

DETERMINANTS OF PROFITABILITY OF FRESH CATFISH MARKETING IN UVWIE LOCAL GOVERNMENT AREA OF DELTA STATE, NIGERIA

Robert Awotu Egware[✉], Abednego Azariah Alakiri

Benson Idahosa University, Nigeria

Abstract. Catfish marketing plays a significant role in Nigeria's economy in terms of GDP and job creation, though its potential has not been fully exploited. This investigation assessed the determinants of profitability of fresh catfish marketing in the Uvwie Local Government Area of Delta State, Nigeria. The study focused on profitability (costs and returns), variables affecting profitability, and marketing efficiency of catfish marketing in the study area as its specific objectives. A two-stage sampling technique was employed in selecting the sample size for the study. In Stage 1, three towns in the Uvwie Local Government Area of Delta state were selected. Stage 2 involved the simple random selection of 25% of each of the active registered fresh catfish marketers from the three towns selected. There were eighty-three (83) marketers from Ekpam, 46 from Effurun, and 42 from Ugboroke, which gave a sample size of 171. A well-structured questionnaire was used in order to obtain data from the marketers. This data was analyzed using the multiple linear regression model, budgetary models, and marketing efficiency model. Budgetary model results revealed that the average total revenue (TR) obtained was ₦74,484.44/45.3 per day, net income ₦5,800, gross margin ₦14,279.8, and ROI 0.084. Regression outcome on variables affecting the profitability of fresh catfish marketing noted that age was negatively significant at 5%, and educational level, marketing experience, selling price and sales volume were found to be positively significant at 5%, 10%, 1%, 1% and 1%, respectively, while household size was not significant. Based on the results of the analysis, it was recommended that marketers should organize themselves to form a cooperative society in order to gain easy access to non-governmental and governmental credit facilities. The government should make provisions for a catfish marketing budget to

attract unemployed youths. The study also recommends that the factors that significantly affected the profitability of catfish marketing should not be left out in policy formulation.

Keywords: profitability, determinants, catfish, marketing, marketing efficiency

INTRODUCTION

Background of the study

Agriculture is the substratum or foundation of many economically developing countries, for example, Nigeria, where more than seventy percent (> 70%) of the population is employed in agribusiness (agriculture). Agriculture accounts for forty-two percent (42%) of GDP (gross domestic product) (Nwankwo et al., 2017). It brings in foreign currency (convertibility), supply food, and provides useful basic materials for industries (Afolabi, 2009). The agricultural part of the nation's economy is made up of five (5) distinct subsectors: fisheries, forestry, wildlife, crops and livestock. With the increasing recreational, therapeutic (medicinal), nutritional and digestibility value of seafood (fish) and its products, the fisheries subsector is advancing enormously (Akarue and Aregbor, 2015).

One of the major or dominant origins of protein in Nigeria is catfish. In Africa, catfish is among the aquatic (freshwater) fish that are of greater commercial

[✉]Robert Awotu Egware, Department of Agricultural Economics and Extension Services, Benson Idahosa University, Benin City, Nigeria, e-mail: regware@biu.edu.ng, <https://orcid.org/0000-0003-0248-3133>

importance and widely traded. In many underdeveloped economies, the trade in catfish generates foreign currency, income, creates food security and employment. Apart from game, frozen and fresh, aquaculture, merchandised live, baked, fried and eaten cooked catfish is said to be imported (FAO, 2006). Approximately 6.9% of Nigeria's GDP (gross domestic product) is supplied by fish and its products (Kainga and Adeyemo, 2012). Fish has a very high amount of Omega 3 (polyunsaturated) fatty acids, which are capable of reducing cholesterol and treating arteriosclerosis and hypertension as well. It also supplies other essential nutrients like valine, lysine, sulphur, arginine, leucine, thiamine, and water/fat soluble vitamins (Agbebi and Adetuwo, 2018; FAO, 2007). The fish supply in Nigeria is 50% lower than demand and, consequently, Nigeria is listed among the highest fish importers in Africa (Igwe et al., 2021).

