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## ECONOMIC ANALYSIS OF SMOKE-DRIED FISH MARKETING IN HADEJIA METROPOLIS, JIGAWA STATE, NIGERIA

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### ARTICLE INFO

### ABSTRACT

#### Keywords:

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*This study was carried out to analyze the marketing of smoke-dried fish in Hadejia Metropolis of Jigawa State. Purposive and random sampling methods were used to select one hundred and nine respondents who market smoke-dried fish in the study area. The data were collected using a well structured questionnaire and analyzed using descriptive statistics, return on investment, marketing margin, marketing efficiency and multiple regression. The results showed that all the smoke-dried fish marketers were males with one form of education or the other. The result indicates that it is profitable to venture in to smoke-dried fish marketing in the study area given a net marketing margin of ₦332.3/ kg of smoke-dried fish, a return on investment of 38.3kobo/kg and a marketing efficiency of 138.3%. The multiple regression results also showed that marital status, educational level and source of capital of the marketers had positive and statistically significant influence on the marketing of smoke-dried fish in the study area. There was however, a negative relationship between household size and marketing of smoke-dried fish in the study area. The major constraints faced by the marketers were inadequate capital, high cost of storage facilities, price fluctuation and so on. It is recommended that marketers should form cooperative societies which will help them have access to capital, storage facilities and regulate and stabilize their marketing.*

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### INTRODUCTION

Fish is an important source of protein in developing countries. Nutritionally, fish is one of the most important sources of protein in many African countries as well as in Asia and Oceania countries where fish contributes more than 1/3 of the total animal protein supply (FAO, 2009). Fish consumption is increasingly becoming popular among Nigerians. Recent data show that Nigeria produced about 1.123 million metric tons of fish in 2016 (Fisheries Committee for the West Central Gulf of Guinea, 2016). Despite this high

level of fish production in Nigeria, the demand for fish which is currently put at 3.32 million metric tons per annum is higher than what the supply in the market could meet up with. The statistics shows a high annual deficit of 2.197 million metric tons of fish which have to be met by imports. It is therefore, necessary to encourage local production of fish from various sources in Nigeria.

Fish is highly perishable and must be processed within few hours of being caught because no form of processing or preservation can improve the quality of spoiled fish.

The situation is worsened in tropical countries especially in the hot climate of Nigeria where poor electricity supply, unsanitary environment and poor handling and storage practices aggravate fish spoilage (Ikeme, 2006). Due to its perishability, many preservative methods are employed to extend its shelf life in Nigeria. Such methods include freezing, drying, smoking, etc. However, smoking is the most common method of preservation (Omoruyi *et al.*, 2015). This is due to the fact that it is affordable and improves the organoleptic properties of the fish. In preserving fish by smoking, water activity is lowered to the point where the activity of spoilage microorganisms is highly minimized. In Jigawa State, the Hadejia Jama'are river is their major source of fish. The river has more than 1000 tributaries which produce varieties of fish, such as tilapia, cat fish and a host of others that are brought to the state from Cameroon, Chad and Niger republics (Kingsway Fishery Services, 2013). This has therefore made fish marketing a major trading activity in Hadejia Local Government Area of the state. However, due to poor and inadequate storage facilities, poor electricity supply, transportation problem and the high cost of fish smoking and drying, marketing of smoke-dried fish is cumbersome in most parts of Nigeria including Hadejia Local Government Area (Iliyasu *et al.*, 2011). Therefore, the local fish seller is faced with the problem of how to maximize profit. It was based on these observations that a study was undertaken to analyze the marketing of smoke-dried fish in Hadejia Metropolis of Jigawa State, Nigeria. The specific objectives of the study were to:

- i. identify and describe the socio-economic characteristics of smoke-dried fish marketers in Hadejia Metropolis,
- ii. determine the profitability and efficiency of marketing smoke-dried fish in the study area,
- iii. determine the influence of socio-economic characteristics of the marketers on the marketing of smoke-dried fish in the study area and
- iv. identify and describe the constraints of smoke-dried fish marketing in the study area.

