Marketing Margins and Efficiencies of Smoked Fish in Kainji Lake Basin, Nigeria

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A R T I C L E I N F O

ABSTRACT

Key words:

Marketing margins,

efficiencies,

smoked fish

The study analyzed the marketing margins and efficiencies of smoked fish in Kainji Lake Basin Nigeria. Specifically, the study examined the socio-economic characteristics of smoked fish marketers, estimated the cost and returns, profit margins and efficiency of smoked fish marketing, evaluated the effects of socio-economic and institutional determinants of net-income of smoked fish marketers and examined the challenges of smoked fish marketers. A 2-stage sampling procedure was used to select 60 wholesale marketers of smoked catfish from a population of 107 catfish marketers. Primary data were collected with the aid of questionnaires administered through interview schedule. Data were presented with descriptive statistics such as percentages and 4-point Likert rating scale. Also, net marketing margin, net profit margin, marketing efficiencies and two-stage least square regression analysis were used to analyze data. Results showed that majority (55 %) of the fish marketers were men with a mean age of 40 years while 36.67 % had experience of 11-15 years. Marketing of smoked catfish is profitable with a net profit margin of 3.49 % and marketing efficiency of 189.79 %. Also, the significant socio-economic and institutional determinants of net-income were age, years of experience and levy while the major challenges of fish marketing were poor pricing ($\bar{x}=3.88$), high cost of transportation ($\bar{x}=3.28$) and access to capital ($\bar{x}=2.80$). It is based on these findings the study recommends that there should be effective price regulations by market unions to stabilize prices of fish in major market centers.

1.0 Introduction

The fishery sector is one important food sector of the Nigerian economy which provides food and employment to a sizeable number of the Nigerian population. This is because fish is one of the major sources of animal protein in Nigeriaandit's available in different forms such as; canned, frozen, smoked, dried, cooked and fried (Girei, Ndanitsa and Ogezi, 2021). These forms are made available due to the perishability nature of fresh fish; however, fish smoking is the principal method used in processing and preserving fish in Nigeria (Alabi, Olaoye, George, Adeola, Alabi and Ojebiyi, 2020). Fish smoking preserves the shelf-life of the fish for a long time, improves flavor and increases consumption of the fish thereby reducing wastage (Upadhyay, Singh, Pandey, Singh and Pal, 2021). Fishes that are smoked usually passes through various points or markets before it gets to the final consumer through an efficient marketing and distribution systems.

Marketing is an integral part of the food chain since production is said to be complete when the commodity produced finally reaches the consumers. Consequently, an efficient marketing system is one which ensures that goods and services are available all year round with little or no variation in prices thereby making sure that the producers and consumers are better off (Adedeji, Osundare and Ajiboye, 2019). Fish marketing provides the means in which the gap between producers and consumers is bridged. Market performance on the other hand, comprise of gross margin, marketing margin and marketing efficiency as it relates to individual market participants such as

producers, wholesalers and retailers (Girei, Ndanitsa and Ogezi, 2021). Fish marketing is not limited to these market actors but includes other players or actors in the distribution channels who are mostly the middlemen. Consequently, the prices of fish increase as it passes through these middlemen before it gets to the final consumers (Bello, Sani, Bukar and Rabiu, 2017).

The major players in fish marketing are women because they lack the access to productive resources to engage in other nodes of the fishery value chain (Ike-Obasi and Ogubunka, 2019). According to Girei, Ndanitsa and Ogezi, (2021), females dominate in the marketing of smoked fish; thus, contradicting Nwabeze, Faleke, Tanko and Malgwi (2019) who opined that smoked fish marketers are dominated by the males. Irrespective of the findings of these scholars, the fact remains that the men and the women are keys players in the marketing of fish in Nigeria. Hence, it is imperative to analyze fish marketing with key interest on the economic returns, margins and marketing efficiencies.

