ECONOMICS OF MARKETING WOOD FUEL IN SOUTH WESTERN NIGERIA

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ABSTRACT

Marketing of fuel wood is an important source of livelihood for most parts of Nigeria. The study examined the economics of marketing of wood fuel in south western Nigeria with a view to determine the socio-economic characteristics of the marketers, the profitability of marketing wood fuel, the market structure and constraints to profitability. Data for the study were obtained from a total sample of 100 randomly selected wood fuel marketers through interviews schedules and application of structured questionnaires. Descriptive statistics was used to analyze the socio-economic characteristics of the marketers. Cash analysis was used to determine the profitability of the enterprise while Gini-coefficient was used to examine the markets' concentration. The result showed that majority of the marketers was in their active years as 51% were between 21-40 years of age. 71% were female while 56% of them were married. Most of the marketers (76%) had formal education and were well experienced in the business. Cash analysis revealed that marketing of wood fuel is profitable with an average Gross margin of 21,190.65 naira per month. The marketing efficiency was found to be 128% and the rate of return on investment was 28% which indicates that for every 100 naira investment in the business, the marketers will enjoy a return of 28 naira. The value of Gini-Coefficient (0.393) indicates high level of market concentration and inefficiency in the market structure. Transportation was the greatest constraint to the business profitability followed by season of the year and government policy.

KEY WORDS

Wood fuel, market, profitability, naira, Gini-coefficient.

Biomass is the most commonly used source of rural energy in Nigeria because fuel-wood is the cheapest and most accessible source of fuel even in urban households. In fact, fuel-wood is the traditional fuel source, which, in spite of the availability of conventional domestic fuels, remains in very high demand at the expense of Nigerian forests. Even in the ecologically fragile Sudan-Sahel belt of northern Nigeria where desertification poses a serious threat to man and the environment, there are hardly any large scale shifts from traditional biomass energy to modern fossil fuels. Supplies appear to be diminishing, overall, in the face of increasing consumption, and massive forest/woodland and farm tree losses. The human and environmental cost of obtaining and consuming fuel-wood appear to be increasing (CPN, 2014).

The total annual consumption of fuel-wood in the country in 1987 was estimated at about 80 million cubic metres. Because of the inefficiency of the local fuel-wood stoves, the bulk of the energy available from wood-burning was lost, amounting to 97 per cent. In terms of the average per capita wood consumption, urban dwellers use about 360 kg/person, while in the rural areas the average per capita consumption has been put at 511.2 kg/person or 0.71m of solid wood. Communal bushes constitute the largest source of wood for fuel, a situation that engenders severe deforestation (Arnold, et al., 2005). In extremely stressed environments in the Sudan-Sahel region, grasses and cow dung are used for fuel because of wood- deficiency. Wood-processing mills provide a small source of wood energy in parts of southern Nigeria. Fuel-wood plantations are of negligible importance even though the first such plantation was established in Lagos in 1912. There were others at Ibadan and Ijebu-Ode. More fuel wood plantations are needed in the country to conserve the natural forests. Another solution, recently embarked upon, is to transport coal from the south to the north, and market it there as an alternative to firewood.

