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Optimizing catfish marketing in forest communities of Ido municipality: The impact of seasonality, storage and pricing on performance

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Abstract

The challenges encountered by catfish marketers due to seasonality of catfish production in most rural areas have masterminded difficulty in free distribution of product to consumers which invariably hampers their income. Therefore, the study examined catfish marketing in Oyo state, Nigeria. A multistage sampling technique was adopted to select sampled respondents. First, 5 wards were selected purposively out of 10 wards in the study area. Next, a total of 10 markets were randomly selected evenly from each ward. Finally, 120 marketers were selected from each of the sampled markets. Questionnaire was adopted for data collection on the demographic characteristics of respondents, marketing channels available, gross margin estimation of catfish marketing, factors influencing of catfish marketing, and constraints on catfish marketing. Data was analyzed using frequencies and percentages, mean scores, gross margin, linear regression, and benefit-cost ratio (BCR). Key findings indicate that 74% of respondents earn between ₦200,000 and ₦400,000 ($476 - $952) monthly, with a gross margin of 64.4%, meaning marketers retain $0.644 for every dollar of revenue. The analysis showed that 58% of variations in catfish marketing could be explained by the identified influencing factors. The benefit-cost ratio (BCR) was found to be 1.41:1, indicating a positive return on investment, with marketers retaining approximately ₦1,453,056 from their activities. However, constraints such as seasonality, high transportation costs, and inadequate cold storage facilities were significant hurdles. Therefore, establishment of commodity markets in rural areas to enhance connections between fish farmers and buyers, promoting partnerships among stakeholders, and providing training on product quality and storage were recommended. These measures aim to improve the efficiency and profitability of catfish marketing.

Keywords: Influencing factors, Catfish Marketing, Gross Margin, Distributive chain

Introduction

The need for protein in human diet of the world's growing population especially among children and youths cannot be overemphasized. The tropical regions mostly in developing nations require more protein so as to supply the essential nutrients which are lacking in other diets (Vries-ten Have et al., 2020). The consumption of fish has no limitations among numerous religious groups in Nigeria, in contrast to munching (consumption) of pork which is a taboo in Islam (Agbelege and Ipinjolu, 2013). In addition, fish marketing is an essential aspect of fish production because the essence of production is mainly to reach the end consumers. So, marketing is described as all processes involved from the point of production of a commodity till it reaches the final consumer (Brunswick, 2014). Marketing is thus regarded as a fundamental aspect of socio-economic well-being of the rural people (dwellers) in connection with their production system (Agbelege and Ipinjolu, 2013).

Hence, the importance of Nigeria's fishery enterprise, which comprises quite a number of sub-sectors such as artisanal, industrial, aquaculture, fish marketers, processors etc (FAO, 2007). According to FAO (2007), the introduction of aquaculture to Nigeria in the 1950s and through it, fish production rose from hundreds of kilograms to 45, 000 metric tons in the early 2000. The aquaculture's potential contribution to domestic fish production brought about by awareness creation has continued to be on the rise due to demand for domestic consumption and export (Finegold, 2009). As observed by Awoyemi (2011), the contribution from aquaculture sub-sector was 0.5 percent and it rose to 1 percent of domestic fish production. Catfish are mostly cultured fish species in Nigeria (Aasa et al., 2020).

Oladimeji (2017) submitted that despite considerable efforts and high potentials in multiplying fish, the production of fish in local terrain have failed to supply the domestic demand of Nigeria's population. According to FAO (2006), raising catfish production would reduce the demand-supply challenge in the country. The enhanced production of catfish was attained in Ogbaru Local Government of Anambra State among catfish marketers by analyzing the socio-economic features of women involved and the profitability of catfish (Okonkwo-Emegha and Isibor, 2023).

Marketing are all the processes involved from the production and exchange of products till the final consumers have the product in their hands (Crammer et al., 2001). Okoh et al. (2008) reported that certain processes are engaged in making goods available to the consumers at the price in the right location. Moreover, past studies have revealed that efficient marketing systems stimulate and drive more investment in agriculture (Abokyi, 2022). Adekoya et al. (2004) observed that the high rate of fish importation in Nigeria is

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absurd where there is rich coastal heritage and endowment that could contribute to the nutrition and economic wellbeing and human capital development.

