

Evaluation of Performance of Trawling Vessels operating in Nigeria

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Abstract

The study was carried out to present an empirical evaluation of the performance of trawling vessels operating in Nigeria. A cross section of 60 vessels comprising large and small, fishing and shrimping were surveyed. Economic performance was analyzed as a ratio between Net Cash Flow and Total Earnings while Financial performance was assessed with the help of Return on Investment (ROI). Empirical results from the study shows that all classes of vessels recorded a positive net cash flow and fully recovered their operational costs. Indices of economic performance (Ep) for small, large, fishing and shrimping vessels were 0.33, 0.38, 0.44, and 0.53 respectively. This represents the percentage of total earnings earned as net profit. Indices of financial performance (ROI) for small, large, fishing and shrimping vessels were 24.5%, 29.9%, 38% and 48.5% respectively. These values show the generative capacity of investment capital for each of the trawling vessels. To increase the earning capacity of trawling vessels and to attract more investors into the industrial fishery sub-sector, direct allocation of Automotive Gas Oil (fuel) to vessel operators is recommended as a measure of reducing the high price of fuel. The Navy should be equipped and repositioned to tackle the incidence of piracy and sea robbery.

Keywords: fishery, performance, trawling vessels, net cash flow, investment outlay

Introduction

The industrial fishery sub-sector occupies an important place in Nigeria's economy by boosting food security through the supply of fishery products, provision of employment and generation of foreign exchange through the export of shrimps. There is an urgent need to conduct analyses to determine the viability of investment in trawling vessels. This is in view of the fact that in recent times, the number of fishing vessels operating in Nigeria's territorial waters have been on the decline. This is buttressed by the fact that as at 1995, there were a total of 315 trawling vessels operating in Nigeria, while in 2012, the number had reduced to 191. Olawuyi (1992) and Amire (2009) attributed the reduction in the number of registered operational vessels and declining profitability to the prohibitive cost of fuel (Automotive Gas Oil). Spore (2005) attributed it to declining fish stocks owing to overexploitation and unsustainable practices of fishers which infringe on fishery regulations.

Presently, little is known empirically regarding the operation of fishing trawlers and considering the huge investment in trawl fisheries, keen interest is taken in its performance. This is in view of the fact that the overall realization of the objective of boosting protein intake through increased consumption of fish is contingent upon efficient operation of trawling vessels. This study aims at determining the financial and economic performance of different classes of trawling vessels.

Results of the study is expected to provide veritable information for improving the efficient operations of trawlers as means of facilitating meaningful policy and investment decisions. A success in this direction is expected to enhance the performance of trawlers, stimulate increased investment in the sector and hence make possible the realization of the objective of national fisheries policy.

Literature Review

In the absence of major market distortions such as extensive subsidies or the existence of price control, profitability is the single most important economic criteria. Fisheries 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.

A change in average profitability of fleet is an imperfect indicator of change in overcapacity as it is also affected by changes in prices and costs. These in turn may be influenced by factors outside of the fishery- for example, exchange rate changes, fuel cost changes, and price changes due to changes in the supply of farmed fish. These factors may either increase or decrease profitability independent of the state of the stocks. Hence, further analysis of the data is required to determine the cause of any change in profitability. Nevertheless, low levels of the average profitability of the fleet are most likely an indication of overcapacity, although low profitability may also indicate that there are no alternatives for fisheries in a fishery and the opportunity costs are zero (or at least very low, as may be the case for artisanal fisheries (FAO, 2008).

