



ECONOMIC ANALYSIS OF CHARCOAL MARKETING IN ONDO METROPOLIS, ONDO STATE, NIGERIA

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Abstract

This study conducted an economic analysis of charcoal marketing in Ondo metropolis, Ondo State, Nigeria. A multistage sampling procedure was employed to select the sample for this investigation. Data were collected on various aspects, including socio-economic characteristics, challenges faced, employment status, and the primary occupation of charcoal marketers, utilizing a self-structured questionnaire. The instrument underwent validation by experts to ensure both face and content validity. The collected data were analyzed using descriptive statistics, as well as budgetary and profitability analysis. The results revealed that the mean age of charcoal marketers was 47.5 ± 8.4 years, with a majority of 62.8% being female and 56.6% married, living in households with an average size of 7.0 ± 3.0 members. Additionally, the findings highlighted that inadequate capital and high transportation costs were among the key challenges confronting charcoal marketers in the region. The budgetary analysis revealed a net marketing margin, while the profitability ratios indicated that the net marketing margin was ₦90,2500, and the gross and operating ratios, along with the return on investment, were calculated at 0.7409, 0.117, and 1.1649, respectively. These results suggest that charcoal marketing is both viable and profitable, yielding a favourable return on each naira invested in the business. Furthermore, the analysis of profit margin drivers revealed that factors such as age, education, household size, capital outlay, and access to credit have a significant impact on profit margins. Based on these findings, it is recommended that efforts be made to improve access to credit, reduce transportation costs through subsidies, and enhance government support services aimed at small-scale businesses.

Keywords: charcoal marketers, economic analysis, marketing efficiency

Introduction

The effect of subsidy removal on petroleum has brought untold hardship to average households in Nigeria. This has resulted in the increase in the prices of food, other consumables in the households with no exception to the domestic sources of energy in the home. There are various sources of energy available to the households, ranging from the traditional sources like firewood, charcoal, kerosene, among others and the modern form liquefied petroleum gas (commonly referred to as gas) and electricity (Akinola and Aboluje, 2019). In rural and urban households in the urban centres, charcoal has become a vital source of energy for domestic homes across Nigeria, including the Ondo metropolis, due to the astronomical increase in the price of liquefied petroleum gas and unstable electricity, coupled with an increase in the tariff. Hence, charcoal remains a significant source of household and commercial energy in many urban centres, a readily available and relatively affordable source of fuel. Charcoal plays a crucial role in meeting the cooking and heating needs of urban households, in restaurants, food vendors, and other small-scale industrial outlets that require a source of energy for cooking (Adeyemi and Adereleye, 2016).



The prevalence of charcoal as a source of energy is driven by economic constraints, fluctuating access to electricity, and the unreliability and high cost (cost per kilogramme) of liquefied petroleum gas (Arowosoge, 2011). However, the increase in the domestic demand for charcoal as a major source of energy in the present period in every home necessitated the proliferation of many charcoal marketers and marketing outlets in town and almost every nooks and crannies of most towns and communities in Nigeria. Moreover, the increase in the cost of modern domestic sources of energy has made the traditional sources, as charcoal, the alternative source of energy among most urban households in Ondo metropolis. This has also created marketing chains of networks for charcoal marketing, producers, wholesalers, retailers, and street vendors who play vital roles in the distribution chain (Obasi and Kalu, 2015).

Despite the growing demand for cleaner energy sources such as electricity and liquefied petroleum gas, charcoal continues to serve as an accessible and relatively affordable alternative for cooking and heating, particularly among low- and middle-income households (Ozturk et al., 2010). The prevalent and consistent demand for charcoal among the households in urban centres is reinforced by irregular electricity supply, the rising cost of alternative fuels such as liquefied petroleum gas, and the proliferation of informal food vending enterprises that rely on charcoal as a primary source of fuel (Adeagbo et al., 2018). This charcoal marketing constitutes a significant component of the urban informal economy, thus providing livelihoods, employment, income and youth engagement to a substantial segment of the population (Adeagbo et al., 2018).