Fuel wood is an important energy source to Nigerian households because it has many diversities that provides potential of a win-win development path for the environment, social and economic development, and energy security (European Union, 2006). There is a clear link between access to energy services and poverty alleviation and hence development. The first sets of critical energy needs are those that satisfy basic human needs: fuel for cooking, heating lighting, energy for pumping water, and electricity for health education services. The second sets of critical energy needs are those that provide energy for income generating activities that help cycle of poverty. The poor rely heavily on wood fuel as a source of energy. Low level of domestic production, poor storage facilities and inconsistent trade policies have been found to be largely responsible for insufficient market supply of these commodities (Onu and Okunmadewa, 2001). The marketing channels for these biomass fuel are rather complex as there are often too many intermediaries in the marketing chains. This causes high marketing margins and declined levels of consumer satisfaction. It has however been argued (Adekanye, 1988) that a rather simple marketing channel is preferable for agricultural commodities as this elevates the degree of marketing efficiency and distribution of the commodities. In general terms, marketing is concerned with all stages of operation, which aid the movement of commodities from the farms to the consumers. These stages include assembling of goods, transportation, processing, grading and financing of all these activities. Adegeye and Dittoh (1985) noted that agricultural marketing was an indication of consumer preferences through the prices they are prepared to pay. This in turn affects the production decision of farmers, as they are likely to produce crops which have high demand. This is of paramount importance to both farmers and markets, but also to policy makers. An efficient marketing system is therefore desired so as to properly stimulate the nation's economy. To assess the market performance and determine the market efficiency, there is the need to estimate the market margins of the intermediaries, such as wholesalers and retailers. Studies (Adekanye, 1988; Ogbonna, (1991) have shown that the marketing margins are high for agricultural products in South Western Nigeria, as the prices paid by consumers are not commensurate with the level of satisfaction they derive from the consumption of these commodities. Again, Taru et. al., (2010) noted that high transportation costs of farm produce from the farms to the market places occasioned by poor conditions of rural roads and poor storage facilities often lead to high market prices of food grains. These and many other factors hinder effective marketing of wood fuel in Nigeria. The specific objective of this study is to (i) examine the socioeconomic characteristics of wood fuel marketers in the study area. (ii) to evaluate the profitability of wood fuel in the study area. (iii) to assess the level of market concentration, efficiency and constraints to effective wood fuel marketing and distribution in South Western Nigeria. Findings from this study are expected to provide solutions to a series of challenges hindering effective marketing and distribution of bio fuels, and thus ensure to increased access of the commodities to many prospective consumers in the region.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Olukosi et. al., (2007) defined a market as an area over which buyers and sellers negotiate the exchange of a well-defined commodity. Markets exist whenever buyers and sellers can be in touch with one another (Ezeh and Eboh, 2007). The most important factors for the existence of markets are that the goods to be sold must exist, there must be seller and buyer, and both must agree on a price. Marketing is often concerned with all the stages of operations which aid the movement of commodities from the farms to the final consumer. These activities include assemblage of goods, storage, transportation, processing, grading and financing of these activities. Marketing is an aspect of the production process which has enjoyed much attention over the years. It could also be defined as the process of planning and executing the concept, pricing, promoting and distribution of ideas, goods and services to create exchange that satisfies individual and organizational objectives. Paul (2008) is however of the opinion that marketing entails activities that are involved in the transfer of goods and services from producers to consumers. It can thus be viewed as the function that provides and directs all the business activities assessing and converting all consumers' purchasing power into product or service to the final users or consumers, so as to achieve

the profit target or other objectives set by the marketer. The term marketing efficiency refers to the efficient allocation of resources to achieve the greatest possible consumer satisfaction. Adegeye and Dittoh (1985) noted that factors that affect the efficiency of markets included market control, externalities and information. Market control refers to the structure, conduction and performance issues, while externalities such as pollution or education relate to the non-market price, incorporated costs and benefits and imperfect information to the access to and availability of market information such as price, supply, demand and quality information (Salisu, 2008). Technical efficiency measures the effectiveness or competence with which the physical aspects of marketing are performed. These physical aspects include storing, transportation and other activities meant to reduce waste and prevent deterioration in quality. Technical efficiency can also be defined as the ability to achieve a higher level of output, given a similar level of production inputs. (Adedayo, 2005) Economic efficiency refers to the realization of maximum output in money terms, or of a given output with the minimum resources. Economic efficiency combines technical and allocative efficiency. Pricing efficiency is concerned with how effectively price reflects the costs of moving the output through the marketing system. The ingredient for efficient marketing is consumer demand, which is accurately and quickly relayed back to the producer, and the resulting information on producer supply is relayed back to the consumer. Marketing and distribution services are provided at the minimum cost per unit, compatible with the kinds and quality of services required. Normally, the cost of marketing services will be reflected in the marketing margin, thereby enhancing innovation and flexibility so that market intermediaries are able to respond to new opportunities in terms of location or product quality, and the national objectives of marketing are assisted. Marketing margins, consumer prices, availability of physical marketing facilities and market competition are indicators identified with marketing efficiency. Marketing margin represents the difference in price paid to the first seller and that paid by the final buyer (Adegeye and Dittoh, 1985). The difference between the producer price and the final consumer price is a measure of the total value added in the marketing process. Marketing margins are mostly governed by the demand for, and supply of, marketing services. This margin can be measured in monetary terms. It can be expressed either in cash or as a percentage of the retail cost. Margins indicate the relative cost of marketing at a particular time. The Gini coefficient model and the Lorenz curve estimates are often used to describe market structure. According to Dillion and Hardaker (1993), the Lorenz curve is obtained by plotting the cumulative proportion of the sellers from the smallest to the largest number against the cumulative proportion of their sales earnings. If the distribution is totally equitable, the curve will fall on the 45-degree line. The greater the inequality the larger the departure from the 45-degree line. The Gini coefficient is the measure of the proportion of the area between the curve and the 45-degree line. When the Gini coefficient is greater than 0.35, there is a high inequitable distribution and a higher coefficient, which means a higher level of concentration and, consequently, higher inefficiency in the market structure.