Marketing plays a pivotal role in ensuring the supply of catfish because supply is heavily dependent on fish availability in the prevailing market at the right location and time (Jabo et al., 2020). Poor warehousing or the lack of storage facilities, numerous middlemen, inadequate resources, an inefficient marketing network and a lack of knowledge are some of the factors contributing to accelerating demand and supply gap (Ugwumba, 2010). Marketing efficiency in the fish marketing system is very important for improving the fisheries sector. It involves the transfer of fish and its products from the production centre to end users at minimum cost without reducing the quality and quantity required by the final consumers (Umoinyang, 2014). According to Dienye et al. (2021), an effective marketing system means that there is an all-round (holistic) supply of products across the nation, irrespective of products' seasonality and price stability. In the food industry, marketing efficiency is the most frequently used measure for assessing market performance. Improving or maximizing the relationship between input to product (output) is called "marketing efficiency" (Olaleye et al., 2019). This is divided into two types, namely: technical or operational efficiency and pricing efficiency. Pricing efficiency is based on the assumption of practical relationship between input and output that is constant. It shows how prices effectively reflect or demonstrate the cost of moving the product or produce through the marketing mechanism. Technical efficiency assesses a firm's productivity in terms of performing marketing

functions with the focus on the cost of creating marketing services (Olukosi et al., 2005).

In a general sense, profit is the earning of rewards (gains) from commercial works to the advantage of entrepreneurs. According to Olaleye et al. (2019), real economic profit is the improvement in wealth which a capitalist or shareholder obtains from an investment, taking into account all costs connected to the investment, as well as the opportunity cost of assets (capital). The literal meaning of profitability is the capacity to make profit. The size of a business and its administrative ability are the measures used in assessing the profitability of any enterprise (Olaleye et al., 2019). Profit is different from wages, rent and interest. Profits fluctuate, while rent, interest and wages do not (Adeosun and Adebukola, 2012).

Objectives of the study

The broad objective of this study is to assess the determinants of the profitability of catfish marketing in the Uvwie Local Government Area of Delta State, Nigeria. The specific objectives were:

- i. to determine the costs and benefits of catfish marketing in the study area
- ii. to establish the determinants of the profitability of catfish marketing in the study area
- iii. to ascertain the marketing efficiency of the catfish marketers in the study area.

LITERATURE REVIEW

One of the most serious problems affecting the globe's impoverished and needy continues to be malnutrition and hunger (FAO, 2002). Every year, 80 to 90 million people need to be supplied with food and fish is often the most stable supply of protein (Ayiola, 2003). The human population of Nigeria is growing every day but its food supply could not meet up with the nutritional demand of this forever growing population. It is on record that Nigeria imported more than eight hundred thousand metric tons (> 800,000 tons) of catfish and its annual domestic demand for catfish greatly supersedes home production (Obasi and Onyenegecha, 2014). Marketing catfish serves as a source of income and employment to those that depend on it for a living. For decades, catfish marketing sector has been dominated by private individuals, who are not economically capable of providing all that is needed

to bring about meaningful growth and development to the sector (Ebewore, 2013). This simply means that the Nigerian government has been deaf to the needs of this useful but long-suffering sector of the economy. However, millions of people who depend on fish live in constant worry of running out of food. There is an increase in demand for fish eating as Nigeria's population grows. Therefore, an appropriate agricultural system is required to both meet the rising demand for food and to use the finite resources that are now available as efficiently as possible. Integrated aquaculture perfectly fits into this. In an integrated aquatic farming mechanism, a fishpond functions as the focal point for other agricultural and livestock farming operations (Ayiola, 2003). In addition, in order to bridge the gap between domestic demand and production of catfish, effective marketing of catfish can spur domestic production (Njoku and Offor, 2016).