Based on the gap that exist between local consumption and production of fish, an efficient catfish production will enhance and raise marketing rate given a huge output which confer reduction in price of fish and accord consumers access to affordable catfish (Adekoya and Miller, 2014). The importance of fish production and its contribution to the economy and well-being of Nigerian citizens cannot be over-emphasized as fish constitutes over 40% of total protein intake in the country according to Eyo (2011).

Furthermore, catfish marketing is a distributive link that exists between the producers and the consumers of fish. The distributive link plays an important role considering the population growth, and global demand for fish when weighed up with supply in Nigeria (FAO, 2008). There are existences of marketing actors at the exchange points in the distributive linkage of the fish marketing through which the fish products are transited to reach the final consumer (Olukosi et al., 2005).

Even though fish and fish products are limited in supply, the demand for fish is higher than its supply in Nigeria which implies that meeting demands has to be found to meet the demand of the population (Irhivben et al., 2015). The factors militating against proper marketing of catfish are price dynamics, and the prices that vary from one market to the other (Olagunju, 2019). In addition, there is problem of intermediaries which has resulted to high fish prices (Olagunju, 2019). The importance of growing population globally for fish demand and its products when weighed up with supply cannot be overemphasized because proximity plays a significant influence among increasing producers (Odioko and Becker, 2022). This is corroborated by Yadav (2010) who reported that catfish can be made available to consumers at the right place and time which calls for an efficient marketing system of the fish products.

However, even the availability of locally raised catfish may not always be a viable solution for consumers facing challenges with access and affordability (Okochukwu et al., 2024). The quality and safety of fish raised in natural ponds can vary, leading to concerns about potential health risks. Additionally, the supply of locally raised catfish may not always meet the demand, especially during certain seasons or periods of high consumption (Rahman & Islam, 2020). This shift in consumer behavior and market trends has led to a significant increase in the production and sale of locally raised catfish. As a result, the availability and affordability of catfish have improved, making it a more accessible option for consumers looking to include fish in their diets Fulanda (2018). Furthermore, the diversification into

marketing catfish has also provided new opportunities for fish sellers to expand their businesses and cater to the changing preferences of consumers (Dauda et al., 2018). By offering a wider variety of fish products, they are able to attract a larger customer base and increase their profits.

Overall, the shift towards locally raised catfish as a more affordable alternative to traditional fish options highlights the importance of understanding consumer demand and adapting business strategies accordingly. This trend not only benefits consumers by providing them with more affordable options for fish consumption but also presents new opportunities for businesses to thrive in an evolving market landscape (Kumar et al., 2008). Based on this backdrop, the study examined catfish marketing analysis in Oyo state, Nigeria: the case of catfish marketers in forest communities of Ido municipality. The following specific objectives: the demographic characteristics of respondents in the study area; marketing channels available in the study area; gross margin estimation of catfish marketing; factors influencing of catfish marketing among respondents; and constraints on catfish marketing among fish marketers were examined.

Materials and methods

Description of the study area

This study was carried out in Ido Municipality of Oyo state with its headquarters situated in Ido town. It is located in the forest areas and geographically in the latitude latitudes $7^0$45´ and $9^0$45´´North of the equator and longitudes $2^0$30´ and $9^0$45´´East. According to the 2006 National Population Census, the municipality has a land area of 986 km^2, a total population of 103,261 and experience 1800 millimeters rainfall yearly. Ido LGA covers the area spanning Apata, Ijokodo, Omi-Adio, Akufo and Apete. This LGA shares boundaries with Oluyole, Ibarapa East, Akinyele, Ibadan South-West and Ibadan North-West LGAs in Oyo State and also with Odeda LGA in Ogun State. The council formerly has six wards, which had been increased to ten for easy exercise of franchise. Among the major towns within the municipality are Ijokodo, Ido, Omi-Adio, Apata, Apete, Akufo and Bakatari as well as about 612 villages which include Ogunweide, Dada, Olowofela, Apooyin, Oderemi, Odetola, Erinwusi, Tade, Alagbaa, Iku- senla among others. On the account of extensive fertile soil, which is suitable for agriculture, the basic occupation of the people is farming either arable or animal farming. There are large hectares of grassland which are suitable for land and aquatic animal domestication, vast forest reserves and rivers. People in

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the area grow varieties of cash crops such as cocoa, kola nut, palm oil, timber and food crops such as maize and rice. The area is also suitable for a wide range of edible fruits.

