

Analysis of determinants and constraints in the sales performance of cultured fish produced by cultured fish producer-marketers in Benue State, Nigeria

Nuhu Boniface Ibrahim^{1*} and Jummai Peter²

¹Department of Agribusiness, Joseph Sarwuan Tarka University, Makurdi, Benue State, Nigeria.

²Department of Agricultural Technology, Federal College of Fresh Water Fisheries Technology
New-Bussa, Niger State, Nigeria.

*Corresponding author. Email: bonnynuhu@gmail.com, nuhu@fuwukari.edu.ng; Tel: +234-8104132255.

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ABSTRACT: The study was conducted to analyze the factors that determine the sales performance and the constraints that producer-marketers encounter in producing and marketing cultured fish in Benue State, Nigeria. Respondents for the study were selected using a multi-stage sampling technique. Three hundred (300) fish producer-marketers were used for the study, and a structured questionnaire was used to collect data. 299 of the questionnaires returned valid, and data collected were analyzed with the use of multiple regression and factor analysis. Findings show that the coefficients of the independent variables of age, experience, cooperative membership, contact with extension agent, start-up capital, technology application, market research training, and a few other variables are significant at various levels. The coefficient of age was significant at a 1% level and negatively related to cultured fish sales. The negative sign of the coefficient conforms to the a priori expectation, indicating that as age increases by 1 year, fish sales decrease by 0.011%, an indication that as the producer-marketer advances in age, energy and stamina give way, thereby having a negative impact on the productivity of the enterprise. Constraints encountered by the cultured fish producer-marketers surveyed are categorized and based on factors loading, key among which were middlemen-related factors such as activities of middlemen (0.465) and union activities (0.746). The study shows that socioeconomic factors such as the age, household size, and experience of respondents are critical variables that determine the sales performance of cultured fish in the study area. Major constraints were the activities of middlemen and the cost of transportation. It is recommended that the government and relevant stakeholders come up with policies and other initiatives that will encourage young people to embrace the fish-cultivation business while deploying modern techniques and strategies to ensure healthy competition and enhanced profitability in the aquaculture business.

Keywords: Benue State, constraints, cultured fish, determinants, Nigeria, producer-marketers, sales performance.

INTRODUCTION

The increase in the human population and the need for improved health has seen a significant increase in the need for protein in the human diet. The need for protein is more critical in the tropical region in which lies most of the developing countries (Ayanboye *et al.*, 2015). Fish is a preferred protein source as it supplies essential nutrients that are lacking in other diets, and its consumption is not forbidden within religious groups; unlike the eating of dog meat and pork which are forbidden in some religion such

as Islam (Agbelege and Ipinjolu, 2003). Fish plays an important role in the human diet in Nigerian cities, towns, and villages. In Benue State, fish provides 77% of the total animal protein intake (Salam *et al.*, 2005), while it constitutes about 16% to world animal protein consumption (FAO, 2010). Fish may be a preferred source of protein, but its sale has to do with the ability of the producer-marketer to meet the taste and needs of consumers. This means that marketing efforts should be

intensified to boost fish production, improve quality, and make it available to buyers in the right place, at the right time, and at the right price. Reports show that the fresh fish market in Benue State seems to be saturated with products; however, producers and marketers of cultured fish are inundated with unsold stock and have to devise strategies to preserve harvested fish for future sales (Salam *et al.*, 2005).

The marketing process plays a critical role in fish production and, ultimately, its sales. This is because it is only when the fish gets to the consumers that production is said to be complete. Fish and fish-related products are highly traded commodities; hence, their production is a necessary part of the marketing function activity value chain. Components of the marketing functions allow sellers the greatest opportunities to increase sales and achieve competitive advantages (Mutambuki and Orwa, 2014).

In order to improve sales, the fish producer-marketer needs to be involved in sales promotion activities such as direct marketing, advertising, and publicity. Core competencies are strategic functions that can be embarked on by the fish producer-marketer by introducing the latest technology application, efficient and effective human resource management, hiring of competent personnel, strategic management, and robust application of financial and other relevant resources. Market positioning for fish enterprise may include online marketing, market segmentation, effective communication and use of appropriate distribution channels as well as target marketing. Marketing is seen as a system with definite functions, and these functions are classified into three main categories, namely: physical, facilitating and exchange functions; the three functions operate in synergy if they are inter-woven, i.e. one gradually leads to another in series and then steadily merges together (Ayanboye *et al.*, 2015).