Tietze (2005), Lery, Prado and Tietze (1999) and Anon (1999) stressed that the economic and financial performance of fishing operations is generally assessed with the help of two indicators. For the assessment of the economic performance of a fishing vessel as in the case of other economic enterprises, the ratio between Net Cash Flow and Total Earnings (NCF/TE) is used. This ratio is a general indicator of economic profitability/viability of enterprises as it shows the amount to total earnings required by a certain type of fishing vessel in order to generate a given amount of net profit. Financial performance is assessed with the help of the rate of Return on Investment (ROI), the ratio shows how much money needs to be invested in a fishing enterprise in order to generate a certain net profit. The economic performance of fishing operations is affected by various factors including fluctuations in revenue, perishability of product, falling yield i.e. catch per unit of effort, static or falling demand, unforeseen increase in the cost of key inputs and catch and effort restrictions. Theory suggests that in an open access, unregulated fishery, the fishery will eventually end up producing at the point where total revenue equals total costs (Garca, 1997; Cheson & Clayton, 1998). In a study by the Food and Agricultural Organization (FAO) fisheries department in 1995-2000 of selected countries in Africa, Asia, Europe and Latin America, it was discovered that inspite of heavily exploited fisheries resources, marine capture fisheries are generally still an economically and financially viable undertaking. In most cases, it generates sufficient revenue to cover the cost of depreciation; the opportunity cost of capital and this generates sufficient funds for re-investment in addition to generating employment, income and foreign exchange earnings (Farmer & Garca, 2000). Of the 108 fishing vessels studied in the survey, 105 or 97% had a positive gross cash flow and fully recovered their operational costs. When considering the cost of capital i.e. the cost of depreciation and interest, 92 out of the 108 vessels or 85% showed a net profit after deducting the cost of depreciation and

interest. Those categories of fishing units with operational losses at the time of the study are located at the extreme ends of the scale of fishing operations. i.e. the very small scale as well as in the very large scale sector of the industry (Sumaila, Lin & Tyedmers, 2002).

In the former case, over exploitation of inshore fisheries resources and competition from more efficient fish capture technologies such as purse seiners and coastal trawlers seem to be responsible for the negative financial performance. In the latter case, excess capture capacity and related excessive costs of operation and investment vis-à-vis limited fishing grounds and fisheries resources seem to be the important factors.

Regulation of fishing through legislation is one of the imperfect indicators of change in overcapacity as it is also affected by changes in prices and costs. These in turn may be influenced by factors outside of the fishery- for example, exchange rate changes, fuel cost changes, and price changes due to changes

Low or negative profitability usually indicates that fish stocks 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 or 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).

As far as financial performance and cost of fishing operations are concerned, some trends are can be observed. In trawl fisheries, for example, noticeable differences can be observed between developed and developing countries regarding financial performance and productivity. While productivity, measured as value of production per crew member, was found to be generally higher in developed countries, the rate of return on investment was found to be generally higher in developing countries. The higher degree of productivity in developed countries studied can be probably attributed to a higher degree of mechanization and sophistication of equipment for fish detection, capture and on-board handling of fish.

Their lower cost of operation in relation to gross earnings and their lower cost of investment/higher depreciation because of the use of older fishing vessels explain the higher profitability of trawl fisheries in the developing countries studied. As the cost of labour increases in developing countries in the course of overall economic development and as old fishing vessels are being replaced through newly built ones, it can be expected that the difference in profitability of fishing operations as compared to developing countries might gradually disappear.

In the case of small scale fishing vessels, the differences between productivity on the one hand and financial performance on the other are even much more pronounced. While productivity is again higher in developed countries, the financial performance of the small scale fishing units studied in developing countries is significantly better than those in developed countries because of lower cost of investments and lower cost of production (Tietze, 2005).

The general positive economic performance of marine capture fisheries is being achieved in an environment where fisheries resources are fully exploited and in many cases overexploited. With a view to ensuring sustainability and viability also in future, there is an urgent need to strengthen and put in place efficient measures to limit fishing effort and to rehabilitate coastal areas and aquatic resources (FAO, 1999).