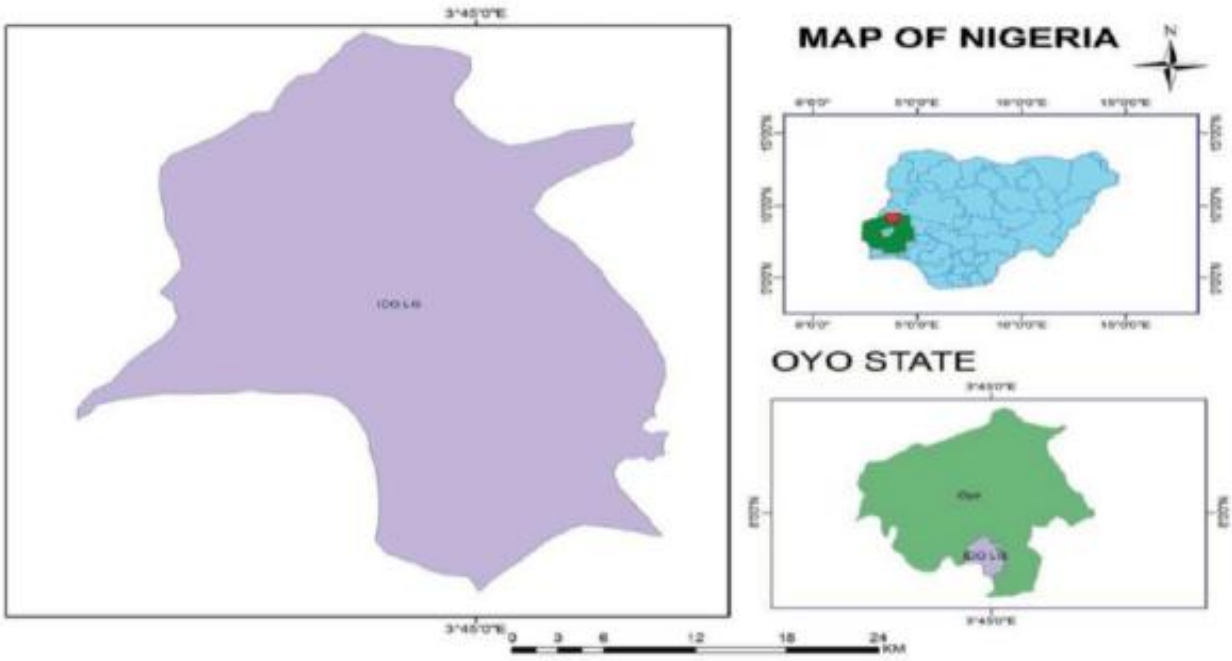

Figure 1. The Map of Ido Municipality in Oyo State, Nigeria

Sampling procedure and sample size

This study adopted a collection of primary data with questionnaire and interviews. The primary data on socio-economic and demographic characteristics of respondents, marketing channels, and constraints on catfish marketing were collected with a structured questionnaire in the month of July, 2022 in the rainy season due to use of earthen pond which receives its water source from natural supply, however secondary data were only used to corroborate the findings from the study. A three-staged random sampling procedure was used to select wards in the forest communities of Ido municipality. In the first stage, purposive sampling was used to select 5 wards out of ten (10) principal wards such as Akufo/Araromi, Omi-Adio/Bakatari, Erinwusi/Adetola, Ogundele/Alaho/Siba/Idi-ahun and Ido/Onikede due to the high concentration of fish marketers. In the second stage, 2 markets were randomly selected from 5 wards which gave a total of 10 markets. In the third stage, 12 catfish marketers were purposively selected from each of the selected 10 markets based on predominant population of catfish marketers. In this survey, the respondents were catfish sellers in forest communities who engage in catfish production and marketing were used because of their predominant population. Moreover, the questionnaire had detailed questions on socio-economic characteristics of the marketers (such as age, sex, level of education, etc), marketing channels

and constraints on catfish marketing in the study area. The survey data were obtained for the year 2022, and it was based on one-year recall period. All the 120 questionnaires distributed to the sample respondents were retrieved, and hence, findings of this study were based on 120 respondents. In all, a total sample size of 120 respondents was selected. The survey was conducted between months of March 2022 and January 2023.