Studies have shown that smoked fish marketing is profitable. Adedeji et al. (2019) reported that the gross margin received in smoked fish marketing in Ondo State Nigeria was ₦38, 101.36, while Girei et al. (2021) result showed that the net benefit cost ratio of smoked fish marketing in Toto Local Government Area of Nasarawa State, Nigeria was 1.57. Hamid (2020) on the other hand, reported that the net-income received by smoked fish marketers in Mubi North Local Government Area of Adamawa State, Nigeria was ₦29, 173. Although these studies affirmed that smoke fish marketing is profitable, there seems to be insufficient information on the profits in relation to marketing margins and efficiencies of smoked fish marketing in Kainji Lake basin, Nigeria. Also, there is a dearth in knowledge on the effects of socio-economic and institutional variables on the net-income of smoked fish marketers. Socio-economic variables are important factors which influence the revenue realized by enterprises. Age and years of experience have been found to be positively related to net-income *ceteris paribus* (Omeje et al., 2021; Adeosun, Ume and Ezugwu, 2019). It is based on this limited knowledge the study analyzed the marketing margins and efficiencies of smoked fish in Kainji Lake Basin. Specifically, the study;

1. Examined the socio-economic characteristics of smoked fish marketers;
2. Estimated the cost and returns, profit margins and efficiency of smoked fish marketing;
3. Evaluated the effects of socio-economic and institutional determinants of net-income of smoked fish marketers; and
4. Examined the challenges of smoked fish marketers.

2.0 Methodology

The study was conducted in kainji Lake Basin, an area located between Niger and Kebbi State, Nigeria. The area is located within Latitudes 9^0 50' and $1^0$55' North and Longitudes 4^0 23' and $4^0$51' East (Omeje, Achike, Arene, Ifejika and Ifejika, 2020). The lake provides livelihood opportunities to fisher folks as well as aquaculture development. Currently, aquaculture is a major occupation of the people which provides steady income to the various fishery value chain actors such as processors and marketers.

The study adopted a 2-stage sampling procedure in selecting respondents who market smoked catfish fish at wholesale level. The first stage involved the purposive selection of 13 communities based on the preponderance of wholesale fish marketers. The communities include; Monai, Malale, New Bussa, Kokoli, Tungan Alhaji Danbaba, Yauri, Wara, Cover dam, Tungan Nailo, Shagunu, Mahuta, Gafara and Wawu. The second stage involved the proportional random selection of six wholesale marketers of smoked catfish from Monai, five each from Malale, New Bussa, Kokoli, Tungan Alhaji Danbaba, Yauri and Wara; and four each from Cover dam, Tungan Nailo, Shagunu, Mahuta, Gafara and Wawu making a total of 60 wholesale marketers of smoked catfish selected from a population of 107 catfish marketers. The sample frame was retrieved from the registered members of fish marketer's association in the area. Primary data were collected with questionnaires that were administered through interview schedule.

Data were presented using descriptive statistics such as percentages and 4-point Likert-type rating scale. Also, Profitability and marketing efficiency indicators as well as two-stage least square regression analysis were used to analyze data. The models were specified below;

2.1 Likert-type scale rating technique

A 4-point Likert-type scale rating technique was employed to achieve objective (iv) in this study. Respondents gave qualitative responses which were rated as Very Serious Challenge (VSC), Serious Challenge (SC), Mild challenge (MC) and Not Serious Challenge (NSC) with corresponding values of 4, 3, 2, and 1 respectively. The mean score of the respondents based on the 4-point rating scale was computed as specified below;

$$\frac{4+3+2+1}{4} = 2.50 \qquad 1.1$$

A 2.50 cut off point using the interval scale of 0.05 was adopted; the upper limit cut-off point was 2.50+0.05 = 2.55 while the lower limit cut-off point was 2.50-0.05 = 2.45. Based on this, any score below 2.45 (MS< 2.45) was taken as a weak factor and not considered while those with mean score of above 2.55 (MS> 2.55) were taken as strong factors and considered.

2.1 Profitability and marketing efficiency indicators

Profitability indicators such as; Net Income, Net Profit Margin, Return on Investment (ROI) and marketing efficiencies models were used to achieve objective (ii) of the study and the models were specified as thus;

i. **Profitability indicators**
   a. **Net Income (NI)**
      NI= *Revenue-Total expenses*   *1.2*
      Where:
      Revenue=Unit Price* Quantity supplied;
      Revenue=Consumer purchase price; and
      NI=Net Marketing Margin.

   b. **Net Profit Margin**
      Net Profit Margin=$\frac{Net\ Income}{Revenue} * 100$ *1.3*

   c. **Return on Investment**
      Return on Investment =$\frac{Net\ income}{Total\ Expenses}*100$ *1.4*

ii. **Marketing efficiency**
   Marketing efficiency =$\frac{Value\ Added}{Total\ Marketing\ Cost\ (TMC)}*100$ *1.5*
   Where:
   Value added=Consumer purchase price-Cost of processed fish
   Total marketing Cost=Total Expenses-Cost of processed fish
   Where: Cost of processed fish=Producer selling price

iii. **Shepherd's efficiency**
   Shepherd's efficiency =$\frac{Consumer\ purchase\ price}{Total\ Marketing\ Cost\ (TMC)}$

iv. **Acharya's efficiency**
   Acharya's efficiency (MME) =$\frac{Producer\ selling\ price}{TMC+Net\ Marketing\ Margin}$
   Where MME=Modified measure of marketing efficiency