Methodology

A multi-stage sampling procedure was used in selecting the sample for the study. First, the list of licensed vessels operating in Nigeria was obtained from the Federal Department of Fisheries (FDF) from which 60 vessels were randomly selected. The second stage involved the use of stratified sampling where the vessels were classified into large and small vessels. The third stage involved the random selection of 30 large and 30 small vessels. The size of large vessels in this study is taken as 18m length overall (LOA) and above while that of small vessels is taken as 10 – 17 LOA. The fourth stage involved stratified sampling where the large and small vessels were further classified into fishing and shrimping vessels. The fifth stage involved the random selection of 15 fishing as well as 15 shrimping vessels from among the large vessels and 15 fishing as well as 15 shrimping vessels from among the small vessels. This brings to 30 each the total number of fishing and shrimping vessels. A total of 60 copies of questionnaire was administered to captains of the trawling vessels using the above criteria. Hence n = 60.

This study made use of both primary and secondary sources for data collection.

Relevant information for this study was gathered through a combination of personal informal interviews, discussions and interview with a questionnaire. The structuring of the questionnaire allowed for both fixed alternative and open-ended questions for increased efficiency in data collection. The questionnaire was designed to obtain original information, which involved a direct field study of the trawlers. Secondary data for the study was obtained from Federal Department of Fisheries (FDF), Nigerian Trawler Owners Association(NITOA), Nigerian Maritime Administration and Safety Agency(NIMASA),

Economic performance was analyzed as a ratio between Net Cash Flow and Total Earnings

$$Ep = \frac{NCF}{TE} \dots\dots\dots 1$$

Where

Ep= Economic performance

NCF=Net Cash Flow

TE= Total Earnings

For the purpose of this study, Net Profit or Net Cash Flow is defined simply in the accounting sense. It is total earnings less total operational costs. Total earning is the value of total sales within the period of the survey.

Financial performance was assessed with the help of the Return on Investment.

$$ROI = \left[\frac{\text{Average Profit}}{\text{Average Investment Outlay) expressed as a percentage}} \right] \dots\dots\dots 2$$

where

ROI = Return on Investment

Average profit = Profit after Tax and Depreciation

Average Investment Outlay= Initial Investment cost plus other subsequent cash outflow divided by 2.

Performance in this study is defined as an appraisal of the economic and financial results emanating from industrial trawl fisheries. For the purpose of this study our measures of performance is based on the following parameters, (i) level of earnings (ii) level of investments,(iii) level of operational costs. While no norm nor yardstick exists against which we can compare the performance with other sectors of the economy, comparison between different classes of vessels allow us to effectively evaluate the activities of trawling vessels.

Results and Discussion

Economic Performance of Vessels

Small Vessels

Table 1 shows that landings of small vessels per trip is 16.83 metric tonnes. Average annual landing per vessel is 134.648 metric tonnes. With price per metric tonne at N623476.65, earning per vessel per trip becomes N10493750 with annual earnings at N83950000. Average annual operational cost for small vessels is N56581325. The net cash flow is N27368675. It can be observed in table 1 that the economic performance of small vessels is 0.33. This ratio implies that small vessels operating in Nigeria record 33 per cent of their total earnings as net profit. This means that the remaining 67 per cent is taken up by operational costs which is very high. High operational cost of fishing vessels is attributed to prohibitive price of fuel (AGO) and pirates (Olawuyi, 1992 and Amire, 2009). The cost of fuel alone takes about 47.7 per cent of total operational cost of small vessels and losses to pirates represented 10.6 per cent of total average annual operating cost. This calls for a measure of delivering fuel cheaply to operators and checkmating the activities of pirates /sea robbers as a measure of reducing operational costs which will go a long way to induce a higher percentage net profit from total earnings.