It is believed that fish farmers and marketers will utilize the outcome of this study to make amendments or control a number of lapses that may be affecting the effective marketing of smoke-dried fish product particularly in Hadejia Local Government Area of Jigawa State, Nigeria.

#### **METHODOLOGY**

The study was conducted in Hadejia, the headquarters of Hadejia Local Government Area, Jigawa State, Nigeria. Hadejia Local Government Area is among the 27 Local Government Areas (LGAs) of Jigawa State, Nigeria. Located between latitudes 12°N-18°N of the equator and longitudes 8°E-10° 33 E of the Greenwich, it lies near the northern limit of the state. The popular Hadejia Jama'are river is the major source of fish for the LGA and other LGAs in Jigawa State (Abubakar and Kuper, 2003).

The Old and New Fish Markets in Hadejia Metropolis were purposively selected for the study because they have the highest population of smoke-dried fish marketers in the metropolis. In each of the markets, the list of smoke-dried fish marketers was obtained from their association: 160 from the Old Fish Market and 50 from the New Market, giving a total of 210 smoke-dried fish marketers. Out of this total, 52% of them were randomly sampled in a ratio proportional to the market size and this gave a total of one hundred and nine (109) smoke-dried fish marketers (83 from the Old Market and 26 from the New Market).

The data was analyzed using descriptive statistics, return on investment, marketing margin, marketing efficiency and multiple regression. Descriptive statistics such as frequencies, mean, standard deviation and percentages were used to achieve part of objectives i and iv.

#### **Return on investment**

Return on investment (ROI) was used to measure the amount of return on investment in smoke-dried fish marketing relative to the investment cost. The formula is given as:

$$\text{ROI} = \frac{\text{Gain from Investment} - \text{Cost of Investment}}{\text{Cost of Investment}} \times 100$$

This tool was used to achieve part of objective ii.

**Marketing Margin**

Marketing margin was used to estimate the margin in terms of revenue and profit that accrue to smoke-dried fish marketers in the study area. This was used to achieve part of objective ii. Marketing margin represents the differences in the price (both selling and supply prices) of a given commodity at different phases of the marketing process as the commodity passes from the farmer to the final consumer (Olukosi et al.,2005 and Shu’aib, 2014).Both gross and net marketing margins were measured. Gross marketing margin as used by Yaro (2012) and Shu’aib (2014), is given as:

$$GMM = TR - PC \dots \dots \dots (1)$$

Where GMM =Gross Marketing Margin (₦) of Smoke-dried Fish, TR =Total Revenue (₦) for Selling Smoke-dried Fish and PC = Purchasing Cost (₦) of Smoke-dried Fish.

Also Net Market Margin (NMM) was obtained by this relation:

$$NMM = TR - TMC$$

Where NMM=Net Marketing Margin (₦) for Smoke-dried Fish, TR=Total Revenue (₦) for Selling Smoke-dried Fish and TMC=Total Marketing Costs (₦) of Smoke-dried Fish.

This included both variable and fixed cost items. Variable cost items include the cost of purchasing the fish, transportation cost, labour cost, firewood cost, kerosene, storage of empty carton, LGA tax and Association levy. Fixed cost items include cost of processing equipment, rent, bowls, brackets, wire gauze and knife.

Therefore,

$$TMC = C_1 + C_2 + C_3 + C_4 + C_5 + C_6 + C_7 + C_8 + C_9 + C_{10} \dots \dots \dots (2)$$

Where TMC=Total Marketing Cost of Smoke-dried Fish, C<sub>1</sub>= Purchase price (₦) for 1kg of wet fish, C<sub>2</sub>= Cost (₦) of transporting 1kg of wet fish, C<sub>3</sub> = Cost (₦) of labour of processing 1kg of wet fish, C<sub>4</sub>= Cost (₦) of firewood for processing/smoking 1kg of wet fish, C<sub>5</sub>= Cost (₦) of kerosene for smoking 1kg of wet fish, C<sub>6</sub>= LGA tax (₦) for marketing 1kg of smoke-

dried fish, C<sub>7</sub>= Association levy (₦) for marketing 1kg of smoke dried fish, C<sub>8</sub>= Rent (₦) paid for market stall for marketing 1kg of smoke-dried fish, C<sub>9</sub>= Market charges (₦) for marketing 1kg of smoke-dried fish and C<sub>10</sub>=Cost (₦) of processing equipment (bowls, brackets, wire gauze and knife) for processing/smoking 1kg of wet fish.