Data analysis

Descriptive analysis

The data on demographic characteristics of catfish marketers such as age, sex, level of education, and other socio-economic characteristics, marketing channels in the study area were analyzed with frequencies, percentages, constraints on catfish marketing were analyzed with mean scores, profitability of catfish marketing was analyzed with gross margin, while factors influencing catfish marketing were analyzed with linear regression model. The model specification for gross margin analysis and factors influencing catfish marketing were depicted below. Statistical package for Social Sciences, IBM SPSS Statistics 20 package was used to carry out the data analysis for the study.

Model specification

i. Gross margin model

Gross Margin is given as:

$$\text{Gross Margin \%} =$$

$$(\text{Total Revenue from Sales of Catfish - Total Cost of Catfish Bought and Processed}) \div \text{Total Revenue}$$

Mathematically, $GM = [(TR - TC) \div TR] \times 100\%$

ii. Benefit-cost ratio

Therefore, BCR = Total Revenue ÷ Total Cost of Catfish Bought and Processed

Decision rule for BCR:

BCR >1 shows fish marketing enterprises in profitable

BCR =1 shows fish marketing enterprises are neither profitable nor loss (breakeven)

BCR <1 shows fish marketing enterprises are not profitable (loss)

iii. Factor Influencing of catfish marketing

The factors influencing catfish marketing was measured using Linear Regression

Here, it is important to note that catfish marketing which is the outcome variable was measured as the catfish sales. This is the more reason why linear regression was used.

The empirical model for linear regression is

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$Yi = \beta_0 + \beta_1 X_i + e_i$, i = 1, 2, · · ·, n……. (1)

Where:

*Y*i = Catfish Sales

B_0 and β_1= Coefficients of explanatory variables

X_i = Factors influencing catfish marketing

Scale of measurement for variables

Variable name	Measurement Scale	Measurement (Scale nomenclature)	Expected sign
X_1 = age of the marketers	Interval	< 20 = 1; 21-25 = 2	Years
X_2 = sex	Nominal	Male = 1; Female = 2	
X_3 =marital status	Nominal	Married = 1; Single = 2	
X_4 = educational level	Interval	Adult Edu =1; Primary =2	
X_5 = household size	Nominal	1-2 = 1; 3-5 = 2	In persons
X_6 = secondary occupation	Nominal	Farming = 1; Trading = 2	
X_7 = catfish marketing	Nominal	< 5 = 1; 6-10 =2; 10-15 =3	Year of experience
X_8 = access to extension services	Nominal	Yes = 1; No = 0	
X_9 = income	Interval	< $200 = 1; $201-500 = 2	$ (Dollars)
X_{10} = transportation cost	Fixed and operating cost	Actual amount	$ (Dollars)
X_{11} = storage cost	Ordinal /Fixed and operating cost	Actual amount	$ (Dollars)
X_{12} = marketing channels	Nominal	Catfish farm-Consumer = 1; Catfish farm-Retailer-Consumer = 2; …..	
e = Random error term			

iv. Constraints on catfish marketing among fish marketers

The data analysis for constraints on catfish marketing conducted with mean score by a three-point Likert scale. The response options of likert scale were scored 3 for very severe, 2 for severe and 1 for not severe because this response options allows respondents to express nuanced opinions or detailed insight for the study.

Bench mark: Mean, $X = \Sigma x /n = 3+2+1 = 6/3 = 2.0$

Decision rule: Based on the bench mark, the decision rule shows that if mean score is less than (<) 2.0, then the constraint is low; and if a mean score is greater than or equal to (≥) 2.0, then the constraint is high.

Results and discussion

Demographic and socioeconomic characteristics of respondents

Table 1 presented the distribution of catfish Marketers in Forest Communities of the Ido Municipality Oyo State. This shows the parameters of respondents' population in the study area. The table showed the distribution of respondents' gender with about 58.3% of them being female and 41.7% being male. This was followed by respondents' age where the majority had a mean age of 35 years showing that about 20.8% were between age of 26 and 35 years, followed by 45.0% between 36 and 45 years, 20.0 % were between 46 and 55 years while 11.6% were above 56 years. Furthermore, the table showed that about 71.7% of respondents were married, followed by 22.5% widow (ers) and 5.8% singles, with household size of 1-5 (55.8%), followed closely by family household size of 6 and above. Also, majority of respondents (78.3%) had trading as their major secondary occupation, marketing experience of 6 years (55.8%) followed by about 12.5% having more than 11 years' experience, about 53.0% of them belong to cooperative society, and 74.2% had average income of ₦345,231 ($238.09).