Table 1: Economic Performance of Small Vessels

Landing per vessel/trip	16.83 metric tonnes
Number of trips per year	8 per
Annual landing per vessel	134.648 metric tonnes
Average price of Shrimp/fish per tonne	N623476.65
Earning per vessel /trip	N10493750
Total Earnings (TE)/year(Annual earning per vessel)	N83950000

Average Operational Cost for Small Vessels N56581325

Net Cash Flow(NCF) = Annual Total Earnings less Operational Costs

$$N83950000 - N56581325 = N 27368675$$

$$NCF = N27368675$$

Economic Performance(Ep) = $\frac{\text{Net Cash Flow(NCF)}}{\text{Total Earnings(TE)}}$

$$\frac{N27368675}{N83950000} = 0.33$$

Source: Survey Data, 2015

Large Vessels

Table 2 shows that landings from large vessels per trip is 26.25 metric tonnes . Average annual landing per vessel is 210.02 metric tonnes. With price per metric tonne at N623476.65, earning per vessel per trip becomes N16367968.75 with annual earnings at N130943750. Average annual operational cost for large vessels is N81465416.25. Net cash flow is N49478333.75. Economic performance when considered as a ratio between net cash flow and total earnings is 0.38 for large vessels implying that large vessels operating in Nigeria are only able to retain 38 per cent of their total earnings as net profit. The corollary is that the remaining 62 per cent is taken up as operational cost which appears to be very high. This could be attributed to the high cost of fuel coupled with loses to pirates. The cost of fuel alone takes about 49.2per cent of total operating cost of large vessels while loses to pirates/sea robbers takes about 9.8 per cent. This result strongly suggests that if the activities of pirates are checked and effaced, vessels will earn about 47.8 per cent of their total earnings as net profit. When fuel becomes cheaper by evolving a better and cheaper means of distribution, vessels will be in a better position to earn a higher percentage of net profit. It can be observed that large vessels like their small vessel counterparts recorded a positive net cash flow and fully recovered their operational costs. They were able to generate sufficient revenue to cover cost of depreciation, opportunity cost of capital as well as generating employment, income and foreign exchange.

Table 2: Economic Performance of Large Vessels

Landing per vessel/trip	26.25 metric tonnes
Number of trips per year	8
Annual landing per vessel	210.02 metric tonnes
Average price of Shrimp/fish per tonne	N623476.65
Earning per vessel /trip	N16367968.75
Total Earnings (TE)/year(Annual earning per vessel)	N130943750

Average Operational Cost for Large Vessels N81465416.25

Net Cash Flow(NCF) = Annual Total Earnings less Operational Costs

$$N130943750 - N81465416.25 = N49478333.75$$

$$NCF = N49478333.75$$

Economic Performance(Ep) = $\frac{\text{Net Cash Flow(NCF)}}{\text{Total Earnings(TE)}}$

$$\frac{N49478333.75}{N130943750} = 0.38$$

Source: Survey Data, 2015

Fishing Vessels

Table 3 shows that landings from fishing vessels per trip is 96.115 metric tonnes. Annual landing per vessel is 768.92 metric tonnes. With average price of fish per tonne at N160209.5, earning per vessel per trip becomes N15398437.5 with annual earnings at N123187500. Total average annual operational cost for fishing vessels is N69437309.63. Net cash flow is N53750190.4. Table 3 further shows that the economic performance of fishing vessels is .44 which implies that fishing vessels operating in Nigeria are only able to retain 44 per cent of their total earnings as net profit. This means that the remaining 56 per cent is taken up as operational costs. Cost of fuel alone constitutes about 42.2 per cent of total operating cost while losses to pirates/sea robbers takes up 10 per cent of total operating cost. If the activities of pirates are completely eliminated, fishing vessels will earn 53 per cent of their total earnings as net profit and if fuel is supplied much more cheaply to vessel operators, vessels stand a chance of earning higher percentage of their total earnings as net profit. Results from table 3 show that fishing vessels also recorded a positive net cash flow.