**Marketing Efficiency**

Marketing efficiency is a measure of the performance of the marketing system of a commodity in terms of how outputs (profit or returns) are maximized with minimum inputs. It is the maximization of the ratio of outputs to inputs in marketing (Olukosi et al.,2005). This was used to analyze part of objective ii.

Market Efficiency (ME) is expressed as:

$$ME = \frac{\text{Value added for marketing 1kg of smoke-dried fish}}{\text{Cost of marketing 1kg of smoke-dried fish}} \times 100 \dots \dots (3)$$

Value added is measured by the amount consumers are willing to pay for 1kg of smoke dried fish.

**Multiple regression**

As applied by Ibekwe and Adesope (2010) and Shu’aib (2014), multiple regression model was used to determine the relationship between the socio-economic characteristics of smoke-dried fish marketers and their level of output or profitability. This was used to measure part of objective iii. The model was specified as:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + U \dots \dots \dots (4)$$

Where Y = Total amount (kg) of smoke-dried fish sold by marketer, X<sub>1</sub> = Age of marketer (Years), X<sub>2</sub> = Formal educational attainment of marketer (Level), X<sub>3</sub> = Marital status of the smoke-dried fish marketer (Married, Single, Widowed or Divorced), X<sub>4</sub> = Household size of smoke-dried fish marketer (Numbers), X<sub>5</sub> = Years of marketing experience (Years), X<sub>6</sub> = Source of capital by smoke-dried fish marketer (Bank, Coop. Society, Savings etc) and U = Error term.

**RESULTS AND DISCUSSION**

**Socio-economic Characteristics of Smoke-dried Fish Marketers in Hadejia Metropolis of Jigawa State.**

The socio-economic characteristics of smoke-dried marketers are presented in Table 1.

All the smoke-dried fish marketers in the two markets were males as shown in Table 1. This

implies that males dominated the business in the study area. The age distribution of the marketers shows that 25.7% of the fish marketers fall between the range of 21-30 years. This is followed by the age range of 31-40 years with 31.2%, 22.9% were within the age range of 41-50, 11.9% between 51-60 years while 8.3% were 61 years and above.

Table 1: Socio-economic characteristics of smoke-dried marketers in Hadejia Metropolis of Jigawa State.

Variable	Frequency	Percentage%
<b>Gender</b>		
Male	109	100
Female	0.0	0.0
<b>Age (Years)</b>		
21-30	28	25.7
31-40	34	31.2
41-50	25	22.9
51-60	13	11.9
>60	9	8.3
<b>Marital Status</b>		
Single	42	38.5
Married	67	61.5
<b>Household Size</b>		
1 - 7	50	45.9
8 - 14	33	30.3
15 - 21	19	17.4
> 21	7.0	6.4
<b>Educational Level</b>		
Qur'anic	18	16.5
Primary	35	32.1
Secondary	46	43.2
Tertiary	10	9.2
<b>Marketing Experience (Years)</b>		
1-10	40	36.7
11-20	39	35.8
21-30	20	18.3
>30	10	9.2

Source: Field Survey, 2019

This implies that most of the marketers involved in the business are young and therefore have the capability to carry on rigorous marketing activities involved in smoke-dried fish marketing. Also, 61.5% of them were married and 38.5% were single. The high percentage of those married suggests

that the financial gains from the trade are probably quite attractive for married men to sustain their families. About 45.9% of the marketers had household size of between 1 and 7 members, 30.3% with 8 -14 members, 17.4% had household size of 15 – 21 and about 6.4% had household size of above 22 members.