METHODOLOGY OF RESEARCH

Area of Study. The study was conducted in three major markets in Ibadan of Oyo state viz Bodjia, Ooje, and Oja Oba. The three markets were chosen for the study because they are well known in the state for a variety of forest products ranging from fuel wood, charcoal, shea butter, herbs among others. They are the major markets where charcoal and fuel woods are readily available any time of the year. Ibadan is the commercial center of Oyo state. It is located in the tropics and has 33 local government areas.

Method of Data Collection. Primary data was collected from three major markets in Ibadan located at different local governments with the aid of interview schedules, structured questionnaires and personal observation. A multi-stage sampling technique was used to collect the data. The sampled fuel wood marketers were identified through their various registered marketing unions/associations. The lists of these unions/associations are also available at the respective state's Ministry of Commerce, Industry and Cooperatives. 100 wood fuel marketers were randomly selected from the three markets in the state. All the samples were taken with due respect to the size of the respective markets and the population of

the registered marketers. Information was collected on their socio-economic characteristics, cost and selling prices, and market structures and efficiency, among others.

Method of Data Analysis. Both descriptive statistics and quantitative methods were used in the survey. The budgeting technique adopted for the study is the Gross margin and is stated thus:

$$\text{Gross margin (GM)} = \text{TR} - \text{TVC} \quad (1),$$

where GM = Gross margin, TR = Total Revenue; TVC = C Total variable cost.

$$\text{Marketing efficiency} = \text{TR} / \text{TVC} \quad (2)$$

If marketing efficiency = 1 (highly efficient), it implies that the market is said to be efficient. But when $me > 1$ (over efficient), it implies that abnormal profit is being made in the trade, and some elements are unduly reaping from the efforts of others. Again, when $me < 1$ (under efficient) implies that a sizeable loss is being recorded in the trade. A moderate level of efficiency is also achieved. The Gini coefficient estimates were used to analyze the level of concentration in wood fuel marketing. It is a measure of inequality of income.

Mathematically, the Gini coefficient is expressed as follows:

$$GC = 1 - \sum XT \text{ (Iheanacho, 2005; Giroh et al., 2010),}$$

where GC = C = Gini Coefficient; X = proportion of sellers; Y = cumulative proportion of sellers; $\sum$ = summation sign.

The Gini coefficient, which measures the degree of concentration, ranges from 0 to 1. A Gini coefficient of 0 implies perfect equality in distribution, while a Gini coefficient of 1 means perfect inequality. In practice, the actual value of the Gini coefficient lies between these two extremes. The estimate of Gini coefficient was done wood fuel marketers in dif in the study area.

RESULTS AND DISCUSSION

Results of research show that 10% of wood fuel marketers are less than 20 years of age while 73 % are in their active age and 17% are more than 50 year old. This reveals that wood fuel marketing business is very accommodative; in the sense that people of all ages can find a place in the business. This supports Afolabi (2007) who stated that age plays a critical role in marketing forest products; the more energetic an individual is the higher the possibility of his or her to perform better than the very young or very old marketers.