Table 3: Economic Performance of Fishing Vessels

Landing per vessel/trip	96.115 metric tonnes
Number of trips per year	8
Annual landing per vessel	768.92 metric tonnes
Average price of fish per tonne	N160209.5
Earning per vessel /trip	N15398437.5
Total Earnings (TE)/year(Annual earning per vessel)	N123187500
Average Operational Cost for Fishing Vessels	N69437309.63
Net Cash Flow(NCF) = Annual Total Earnings less Operational Costs	

$$N123187500 - N69437309.64 = N53750190.38$$

$$NCF = N53750190.38$$

$$\text{Economic Performance}(Ep) = \frac{\text{Net Cash Flow}(NCF)}{\text{Total Earnings}(TE)}$$

$$\frac{N53750190.38}{N123187500} = 0.44$$

Source: Survey Data, 2015

Shrimping Vessels

Average landings from shrimping vessels per trip is 12.23 metric tonnes. Average annual landing per vessel is 97.84 metric tonnes. With average price of shrimps per tonne at \$7682.14, earning per vessel per trip amounted to \$93952.57 with average annual earnings at \$751620.58. When converted to Naira at the foreign exchange rate of N199 to a dollar, the total earning becomes N149572380. Total average annual operational cost for shrimping vessels is N69437309.63. Net cash flow is N149572380. The index of economic performance for shrimping vessels is 0.53 which implies that shrimping vessels are able to retain 53 per cent of their total earnings as net profit. This means that the remaining 47 per cent is taken up as operational costs. Cost of fuel takes up about 40 per cent of total operational cost while losses to pirates represented about 5 per cent of total operational cost. If the activities of pirates are completely eliminated, shrimping vessels will now earn 58 per cent of their total earnings as net profit. Putting in place appropriate measures to make fuel cheaper for vessels will go a long way to induce higher percentage earnings of shrimpers from their total earnings as net profit and is capable of attracting more investors into Nigeria's industrial fishery sub-sector. Shrimping vessels similarly recorded a positive net cash flow.

Table 4: Economic Performance of Shrimping Vessels

Landing per vessel/trip	12.23 metric tonnes
Number of trips per year	8
Annual landing per vessel	97.84 metric tonnes
Average price of Shrimps per tonne	\$7682.14
Earning per vessel /trip	\$93952.57
Total Earnings (TE)/year(Annual earning per vessel)	\$751620.58
Exchange rate of Naira to a dollar	N199
(\$751620)199	N149572380
Average Operational Cost for Shrimping Vessels	N69437309.63

Net Cash Flow(NCF) = Annual Total Earnings less Operational Costs

$$N149572380 - N69437309.63 = N80135070.37$$

$$NCF = N80135070.37$$

Economic Performance(Ep) = $\frac{\text{Net Cash Flow(NCF)}}{\text{Total Earnings(TE)}}$

$$\frac{N80135070.37}{N149572380} = 0.53$$

Source: Survey Data, 2015

Financial Performance of Vessels

Small Vessels

Table 5 depicts financial performance of small vessels. Average profit which is the net cash flow less corporate tax is N19158072.5. Average investment outlay is N78290662.5. The table further indicates that the Return on Investment (ROI) for small vessels is 24.5 per cent. This finding implies that the proportion of their investment capital from which they earn their average profit is 24.5 per cent. In other words, investors in small vessels are only able to retain 24.5 per cent of investment funds as average profit. This means that the reproductive capacity of their investment funds is only 24.5 per cent. From this result, any capital invested in small vessels will *ceteris paribus* earn about 24.5 per cent in returns as average profit. The corollary is that the remaining 75.5 per cent is swallowed up by cash outflows of subsequent investment outlay. Measures to improve the generative capacity of investment capital in small vessels include trimming down of operational costs, tax rebate for trawling vessels and increased landings of fishery products.