Results in table 1 show about 58.3% of the respondents were female. This indicates that women are more involved in marketing of fish and its products. This finding corroborates Ali et al. (2008) who submitted that females participate more in catfish processing and marketing. Also, 45.0% were aged between 36 years and 45 years. This implies that middle-aged young, energetic and active people participate in fish marketing. This corroborates Ebewore (2013) who reposed that economically active young people are involved in economic activities like fish marketers. Also, higher proportion of the respondents was married (71.7%). This indicates stability and commitment of married women towards use of family labor in fish marketing because being married depicts responsibility. This finding corroborates Ayoboye et al. (2015) that majority of fish sellers engage in catfish marketing business due to the cultural belief that fish selling is female gender based in Oyo state. Majority of respondents (78.3%) were traders. This implies that respondents have secondary occupations and this may hinder them in having access to market information. Further, about 56% of respondents were having 1 year to 5 years' experience in marketing. This indicates that fish marketers have enough experience in frozen fish marketing and the experience may

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help them to cope with likely constraints that may arise from fish marketing. About 53% of respondents were active members of cooperative societies. This indicates that most marketers showed interest in cooperative savings to enhance their business output. Most respondents (74.2%) earned between ₦200,000 - ₦400,000. The implication is that most marketers were average income earners, especially when the comparison is made based on the Naira to 1 dollar exchange rate.

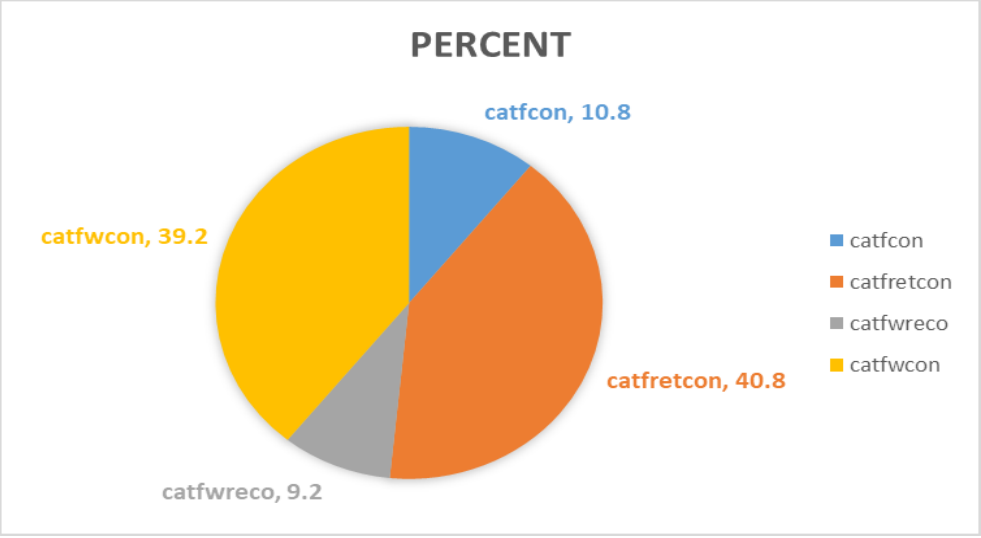
Table 1. Demographic and socioeconomic characteristics of respondents (n = 120)

Variables	Frequency	Percentage	Mean
Gender			
Male	50	41.7	
Female	70	58.3	
Age (in Years)			
< 25	3	2.5	
26-35	25	20.8	
36 – 45	54	45.0	35
46-55	24	20.0	
≥ 56	14	11.6	
Marital status			
Single	7	5.8	
Married	86	71.7	
Widowed	27	22.5	
Household size (persons)			
1-5	70	58.3	5
6 and above	50	41.7	
Secondary occupation			
Artisan	25	20.8	
Trading	94	78.3	
Civil servant	1	.8	
Marketing experience (Years)			
1-5 years	67	55.8	6
6 - 10	6	5.0	
11 and above	15	12.5	
Cooperative society			
Yes	63	52.5	
No	57	47.5	
Income (₦)			
>200,000	3	2.5	
200,001-400,000	89	74.2	345,231
400,000-600,000	25	20.8	
600,001 and above	3	2.5	

Source: Field survey, 2022

Marketing channels used by the respondents in catfish marketing – re-discuss based on the flow chart