Research shows that 71 percent of the marketers are females which revealed that wood fuel marketing is gender sensitive. The results suggest that the business is more of feminine than men simply because females are mostly the one that uses the wood fuel and thus patronize the business and know how to persuade their fellow women in the business. This supports (Kwaghe 1999) who reported that charcoal marketing is a female dominated business but most of these females were young and active so as to be able to withstand the rigorous nature of the business. He therefore concluded that the wood fuel business is more emotional; as females are the one that mostly use and demand for fuel wood products so, female marketers are the ones that know the best way to handle their gender.

Majority of the marketers is married people (56%) This agree with Taphone (2009) who reported that married people have more responsibility in taking care of their families and hence are always making effort to involve in business that will give them financial empowerment. This may be the reason why the business is dominated by the married people unlike the case for the singles who may not likely have other people to take care of beside themselves. The result also revealed that (19%) of the marketers were singles while 25% percent were both widow and divorced respectively. This suggests that wood fuel business is highly flexible and accommodate people of different marital status.

Majority of the marketers (76%) have formal education ranging from primary (31%), secondary (31%) and tertiary education (14%) while 24 percent has no formal education. This showed that formal education is a prerequisite to being successful in wood fuel business because the business involves lots of logical reasoning and calculation. The result also support Afolabi (2001) who stated that the higher the level of education of a marketer, the better the chances of enjoying higher returns from his effort in the business. He also emphasized that marketers with high formal education are more exposed to accepting innovations, new ideas and take calculated risks that can make the business boom and flourish within short period.

Research revealed that new entrants without any experience might not be able to make good way in wood fuel business; since marketing experience is an important ingredient to enjoying greater benefits in the business. The study showed that 20 percent of the marketers have 1-5 years experience, 24 percent has 6- 10 years experience, 15 percent has 11-15 years experience, 20 percent has 16-20 years experience while another 20 percent has more than 20 years experience in the business. This implies that, the higher the marketing experience a marketer has, the better the chances of having more gains, benefits and returns from the business. This is because a marketer with higher marketing experience would have mastered the dos and don'ts of the business and how to go about the business with minimum inputs.

Three major tribes in Nigeria are involved in the wood fuel business. The study further revealed that Yoruba constitutes 75 percent, Igbo constitutes 10 percent while the Hausas are 15 percents of the marketers in the study area. This supports (Kalu and Izekor, 2007) who stated that the environment in which a particular resource is found has great influence on the type of people that will engage in its business. Hence, since the study area is Yoruba land, majority of the marketers are Yoruba while only few Igbo (10%) and Hausa (15%) engaged in the business.

Analysis showed that wholesalers (40%) are the chief player in fuel wood business followed by the retailers (30%) and then, those that performed the functions of both the wholesalers as well as the retailers at the same time. This group of marketers is termed as wholesalers/ retailers. They constitute (20%) while the wood fuel producer/ processors are 10% of the total sample. The dominance of wood fuel marketing in the study area may be due to the medium capital investment required to run the business. The retailers are the next dominance because small capital investment is required to start the business but it was also found that most retailers always aspire to expand their business and move to the stage of wholesale because the business is easier and ensures ready income at this stage.

Profitability Analysis. Research revealed that acquisition cost accounted for 63.21% of the total sales while cost of transportation accounted for 12.30% of the total sales revenue. The cost of storage accounted for 1.3% while labour cost gulped 0.83% association level per month accounted for 0.05% of the total sales revenue.

Research showed that acquisition cost accounted for 81.36% while cost of transportation accounted for 15.83% of the total cost. The cost of storage accounted for 1.68% and labour cost gulped 1.07% while association levy per month accounted for 0.06% of the total cost. The low storage cost among the respondents may be due to the fact that most of the marketers sell the wood fuel in open spaces, along the road where stalls are allocated to marketers or pay for a section of another person's shop. Some marketers also put their fuel wood in front of their houses where buyers can easily locate them and thus patronize them. This support the finding of Giroh et al. (2010), who stated that garri marketers usually have low storage cost because they sell their products by the road side or along the stall allocated to another foodstuff sellers.

Average marketer incurred a total variable cost of N73,809.35 per month but earned average revenue of N95,000.00 per month. This indicates that an average marketer earned N21,190.65 as gross margin per month suggesting that wood fuel as a profitable venture in the study area. The gross margin is high and could be attributed to favorable prices of wood fuel in the Nigeria, which could have positive effects on the producers.

