

FACTORS AFFECTING EARNINGS OF TRAWLING VESSELS IN NIGERIA

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Abstract

This study examined the determinants of trawling vessels total earnings in Nigeria. Random sampling techniques were used to select 60 trawling vessels comprising large and small vessels. Data were collected with aid of pre-tested questionnaire and personal interview with the captains of vessels. Data analysis was facilitated by means of multiple regression techniques using the SPSS 20.0 version. Results from the study show that all the explanatory variables in the model (quantity of fish landed, prices obtained and size of vessel) have a positive sign. Of the three explanatory variables, only quantity of fish landed by a vessel was statistically significant at the 5 per cent level of probability ($P < 0.05$) showing that it is the dominant factor accounting for variation in the earning of vessels. To increase quantity of fish landings and hence earnings of vessels, the study recommends that the activities of pirates and militants who restrict access to some fishing grounds be checkmated by maritime security agencies, use of vessels with sophisticated technology for fish detection and capture, optimum selection of fishing gear and employment of well trained and experienced captain and engineer.

Keywords: trawling, vessels, earnings, landings, fishing gear

Introduction

The revenue of a firm together with its costs determine profits (Jhinghan, 1997). For trawling vessels, revenue or earnings refers to the receipts obtained by vessels from the sale of certain quantities of fishery products at various prices. The role of the fishery sub-sector of the Nigerian economy is well recognized in terms of its contribution to food security, employment and income generation, foreign exchange earnings from the sale of shrimps as well as provision of raw materials for livestock feed industry. The industrial fishery sub-sector plays a critical role in the realization of the objective of the overall fisheries policy of the nation by providing a substantial proportion of fishery products consumed in the country. For industrial fishery sub-sector to continue to play its role in the Nigerian economy, trawling vessels must be seen to operate profitably. The earnings of vessels and costs determine to a great extent its profitability. Profitability is a major index of viability of a trawling vessel which could serve as a signal to attract investors. In recent times, the number of trawling vessels operating in Nigeria's territorial waters have been on the decline. The extent to which a trawling vessel is able to make profit is critical to the survival of the industrial fishery sub-sector. Presently not much is known empirically regarding the factors which influence the gross earnings of trawling vessels in Nigeria; previous work by Effiong, Aligbe, Uzoho and

Eze (2016a&b) had centred on the analysis of economic and financial performance of trawling vessels as well as its cost structure. This study examines the factors that influence the gross earnings of vessels as a first step in determining profitability. A study of this nature is expected to give insight on measures that could be adopted by vessel operators to increase the size of their gross earnings.

Literature Review

FAO (2000) and Tietze (2005) pointed out that revenues depend on species and quantities caught and prices obtained which again depend on marketing channels and markets, seasonal fluctuations and other factors. Low or negative profitability usually indicates that fishstocks are exploited in an economically wasteful manner and fishing capacity and effort are excessive on both economic and biological grounds (Caddy & Mahon, 1995; Pauly & Christenten, 1995). Only in rare instances would low productivity result from an unfavourable combination of relatively low fish price and high fishing costs. Most commercial fish stocks can yield high satisfactory returns on investment with present fishing technologies and when subjected to effective fisheries management. In a theoretically perfect market economy, profit would be equal to resource rent as all inputs and outputs are correctly priced at their opportunity cost or willingness to pay level (FAO, 1999). Fishing vessels are capable of producing considerable levels of economic profits, but these profits will decline as a fishery becomes increasingly overcapitalized, the fish stocks deteriorate, and overfishing occurs. Hence a decline in the average profitability of the fleet is most likely associated with overcapacity even though overcapacity itself is also affected by changes in prices and costs (FAO, 2008).