Figure 1 presented the bar chart flow of marketing channels utilized by the catfish marketers in forest communities of the Ido Municipality Oyo State. The marketing channels consist of four types of actors who are catfish farms (farmers), wholesalers, retailers and the consumers. This flow chart presented different distributive channels engaged by the catfish marketers in the studied area. The flow chart showed that 40.8% catfish marketers made use channel of catfish farm-retailer-consumer, 39.2% made use channel of catfish farm- wholesaler – consumer, 10.8% made use channel of catfish farm – consumer, and about 9.2% made use channel of catfish farm – wholesaler – retailer – consumer. This result indicates that most respondents used channels of Catfish farm – Retailer – Consumer and Catfish farm – Wholesaler –Consumer, and this might be because these channels pulls more sales volume and increases the profit of the catfish marketers. This study contradicts Olaoye et al. (2017) which identified Catfish farm – Wholesaler – Retailer – Consumer as the major channels used by the fish marketers in Ogun state. Furthermore, figure 2 shows the volume of sales for marketing channel 2 which was 1,056kg whereas for other marketing channels volume of sales were not measured because the dominant channel was obtainable in the study area.



Note: Blue legend = Catfish farm – Consumer (Ranked 4th).

Orange legend = Catfish farm – Retailer – Consumer (Ranked 1st).

Grey legend = Catfish farm – Wholesaler – Retailer – Consumer (Ranked 3rd).

Gold legend = Catfish farm – Wholesaler – Consumer (Ranked 2nd).

Figure 1. Flow charts of Catfish Marketing Channels in Forest Communities

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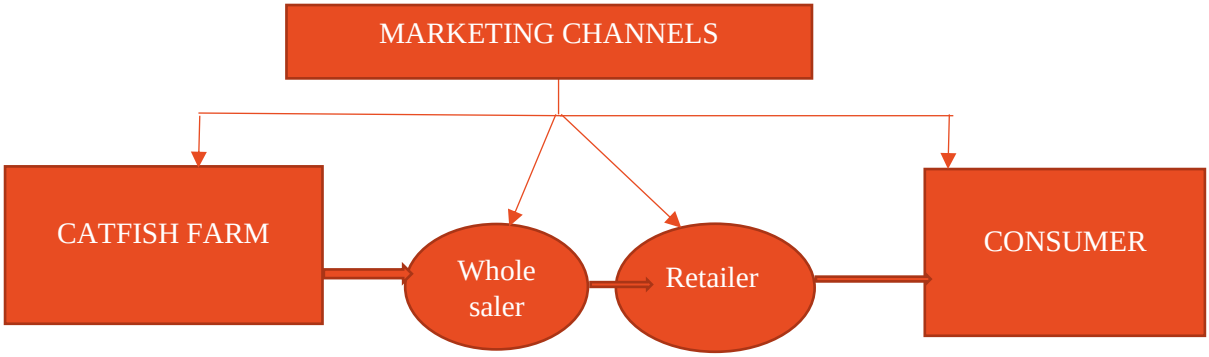

Marketing Channel1 Catfish farm → Consumers Volume of Sales = NM

Marketing Channel2 Catfish farm → Retailers → Consumers V=M=1,056Kg

Marketing Channel3 Catfish farm → Wholesalers → Retailers → Consumers V=NM

Marketing Channel 4 Catfish farm → Wholesalers → Consumers V= NM

Note: NM= Not Measured; M = Measured; V= Volume of sales

Figure 2. Flow charts of Catfish Marketing Channels based on volume measured.

Gross margin of marketing catfish in in the forest communities

The gross margin was conducted for Catfish farm – Retailer – Consumer Channel in the Forested Communities because the channel is more obtainable in the study area. Table 2 presented the gross margin of fish marketing in forest communities of the Ido Municipality Oyo State. The table presented the total expenditure and total returns from catfish sales. About ₦516,352 was the total marketing total cost of catfish bought and processed while ₦1,453,056 was the market revenue (the quantity of catfish processed sold multiplied by price per kilogram). The catfish marketing returned a gross margin of ₦936,704 which indicated profitability in the region of net income. This finding showcased better efficiency than the outcome of Ochiaka and Obasi (2017) who reported that catfish profitability in the South-east Nigeria has net income of ₦326, 450 with BCR of 1.26 and by implication improving profitability requires optimizing the efficient use of variable inputs to increase efficiency. This suggests that catfish production in South-west Nigeria is a more viable business than what is obtainable in the South-east Nigeria. The results show that total expenditure and total returns from catfish sales (See Table 3). The findings indicate that ₦516,352 was the total marketing variable cost of catfish marketing while ₦1,453,056 was