The marketing of charcoal in most urban centres operates largely within informal systems and is devoid of organised institutional frameworks or regulatory oversight (Fontodji et al., 2009; Adepoju et al., 2012; Ibitoye, 2014). However, this informal network of actors includes the producers, distributors, wholesalers, retailers, and street vendors, who collectively facilitate the flow of charcoal from rural production zones to urban consumption centres (Akinola and Aboluje, 2019). The various actors in the distribution chain play a crucial role in sustaining urban energy needs in providing cheap and affordable sources of energy in the home as well as contributing to local economic activity (Alemu et al., 2008). However, the marketing of charcoal as an available source of energy is constrained by infrastructural inadequacies, inconsistent supply chains, and limited access to financial and technical resources (Akinola and Aboluje, 2019).

Charcoal marketers in the distribution chain in Ondo metropolis are faced with myriad operational challenges, including but not limited to irregular supply patterns, seasonal price volatility, inadequate and high cost of transportation, poor infrastructure, and the absence of proper storage and handling facilities (Ibekwe and Adesope, 2010; Akinola and Aboluje, 2019). These constraints often result in market inefficiencies, increased transaction costs, and reduced profitability. Moreover, the sector's dependence on local or primitive tools and labour-intensive practices compromises marketability and hinders scalability (Adeagbo et al., 2018).

Despite the significance of charcoal marketing as households' source of energy, urban energy security and rural ecological stability, a comprehensive analysis of its market structure, profitability, and challenges becomes imperative. Literature provides a series of studies on



charcoal marketing and agricultural products marketing in Nigeria and other developing countries (Adeagbo et al., 2016; Akinola and Aboluje, 2019; Adepoju et al., 2012; Adeyemi and Adereleye, 2016; Ibrahimhin and Ukwenya, 2012; Eze et al., 2018). Moreover, several of these studies methodologically used the gross margin in their analysis. However, this study in addition employed the marketing efficiency analysis and ordinary least squares regression to assess the efficiency and drivers of profit margin in charcoal marketing in the study area. This study becomes necessary for policy interventions aimed at understanding the profitability, market efficiency, drivers of profit margin, supporting livelihood sustainability, and promoting household access to domestic energy in homes. The findings of this study will contribute to evidence-based policymaking and sustainable urban energy transitions.

Despite the socio-economic relevance of charcoal as a traditional source of energy in households, the charcoal marketing sector in Ondo metropolis is under-documented, and there is limited empirical evidence on the profitability and efficiency of charcoal marketing in Ondo metropolis in Ondo State, Nigeria. This study, therefore, seeks to investigate the dynamics of charcoal marketing, profitability and challenges in Ondo metropolis. The specific objectives of the study are to;

1. Profile the socio-economic characteristics of the charcoal marketers in the metropolis;
2. Identify the challenges facing charcoal marketers in the study area.
3. Estimate the profitability analysis of charcoal marketing in the study area, and determine factors influencing the profit margin in charcoal marketing in the study area.

Materials and Methods

The study was conducted in Ondo metropolis in the Ondo West local government area of Ondo State. The local government area comprises an estimated population of 4,529,081.02 people (NPC, 2024). The major occupation of the inhabitants of the local government is farming; however, there are other non-farm activities engaged in by the people in the metropolis. The multistage sampling procedure was employed in the random selection of charcoal marketers in the metropolis. Stage one comprised the division of the metropolis into areas or quarters (Aiyeyemi, Oka, Akinjagunla, Okeayadi, Agbogboke, Valentino and Sabo Areas) (Ondo-West Local Government, 2010). Stage two entailed the random selection of charcoal marketers from the list of registered marketers in these areas with the Ondo-West local government area office in the metropolis. Stage three consisted of a random selection of 145 charcoal marketers in the metropolis. Data were collected from the charcoal marketers with the aid of a self-structured questionnaire. This instrument was validated by specialists for face and content validity. Information was gathered using the instrument on socio-economic characteristics, capital outlay, and challenges of charcoal marketing, among others. Data collected from the marketers were analysed using descriptive statistics (mean, standard deviation, and frequency counts), profitability analysis and factors influencing profit margin among charcoal marketers in the metropolis. The profitability analysis was determined using marketing margin, gross ratio, operating ratio, returns on investment (ROI) and marketing efficiency.