Essien (1982) reported that the level of fish production in a vessel depends on the quality of the Captain and the Engineer. Mabawonku (1982) stresses that volume of catch varies according to whether there is full moon or not. During full moon, the volume of catch is often meager relative to the period when the moon has disappeared. This fact is corroborated by Essien (1982) who stressed that fish landing by vessels vary depending on the tide and season. The study further observed that fish migration also affects total catch as well as varieties of fish caught. However, the volume of catch can be invariant with respect to migration among those vessels who fish far away.

Trawling gear is the most important commercial method of fish capture in Nigeria. Essential studies conducted on the resistance of bottom trawled gear and effective utilization of power has made it possible to evolve new designs of demersal fish trawled gear suitable for medium sized trawlers. The effect of large mesh sizes (101.6-127mm) used in fabricating front parts of demersal trawl nets; to increase fish landings have been successfully demonstrated. Simultaneously, experiments with otter boards of different shapes to increase efficiency in the trawling technique have been undertaken. V-shaped metal otter boards have been found to be relatively more effective in demersal fish trawling than the traditional flat wooden otter boards (Udolisa 1975).

Udolisa and Solarin (1982) proposed that improvement in the efficiency of trawling through optimum selection of fishing gear components will provide substantial benefits for the inshore trawler fishermen. It is also often essential to consider the whole fishing unit such as the trawler, rigging and the trawl net with its fish catch contents since these and their inter-relationships between them have important role on determining trawling efficiency.

Mabawonku (1982) observed that abundance of an area in terms of the stock and variety of fish often determine the level of earnings in a vessel and that historical exploitation of fishery resources appears to influence the volume and variety of fish catch. Furthermore, disparity in earnings among vessels can be attributed to the number of vessels operating within a particular fishing zone and the abundance of fish stock in that area.

Methodology

All licensed trawling vessels operating in Nigeria, both Nigerian flagged and foreign flagged registered were involved in this study. The list of licensed vessels operating in Nigeria was obtained from the Federal Department of Fisheries (FDF) from which 60 trawling vessels were randomly selected. A total of 60 copies of questionnaire were administered to the captains of these vessels. Hence $n = 60$

Analytical Technique

The factors influencing the gross earnings of trawling vessels will be facilitated by means of multiple regression analysis. The functional relationship can be stated thus:

$$R_v = f(Q_t, P_c, S_v, e_i) \dots\dots\dots 1$$

Where

- R_v = Total earnings of vessels (measured in Naira)
- Q_t = Quantity of fish or shrimps caught (measured in metric tonnes)
- P_c = Price of fish or shrimps/tonne (measured in Naira)
- S_v = Size of vessel (measured in metres [length overall LOA]) This is a dummy variable.
0 for small vessels (10m-17m LOA) while 1 for large vessels (18mLOA and above)
- e_i = Error term

A multiple regression model with Gross earnings as dependent variable and quantity of fish or shrimps caught, price of fish or shrimps and cost of trawling operations and size of vessel as independent variables was estimated using the OLS method of multiple regression analysis. All the assumptions underlying the OLS method is assumed to hold in this study.

$$R_v = P_0 + b_1 Q_t + b_2 P_c + b_3 S_v + e_i \dots\dots\dots 2$$

Where

- P_0 = Constant term
- B_s = unknown coefficients to be estimated

Data was fitted with four functional forms of the regression model, namely linear, exponential, semi-log and double log. The one that gives the best fit in terms of standard error, value of co-efficient of multiple determination, number of significant variables and other econometric criteria was chosen as the lead equation. The functional forms are given as:

$$\text{Linear: } R_v = \beta_0 + \beta_1 Q_t + \beta_2 P_c + \beta_3 S_v + e_i \dots\dots\dots 3$$

$$\text{Exponential: } \log R_v = \beta_0 + \beta_1 Q_t + \beta_2 P_c + \beta_3 S_v + e_i \dots\dots\dots 4$$

$$\text{Semi-log: } R_v = \beta_0 + \beta_1 \log Q_t + \beta_2 \log P_c + \beta_3 \log S_v + e_i \dots\dots\dots 5$$

$$\text{Double Log: } \log R_v = \beta_0 + \beta_1 \log Q_t + \beta_2 \log P_c + \beta_3 \log S_v + e_i \dots\dots\dots 6$$