the market revenue (the quantity of catfish processed sold times price/kg). Further, the results in Table 2 show that the gross margin made by the respondents was 0.644. The result further reveals the cost and returns analysis indicated that catfish marketing would have a gross margin of 64.4% which indicates that total sales return had very strong business efficiency. This corroborates Njoku and Offor (2016) reported that high percentage of gross margin shows a very strong marketing efficiency. Hence, the BCR equals ratio 1.41:1 which indicates that for every one Naira (₦1) of money spent on catfish marketing, 1 turns a benefit of 1.14 Naira. Since the gross margin of ₦936, 704 is positive, thus catfish marketing with a net profit was achieved.

Table 2. Gross margin of marketing catfish for catfish-retailer-consumer channel in the forested communities

Variable costs	Average quantity and cost /naira
Cost of catfish bought for processing	₦481,960
Transportation cost	₦2,086
Storage cost	₦2, 425
Cost of liters of materials	₦1,528
Haulage and other charges	₦2,950
Security charges	₦10,250
Packaging materials cost	₦4,268
Cost of labor	₦3,428
Cost of Maintenance	₦2,029
Other costs	₦5,428
Summation of all incurred costs = Total cost of catfish Bought and Processed	516,352
Quantity of fish processed	1,056kilogram
Selling price per kg	₦1,376
Total revenue (TR)	₦1,453,056
Gross margin% (GM)	(₦1,453,056 – ₦516,352)÷ ₦1,453,056 ₦936,704 ÷ ₦1,453,056
Gross Margin%	= 0.644
GM	=64.4%
BCR	Total Revenue ÷ Total Cost ₦1,453,056 ÷ 516,352 = 2.81÷ 2 = ₦1.41

Note: This gross margin was calculated for the dominant marketing channel because that is the channel that is common among respondents in the study area

Source: Author's computation using field survey data, 2022.

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Determinants of catfish marketing

Table 3 presented the factors influencing catfish marketing in forest communities of the Ido Municipality Oyo State. The table showed the linear regression coefficients of catfish marketing and coefficient of determination, R^2 equating 0.58. In addition, the table presented age (β = -8207.167*), years of formal education (β = 26614.329*), marketing experience (β = 13209.350*), income (β = 65499.703*) as well as marketing channel (β = -480981.590*). This indicates that age, years of education; marketing experience, income and marketing channels have significant influence on the catfish sales/marketing at $\alpha_{0.05}$. Table 3 further reveals the linear regression coefficients of catfish marketing. The coefficient of determination, R^2 of 0.58 which indicated the variation of dependent variable was explained by 58% of the variation in independent variables showing strength of relevance and correlation of explanatory variables and the outcome variables.

Table 3. Determinants of catfish marketing in the forest communities

Parameters	Beta coeff.	Standard Error	t-value	p-value
(Constant)	2.6896	903426.513	2.977	0.004
Gender	674.310	152694.121	0.980	0.329
Age	-8207.167	9584.293	-0.856	0.014*
Marital status	-80821.340	95681.792	-0.845	0.400
Religion	-55845.555	151804.219	-0.368	0.714
Years of formal education	26614.329	90184.402	0.295	0.008*
Household size	-50755.170	52229.074	-0.972	0.333
Secondary occupation	-242169.749	240984.348	-1.005	0.317
Marketing experience	13209.350	24537.428	0.538	0.021*
Member of cooperative society	152889.741	162206.067	0.943	0.348
Monthly income	65499.703	243326.583	0.269	0.008*
Marketing channel	-480981.590	326271.196	-1.474	0.013*
Transportation cost	-6.990	47.151	-0.148	0.882
F-statistic	50.6			
R square	0.58			
Adjusted R^2	0.57			

Note**:** Monthly income and Marketing channel were obtained from field survey.
Source: Author's computation using field survey data, 2022