Marketing Margin Analysis: Marketing Margin is the difference in prices of a commodity at different stages due to variations of time, place, form and possession as it moves from producer to the ultimate or final consumer (Olukosi *et. al.*, 2007). The model is specified as follows:

$$\text{Net Marketing Margin (NNM)} = \text{TR} - \text{TMC} \quad 1$$

Where; NMM = Net Marketing margin; TMC = Total Marketing Cost ($C_1 + C_2 + C_3 + C_4 + C_5 + C_6$)

Where: C_1 = Cost of Transportation; C_2 = Cost of labour; C_3 = Marketing charges; C_4 = Storage; C_5 = Security fee; C_6 = Tax

Gross Ratio: Gross ratio measures the overall financial success of the charcoal marketing business. A gross ratio of value less than 1 is desirable. This implies that the lower the ratio, the higher the profit (Olukosi and Erhabor, 2008). Gross ratio of a business is expressed as:

$$\text{GR} = \frac{\text{TMC}}{\text{TR}} \quad 2$$

Where, GR = Gross Ratio; TMC = Total Marketing Cost; TR = Total Revenue

Operating Ratio: It measures the solvency of a business. A ratio less than 1 is desirable because it indicates that the business is making a profit. A ratio of 1 implies break-even, and a ratio greater than 1 implies a loss (Olukosi, 2007). According to Musa *et al.* (2006) stated that the lower the ratio (<1), the higher the profitability of the business. It is given as:

$$\text{OR} = \frac{\text{TVC}}{\text{TR}} \quad 3$$

Where, OR = Operating Ratio; TMC = Total Variable Cost; TR = Total Revenue

Return On Investment (ROI): Return on capital invested is defined as total income or revenue divided by total marketing cost (Olukosi *et. al.*, 2005). It is given as:

$$\text{ROI} = \frac{\text{TR}}{\text{TMC}} \quad 4$$

Where; ROI = Return on Capital Invested; TR = Total Revenue; TMC = Total Marketing Cost

Marketing Efficiency: Marketing efficiency measures the ratio of output to input, which is the maximization of the ratio of output to input marketing (Olukosi *et al.*, 2005). The higher the ratio, the higher the marketing efficiency and vice versa. The formula is specified as:

$$\text{M.E} = \frac{\text{Value added by marketing}}{\text{Cost of marketing services}} \times \frac{100}{1} \quad 5$$

Value Added by marketing (VA) could be expressed as $VA = Sp - Pp$;

Where, SP = Selling price of charcoal (naira); Pp = Purchase price of charcoal (naira)

Factors affecting profit margin in charcoal marketing in the study area

The Ordinary Least Squares regression (OLS) was used to estimate the causal relationship between the dependent variable (marketers' margin from charcoal marketing) and other independent variables (age, sex, education, household size, capital outlay, access to credit, etc.). Factors influencing marketers' margin or profit were estimated as explicitly stated in the equation (6) below;

$$\pi_i = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, \epsilon) \quad 6$$

Where π_i = Profit margin of the i th marketer (TR-TC)



X_1 = Age (years), X_2 = Sex (1 = male, 0 = female); X_3 = Educational level (years); X_4 = Household size (number of persons), X_5 = Marketing Experience (years); X_6 = Selling price (₦); X_7 = Capital Outlay (₦); X_8 = Distance (km); X_9 = Cost of transportation (₦); X_{10} = Price per bag (₦); X_{11} = Cost of labour hired (₦); X_{12} = Storage/Rent cost (₦); X_{13} = Access to credit (1 = yes, 0 = no), ε = disturbance or error term.

Where: TR = Total Revenue; TC = Total Cost; TVC = Total Variable Cost.

Results and Discussion

The results of the socio-economic characteristics (age, gender, marital status, household size and educational attainment) of the marketers in Table 1 revealed that 57.2% of the marketers were between 46-50 years, with the mean age of 48.5 ± 8.4 years. This indicates that the charcoal marketers are physically active and would be able to withstand the various activities involved in charcoal marketing. The finding conforms to Eze et al. (2018), who reported a mean age of 47 years for cocoyam marketers. The result of the analysis on gender showed that 62.8% of charcoal marketers in the study area were female, as against 37.2% male in the business. This indicates that charcoal marketing in Ondo Metropolis is dominated by women. This supports the finding of Adeagbo et al. (2018) in Ibarapa local government area of Oyo State, who reported more female involvement in charcoal marketing.