2.3 *Two-stage least square regression analysis*

Two-stage least square regression analysis was used to estimate the socio-economic and institutional determinants of net-income. The technique was used to achieve objective (iii) of this study. The model is specified as thus;the structural equation is specified below;

$Y= \beta_o+ \beta_1X_1 +b_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5+\beta_6X_6+\beta_7X_7 + \varepsilon$ *1.6*
Where; Y=net-income (₦), X_1=age (Years), X_2= Experience (Years), X_3=Years in school (Years), X_4= initial capital (₦), X_5=household size (number), X_6=Commodity price (₦), X_7=Levy (₦) and ε=error term

However, X_1 is endogenous because it correlates with an immeasurable variable "ability" which is accounted for by ε. An instrumental variable "parents' income" was uncorrelated with ε. This satisfied the condition for two-stage least square regression analysis as stipulated by Qian (2014). The instrumental variable was used for the estimation of the reduced form of the equation as specified below; Reduced form of the equation

$X_1= \pi_o + \pi_1Z_i + \pi_2X2 + \pi_3X_3 + \pi_4X_4 + \pi_5X_5 + \pi_6X_6 + \pi_7X_7$ *1.7*

Where; Z_i =parents' income and $\pi_1\neq0$

3.0 Results and Discussion

3.1 Socio-economic Characteristics of Wholesale Fish Marketers

The result for the socio-economic characteristics of the wholesale fish marketers is presented in Table 1. The result shows that 6.67 % of the *wholesale fish marketers* in Kainji lake basin were within the age category of 21-30, 50.00 % were within the age category of 31-40 years and 36.66 % were within the age bracket of 41-50 years. The mean age of the *wholesale fish marketers* was 39.95 which imply that *wholesale fish marketing* in the area is dominated by "young people" or those within their youthful age. This is in accordance with the description of Hamid (2020) that fish marketers within the age bracket of 20-40 years are within their youthful age. Hence, one can see that wholesale fish marketing is quite an attractive enterprise for the young people. *Also, the result shows that 55.00 % of the wholesale fish marketers were men, 15.0 % were women and 30.00 % were youths. The result indicates that about 85 % of wholesale fish marketing in Kainji Lake basin is dominated by the men and youths. Even though this result agrees with Hamid (2020), it contradicts the results of Adedeji et al. (2019) and Girei, Ndanitsa and Ogezi (2021) that fish marketing is dominated by women. Their claims can best be understood if they were explicit in describing the marketing chain the women dominate, as one could perceive that women's participation in the fish marketing chain is high in the retail business.* Furthermore, the result shows that 25.00 % of the *wholesale fish marketers* had experience of 1-5 years, 30.00 % had 6-10 years of experience in *wholesale fish marketing,* 36.67 % had 11-15 years of experience and 8.33 % had 16-20 years of experience in *wholesale fish marketing*. The mean years of experience was 11.68 which agrees with the result of *Nwabeze et al. (2019) that fish marketers in Kainji Lake Basin had experience in fish marketing for more than 10 years. The number of years an entrepreneur is in business is an indication of the maturity of the business and a study by Njogu (2017) has shown that on the job experience is positively*

related with performance of the business. Moreover, the result shows that 55.00 % of the wholesale fish marketers spent 6-10 years in school, 33.33 % spent 11-15 years in schooland 11.67 % spent 16-20 years in school. The mean year in school was 10.12. This shows that the fish markers have attained some form of educational qualifications that will enable them enhance their level of interaction with clients from other climes. Hamid (2020) reported that fish marketers have at least one form of education which enhances the ease of adopting improved technology. Finally, the result shows that 43.33 % of the wholesale fish marketers had household size of 1-5 persons, 43.33 % had household size of 5-10 persons and 13.34

% had household size of 11-15 persons. The mean household size was 6.55 which indicate that the fish marketers in Kainji Lake Basin have relatively large household sizes. *The result is slightly consistent with the result of* Gerei, Ndanitsa and Ogezi (2021) that the majority of fish marketers in Toto local government area of Nasarawa state have household size of 6 persons. The large household size can be a good source of family labour; however, it could connote to high household demands in terms of feeding, education, health etc. The task of meeting large household needs may lead to poor management of the business, tampering with business capital and investment.