Numerous parameters such as socioeconomic, institutional and market factors affect the profitability of catfish marketing. According to Omeje et al. (2021), marketing experience, age, and household size were significant and positive variables that influenced farms' net income. Market variables like price of commodity, market remoteness, marketing experience and knowledge of price are principal elements affecting efficient and effective marketing of catfish (Muhammed, 2011). Institutional elements such as increased cost of transportation, sky-high cost of fish feed, insufficient doorway or access to credit and bad road connections also affect catfish production and marketing (Nwabunike, 2015). As noted by Njoku and Offor (2016), the results of regression analysis showed that education, age, quantity of catfish handled, and marketing experience were significant determinants of the profitability of catfish marketing. Nwabunike (2015) asserted that a number of environmental factors have an array of effects on the selling of fish in Nigeria. These elements include economic factors: as a result of unemployment and declining household earnings, the majority of the population is unable to meet their financial needs, which means they have less money to buy fish. Political factors: this has to do with who is in power. If the vast majority of those in charge can move money around, there will be enough money to buy fish, but if money cannot move around, it will be challenging to buy fish. Demographic factors: this variable is related to the overall population of a specific area; as the population expands, so does the

demand for fish there, while a population decline results in a reduction in demand. The producer's goals, which are to meet consumer demand and ensure the company's profitability, are frequently hampered by numerous issues (Madugu and Edward, 2011).

RESEARCH METHODOLOGY

Delta State is one of the nine (9) states in the Niger Delta region of Nigeria, located roughly between longitudes 5.00° and 6.45° East and latitude 5.00° and 6.30° North (Ugbomeh and Atubi, 2010). It comprises twenty-five (25) local government areas with Asaba as the headquarters. The state is made up of a total landmass of 17,698 sq. km with an estimated population of 5,663,400 (NPC, 2016). Uvwie local government area is one of the twenty-five (25) local government areas in Delta State, with its headquarters situated at Effurun. It is located approximately between longitudes 5.40° and 5.50° East of latitudes 5.30° and 5.50° North. The local government area has an estimated gross land area of 100 sq. km and is occupied by approximately 259,900 people (NPC, 2016). Uvwie is made up of the following communities: Enerhen, Ekpan, Okuamowah, Okwemowa, Okuireroh, Okwetata, Okwtata, Ugbolokposo, Ugboroke and Ugbomoro (ULGC, 2020).

Sources of data

Primary and secondary data were utilized in this investigation. A structured questionnaire was employed for eliciting primary data. Internet, journals, textbooks, publications, and other meaningful literature was engaged to obtain secondary data.

Sampling technique and data collection

A two-stage sampling procedure was employed in selecting the sample size. In Stage 1, three towns in Uvwie Local Government Area, Delta State, were selected Ekpan, Effurun and Ugboroke. This was due to the predominance of catfish marketers (Akarue and Eyovwunu, 2012). Stage 2 involved the simple random selection of 25% each of the active registered fresh catfish marketers (685) from the three towns. Eighty-three fresh catfish marketers from Ekpan, forty-six from Effurun and forty-two from Ugboroke, respectively, which gave a sample size of one hundred and seventy-one (171). The distribution of the sample size for the selected three towns of the Local Government Area is presented in Table 1.

Table 1. Distribution of active registered fresh catfish marketers by location

Towns	Members of Catfish Marketers Association	25% of active marketers from each town
Ekpan	332	83
Effurun	184	46
Ugboroke	169	42
Total	685	171

Source: UUFFA, 2020.

Measurement of variables

- Return on investment (ROI) was measured in (₦).
- Age of catfish marketers was measured in years (yrs).
- Household size of catfish marketers was measured in number of persons living in the same house and eating from the same pot.
- Educational level of catfish marketers was measured as no formal education, primary education, secondary education or tertiary education.
- Marketing experience of catfish marketers was measured in years (yrs).
- Quantity of fish was measured in kilogram (kg).
- Revenue was measured in naira (₦).

Analytical techniques

The multiple linear regression model, budgetary models, and the Shepherd-futeral model were used in this analysis.