This household size is relatively large and can be attributed to the extended family in the study area. For their educational attainment, about 16.5% of them had Quranic education only, 32.1% had primary education and 43.2% had secondary education, while only 9.2% had tertiary education. This implies that smoke-dried fish marketers in the study area have one level of education or the other that will enable them to process marketing information that would help to improve their profitability. In terms of marketing experience, 36.9% have been in the business for between 1-10 years, 35.8% for more than 10 years while 18.3% and 9.2% have been in the business for 21 – 30 and above 31 years respectively. This means that the marketers have good marketing experience which can help them to maximize their profit. All these observations agree with those of Abolagba and Nuntah (2011), Osarenren and Ojor (2014) and Omoruyi *et al.* (2015).

### Marketing Margin Analysis for one kilogramme (1kg) of Smoke-dried Fish in Hadejia Metropolis of Jigawa State

Table 2 reveals the costs and returns associated with marketing of 1kg of smoke-dried fish in the study area. The result revealed that the total revenue realized was ₦1200, total variable cost was estimated to be ₦708.8, total fixed cost was ₦159, gross marketing margin was found to be ₦491.2 while the net marketing margin was ₦332.2. The return on capital invested shows that if you invest one naira in the marketing of 1kg of smoke-dried fish you get a return of 38.3 kobo. The marketing efficiency was 138.3% implying high efficiency in smoke-dried fish marketing in the study area. All these analyses clearly showed that marketing of smoke-dried fish is quite profitable and efficient in the study area.

Table 2. Average Cost and Return Analysis for 1kg of Smoke-dried Fish Marketing in Hadejia Metropolis of Jigawa State.

Items	Cost (₦)/kg
<b>Total Revenue.</b>	<b>1200</b>
<b>Variable Cost</b>	
Purchase price for 1kg of wet fish	538.5
Transportation cost	9.6
Labour (loading & off-loading)	38.5
Firewood	26.9
Kerosene.	3.8
Storage of empty carton	11.5
LGA Tax.	30.0
Association levy	50.0
<b>Total Variable Cost (TVC)</b>	<b>708.8</b>
<b>Fixed Cost ( including depreciation)</b>	
Rent	55.6
Bowls	66.7
Wire gauze	20.0
Brackets	13.3
Knife.	3.4
<b>Total Fixed Cost (TFC)</b>	<b>159.0</b>
<b>Total Marketing Cost (TMC)</b>	<b>867.8</b>
<b>Gross Marketing Margin (TR – TVC)</b>	<b>491.2</b>
<b>Net Marketing Margin (TR - TMC)</b>	<b>332.2</b>
<b>Return on Investment (ROI)</b>	<b>0.383</b>
<b>Marketing Efficiency</b>	<b>138.3%</b>

Source: Field survey, 2019

This is in conformity with Iliyasu *et al.*(2011), who reported that it is profitable to venture into smoke and dried fish marketing given a high profit margin of ₦142.03/kg of fish, return on investment of 47k per one naira invested and operational efficiency of 287.9% in Yola North and South Local Government Areas of Adamawa State, Nigeria.

**Multiple Regression of Socio-economic Characteristics that Influence Smoke- dried Fish Marketing in the Study Area**

Table 3 shows the multiple regression results for socio-economic characteristics of smoke-dried fish marketers that influence their marketing business. The regression results indicate that 40.4% ( $R^2= 0.404$ ) of the variations in the marketing output of smoke-dried fish in study area were explained by the explanatory variables included in the regression model.

Table 3: Results of Multiple Regression Analysis of Socio-economic Characteristics of Smoke-dried fish Marketers Influencing their Business in Hadejia Metropolis of Jigawa State.