Table 1: Socio-economic characteristics of wholesale fish marketers

Variables	Percent	Mean
Age		39.95
21-30	6.67	
31-40	50.00	
41-50	36.66	
>50	6.67	
Gender		
Men (male > 35 years)	55.00	
Women (female >35 years)	15.00	
Youths (male/female <35 years)	30.00	
Experience		11.68
1-5	25.00	
6-10	30.00	
11-15	36.67	
16-20	8.33	
Years in school		10.26
6-10	55.00	
11-15	33.33	
16-20	11.67	
Household size		6.55
1-5	43.33	
6-10	43.33	
11-15	13.34	

Source: field survey, 2020

3.2 Cost and Returns, Profit Margins and Efficiency of Smoked Fish Marketing per Month

The result of the cost and returns, profit margins and efficiency of smoked fish marketing per Month is presented in Table 2. The result showed that total revenue of ₦5,294,432.18 was received from the sale of big, medium and small cartons of smoked catfish fish. The total expense incurred was ₦5,109,442.93 with a total marketing cost of ₦206,002.18. The net-income realized was ₦184,989.26 which implies that the wholesale fish marketers realize an amount in excess of total cost. This shows that smoked fish marketing is profitable, hence affirming the result of Adedeji et al (2019) and Hamid (2020). Also, the

value added to smoked fish was ₦390,991.44 which shows the economic benefit derived through value addition in agricultural products such as fish. Furthermore, the net-profit margin was 3.49% which means that to every ₦1 of sales, the smoke fish marketers earned the sum of 3 kobo as profit while the return on investment (ROI) was 3.62% which implies that to every ₦1 invested, the smoked fish marketers realized a sum equivalent to 4 kobo. The marketing efficiency on the other hand, was 189.79 % which shows that smoked fish marketing is efficient. Similarly, Osundare and Adedeji (2018) reported that fish marketing is highly efficient. This was further confirmed by Shepherd's and Acharya's efficiency ratios of 25.7 and 12.54 respectively.

Table 2: Cost and Returns, Profit Margins and Efficiency of Smoked Fish Marketing per Month

Variables	Unit	Outcome
Revenue		
a) Qty of Big Carton	Number	27.71
b) Qty of Medium Carton	Number	56.57
c) Qty of Small Carton	Number	68.52
d) Price of Big Carton	₦	56622.05
e) Price of Medium Carton	₦	38323.23
f) Price of Small Carton	₦	22731.33
g) Revenue Big Carton=a*d	₦	1568808.36
h) Revenue Medium Carton=b*e	₦	2168072.87
i) Revenue Small Carton=c*f	₦	1557550.96
Total Revenue=g+h+i	₦	**5294432.18**
Expenses		
Cost of processed fish	₦	4903440.74
Cost of packaging materials	₦	22061.31
Transportation cost	₦	152800.00
Wages	₦	22407.63
Labour (loading and Offloading)	₦	7640.00
Depreciation	₦	593.25
Tax/levy	₦	500.02
Total Expenses	₦	**5109442.93**
Total Marketing Cost	₦	**206002.18**
Value Added	₦	**390991.44**
Net Marketing Margin	₦	**184989.26**
Net-Profit Margin	%	**3.49**
Return on Investment	%	**3.62**
Marketing Efficiency	%	**189.79**
Shepherd's Efficiency	Ratio	**25.7**
Acharya's Efficiency (MME)	Ratio	**12.54**

Source: computation from field survey, 2020

3.3 Socio-economic and institutional determinants of Net-income of smoked fish marketers

The result of the socio-economic and institutional determinants of net-income of smoked fish marketers is presented in Table 3. The result showed that age, experience and levy were the significant socio-economic and institutional variables on net-income of smoked fish marketers. The variable "age" had a positive sign and was statistically significant ($P<0.05$) which implies that an increase in the age of the fish marketers will result to an increase in net-income. According to Omeje et al. (2021), age is a significant determinant of the amount of profit realized because age is an indication of the level of maturity in day-to-day business management. Also, experience was positive and statistically significant ($P<0.10$) which means that the years of experience is positively related to the profit realized by smoked fish marketers. The result is consistent with the findings of Offor, Okpara and Ibeagwa (2017) that years of experience is a significant determinant of net-income of fish marketers. Hence, it implies that the longer the years of experience in smoked fish marketing, the higher the amount of net-income realized *ceteris paribus*. Finally, the variable "levy" was negative and statistically significant ($p<0.05$) on net-income of wholesale marketers. This implies that an increase in levies charged on wholesale marketing of smoked fish will result to a decrease in net-income of wholesale fish marketers. Similarly, Kabwe and Zulu (2017) reported that an increase in levies increased production cost as well as the cost of trading. This result is plausible since levy is accounted for as cost in business accounting.