Marketing efficiency was 1.287 while the rate of return (ROR) was 0.287. Both indicators can be multiplied by 100 to convert them to percentage. The rate of return to

investment can be compared with lending rate which stood at 20-22% to determine the desirability of the venture. Rate of return is usually the undiscounted cost benefit ratio of a project. The marketing efficiency is similar to rate of return on investment (RORI) and is greater than bank lending rate implying that farm gate marketing is profitable. This also supports viability and profitability.

Market structure of wood fuel. Analysis of seller's concentration for wood fuel showed that the Gini coefficient is 0.393 and is relatively low. The closeness of the coefficient to unity indicates the existence of non- competitive behaviors' such as collusion and inequality in earning. Farm gate marketing in the study area is near perfection and characterized by equality in earning. Hence, variation in earning from wood fuel is minimal.

The result revealed that transportation (32%) is the main constraint to profitability in wood fuel marketing business in the study area. This suggests that most marketers find it difficult to transport their goods from the farm gate to the buyers. The study hence supports Aremu (2011) who reported that transportation is a major constraint to marketing agricultural products in South western Nigeria. The result also showed that season of the year is also a threat to profit maximization in marketing wood fuel. Because of the heavy nature of rainfall in the study area, wood fuel is always scarce in wet season but abundant in dry season. This fluctuation in wood fuel supply due to changes in season therefore constraint most marketers, especially new entrants (with little or no experience) in making the necessary returns from their investments. This supports the result which states that marketing experience is a necessary condition that must be fulfilled by a potential wood fuel marketer before he can make the best gain from the business.

The result analysis also revealed that government policy (22%) is another factor that prevents the marketers from having the best returns from their investments. The refusal of government to implement most of the forest policies accordingly has hindered smooth running of the business in the study area. The actions of government to ensure forest regulations in the study area was reported to be a frustration to most marketers in sourcing wood fuel especially charcoal and fuel wood. Capita set up limits the marketers from making much profit. Though marketers can start the business with as little amount as possible, but to be among the 'big earners' who will be creaming the highest profits from their investments, a considerable large amount of capital set up is necessary. The market instability is the least constraint since there are ready buyers once the location is good for sales.

CONCLUSION AND RECOMMENDATIONS

Marketing wood fuel is a profitable business. It is a major source of cooking energy for Nigerian households throughout the year. Wood fuel is providing reliable incomes for urban as well as rural households in Nigeria. The total revenue and gross margin per month were N9,500,000 and N2,119,065 while the revenue and gross margin per marketer were N95,000 and N21,190.65 respectively. The marketing efficiency was also high (128%) and the rate of return was 28% which indicates that an investment of N100 in the business will yield N28.00. The value of Gini-Coefficient greater than 0.35 are high indicating inequitable distribution of incomes/sales. (Afolabi, 2009; Dillon and Hardaker, 1993). The Gini-coefficient for wood fuel marketers in the study area is 0.393 indicates high level of concentration and consequently high inefficiency in the market structure. This suggests that, marketing of wood fuel is competitive in the area. Despite the competition among the marketers, transportation is the major constraint to wood fuel profitability followed by season of the year, government policy and set up capital while market instability is the least. It is therefore recommended that government should provide effective transportation networks for wood fuel marketers. She should also review and implement her policies on wood fuel production and marketing. Marketing experience is therefore recommended for prospective wood fuel marketer so as to overcome the constraint posed by season of the year. It is recommended that prospective wood fuel marketers have a considerable set up capital in order to enjoy the «fat» of the business.