- Objective One: To fulfill this objective, the farm budgetary models were adopted. The monetary worth and performance of the catfish marketers were ascertained using the under listed equations:
 - Total Revenue (TR) = Price per kg of catfish (P) × Quantity (in kg) of catfish sold (Q) (1)
 - Profit (π) = Total Revenue (TR) – Total Cost (TC) (2)
 - Gross Margin (GM) = Total Revenue – Total Variable Cost (TVC) (3)
 - Gross Income (GI) = Total Revenue – Cost of fish sold (4)
 - Return On Investment (ROI) = Net income (NI) / Total Cost of Investment (TCI) (5)
- Objective Two: To achieve this objective, multiple linear regression analysis was used.

Linear function

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + e \quad (6)$$

where:

- Y – gross income (₦)
- X_1 – age (years)
- X_2 – household size (number of persons)
- X_3 – educational level (years)
- X_4 – marketing experience (years)
- X_5 – sales volume per day (kg)
- X_6 – selling or market price of fish per kg (₦)
- b_0 – constant term
- $b_1 - b_5$ – coefficients to be estimated
- e – error term

- Objective Three: To accomplish this objective, the Shepherd-Futeral model was used. This could be expressed mathematically as follows:

$$\text{Marketing efficiency (M.E.): } TC / GI \times 100 \quad (7)$$

where:

- TC – total cost (₦)
- GI – gross income (₦)

Decision rule: M.E. \geq 50% is considered efficient and $<$ 50% not efficient (Tijani et al., 2014)

RESULTS AND DISCUSSIONS

Profitability (costs and returns) of fresh catfish marketing in Uvwie LGA of Delta State

Table 5 outlines the profitability (costs and returns) of fresh catfish marketing in Uvwie LGA and shows total revenue, profit, gross margin, and return on investment. The analysis shows that fresh catfish marketing is a lucrative venture with an average total revenue of ₦74,484.44 per day; a profit of ₦5,800 per day; a gross margin of ₦14,279.8; and a return on investment of 0.084. ROI (0.084) indicates that for every one naira invested, an extra ₦8.40 were obtained as returns. This implies that fresh catfish marketing is worthwhile in the study area. This result agrees with the findings of Igwe et al. (2021), who stated that catfish marketers in the Onitsha North and South Local Government Area of Anambra State were profitable.

Test for autocorrelation and multi-collinearity

One of the key underlying assumptions of a regression model is the absence of autocorrelation among the

Table 2. Profitability of Fresh Catfish Marketing in Uvwie LGA, Delta State

Items	Mean Amount (N)	Percentage (%)
Variable costs		
Transportation	544.854	0.79
Loading / offloading	313.103	0.46
Security levy	100.000	0.15
Labour	237.500	0.35
Feeding	1165.09	1.70
Ticket	403.099	0.59
Recharge card	352.688	0.51
Purchase of catfish	57,088.304	83.12
Total variable costs	60,204.64	87.65
Fixed costs		
Machete	1,121.97	1.63
Wooden table	1,170	1.70
Store rent	1,473.94	2.15
Weighing scale	2,571.97	3.74
Basin	1,349.96	1.97
Knife	520	0.76
Wood	271.97	0.40
Total fixed costs	8,479.81	12.3
Total cost	68,684.44	100
Total revenue	74,484.44	
Profit	5,800	
Gross margin	14,279.8	
ROI (Return on Investment)	0.084	

Source: field survey, 2022.

residuals. The results of the model might not be accurate if autocorrelation is present. Checking this assumption is crucial, as was the case with the study by Lee (2013). In a regression model, multi-collinearity happens when there is a strong correlation between two or more independent variables in a data set. Since unstable and unreliable coefficient estimations are a potential side effect of multi-collinearity, it might be challenging to evaluate

the data and derive relevant model conclusions. Regression models must be robust and valid, and it is crucial to identify and deal with multi-collinearity (Jason and Elaine, 2002).