Other variables such as; years in school, household size, initial capital and commodity price were statistically not significant ($p<0.05$ or $p<0.1$), hence not considered as significant determinants of net-income of wholesale fish marketers. The R-squared was 0.5032 which implies that about 50% variation in net-income of wholesale fish marketers is influenced by the socio-economic and institutional variables. Also, the prob>Chi^2 was statistically significant at 1% level implying that one of the coefficients of the socio-economic and institutional characteristics is not equal to zero; thus, correctly influencing the variation of net-income of actors in the aquaculture value chain.

Table 3: Socio-economic and institutional determinants of Net-income of smoked fish marketers

Variables	OLS Estimates		2SLS Estimates	
	Coef.	t	Coef.	T
Age	0.0727	2.98	0.8305	2.02**
Experience	0.3931	2.42	0.8133	1.94*
Years in school	0.0479	0.80	0.0014	0.11
Household size	0.0039	0.38	0.0056	0.36
Initial capital	0.0088	0.06	0.0368	0.23
Commodity price	0.3120	1.24	0.3583	1.33
Levy	-0.0251	2.48	-0.0290	-2.50**
R-squared	0.6078		0.5032	
Adj R-squared	0.5550			
Wald Chi-Square			74.03	
Prob>Chi^2			0.00	

Source: computation from field survey, 2020   **=sig. at 0.05; *=sig. at 0.10

3.4 Challenges of wholesale fish marketing

The challenges of wholesale fish marketing are presented in Table 4. The result showed that poor pricing ranked first ($\bar{x}$=3.88) as a very serious challenge in wholesale fish marketing. This is because most fish marketers expect good prices for their products; however, due to the presence of middlemen in major market centers, the prices are usually negotiated at a rate below the expectations of the wholesale fish marketers. It was based on this bottleneck the marketers proposed a tradeoff on price regulation by market unions. This will enable market unions set an acceptable price for the product that will be quite rewarding to both wholesale marketers and middlemen. Furthermore, high cost of transportation ranked second as a serious challenge with a mean score of $\bar{x}$=3.28. High cost of transportation increases the marketing cost of fish which adds to production

cost as reported by Kabwe and Zulu (2017). However, the wholesale fish marketers pointed out that rising cost of fuel used for transport was the major factor behind the rise in transportation cost. Hence, subsidy on petrol/diesel or other alternative of low-cost petrol/diesel supply such as; government regularized price control on local refining of crude oil should be implemented. Finally, access to capital ranked third with a mean score of $\bar{x}$=2.8. Wholesale fish marketing requires large amount of capital because of the lofty cost of purchasing large volume of processed fish that will be packed in cartons for transport to market centers. This result is consistent with Agbebi and Adetuwo (2018) that inadequate capital as well as access to credit is a major constraint faced by fish marketers. According to Hamid (2020), in order to finance smoked fish marketing, timely access to low interest rate credit facilities is required to facilitate and sustain efficient and effective marketing processes.

Table 4: Challenges of wholesale fish marketing

S/N	Challenges	Mean	Rank	Inference	What can be done to solve this problem
1	Access to Capital	2.80	3rd	SC	Provide easy platforms for accessing formal credit facilities at low interest rate
2	Lack of regulations guiding enterprise	2.15	4th		
3	Shortage of packaging materials	2.03	5th		
4	Poor pricing	3.88	1st	VSC	There should be a tradeoff on price regulation by market unions
5	High cost of transportation charges	3.28	2nd	SC	Provide subsidy on petrol/diesel or make alternatives for low cost petrol/diesel
6	Excessive association levies	1.50	7th		
7	Insufficient transportation channels	2.03	5th		
8	Poor demand of fish in major markets	1.82	6th		

Source: computation from field survey, 2020

4.0 Conclusion and Recommendations

The study showed that wholesale marketing of smoked catfish is profitable with high level of marketing efficiency. Also, the major socio-economic and institutional determinants of net-income were age, years of experience and levy while the major challenges of fish marketing were poor pricing, high cost of transportation and access to capital. It is based on these findings the study recommends that there should be effective price regulations by market unions to stabilize prices of fish in major market centers.