REFERENCES

1. Adegeye, A.J, Dittoh, J.S (1985) Essentials of Agricultural Economics. Impact Publishers Nig. Ltd. Ibadan.pp. 113-119.
2. Adekanye, T.O (1988) A Rice Grading Scheme for Nigeria in Adekanye T.O. (ed), Readings in Agricultural Marketing, Longman, Lagos.
3. Afolabi, J.A (2007) Evaluation of Poultry Egg Marketing in South-Western Nigeria. *Int. J. Poultry Sci.* 6(5):362-336.
4. Aremu, F.J (2011) Marketing of Fresh Tomatoes in Oyo State. Nigeria. B.sc. Thesis, Department of Agricultural Economics, Obafemi Awolowo University, Ile Ife, Nigeria.
5. Dillon, J.L; Hardaker, J.B (1993) Farm Management Research for Small Farmer Development. Rome: FAO.
6. European Union (2006) "Commission Urges New Drive to Boost Production of Biofuels" European Union. Brussels.
7. Giroh, D.Y, Umar, H.Y, Yakub, W (2010). Structure, Conduct and Performance of farm gate marketing of natural rubber in Edo and Delta States, Nigeria. *African Journal of Agricultural Research.* Vol.5 (14), pp.1780-1783.
8. Ihenanacho, A.C (2005) Structural Characteristics and Performance of Retail Marketing of Eggs in Maiduguri Metropolis of Borno State, Nigeria *J. of Sustainable Dev. Agric. Environ.*, 1:70-76.
9. Kalu C, Izeko, D.N (2007) Charcoal Enterprise in Benin City, Edo State, Nigeria. *J.Appl. Sci. Environ. Manage.* Vol. 11(3)63-67.
10. Kwaghe, P.V (1999) Women feed the world prospect, problem and solutions for sustainable agriculture. In: DC Undiandeye, Y Billa, S Kushwaha (Eds.): Sustainable Agricultural Development: Principles and Case Studies in Nigeria. Maiduguri, Nigeria: Mainnasara Publishers, P.30.
11. Taphone, B. G (2009) Resource Productivity and Efficiency of Groundnut Farming in Northern Part of Taraba State, Nigeria. MSc.Thesis. Department of Agricultural Economics and Extension, Yola Adamawa State Federal University of Technology.
12. Onu, J.I, Okunmadewa, F.Y(2001) Efficiency of Cotton Marketing in Northern Nigeria, *Int.J. Econ.Dev.*, 1(1).
13. Adedayo, A.G (2005) Gender roles in forest resources utilization and its impact on rural environment in Kwara State, Nigeria. In: Environmental sustainability and conservation in Nigeria.
14. Arnold, M.J.E, Kohlin, G, Persson, R (2006) Woodfuels, Livelihoods, and Policy Interventions: Changing Perspectives. *World Dev.* 34(3):596-611.
15. Brouwer, R, Falcao, M.P (2004) Wood Fuel Consumption in Maputo, Mozambique.*Biomass Energy.* 27:233-245.
16. FAO (2001) "The Role of Woodfuel in Africa by D. Gustafon. In: N Wamukonye (Ed) Proceeding of a High Level Regional meeting on Energy and Sustainable Development." 10-13 January 2001. Nairobi, Kenya. Food and Agriculture Organization of the United Nations, Rome. pp. 99-101.
17. Ehirim, N.L.C, Onyemauwa, C.S, Ikheloa, E, Umezurumba, I.E (2007) Economics of yam Marketing in Umuahia, Abia state, Nigeria. *Int. J. Agric. Food Syst.* 1(91):51-56.
18. Olukosi, J.O, Isitor, S.U, Moses, O.O (2007) Introduction to Agricultural Marketing and Prices. Principle and Application 3rd Edition Living Books Series Publication Abuja, Nigeria. pp. 1(27):51866.
19. Nzeh, C.E., Eboh, E.C (2007) Analysis of Income Effects of Forest Products Activities Among Rural Households in Enugu State, Nigeria. *J. Agric. Soc. Res.* 7(1):23-33.
20. Paul, J (2008) Comparative Analysis of household Energy use in Yola Metropolitan Area. An unpublished M.Sc Thesis Department of Agricultural Economics and Extension, Federal University of Technology, Yola Adamawa state Nigeria.
21. Salisu, M (2008) Structure and Performance of Cowpea in Yola Metropolis of Adamawa state unpublished M.Sc Thesis Department of agricultural Economics and extension federal university of technology Yola Adamawa State Nigeria.
22. Taru, V.B, Kyagya, I.Z, Mshehia, I.S (2010) Profitability of Groundnut Production in Michika Local Government Area of Adamawa state. *World J. Agric. Sci.* 1(1):25-29.