METHODOLOGY

Study area

This research was conducted in Benue State, which is located in the North Central region of Nigeria and lies between latitudes 6°25'N and 8°8'N and longitudes 7°47'E and 10°E' (Salam *et al.*, 2005). The state has a total land mass of about 33,955 square kilometers and a population size of 5,741,815 (National Population Commission, 2017). The average population density of the state is 99 persons per square kilometer. The prevalence of loamy-clay soil in the state makes it suitable for earthen fish cultivation.

Population of the study

The population of the study was drawn from the membership of the Fish Producers' Association of Nigeria,

Benue State Branch. At the time of conducting this study, the Association's record shows that there are one thousand two hundred (1200) registered members, which was adopted for this research.

(Source: Fish Producers Association of Nigeria, Benue State Chapter data 2024).

Determination of study sample

The study used the Yamene (1967) formula to determine the sample size used for the study. The Taro Yamene formula is given by:

$$n = \frac{N}{1 + N(e)^2}$$

Where: n = the required sample size, N = the population, e = Sample error.

From the adopted population of 1,200 fish producer-marketers in the study area, a confidence level of 95% and a tolerable level of 5% was set.

Using the Taro Yamene formula, the sample size was determined thus:

$$n = ?, N = 1200, e = 5\%$$

Therefore:

$$n = \frac{1200}{1 + 1200(0.05)^2}$$

$$n = \frac{1200}{1 + 3}$$

$$n = \frac{1200}{4}$$

$$n = 300$$

Thus, the sample size of the study was 300 cultured fish producer-marketers. A purposive sampling technique was then used to identify the most prolific fish-producing local government areas in Benue State (sourced from Benue State Ministry of Agriculture). Similarly, two LGAs from each of the three geopolitical zones were randomly selected to represent each zone. Again, using purposive sampling, fifty (50) fish production enterprises were identified in each of the six (6) LGAs and used for the study.

Method of data collection

The study adopted the use of a questionnaire and a scheduled method of data collection to generate relevant

information from respondents. In addition to a structured questionnaire, the researcher used the scheduled call to clarify doubts and offer necessary explanations to aid appropriate responses.

Analytical framework

The analytical framework necessary for data analysis was carefully selected and explained to achieve the study's specific objectives. Multiple linear regression and factor analysis were used for the analysis of data collected for the study.

RESULTS AND DISCUSSION

Determinants of cultured fish sales performance

Table 1 is a representation of the determinants of cultured fish sales by producer-marketers. The multiple linear regression model was used in the analysis of determinants of cultured fish sales performance in the study area. The double log function was selected as the lead equation; this choice was based on the *a priori* expectation and the large number of statistical significance of the estimated regression coefficients. The double log function had the best fit and was selected as the lead equation for the analysis. The result in Table 1 indicates that a 78.95% variation in fish sales was explained by the independent variables included in the multiple linear regression model, as shown by the R^2 , which is the coefficient of determination. The implication is that 21.05% of the variations in the sales of fish were caused by factors not included in the model.

The coefficient of age was significant at 5% and negatively related to fish sales. The negative sign of the coefficient conforms to the *a priori* expectation, indicating that as age increases by 1%, fish sales decrease by 0.91%, showing that there is no significant correlation between the variables. This result is in conformity with a study by Iliyasu *et al.* (2011), who reported a negative relationship between age and fish sales.

Further analysis of the result shows that household size was significant at 10% levels and positively related to fish sales. The positive sign of the coefficient is in line with the *a priori* expectation, which indicates that as household size increases by 1%, fish sales increase by 0.50%. The household includes members of the producer-marketers' family who live in the same physical space and help out with domestic and other business ventures of the family; hence, an increase in members of the household reflects on the level of production and helps boost business due to the availability of additional and cheaper labour. This aligns with Apata (2012), whose study reported a positive relationship between fish production and sales and household size. According to Omiti *et al.* (2009), this

implies the availability of labour for the production and increased saving of cash, which is a good source of extra income to meet the needs of the family.