References

Adedeji, T., Osundare, F. and Ajiboye, A. (2019). Profitability and marketing efficiency of smoked fish: An empirical evidence from Ondo State, Nigeria. *International Journal of Agricultural Extension and Rural Development Studies*, *6*(3), 26–33.

Adeosun, K. P., Ume, C.O. &Ezugwu, R. U. (2019). Analysis of socio-economic factors of fish pond production in Enugu State, Nigeria. *Journal of Tropical Agriculture*, *57*(1), 27–34.

Agbebi, F.O. and Adetuwo, K. I. (2018). Analysis of Socio-Economic Factors Affecting Fish Marketing in Igbokoda Fish Market, Ondo State, Ngeria. *International Journal of Environment, Agriculture and Biotechnology (IJEAB)*, *3*(2), 512–521.

Alabi, O. T., Olaoye, O. J., George, F. O. A., Adeola, A. A. Alabi, J. O. and Ojebiyi, W. G. (2020). Awareness and adoption levels of improved smoking oven among fish processors in Lagos Lagoon, Nigeria. *Ghana Jnl Agric. Sci.*, *55*(2), 39 – 58.

Bello, M. M., Sani, H., Bukar, A. and Rabiu, M. M. (2017). The Economic Effect of Insurgency on Smoked Fish Sellers in Maiduguri Metropolis of Borno State Nigeria. *Journal of Agricultural Extension*, *21*(37–45).

Girei, A. A., Ndanitsa, M. A. Ogezi, E. and, & Imam, M. I. (2021). Smoked and fresh fish marketing in Toto Local Government Area of Nasarawa State, Nigeria: a comparative analysis. *Acta Sci. Pol. Zootechnica*, *20*(1), 15–26.

Hamid, M. Y. (2020). Analysis of Smoked Fish Marketing in Mubi North Local Government Area, Adamawa State. *International Journal of Forest, Animal and Fisheries Research (IJFAF)*, *4*(4), 52–63.

Ike-Obasi, J. and Ogubunka, S. O. (2019). The Roles of Women in Fish Processing Activities in Some Local Government Areas of Rivers State, Nigeria. *Agricultural Extension Journal*, *3*(2), 73–77.

Kabwe, S. and Zulu, C. (2017). *Agricultural Trade: A qualitative analysis of effects of crop levies on grain trade in Zambia. Indaba Agricultural Policy Research Institute (IAPRI)* (No. 127).

Njogu, I. W. (2017). *Effects of employees' work experience on performance within hotel industry: A case of Amber Hotel, Kenya.*

Nwabeze, G. O., Faleke, S., Tanko, M. and Malgwi, Y. Y. (2019). Strategies Use by Smoked Fish Marketers in Kainji Lake Basin, Nigeria. *Journal of Agricultural Extension*, *23*(1), 54–65.

Offor, E. I., Okpara, B. O. and Ibeagwa, O. B. (2017). Determinants of Net Return among fish marketers in Port Harcourt Local Government Area of River State, Nigeria. *The Nigerian Agricultural Journal*, *48*(1), 159–168.

Omeje, J. E., Achike, A. I., Arene, C. J., Faleke, S. A., Manuwuike, Q. C. and Usman, G. A. (2021). Socio-economic determinants of net-income in fish farming in Kainji Lake Basin, Nigeria. *Global Journal of Agricultural Sciences*, *20*, 53–61.

Omeje, J. E., Achike, A. I., Arene, C. J., Ifejika, P. I. and Ifejika, L. I. (2020). Participation of Stakeholders in Aquaculture Value Chain of the West African Agricultural Productivity Programme in Nigeria. *Journal of Agricultural Extension*, *24*(4), 39–52.

Osundare, F. and Adedeji, T. (2018). Economic Analysis of Market Performance of Fresh Fish in Lagos State, Nigeria. *International Journal of Environment, Agriculture and Biotechnology (IJEAB)*, *3*(2), 594–599.

Qian, J. (2014). *Dealing with endogeneity*. Retrieved from http:// jhqian.org /ec310 /06endogeneity. pdf % 0A%0A

Upadhyay, A. D., Singh, S. G., Pandey, D. K., Singh, Y. J. and Pal, P. (2020). Profitability, efficiency and gender equity in smoked fish value chain of North Eastern Region of India. *Journal of Entomology and Zoology Studies*, *8*(6), 1029–1035.