Some of the sampled marketers claimed to lack necessary facilities required for efficient charcoal marketing e.g stall. Some of the marketers were going about their trading activities under the sun, and nave no safe place to store yet to be sold charcoals.

Result of Regression Analysis

The simple linear regression model was used to test the hypothesis of the study.

Ho: there is no significant relationship between selected market variables and marketing efficiency of respondents.

The analysis was employed to know the level of variation in the marketing efficiency (Y) explained by the independent variables.

Multiple R= 0.830

R square= 0.688

Adjusted R square= 0.660

Standard error of the estimate=113530.37649

F- Value =24.091 significant level at 1%

Discussion:

The adjusted R square value of 0.660 implies that 66% of total variation in marketing efficiency of the respondents was explained by the estimated variables. The F-value of 24.091 and significant at 1% indicates that there is significant relationship between the dependent and independent variables. Such, the null hypothesis is rejected while the alternative hypothesis is accepted.

From the result as shown on table 3, five of the variables were found to have statistical relationship with marketing efficiency. They are: Selling price (#), Cost of packaging material (#), Sales per month (bags), Cost of purchase (#), and depreciated fixed cost (#).

Selling price: This is significant at 1% level. It bears a positive sign which means it has a direct relationship with marketing efficiency. This could imply that as market price of charcoal increases and marketers generate higher revenue, they are encouraged to improve on marketing services provided to consumers by stocking good quality product, it may be expensive but at the end of the transaction, consumers also obtain better quality for their money.

Cost of packaging material: This is significant at 1%. It bears a positive sign which means it has direct relationship with marketing efficiency. This implies that when marketers invest in attractive, good looking packaging material (sacks, cellophane nylons e.t.c.) consumers are satisfied and encouraged to buy. This will also be an advantage to marketers because the resultant increase in demand will lead to increased revenue.

Quantity (in bags) of charcoal sold per month: This is significant at 5%. It bears a positive sign which means it has direct relationship with marketing efficiency. This implies that when marketers are able to operate at wholesale level, per unit transaction cost will reduce. Such is an advantage to both marketers and consumers as it results in more revenue to marketers and a little lower price to consumers.

Cost Price: This is significant at 1%. It bears a negative sign which means it has inverse relationship with marketing efficiency. This implies that as the cost price (at which marketers obtained charcoal from primary producers) increases, marketing efficiency drops. This is actually expected because higher cost price will increase total cost of transaction and reduce revenue generated by marketers. It will also affect consumers selling price will simultaneously increase.

Depreciated fixed cost: This is significant at 1% level. It bears positive sign which means it has direct relationship with marketing efficiency. The reason for this could be associated with the fact that when marketers invest in good quality fixed cost items, such items tend to have very long useful life which at the long run bears positive effect on marketers revenue at no added cost to consumers.

Table 3: Result of Regression Analysis

Variable	Beta	t-value	Remark
Constant	-216878.4	-2.995	
Selling price	44.491	8.164***	significant
Transportation cost	-158.150	-1.577	not significant
Cost of packaging	3983.091	3.651***	significant
Labour cost	-494.337	-0.836	not significant
Sales per month	80.732	2.555**	significant
Purchase cost	-154.342	-3.149***	significant
Cost of tools/equipment (depreciated)	28.420	6.713***	significant
Years of marketing	2061.616	0.996	not significant
Years spent in school	-2676.110	-1.205	not significant
Age	48.211	0.03	not significant

*** Significant at 1%

** Significant at 5%

Source: Data analysis, 2012

CONCLUSION AND RECOMMENDATIONS

- Charcoal marketing is a profitable enterprise in the study area.
- Charcoal market tends toward perfect competition.
- There is need to improve marketing efficiency of charcoal in the study area.
- Charcoal marketers are contending against many marketing problems
- Selling price of charcoal, cost of packaging material, quantity sold, cost of purchase, and depreciated fixed cost are variables having significant effect on marketing efficiency in the study area.

Based on research findings, the following recommendations were made: The establishment of cooperatives should be encouraged among marketers since this will boost the marketers' credit worthiness when applying to obtain micro credit from financial institutions. The marketers will also have access to timely loans at very low interest rate within the cooperative system. This will help solve their financial problems.

There is the need for the government to provide better feeder roads linking areas of production of essential agricultural products with consumption centers. This will make the process of transportation easy and cheaper. There is also the need to provide some basic marketing facilities in the market places such as toilets, stalls and warehouses. These can be provided by marketers' cooperative groups as well as local and state governments.

The marketers are encouraged to purchase charcoal in bulk from producers. This will reduce per unit transaction cost expended by the marketers. This will help improve marketing efficiency. A lasting solution should be found to the problem of Inland Revenue collectors. Adequate checks and balances should be put in place by local government authorities so that the marketers are not exposed to undue exploitation from the revenue collectors.

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