# Price Efficiency and Profitability of Fresh Fish Marketing In Delta State, Nigeria

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**Abstract:** Information on the profitability, marketing efficiency, determinants of profit and constraints to fresh fish marketing in Delta State gave rise to this study. Multistage and random sampling techniques were used to select 120 respondents. Data were collected using pre-tested questionnaire administered to the respondents by personal interview through trained enumerators. Data analysis was by descriptive and inferential statistics. Findings indicated mean age and marketing experience of 45 and 15 years respectively. Females dominated the business both at the wholesale and retail levels. The enterprise proved profitable with significantly different monthly mean net marketing incomes and marketing efficiency levels of ₦261,897 and ₦106,609; 76.59% and 62.60% for wholesalers and retailers respectively, though the retailers were economically more efficient than the wholesalers in the business. Significant determinants of net marketing income were marketing cost, marketing experience, and product price while serious constraints to marketing were inability to access credit, inadequate capital, high and unstable price of produce, high transportation cost and inadequate storage facilities. Policies measures that would reduce marketing cost such as provision of infrastructural facilities and low-cost credits, keeping of accurate transaction records, and formation of thrift and cooperative societies would mitigate the identified problems and increase the benefits accruing to players in the fresh fish valve chain.
**Keywords**: Marketing efficiency, Profit, Fresh fish, Delta state, Nigeria

## INTRODUCTION

Agriculture is the bedrock of most economies of the world especially developing economies such as Nigeria. In Nigeria, it currently contributes about 42% of the gross domestic product (GDP) and provides employment to more than 70% of the people [1]. The agricultural sector of the economy comprises crops, livestock, fisheries, wildlife, and forestry subsectors. The fisheries sub-sector is growing in its importance due to the emerging nutritional, recreational and medicinal values of fish products [2]. Fish is an important source of protein in developing countries. It is highly nutritious, tasty and easily digested. It is much sought after by a broad section of the world's population, particularly in developing countries where an estimated 60% of the people depend on fish for over 30% of their animal protein supplies. This is contrary to the situation in most developed countries where 80% of the people obtain less than 20% of their animal protein from fish. However, with increasing awareness of the numerous health benefits of fish and the ensuing rise in fish and fish products prices, these figures are rapidly changing [3].

Fish contains about 15-2-% low-far quality protein particularly lysine. Also, it is rich in Omega 3 fatty acids, vitamins D, B2 (Riboflavin), calcium, phosphorus, and minerals such as iron, zinc, iodine, magnesium and potassium [3]. The proteins, vitamins, and nutrients found in fish can help lower blood pressure and help reduce the risk of heart attack or stroke, hence the American Heart Association recommends eating fish at least two times per week as part of a healthy diet (Washington State Department of Health (WSDH), 2015) [4]. The omega 3 fatty acids are essential nutrients for health and brain health, infant vision and nerve development; and the reduction of depression, Alzheimer's disease, dementia, diabetes, inflammation, and arthritis [3, 4]. As a maritime nation with a vast population of over 160 million people and a coastline measuring approximately 853 kilometers, the fishery sub-sector possesses the capacity to contribute immensely to the agricultural sector [5]. With an annual fish demand in the country of about 2.66 million tonnes, and a paltry domestic production of about 780, 000 tonnes, the demand-supply gap stands at a staggering 1.8 million tones [1, 6].

Rondon and Nzeka (2010) [7] reported that Nigeria's fish demand amounted to nearly 2.0 million metric tonnes (valued at more than $1.8 billion) in 2009, leaving approximately 600,000 tonnes of untapped market potential. Nigeria spends N100 billion on fish importation annually and the current fish demand consumption in Nigeria stands at over 2.66 million tonnes per annum, while the present importation

rate is over 750,00 metric tonnes [8]. The opportunity of bridging the widening demand –supply gap of fish in Nigeria through domestic production and effective marketing offers a great investment potential to the Nigerian populace and also the inflow of foreign direct investment in the country. In Nigeria, fish and fish products constitute over 40% of the dietary animal protein intake of the average Nigerian [1]. The fishery sub-sector provides employment opportunities to many rural dwellers in different fields of fishing activities such as production, processing, preservation, and transportation [9]. Aside human consumption, fish is important for animal feed formulation, and a source of raw materials in allied businesses [10].