Table 3. Autocorrelation Results of Determinants of profitability of fresh catfish marketing

Model	R	R Square	Adjusted R square	Std. error of the estimate	Durbin-Watson
1	.997	.994	.994	4975.378	1.933

Predictors (constant): X6sellingpriceperkg, X3EduLevel, X2Householdsize, X4MktingExperience, X5salesvolperday, X1Age. Dependent variable: Ygrossincome.

Decision rule: $1.5 < D.W < 2.5$ (Lee, 2013)

The Durbin-Watson (D.W.) value in the aforementioned finding, which is 1.933, is larger than 1.5 but less than 2.5, proving that the data set is free from autocorrelation.

Source: Author's compilation from SPSS 16.0.

Table 4. Multi-collinearity Results of Determinants of profitability of fresh catfish marketing

Independent variables	Collinearity statistics	
	tolerance	VIF
X ₁ Age	.596	1.677
X ₂ Householdsize	.700	1.428
X ₃ EduLevel	.916	1.092
X ₄ MktingExperience	.620	1.612
X ₅ salesvolperday	.623	1.606
X ₆ sellingpriceperkg	.660	1.514

Decision rule: Tolerance (T) > 0.1 (No multi-collinearity issue) and VIF < 5 (No multi-collinearity issue), Joshi et al. (2012).

Source: author's compilation from SPSS 16.0.

In the tolerance review, we want to make sure that no numbers are lower than 0.1. We can see from the findings above that the lowest tolerance value is 0.596, indicating that our tolerance study did not reveal any risk of multi-collinearity. Regarding variance inflation, anything above the value of 5 is the golden number to watch for. As we can see from the values shown in the findings above, our greatest number, which is 1.677, indicates that there is no multi-collinearity issue in the data set.

Determinants of profitability of fresh catfish marketing in Uvwie

To ascertain the determinants of the profitability of catfish marketing in the study area, a multiple linear regression analysis was employed. The criteria for the selection of the linear model were based on statistical consideration of the high value of R-squared (coefficient of determination) and F-ratio. R² shows the analytical ability of the regressors, while the F-ratio accounts for the goodness of fit of the chosen model. The determinants of the profitability of catfish marketing are displayed in Table 5. The result shows that the coefficient of determination (R²) was 0.994, which signifies that 99.4% of the variability in the response variable (gross income) was explained by all the regressors (independent variables) (age, household size, educational level, marketing experience, selling price, sales volume and purchase price). However, age, educational level, marketing experience, selling price and sales volume were found to be significant at 5%, 5%, 10%, 1%, 1% and 1%, respectively, while household size was not significant. These are further explained in turn.

Age

The result presented in Table 5 shows that age was negatively significant at five percent (5%). This tells us that for each unit increase in age, income decreases by one hundred and seventy-five naira. This means that as the marketers age, their income falls. This may be due to a lower volume of trade. In addition, marketing fish

requires some degree of energy. As the marketers grow older, their vigour or energy to carry out marketing activities declines, and as a consequence, their income also drops (*ceteris paribus*). This result confirms the findings of Azeez et al. (2021), who suggested that as the age of the fish marketers in Ido Local Government Area of Oyo State increases, their incomes fall as a result of a decline in energy.

Educational level

The coefficient of educational level was positive at 5%. This indicates that for every single increase in educational level, gross income increased by one thousand six-hundred ten naira. This may imply that as the educational level of the marketers increased, it helped them to easily gain access to or discover new marketing technology that may boost their performance and productivity. This is in line with Njoku and Offor's (2016) findings, who established that an increase in educational level among catfish marketers in Aba South Local Government Area of Abia State led to an increase in net income.