Results and Discussion

4.7 Factors Affecting Revenue of Trawling Vessels

The estimated regression coefficients of quantity of fish landed, prices obtained and size of vessel as determinants of trawling vessel total earnings is represented in Table 1. Data was fitted to four functional forms of Linear, Exponential, Semi-log and Double log and analyzed using the SPSS 20.0 statistical package. Out of the outputs of the four functional forms, the Exponential output was the best in terms of signs, magnitudes and number of significant parameter estimates and was therefore chosen as the lead equation. The result show that 95.6 per cent of the variation in the dependent variable (total earnings of trawling vessels) is accounted for by the independent variables i.e. Quantity of fish landed, prices obtained and size of vessels showing that the R^2 is highly significant. The estimated coefficients of the explanatory variables show that quantity of fish landed (Qt), prices obtained (Pc), and size of vessels (Sv) has a positive sign. This conforms with our *a priori* expectation. This implies that total earnings of trawling vessels increases with increase in the quantity of fish landed, prices obtained and vessel size. This accounts for the high multiple R obtained. The F- value of the equation is statistically significant at the 5 per cent level and suggests that the joint influence of all the explanatory variables on the earnings of trawling vessels is strong. Of the three explanatory variables, only quantity of fish landed was statistically significant at the 5 per cent level showing that it is the determinant factor accounting for the variation in the earnings of trawlers. The magnitude of the coefficient of price obtained (5.173E-008) even though not statistically significant show the possibility of increasing earnings of trawling vessels by targeting fishing grounds where species of high economic value abound and also by establishing direct retail outlets to sell fishery products directly to consumers. By avoiding middlemen and the margin accruing to them, vessel operators can get the benefit of full retail price for their products which are higher than selling through intermediaries. This finding agrees with Solarin and Udolisa(1982), FAO(2000), and Tietze (2005).

Table 1 : Estimated Regression Parameters for Determinants of Trawling Vessels Total Earnings

Variable	Linear	Semi-log	Double-log	Exponential
Constant term	-13574093.79 (4815892.815)	-387419603.2 (20563960.32)	.07817 (.224)	16.991 (.056)
Quantity of fish	542823.848**(19765.841)	90715174.65** (4266050.429)	1.109** (.046)	.007** (.000)
Price of Fish	1.468 (10.084)	314063.465 (408192.371)	.002 (.0004)	5.173E-008 (.000)
Size of Vessel	120453.126 (1793093.560)	824233.117 (2264020.235)	.009 (.025)	.002 (.021)
Standard Error of Estimate	5626638.835	7173559.824	.07817	.06524
R^2	.952	.920	.935	.956
Adjusted R^2	.949	.915	.931	.954
F-value	358.156**	213.874**	268.232**	392.479**
N	60	60	60	60

Source: Survey Data, 2015

Note: Figures in parenthesis are standard errors

**** means significant at the 5 per cent level**

Conclusion and Recommendations

To increase quantity of fish landed and hence increase total earnings of trawlers, this study recommends that the activities of pirates/militants who restrict access to some fishing grounds should be checkmated by relevant maritime security agencies, use of vessels with sophisticated technology for fish detection and capture, optimum selection of fishing gear and well trained captain and engineer. The level of fish production in a vessel depends on the quality of the Captain and the Engineer. At present there are no sufficient qualified and experienced Captains and Engineers to man the operations of trawling vessels effectively; this underscores the need for maritime training institutions to train indigenous persons to play active part in maritime sub-sector in line with the requirements of the Cabotage Act 2005.

Closure season as is enshrined in the Sea Fisheries Act should be enforced to protect spawning stock and to further replenish exploitable stock.

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