Fresh fish gets to the consumers through the marketing system. The American Marketing Association (AMA) (2007) [11] defined marketing as the activity, set of institutions, and process for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners and society at large. It is a management process responsible for the identification, anticipation and satisfaction of consumer requirement [12]. Agwu, Eke, Nwachukwu and Ogbu (2010) [13] described marketing as a machine that directs production along the line most suited to consumer requirement, thus production is limited by the extent of marketing. The function of marketing is an economic system is to ensure that comsumers get the product they desire at the right form (form utility), made available at the right place (pace utility), at the right price (possession utility) and at the right time (time utility), to fully satisfy the consumer [14].

In the study area, the price of fresh fish has been on the increase. This situation is probably due to rising demand for the product occasioned by increasing population and inability of the farmers to expand their productivity (i.e. supply), hence the widening demand-supply gap. The widening demand-supply gap can also be attributed to the existence of inefficient marketing system due to marketing problems such as lack of market information, poor market structure, high transportation cost, and lack of capital, poor storage facilities, limited markets and large number of intermediaries [15]. Based on this backdrop, this study was designed to answer the following questions: Is fresh fish marketing profitable in Delta State; how efficient are the wholesalers and retailers in transacting the business; which socio-economic factors of the marketers significantly determined profit; and which problems militated against the marketing of fresh fish in the area.

## MATERIALS AND METHODS

The study area is Delta State, Nigeria. Delta State one of the 14 oil producing States in Nigeria. The State has a population of 4,098,094 (National Population Commission (NPC), 2006) [16], and a total land mass area of 16,842 square kilometers (6,503 square miles) of which more than 60% is land. It lies approximately between longitude $5^0 00'$ and $6^0 45'$ East and latitude $5^0 00'$ and $6^0 30'$ North. It has a wide coastal belt inter-lace with rivulets and streams, which form part of the Niger-Delta. Delta State is made up of 25 Local Government Areas (LGAs) with Asaba as its capital city, and Warri and the economic nerve centre and most populated city in the State. The State is divided into three Agricultural Zones, namely Delta-South, Delta-North, and Delta-Central Agricultural Zones [17].

Fresh fish production and marketing are common features in the state. Some of the government sponsored fisheries projects aimed at boosting fish production and supply in the State include Agbo and Deghele Fish Farm clusters, Songhai, Delta, integrated Farm, Amukpe, and Aviara Fish Farm Estate (AFFE). The study population consisted of all fresh fish marketers in Delta State, Nigeria. Multistage and random sampling procedures were used to select two agricultural zones, three LGAs from each of the selected agricultural zones (ie 6 LGAs); two daily fresh fish markets from each of the selected LGAs (ie 12 markets); 10 wholesalers and 10 retailers from each of the selected markets to arrive at a total of 120 respondents (60 wholesalers and 60 retailers) for the study.

Data for the study were collected from primary source. Primary data were obtained by using pre-tested questionnaire. The questionnaire was designed to enable data collection on the specific objectives of the study viz profitability, marketing efficiency, determinants of profit and constraints to fresh fish marketing. Data analyses were done using enterprise budgeting, Sherphered-Futrell, and Ordinary Least Squares (OLS) regression techniques for profitability, marketing efficiency and determinants of profit respectively while ranking of means was deployed to achieve order of seriousness of the constraints to fresh fish marketing in the area.

The enterprise budgetary technique was used to estimate enterprise profitability as:

GM = TR-TVC
GR = TC/TR
NMI = TR-TC
NROI = NMI
$\qquad$ TC

Where:
GM= Gross margin
GR=Gross ratio
TR=Gross ratio
TR=Total revenue
TVC=Total variable cost
NMI=Net marketing income/profit
TC= Total cost
NROL= Net return on investment.