Analysis of the result shows that there is a negative relationship between education and fish sales in the study area; the coefficient of education was negative at a 1% significance level. The negative sign conforms to the *a priori* expectation that as the education of the fish producer-marketer increases by 1%, fish sales decrease by 2.33%. This implies that as fish producer-marketers acquire more education, there is the tendency of inadequate attention to the business and a shift of focus to other sources of income.

The coefficient of experience acquired by fish producer-marketers is positive and significant at 1%. A positive sign is an indication that there is a positive relationship between experience and fish sales; the implication is that as the fish producer-marketer experience increases by 1%, fish sales increase by 0.94%. Consistent and repeated actions indulged by the cultured fish producer-marketer aimed at improving and growing the business will generally have a positive effect on the productivity and profitability of the business over time. This result is in agreement with Madugu (2011), whose work reported a positive relationship between the experience garnered by fish marketers and the sales volume achieved.

Cultured fish producer-marketers' contact with extension agents had a positive coefficient of 0.25 and was significant at 1%. The positive sign conforms to the *a priori* expectation that contact with extension agents will reflect a 0.25% increase in fish sales. Extension agents play a vital role in educating fish farmers on the various relevant aspects of their operations and thereby enhance productivity. The result is consistent with the position of Okunlola *et al.* (2011) that good access to extension agents bring about practical demonstration of innovation, which eventually brings about understanding and application.

The coefficient of annual marketing income of cultured fish producer-marketers in the study area is negative at a 1% significance level. The implication here is that as the annual marketing income of fish producer-marketers increases by 1%, fish sales decrease by 0.55%, an indication that an increase in marketing cost decreases profit. Suleiman (2007) reported that marketing income depletes the overall income of a business because cost-related avenues are opened to inject funds in order to attract customer attention, especially in the short run.

Constraints of cultured fish production and sales

Factor analysis was used to identify factors that are constraining cultured fish sales performance in the study area. Kaiser's rule of thumb of 0.4 was used as a minimum point that a variable will load before it can be accepted as having an effect on the sales of cultured fish. The study

Table 1. Determinants of cultured fish sales among producer-marketers in the study area.

Variables	Coefficient	Standard Error	T-Statistics
Sex	-0.13 ^{NS}	0.13	-0.98
Age	-0.91 ^{**}	0.41	-2.23
Marital Status	0.17 ^{NS}	0.21	0.82
Household size	0.50 [*]	0.27	1.87
Education	-2.33 ^{***}	0.80	-2.92
Experience	0.94 ^{***}	0.24	4.02
Membership of Coop	-0.21 ^{NS}	0.32	-0.65
Contact with Ext. Agent	0.25 [*]	0.14	1.80
Annual Marketing Income	-0.55 ^{***}	0.19	-2.88
Access to credit	-0.02 ^{NS}	0.15	-0.14
Off-farm business involvement	-0.02 ^{NS}	0.18	-0.10
Fish farm status	-0.19 ^{NS}	0.24	-0.79
Start-up capital	-0.12 ^{NS}	0.09	-1.26
Dependent Ratio	-0.14 ^{NS}	0.19	-0.77
Marketing Cost	0.25 ^{NS}	0.18	1.38
Technology Application	-0.01 ^{NS}	0.05	-0.19
Market Research Training	0.21 ^{NS}	0.13	1.65
Constant	21.83 ^{***}	3.05	7.17
R-Square	0.7895		
Adjusted R-Square	0.7023		
F-Value	9.05 ^{***}		

Source: Field Survey, 2024.

*Significant @10% **Significant @5% ***Significant @1%NS = Not Significant.

Lead Equation - Double - Log Function.

Table 2. Constraint of cultured fish production and sales.

Middlemen Factors	Production factors	Price factors	Handling factors	Transportation factors	Capital factors
Activities of middlemen (0.465)*	Poor production system (0.604)	Price fluctuation (0.726)	Poor handling and processing (0.600)	High cost of transportation (0.768)	Lack of capital (0.50)
Union activities (0.746)	Inadequate space for selling fish (0.673)	Low market prices (0.552)	Lack of standard unit of measurement (0.516)		
	Lack of stable electricity (0.808)	Low income of the population (0.790)			

Source: Field Survey, 2024.