The marital status of the respondents showed that 56.6% were married among the charcoal marketers. This attests to other studies that reported the prevalence of married respondents (Eze et al., 2018; Adeagbo et al., 2018; Ochonma et al., 2018). The result revealed a mean household size of the charcoal marketers to be 7.0 ± 3.0 members. The mean is above the average national household in Nigeria; this could be advantageous to the households in terms of labour supply in charcoal marketing. However, the increase in the number of household members could also have negative effects on the margin of charcoal marketing due to consumption by the households (Simeon et al., 2016). The educational status of the marketers revealed that the majority of the marketers had secondary education, which could be advantageous in record keeping, adoption of marketing innovations and other activities that could enhance the marketing business activities. Moreover, about 12.4% had tertiary education, which is observed to be a good attribute in promoting the business.



Table 1: *Distribution by age, gender, marital status, household size and educational attainment of Charcoal Marketers N = 145*

Variables	Frequency	Percentage (%)
Age		
<31	6	4.1
31 – 45	43	29.7
46 – 60	83	57.2
>60	13	9.0
Mean/SD		47.5±8.4
Gender		
Male	54	37.2
Female	91	62.8
Marital Status		
Single	35	24.1
Married	82	56.6
Divorced	17	11.7
Separated	11	7.6
Household Size		
<5	28	19.3
5 – 8	77	53.1
9 – 12	36	24.8
>12	4	2.8
Mean/SD		7.0±3.0
Education Attainment		
Non-formal education	28	19.3
Primary education	15	10.3
Secondary education	84	57.9
Tertiary education	18	12.4

Source: Field Survey, 2025

The results in Table 2 revealed the employment status, primary occupation, sources of capital, challenges and membership of the association of charcoal marketers in the study area. The result on employment status showed that 29.7% were self-employed, while 26.9%, 24.4% were government employees, unemployed, respectively, and 18.6% were in private employment. This implies that charcoal marketing accommodates different shades of employment as alternative sources of income to supplement the main income and means of livelihoods to the people (Adeagbo et al., 2018). On the primary occupation of marketers, the results revealed that 44.5% were into public service work/teaching, while 20.0% were mostly into the sale of charcoal as the only occupation with cooperative societies as their major sources of capital for the business, which accounted for 56.6%. Moreover, 20.7% indicated that credit savings/thrift constituted their sources of start-up capital for charcoal marketing in the study area. This is, however, in agreement with Simeon et al. (2018) that the majority of small-scale business owners patronised cooperative societies and thrift to finance their business due to timeliness and steady release of funds with minimal interest, unlike the bureaucracy of banks and high interest rates on bank loans. The finding revealed that 70.3% of charcoal markers are members of one association or the other. This is contingent on enhancing access to loans or credit to finance the business they engaged in the study area. The challenges facing charcoal marketers, as revealed, range from inadequate capital



(29.7%), high cost of transportation (33.1%), price fluctuation, and poor storage facilities, among others. This is in harmony with Eze et al. (2018) and Adeagbo et al. (2018), who identified a lack of capital, high cost of transportation, and price variability, among others.

Table 2: *Distribution by types of employment, occupation, sources of capital, challenges of charcoal marketing and membership of association N = 145*

Variables	Frequency	Percentage (%)
Employment Status		
Self-employment	43	29.7
Government employment	39	26.9
Private employment	27	18.6
Unemployed/Retiree	36	24.4
Major Occupation		
Sole Marketing (Charcoal)	29	20.0
Public Service/Teaching	65	44.5
Artisan	28	19.3
Petty trading	23	15.9
Sources of Capital		
Personal/Self savings	30	15.2
Cooperative societies	82	56.6
Credit/Thrift/Ajo	22	20.7
Commercial Banks	11	7.6
Challenges of Charcoal Marketing		
Inadequate capital	43	29.7
High cost of transportation	48	33.1
Excessive rainfall	12	8.3
Inadequate storage facilities	15	10.3
Price fluctuations	14	9.7
High taxes/association dues	13	9.0
Membership of association		
Yes	102	70.3
No	43	29.7