The Sherpherd-Futrell method (Ugwumba and Okoh, 2010) [15] used to determine the efficiency of fresh fish marketing by the intermediaries is given as:

$$ME = \frac{TC \times 100}{TR} \quad 1$$

Where:

ME = Coefficient of marketing efficiency

TC = Total cost incurred by the marketers

TR = Total value of product sold.

The multiple regression model used to ascertain the determinants of net marketing income/profit is implicitly stated as:

NMI = f (AGE, GEN, MAS, EDU, MKC, EXP, ACC, PDP, TOF; e)

Where:

NMI = Net marketing income/Profit (₦)

AGE = Age of the marketer

GEN = Gender of the marketer (dummy: male = 1; female = 0)

MAS = Marital status of the marketer (dummy: married = 1; otherwise = 0)

EDU = Educational level of the marketer (years of formal education of respondent)

MKC = Marketing cost (₦)

EXP = Marketeering experience of the marketer (years spent in the business)

ACC = Access to credit (dummy: accessed credit = 1; otherwise = 0)

PDP = Type of fresh fish (dummy: catfish = I, otherwise =0)

$e_i$, = Stochastic error term.

Four functional forms of the regression model (linear, exponential, semi-log, and double-log) were tried with the data. Output of the functional form with the best result in terms of econometric *a priori* criteria was adopted as the lead equation. The functional forms are:

Linear: NMI = $a_1$ +$a_2$AGE + $a_3$GEN + $a_4$MAS + $a_5$EDU + $a_6$MKC + $a_7$EXP + $a_8$ACC +$a_9$PDP + $a_{10}$TOF + $e_i$

Exponential: In NMI == $a_1$ +$a_2$AGE + $a_3$GEN + $a_4$MAS + $a_5$EDU + $a_6$MKC + $a_7$EXP + $a_8$ACC +$a_9$PDP + $a_{10}$TOF + $e_i$

Semi-log: NMI = $a_1$ + $a_2$ lnAGE + $a_3$lnGEN + $a_4$lnMAS + $a_5$lnEDU + $a_6$lnMKC + $a_7$lnEXP + $a_8$lnACC +$a_9$lnPDP + $a_{10}$lnTOF + $e_i$

Double-log: InNPI = $a_1$ +$a_2$lnAGE + $a_3$lnGEN + $a_4$lnMAS + $a_5$lnEDU + $a_6$lnMKC + $a_7$lnEXP + $a_8$lnACC +$a_9$lnPDP + $a_{10}$lnTOF + $e_i$

## RESULTS AND DISCUSSIONS
### Profitability of fresh fish marketing

Cost analysis revealed that the cost of purchases accounted for 96.15% and 94.87% of the total cost of marketing for the wholesalers and retailers respectively, followed by transportation costs and annual shop rent of 2.07% and 0.61% for the wholesalers, 2.56% and 1.25% for the retailers respectively. Bassey, Uwemedimo, Uwem, and Edet

(2015) [18] reported that purchases similarly constituted 95.2% and 96.2% of the total cost of marketing of fresh fish for the wholesalers and retailers, followed by transportation costs and security charges of 3.7% and 0.23% for the wholesalers, 2.6% and 0.24% for the retailers.

Gross margin, net marketing income, net return on investment and gross ratio analysis (Table 1) revealed gross margin for the wholesalers as ₦16,303,605 and ₦6,630,513 for the retailers. This implied that fresh fish marketing in the study area was profitable. Similar finding was reported by Abah, Zaknayiba and Simon (2013) [19]. Though both the wholesalers and retailers realized substantial profits, the wholesalers realized higher profit of ₦15, 713,801 than the retailers' ₦6, 630,513. This was due probably to higher volumes of investment and turnover as well as better economies of scale enjoyed by them in the marketing process. This finding is in agreement with Abah *et al.;* in 2013 [19] that wholesalers realized more profit than retailers of fish marketing in Lafia Local Government Area of Nassarawa State, Nigeria. Net return on investment of 0.31 for the wholesalers and 0.61 for the retailers implied that the wholesalers realized 31 kobo while the retailers realized 60 kobo respectively on every 100 kobo expended in the enterprise, hence re-confirming that the enterprise is profitable. Similar result of net return on investment 0.24 and 0.23 by fresh fish wholesalers and retailers was reported by Bassey *et al.;* in 2015 [18] in South-South geo-political zone of Nigeria. Furthermore, gross ratio measures producers' ability to maximize cost or efficiency in input utilization and other costs of production to improve profit. The lower the gross ratio the better is the business, conversely the higher the gross ratio the worst is the business. Gross ratio of 0.76 for fresh fish wholesalers in the study area implied that 76% of the total income generated was used in offsetting marketing costs. By implication, the profit made by the wholesalers was 24% over the capital invested. That is, every ₦1 invested generated twenty four kobo or ₦0.24 as profit. On the other hand, the retailers generated thirty seven kobo or ₦0.37 for every ₦1 capital invested. Bassey *et al.;* in 2015 [18] recorded similar finding of 0.76% and 0.77% for fresh fish wholesalers and retailers respectively.