*Values in bracket are factor loading.

identified the activities of middlemen, production capacity, price fluctuation, fish processing and handling, high cost of transportation, and lack or insufficient operational capital as some of the challenges that can influence the sales of cultured fish in the study area. These constraints are categorized into six (6) factors, as shown in Table 2.

Based on factor loading, the following middlemen-related factors identified as constraints were extracted: activities of middlemen (0.465) and union activities (0.746). Production factors are poor production systems (0.604), inadequate space for selling fish (0.673), and a lack of stable electricity (0.808). Under the price factor,

three variables were identified as constraints, and these are price fluctuation (0.726), low market prices (0.552), and low income of the population (0.790). Handling of products is another factor, where we have poor handling and processing (0.600) and lack of standard unit of measurement (0.516). Transportation constraint involves high cost of transportation (0.768), and finally, we have under the capital factors, lack of capital required for operations. These findings are in agreement with Onoja *et al.* (2012), who identified that some social constraints serve as militating constraints to the profitable production and marketing of pond fish.

Ayanboye *et al.* (2015) observed that the cost of transportation is a huge challenge for fresh fish enterprises because failure to reach the markets with their commodities can result in large-scale losses due to the perishable nature of these products. Akinneye *et al.* (2007) reported that non-availability of adequate transportation (roads, vehicles, rails etc.) also hinders effective distribution of goods from one point to another. Another main constraint of fish marketing in the low-income sector of the population is price. It should be noted that prices are likely to be high in areas close to large and growing urban markets with access to good transportation systems. There is clearly a demand for fresh fish in both the urban and rural areas, and all fish cultivated are easily sold in rural areas. Rural producers assume that a premium price will be paid for fish in the urban or sub-urban markets but are faced with transportation problems (Nwabunike, 2015). Omitoyin and Okeowo (2015) noted that price fluctuation is a critical challenge that hampers the development of the cultured fish business. The impact of globalization has a negative influence on fish marketing and distribution in Nigeria; it has proven to be a disincentive to their operations due to the influx of cheaper-priced imported fish into the country.

The post-harvest, which primarily involves processing, storage, and preservation, is in the lowest ebb. It should be noted that fish products are extremely fragile, and the type of physio-chemical techniques used in processing and conservation have a large part to play in targeting the market and the prices.

Conclusion

Findings in this study show that the determinants of cultured fish sales performance are strongly related to facilitating socioeconomic factors such as age, household size, experience, interface with extension workers, and membership of cooperative societies. It also revealed that cultured fish-producer-marketers are encumbered by so many militating factors that have a strong tendency to discourage investment in the sector. With an average annual income of over 4 million Naira (Benue State Ministry of Agriculture, 2022), cultured fish production and marketing has shown to be a highly profitable business venture that has the potential to positively influence the economy of the State and Nigeria as a whole if fully supported and harnessed by stakeholders, especially the government.

Recommendations

From the findings of the study, the following recommendations suffice;

1. More women should be encouraged to embrace cultured fish production and marketing; needless to

emphasize the impact and contribution of women in household income and the general wellbeing of families.

2. There is a need for cultured fish producer-marketers to embrace the use of improved technologies in their business, such as the use of ICT to aid ease of communication and contact with extension agents and; adoption of innovative processing and preservation methods to minimize losses related to spoilage and significantly increase the shelf life of harvested fish.
3. The government should engage more with cultured fish producer-marketers through extension services to regularly educate and update them with information on modern and cost-effective methods of operation as well as the rearing of resistant or quality species of fish.
4. Undoubtedly, investment capital is a major constraint for businesses in Nigeria, and cultured fish producer-marketers are not exempted from the effects of the dearth of business capital. In order to support them, the government should develop and implement policies that are mutually beneficial to all stakeholders to enable ease of access to capital to start and boost cultured fish production and marketing business.
5. The government can further support cultured fish producer-marketers by direct intervention to protect them from the activities of unscrupulous middlemen through effective regulation.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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