Variable	Coefficient	S.E	T-Value	Sig level
Constant	3.615	0.125	28.875	0.000***
Age	0.007	0.005	1.444	0.152 <sup>ns</sup>
Marital status	0.146	0.064	2.289	0.024*
Education level	0.038	0.022	1.752	0.083*
Marketing experience	0.008	0.006	1.358	0.178 <sup>ns</sup>
Household size	-0.012	0.004	-2.877	0.005**
Source of capital	0.045	0.018	2.551	0.012*
R <sup>2</sup>	0.437			
R <sup>2</sup> adjusted	0.404			
F-Value	13.176***			

Source: Field Survey, 2019

\*\*\*means significant at 1%, \*\*significant at 5% and \* significant at 10% and ns, not significant

These variables were age, marital status, education level, marketing experience, household size and source of capital of the marketers. The F-value of 13.176 was significant at 1%. This means that the model has measured the joint or overall significance of the variables included in the model. The intercept which was significant at 1% ( $p < 0.01$ ) amounted to 3.615, meaning that about ₦3,615 worth of smoke-dried fish could be sold by the marketers without considering the variables included in the model.

The marital status was positive and statistically significant at 10% signifying that being married has a positive impact on smoke-dried fish marketing in the study area. The result also showed that educational level had a positive and statistical significance at 10%. This implies that higher level of education plays a significant role in improving marketing of smoke-dried fish. This finding is line with Ali-

ud- din Khan and Ahmad (2014), who reported that increase in level of education had a positive influence on the marketing of smoked fish. The finding however, contradicts Mafimesebi (2012) and Gebrezgabher *et al.* (2015), who opined that higher educational attainment may induce negative incentive towards smoke catfish consumption and marketing in Southwest Nigeria. The result equally showed that household size though significant at 5% had negative coefficient. This implies that larger household size negatively affects smoke-dried fish marketing in the area by imposing financial constraints on the marketers which reduces the level of their profitability. This correlates with Abiodun and Adedayo (2016), who established negative/insignificant relation between income and household size on the level of fish consumption and marketing in South West, Nigeria.

The result also showed that source of capital was positive and statistically significant at 10%, on the marketing of smoke-dried fish. This means that the higher the initial capital each marketer is able to invest in the business, the higher the profit. The study however, revealed that age and marketing experience are not significant respectively, which by implication means that an increase in the level of experience and age will not significantly increase the amount of smoke-dried fish sold. This is however, contrary to *a priori* expectation as it was expected that any increase in the level of experience may increase the level of marketing.

**Constraints of Smoke-dried Fish Marketing in Hadejia Metropolis, Jigawa State**

Multiple responses taken for constraints affecting the marketing of smoke-dried fish in the study area revealed that 22.8% had suffered from inadequate capital, 19.0% suffered from high cost of storage, 17.8% from price fluctuation, 15.8% and 13.2% suffered from transportation and insect infestation problems while only 11.4% had suffered from spoilage as shown in Table 4. This is in line with Osarenren and Ojor (2014) who found major constraints faced by the smoke-dried fish marketers in Etsako LGA of Edo State Nigeria, to include lack of capital, which was ranked first, followed by high cost of storage facilities and price fluctuation etc.

**Table 4:** Constraints Militating Against Smoke-dried Fish Marketing in Hadejia Local Government Area of Jigawa State.

Problem	Frequency	Percentage	Ranking
Inadequate capital	78	71.6*	1st
High cost of storage	65	59.6	2nd
Price fluctuation	61	56	3rd
Problem of transportation	54	49.5	4th
Insect infestation	45	41.3	5th
Spoilage	39	35.8	6th

\*Multiple responses were taken. Source: Field survey, 2019

**CONCLUSION AND RECOMMENDATIONS**

The results of the study indicated that it is profitable to venture in to smoke-dried fish marketing in Hadejia Local Government Area of Jigawa State given a net marketing margin of ₦332.3 per kg of fish, a return on investment of 38.3kobo/kg and a marketing efficiency of 138.3%. The results also showed that marital status, educational level and source of capital of the marketers had positive and statistically significant influence on the marketing of smoke-dried fish. Though statistically significant, there was however, a

negative relationship between household size and marketing of smoke-dried fish in the study area. The major constraints faced by the marketers were inadequate capital, high cost of storage facilities and price fluctuation. It is recommended that smoke-dried fish marketers should form cooperative societies which will help them have access to capital, regulate and stabilize their marketing activities. They should also pool their resources together to provide storage facilities that will help them to adequately store their fish to avoid spoilage.

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