### Marketing efficiency levels of the fresh fish marketers

Results of analysis of coefficients of marketing efficiency using Sherpherd-Futrell technique is shown in Table 2. The Shepherd-Futrell technique which has been proved to be a better method of calculating marketing efficiency [20] yielded coefficients of marketing efficiency of 76.59% for the wholesalers and 62.60% for the retailers. This result indicated that 76.59% and 62.60% of their sales revenue were taken up by costs. That is, the lower the coefficients of marketing efficiency the higher the level of efficiency,

thus the retailers were more efficient in the business than the wholesalers. This result compares favourably with the 92.05% and 82.33% recorded for wholesalers and retailers of catfish marketing in Anambra State, Nigeria by Ugwumba and Okoh (2010) [15]. Therefore, efficiency of fresh fish marketing can be increased by adopting measures that would increase revenue, reduce marketing costs and thus lower the coefficient of marketing efficiency.

**Determinants of profit realized by the marketers**

The predictors of profit from fresh fish marketing considered in the study were age, gender, and marital status, level of education, marketing cost, marketing experience, and access to credit, product price, and type of fish. Table 3 shows output of the four functional forms of the multiple regression model analysis. The linear model was chosen as the lead equation out of the four functional forms (linear, exponential, semi-log, and double-log) that were estimated. This decision was based on the values of $R^2$, $R^2$ adjusted, F-statistic, Durbin-Watson statistic, and the conformity of the estimates to *apriori* expectations (i.e. signs and magnitudes of the coefficients of the variables). Out of the nine predictors included in the model, only three variables (marketing cost, marketing experience, and product price) had statistical and significant influences on profit earned by the respondents. The regression equation is presented as:
NMI = 182314 – 918AGE + 662GEN + 10336MAS + 6475EDU + 7.2863MKC + 2714EXP + 18225ACC – 187.67PDP – 16222TOF

The coefficient of marketing cost was positive and statistically significant at 1% probability level. This implied that the higher the marketing cost incurred by the intermediaries, the higher the net marketing income realized. This result is against *apriori* expectation that marketing cost should have an inverse relationship with net marketing income - that is, marketers who spend less on marketing cost are bound to make more profit, *cetirus paribus*. It, however, corroborates Ugwumba and Okoh (2010) [15] who reported a negative and significant relationship between marketing cost and catfish marketing income; making marketing cost the biggest determinant of catfish marketing income in that area.

Marketing experience was positive and significantly related with net marketing income at 10% probability level. The growth and stability of any business could be dependent on the skills, experience, and training of the entrepreneur, among others. Thus, the longer the marketer is involved in fresh fish marketing, the more experience he gains in sourcing for cheaper and better products, increased market participation, better bargaining and negotiation skills, and increased financing in order to improve his marketing income. This finding conforms to Esiobu and Onubuogo (2014) [21], and Abiodun, Aisha, Shakirat

and Caroline (2016) [22] who reported a positive and significant relationship between marketing experience and profit of frozen and fresh fish marketing respectively.