Source: Field Survey, 2025

Table 3 shows the marketers' status, means of transporting charcoal and income realised from charcoal marketing. Results revealed that 31.7% were retailers while 29.7% were micro-retailers that sell by breaking the charcoal bags into smaller quantities for the affordability of consumers who cannot buy large quantities. The micro-retailers ensure that consumers' needs are met irrespective of the quantities and amounts in their hands. The means of transporting charcoal by marketers has been a major determinant of the business because the distribution of goods on time to a place and the minimum cost possible is very important (Olukosi, 2007). Motor vehicles accounted for 51.7% as a major means of transportation among charcoal marketers. This may not be unconnected with the timeliness, ease and quantity it can convey at a time. The result is in line with Eze et al. (2018), who reported transportation as the main engine of marketing activities. On income realised by charcoal marketers, the result showed an average of ₦221186.74±₦87265.52 from charcoal marketing. This implies that with effective distribution and active engagement, charcoal marketing could be a viable and lucrative economic activity and a means of livelihood for the people.



Table 3: *Distribution by marketers' status, means of transport, income, price per bag and sales stock N = 145*

Variables	Frequency	Percentage (%)
Marketers Status		
Distributors	13	9.0
Producers	20	13.8
Wholesalers	23	15.9
Retailers	46	31.7
Micro-retailers	43	29.7
Means of Transportation		
Wheel barrow	22	15.2
Head	7	4.8
Motor Vehicle	75	51.7
Motorcycles	41	28.3
Income Realised		
<500000.00	2	1.4
50000.00 – 198156.66	18	12.4
198156.67 - 346313.32	121	83.4
>346313.32	4	2.8
Mean/SD		221186.74±847265.52

Source: Field Survey, 2025

Profitability Analysis of Charcoal Marketing

The profitability analysis of charcoal marketing revealed (Table 4) that the cost of purchase accounted for 74.7% of the total variable cost, while transportation cost accounted for 17.04% of the total variable cost. Labour cost accounted for 3.01% while storage cost/rent, tax and association dues, loading and off-loading costs accounted for 2.84%, 0.88% and 1.51%, respectively, of the total variable cost. The profitability ratios indicate that the gross ratio, operating ratio are 0.7409 and 0.117 which are both less than 1, respectively. This implies that charcoal marketing is both desirable and profitable (Olukosi and Isitor, 2007; Ibitoye, 2014). The returns on capital invested (ROI) revealed that for every naira invested in the charcoal marketing, ₦1.16 is returned as profit. The value of the marketing efficiency of charcoal was found to be 226.67%. The result further revealed that with this higher value, the marketing of charcoal in the study area was efficient. This is in agreement with Olukosi et al. (2005) that the higher the ratio, the higher the marketing efficiency and vice versa.



Table 4: *Costs and Returns Analysis of Charcoal Marketing*

Items	Average Qty/Price	Amount (₦)	% Marketing Cost
Marketing Costs (₦)			
Cost of Purchase	₦5600	4760000:00	74.7
Cost of Transportation		480000:00	17.04
Cost of Labour		85000:00	3.01
Cost of Storage/Rent		80000:00	2.84
Tax/Association Dues		25000:00	0.88
Loading & Offloading Cost	₦50/bag	42500:00	1.51
Cost of Marketing Services(₦)	₦838.24/bag		
Marketing Cost (MC) (₦)		712500:00	100.0
Total Marketing Cost (₦)		5472500:00	
Total Revenue (TR) (₦)	850/₦7500	6375000:00	
Net Marketing Margin (NMM)		902500:00	
Gross Ratio		0.7409	
Operating Ratio		0.117	
Returns on Capital Invested		1.1649	
Marketing Efficiency (%)		226.67	