Constraints on catfish marketing in the forest communities

Table 5 presented the constraints on catfish marketing in forest communities of the Ido Municipality Oyo State. This revealed challenges experienced by fish marketer which hinders the profitability of catfish marketing. The table showed that Season of fish products had a mean score of 2.63 and ranked 1st, followed by transportation cost with mean score of 2.46 and ranked 2nd, inadequate cold rooms (M = 2.41) and ranked 3rd, poor access road (M = 2.30) and ranked 4th, inadequate credit facilities (M = 2.41) and ranked 5th, and so on. The results show that the season of fish products rank first. This was followed by the cost of transportation which rank second, inadequate storage facilities rank third, poor access road rank fourth while lack of credit facilities rank fifth. The findings indicated that the constraints on catfish marketing in forest communities of the Ido municipality involved a lot of challenges which oftentimes hamper the marketing of catfish. Furthermore, findings from the study imply that the season of the commodity was a major constraint on catfish marketing in forest communities of the Ido municipality. This corroborates Ike-Obasi (2021) who reported seasonal effect is a factor influence market price and efficiency of catfish in Nigeria. Furthermore, the finding is in agreement with Muhamad et al. (2020) that inadequate storage facilities, poor pricing constituted serious challenge to marketing activities of catfish marketers and catfish efficiency in Nigeria, however it negates the report of Njoku and Offor (2016) that seasonality of product poses little or minimal constraint to the activities of catfish marketers. Also, the result corroborates Adeoye et al. (2022), who reposed that cost transportation and inadequate funds disrupt fast distribution of products from one place to another. Musa et al. (2014) also submitted that the problem confronting agricultural products is not instability of product surplus, but the cost of transportation (roads, vehicles, rails, waterways) which hinders constant movement and efficiency flow of goods and services from one point to another. Further, a poor supply of cash could also constitute an inefficient marketing system. Therefore, the challenges encountered in catfish marketing among fish marketers are a great deal to effective marketing.

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Table 5. Constraints on catfish marketing in the forest communities

Constraints	Very severe	Severe	Not severe	Mean	Rank
Transportation costs	51(42.5)	69(57.5)	0(0.0)	2.46	2nd
High levy tariff on goods	14(11.7)	58(48.3)	48(40.0)	1.72	8th
Season of fish products	88(73.3)	19(15.8)	13(10.8)	2.63	1st
Price instability	35(29.2)	23(19.2)	62(51.7)	1.78	7th
Inadequate market information	35(29.2)	14(11.7)	71(59.2)	1.70	9th
Poor access road	47(39.2)	62(51.7)	11(9.2)	2.30	4th
Inadequate credit facilities	11(9.2)	109(90.8)	0(0.0)	2.09	5th
Low demand for product	0(0.0)	25(20.8)	95(79.2)	1.29	10th
Damage due to animal and theft	11(9.2)	5(4.2)	104(86.7)	1.23	11th
Inadequate cold rooms	58(48.3)	53(44.2)	9(7.5)	2.41	3rd
Inadequate processing equipment	32(26.7)	63(52.5)	25(20.8)	2.06	6th

Percentages in parenthesis
Source: Field survey, 2022

Conclusion and recommendations

The key insights from the study showcased that most catfish sellers were predominantly female. They had an average household size of at least 5 people and 6 years of experience in catfish marketing. Further, most rural catfish marketers earned ₦200,000 to ₦400,000 ($476 - $952) monthly. The most common marketing channels was Catfish farm – Retailer – Consumer which resulted to catfish marketing that had a gross margin of 64.4%, indicating business efficiency and profitability with a benefit-cost-ratio of ₦1:41 kobo. In addition, 58% of variation in catfish marketing was explained by the influencing factors studied. Among major challenges encountered by the catfish marketers were seasonality, high cost of transportation, poor access roads, inadequate credit facilities and lack of cold storage. Therefore, to address these issues, the study recommended policies among stakeholders that would enhance catfish marketing such as improvement of physical infrastructure like good quality roads to reduce transportation costs, establishing rural commodity markets to better connect catfish producers/ farmers, sellers and buyers, facilitating partnerships between producers, processors and buyers, providing credits and financing options for catfish business, developing public-private initiatives to improve market infrastructure and product quality, introducing price subsidies to enhance affordability for consumers and investing in sustainable transportation and infrastructure in rural communities.

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Author's contribution

The author was involved in all the sections of the study from the point conceptualization, design and fieldwork, collection of data, data analysis, interpretation and writing of the manuscript.

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Conflict of interest

The author, Adebayo Samson Adeoye, PhD. declares that there is no conflict of interest to disclose.

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