Product price had a negative and statistically significance effect on net marketing income. Increase in product price means that the marketer will spend more money in procuring his product thereby minimizing his profit margin, as he is bound to sell at the prevailing market price in order to minimize losses that might accrue from spoilage and preservation/processing costs. Therefore, the marketer is compelled to reduce his profit margin by selling at the prevailing price so as to stay in business. Bassey *et al.;* (2015) [17] identified fish buying prices as one of the factors which impacted negatively and significantly on traders' profit in Akwa-Ibom, Nigeria.

Overall, the coefficient of multiple determinations ($R^2$) of the regression output indicated that 68.8% of the variation in net marketing income realized by the intermediaries was attributed to variations in the independent variables while the remaining 32.2% was due to random disturbances. The F-statistic value of 26.25 indicated that collectively all the socio-economic characteristics of the fresh fish marketers significantly influenced profit, and that the regression model was a good fit for the data.

**Constraints to fresh fish marketing in the area**

Fresh fish marketers in the study area, both at wholesale and retail levels encountered several constraints in the course of transacting their business. A four-point Likert-type scale was used to collect data on the degree of seriousness of the identified constraints to fresh fish marketing in the area. Findings from Table 4 indicated that the problems of inability to access credit (M=3.49) and inadequate capital (M=3.34) ranked 1st and 2nd to become the most serious constraints to the business. Finance (credit and/or capital) is an essential and a veritable input in any enterprise, without which, the success of the enterprise could be hampered. Money is needed for the day-to-day running of fresh fish marketing beginning from transportation to procurement, marketing costs and others. Therefore, inability to access credit and inadequate capital are major setbacks to fresh fish marketing in the study area. Similar finding was reported by Esiobu and Onubuogo (2014) [21]. These constrains were closely followed by high and unstable price of produce (M=2.95) and high transportation cost (M=2.91). Nwabueze and Nwabueze (2011) and Ugwumba [23], Okoh and Uzuegbunam (2011) [24] identified transportation cost as a major constraint to fresh fish and live-catfish marketing respectively. Most fresh fish marketers in the study area travelled long distances by road and water to source for the product. Some of these roads are bush tracks and un-tarred thus making cost of transportation high. Also, the fresh fish products are transported in large, wide and

round containers due to their shapes and delicate nature, adding to the cost of transportation. The problems of inadequate market information (M=2.18) and too many middlemen (M=1.66) were the least problems encountered by the market intermediaries. Free flow of market information is vital for better participation of the marketing agents, as price is the driver of interactive force between the quantities demanded and supplied of a commodity so as to attain equilibrium.

**Table 1: Estimated profitability of fresh fish marketing by intermediaries**

| Variables | Wholesalers | % of TC | Retailers | % of TC |
|---|---|---|---|---|
| **Total Revenue (TR)** | 67,123,790 | | 17,104,600 | |
| **Variable Cost (VC)** | | | | |
| Purchases | 49,428,206 | 96.15 | 10,158,177 | 94.87 |
| Loading | 122,762 | 0.23 | 16,200 | 0.15 |
| Off-loading | 124,991 | 0.24 | 17,600 | 0.16 |
| Transportation | 1,063,800 | 2.07 | 273,910 | 2.56 |
| Miscellaneous costs | 80,426 | 0.16 | 8,200 | 0.08 |
| **Total Variable Cost (TVC)** | 50,820,185 | | 10,474,087 | |
| **Fixed Costs FC** | | | | |
| Annual shop rent | 310,900 | 0.61 | 133,605 | 1.25 |
| Interest on loans | 98,800 | 0.19 | 32,450 | 0.30 |
| Local government rate | 36,870 | 0.07 | 18,080 | 0.17 |
| Depreciation on equipment | 128,564 | 0.25 | 46,328 | 0.43 |
| Miscellaneous costs | 14,670 | 0.03 | 3,510 | 0.03 |
| **Total Fixed Cost (TFC)** | 589,804 | | 233,973 | |
| **Total Cost (TC)** | 51,409,989 | | 10,708,060 | |
| **Gross Margin (GM)** | 16,303,605 | | 6,630,513 | |
| **Net Marketing Income (NMI)** | 15,713,801 | | 6,396,540 | |
| **Net Return on Investment (NROI)** | 0.31 | | 0.60 | |
| **Gross Ratio (GR)** | 0.76 | | 0.63 | |

Source: Field survey, 2016.