Marketing experience

The coefficient of marketing experience presented in Table 5 was positively significant at 10%. This explains that as marketing experience increases, gross income will surge by three hundred and four naira. This is so because the longer the marketers stay in the business, the more efficient they become and the more knowledge they gain in order to improve their productivity and

Table 5. Determinants of Profitability of Catfish Marketing in Uvwie

Independent variables	Coefficient	Standard error	T-ratio	P-value
Constant	-49 684.6	7 305.41	-6.801	1.87e-010***
Age (years)	-175.162	87.0291	-2.013	0.0458**
Household size (no. of persons in the same house)	274.476	392.182	0.6999	0.4850
Educational level (years)	1 610.36	643.399	2.503	0.0133**
Marketing experience (years)	302.871	172.977	1.751	0.0818*
Sales volume(kg)	1 425.99	11.1769	127.6	3.11e-165***
Selling price (₦)	17.3201	3.60890	4.799	3.58e-06***

R-squared = 0.994493. Adjusted R² = 0.994257. F(7, 163) = 4205.324.

***1%, **5%, *10% level of significance.

Source: field survey, 2022.

income. This outcome corresponds with Offor and Nse-Nelson's (2015) findings, who found that marketing experience has a positive significant effect on marketing efficiency and returns among poultry egg marketers in the Umuahia South Local Government Area of Abia State, Nigeria.

Sales volume

The results in Table 5 indicates that the coefficient of sales volume was positively significant at 1%. This explains that for every increase in sales volume, returns increase by one thousand four hundred and twenty-six. This implies that as the marketers increased the quantity (kg) of fish they bought and sold, their income increased as well. This result is in line with the study by Njoku and Offor (2016), who postulated that an increase in the quantity (kg) of fish sold raised the returns of catfish marketers in Aba South Local Government Area of Abia State.

Selling price

As shown by the results in Table 5, the coordinate of selling price was significant at 1% and had a positive direct linear relationship with gross income. This means that for every increase in the sale price, income increased by seventeen naira. This is because the revenue that a marketer obtained per kg of fish depended directly on the market price. This outcome is in line with Oluwatoyin (2020), who found out that as selling price per kg increased, total revenue of catfish marketers increased in Ondo State, Nigeria.

Marketing Efficiency (M.E.) of fresh catfish marketing in Uvwie LGA of Delta State

In order to find out the maximization of the ratio of output to input in fresh fish marketing, marketing efficiency was estimated using the Shepherd-futeral model. The result shows the average marketing efficiency (M.E.) value of the catfish marketers in Uvwie. The result indicated that there was an efficient market performance among fresh catfish marketers in the study area, as revealed by the M.E. value of 92.2%, because more than fifty percent (50%) of the market share was received by the marketers. This outcome corresponds with the findings of Tijani et al. (2014), who were of the opinion that there was efficient market performance among fish marketers in Maiduguru Metropolis in Borno State.

$$\text{Marketing Efficiency (M.E.)} = \text{TC} / \text{GI} \times 100 \quad (8)$$

$$\begin{aligned} \text{M.E.} &= \frac{68,684.44}{74,484.44} \times 100 \\ &= 92.2\% \end{aligned}$$

Decision rule: M.E.>50% is considered efficient and <50%, not efficient (Tijani et al.,2014).

CONCLUSION AND POLICY IMPLICATIONS

This investigation examined the determinants of profitability of fresh catfish marketing in Uvwie L.G.A. of Delta State. Data were analyzed using budgetary models, multiple linear regression model and the Shepherd-futeral model. The study revealed that fresh catfish marketing was profitable in Uvwie, as indicated by the values of budgetary models. The variable age was significant and had a negative relationship with the fish marketers' income, while educational level, marketing experience, selling price, and sales volume were the positive significant variables influencing the profitability of catfish marketing. Regarding marketing efficiency, there was an efficient market performance among the fresh catfish marketers. The study suggested that the government should make provisions for a catfish marketing budget through already existing micro credit programmes to boost the sector and this will in turn attract unemployed youths. Catfish marketers should organize themselves into cooperatives to enable them to gain easy access to government credit facilities. Moreover, the study suggested that factors such as educational level, selling price, marketing experience and sales volume that had a positive and significant influence on the profitability of catfish marketing should not be left out when formulating appropriate policy that will enhance catfish marketing.

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