Source: Authors' Computation, 2025

Factors influencing profit margin in charcoal marketing

Table 5 shows the results of the regression on factors influencing the profit margin in charcoal marketing in the study area. Ordinary least squares technique in three functional forms; linear, semi-log log and double log were fitted were run for the marketing function analysis. These estimated functions were evaluated for the statistical significance of the coefficients of multiple determinations (R^2) using the result of the F-value, the significance of the coefficients (Adeagbo et al., 2018). However, on the choice of lead equation, the double log functional form was selected due to statistical significance and economic criteria. The result of the analysis revealed that age, educational attainment, household size, years of marketing experience, selling price, capital outlay, cost of transportation, price per bag, and access to credit were significant at the 1% and 5% levels. This implies that a unit increase in the age of charcoal marketers would increase the profitability by 0.086 units, and as the years of completed education increase, this will lead to an increase in the margin of profitability by 0.105 units. This may be due to the application of innovation and economic practices acquired through education (Eze et al., 2018; Obasi and Kalu, 2015).

Household size had a negative and significant coefficient at 1% indicating that an additional increase in the number of households would lead to a decrease in profit margin by 0.072 units. This indicates that an increase in household members would have resulted in the consumption or use of the charcoal at the household level for cooking, hence, reduced the quantity sold and ultimately reduced the margin. This is in line with Eze et al. (2018). Years of experience in charcoal marketing were found significant and positive at 5% which implies that a year increase in experience would influence the margin positively by 0.098 units. This suggests that experience in a business could aid performance in the business (Ochonma et al., 2018). Selling price, capital outlay and price per bag of charcoal were significant and positive at 5%. This indicates that if the selling price, capital outlay and price per bag increase by one unit in naira, the margin of profit would be increased by 0.076, 0.097 and 0.035 units, respectively. This suggests that a boom in selling price and price per bag of charcoal, coupled with more capital outlay in the business, will enhance margins for the marketers in the business. The cost of transportation was significant at 5% level with a negative implication of the coefficient. This indicates that a unit of naira increase in the cost of transportation would result in a decrease in profit margin by 0.094 units. This supports the finding by



Simeon et al. (2018) that an increase in the cost of transportation decreases the profit margin in a business. The adjusted R square (AR^2) is 0.867; this implies that the independent variables have explained 86.7 of % variations of the dependent variable, that is, the profit margin. The remaining 13.3% was not explained by the independent variables, which could be attributed to the disturbance or error term.

Table 5: Regression analysis of factors influencing marketing margin in the charcoal business

Variables	Coefficient.	p>/t /
Age (years)	0.086	0.017**
Sex (1 = male, 0 = female)	-0.192	0.457
Educational level (completed years)	0.105	0.007***
Household size (number of persons)	-0.072	0.027**
Marketing Experience (years)	0.098	0.015**
Storage/Rent cost (₦)	0.231	0.552
Selling price (₦)	0.076	0.036**
Capital Outlay (₦)	0.097	0.029**
Distance (km)	0.165	0.267
Cost of transportation (₦)	-0.194	0.023**
Price per bag (₦)	0.111	0.035**
Cost of labour (₦)	0.149	0.281
Access to credit (1 = yes, 0 = no)	0.232	0.033**
Constant	2.397	0.000

Source: Field Survey, 2025 $R^2 = 0.867$; Adjusted $R^2 = 0.742$; F value = 8.54;

*** & **significant at 1% and 5%.

Conclusion and Recommendations

Charcoal marketing has been a major means of income and livelihood for the people, particularly in the Ondo metropolis. This is because other domestic sources of energy have almost gone beyond the reach of average households. The prevalence of charcoal has been observed to be connected with the steady markets and affordability of the fuel. Even though charcoal is commonly used by households, unlike LPG, electricity, among others, the marketing is constrained by inadequate capital, high cost of transportation, and price volatility, among others. The profitability analysis revealed that charcoal marketing in the study area is profitable and efficient. Findings also showed that the profit margin in charcoal marketing is influenced by capital outlay, members of the household, selling price of charcoal and price per bag, and access to credit, among others. It is therefore recommended that charcoal marketing should be encouraged among the people in the study area; they should be given education, encouraged to access credit for their business and financial institutions should support them in the study area.

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