**Table 2: Estimation of marketing efficiency levels- Shepherd-Futrell technique**

| Item | Wholesaler | Retailer |
|---|---|---|
| Total revenue (TR) | ₦67,123,790 | ₦17,104,600 |
| Total cost (TC) | ₦51,409,989 | ₦10,708,060 |
| Marketing efficiency (ME) (Sherpherd-Futrell (TC/TR x 100) | 76.59% | 62.60% |

Source: Field survey, 2016.

**Table 3: Determinants of profit realized by the marketers**

| Predictors | Linear | Exponential | Semi-log | Double-log |
|---|---|---|---|---|
| Constant | 182314 | 5.3144 | -177840 | 5.0362 |
| | (2.91) | (33.36) | (-0.44) | (5.46) |
| AGE | -918 | -0.002172 | -77064 | -0.1496 |
| | (-0.77) | (-0.72) | (-0.91) | (-0.52) |
| GEN | 662 | -0.01753 | 274 | -0.00969 |
| | (0.04) | (-0.38) | (0.04) | (-0.67) |
| MAS | 10336 | 0.04625 | 2256 | 0.00998 |
| | (0.50) | (0.88) | (0.31) | (0.61) |
| EDU | 6475 | 0.00769 | 28201 | 0.0082 |
| | (0.56) | (0.26) | (0.56) | (0.07) |
| MKC | 7.2863 | 0.000016 | 273850 | 0.67307 |
| | (10.81)*** | (9.35)*** | (10.18)*** | (10.97)*** |
| EXP | 2714 | 0.006667 | 77108 | 0.15725 |
| | (1.87)* | (1.81) | (1.77) | (1.59) |
| ACC | 18225 | 0.03787 | 9659 | 0.02029 |
| | (0.96) | (0.79) | (1.44) | (1.33) |
| PDP | -187.67 | -0.0007175 | 247386 | -0.8881 |
| | (-2.71)** | (-4.08)** | (-2.13)* | (-3.35)** |
| TOF | -16222 | 0.002755 | -7135 | 0.00249 |
| | (-0.98) | (0.65) | (-1.23) | (0.19) |
| $R^2$ | 68.8% | 65.3% | 65.2% | 68.7% |
| $R^2$ (Adjusted) | 66.2% | 62.4% | 62.2% | 66.1% |
| F-statistics | 26.25 | 22.40 | 22.25 | 26.13 |
| Durbin-Watson Stat. | 1.52 | 1.75 | 1.38 | 1.63 |

Source: Computed from survey data, 2016. Note: ***= significant at 1%, **=significant at 5% and *=significant at 10% probability level.

**Table 4: Constraints to fresh fish marketing in the area**

| Parameters | Mean Score | Rank |
|---|---|---|
| High transportation cost | 2.91 | 4th |
| Inability to access credit | 3.49 | 1st |
| Too many middlemen | 1.66 | 7th |
| Inadequate capital | 3.34 | 2nd |
| High cost of storage | 2.72 | 5th |
| Inadequate market information | 2.18 | 6th |
| High and unstable price of produce | 2.95 | 3rd |

Source: Field survey, 2016.

## CONCLUSION AND RECOMMENDATIONS

Fresh Fish marketing in Delta State, Nigeria was a profitable enterprise dominated by female marketers both at the wholesale and retail levels. The retailers were more efficient in the business than the wholesalers. Marketing Efficiency, hence profitability would improve if adequate measures are taken to ameliorate the constraints identified by this study to have learned the profit realized by the marketers.

The marketers should organize themselves into groups/cooperative unions to be able to access government and other non-governmental credit facilities to improve their capital base. Government should provide good and accessible roads to reduce cost of transportation and make fresh fish readily available from the farm gates to the markets. Also, government through its agricultural information dissemination units should establish information links with the prints and electronic media outfits to propagate the day-to-day prices and locations of the product.

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