Table 5: Financial Performance of Small Vessels

Average profit = Net Cash Flow less 30 per cent corporate tax

$$N27368675 - N82106025 = N19158072.5$$

$$\text{Average Investment Outlay} = N100000000 + \frac{N56581325}{2} = \frac{N156581325}{2} = N78290662.5$$

$$\text{ROI} = \frac{N19158072.5}{N78290662.5} = 0.245$$

Expressed as a percentage $0.245(100) = 24.5\%$

Source: Survey Data, 2015

Large Vessels

Table 6 shows financial performance of large vessels (fishing and shrimping combined). Average profit which is the net cash flow less corporate tax is N34634833.63. Average investment outlay is N115732708.13. The Return on Investment for large vessels as shown in table 6 is 29.9 per cent. This result shows that they are only able to regenerate 29.9 per cent of invested funds for re-investment. This means that the reproductive capacity of their investment funds is only 29.9 per cent. From this result any capital invested in large vessels will *ceteris paribus* bring about 29.9 per cent in returns as average profit. The corollary is that the remaining 70.1 per cent is taken up by cash outflows in subsequent investment outlay.

Table 6 : Financial Performance of Large Vessels

Average profit = Net Cash Flow less 30 per cent corporate tax

$$N49478333.75 - N14843500.13 = N34634833.63$$

$$\text{Average Investment Outlay} = N150000000 + \frac{N81465416.25}{2} = \frac{N231465419.25}{N115732708.13}$$

$$\text{ROI} = \frac{N34634833.63}{N115732708.13} = 0.299$$

$$\text{Expressed as a percentage } 0.299(100) = 29.9\%$$

Source: Survey Data, 2015

Fishing Vessels

Financial performance of fishing vessels can be observed in table 7. Average profit which is the net cash flow less corporate tax is N37625133.26. Average investment outlay is N97218654.81. The Return on Investment on Fishing Vessels is 38 per cent. By this result, fishing vessels are barely able to regenerate 38 per cent of investment funds for re-investment. This implies that the proportion of their investment funds from which they earn their average profit is only 39 per cent. In other words, investors in fishing vessels are only able to retain 39 per cent of investment funds as average profit. This means that the reproductive capacity of their investment capital is only 39 per cent. From this result, any capital invested in fishing vessels will *ceteris paribus* earn about 39 per cent in returns as average profit. The corollary is that the remaining 61 per cent is swallowed up by high cash outflows in subsequent investment outlay. High cash outflows are induced by the prohibitive price of fuel and the activities of pirates and is capable of scaring away investors.

Table 7 : Financial Performance of Fishing Vessels

Average profit = Net Cash Flow less 30 per cent corporate tax

$$N55750190.38 - N16125057.11 = N37625133.26$$

$$\text{Average Investment Outlay} = \text{N}125000000 + \frac{\text{N}69437309.63}{2} = \frac{\text{N}194437309.63}{2} = \text{N}97218654.81$$

$$\text{ROI} = \frac{\text{N}37625133.26}{\text{N}97218654.81} = 0.38$$

Expressed as a percentage $0.38(100) = 39\%$

Source: Survey Data, 2015

Shrimping Vessels

Table 8 shows financial performance of shrimping vessels. Average profit which is the net cash flow less corporate tax is N56094549.49. Average investment outlay is N97218654.81. It can be observed in table 8 that the Return on Investment on Shrimping Vessels is 57 per cent. By this finding, shrimping vessels rake in 57 per cent of their invested funds for re-investment. This implies that the proportion of their investment funds from which they earn their average profit is 57 per cent. In other words, investors in shrimping vessels are able to retain 57 per cent of investment funds as average profit. This means that the reproductive capacity of their investment capital is high relative to other classes of vessels. From this result, any capital invested in shrimping vessels will *ceteris paribus* earn about 57 per cent in returns as average profit. The corollary is that the remaining 43 per cent is swallowed up by cash outflows. Investment in shrimping vessels enjoys higher returns because its products which are for export commands high value in international market.

Table 8: Financial Performance of Shrimping Vessels

Average profit = Net Cash Flow less 30 per cent corporate tax

$$\text{N}80135070.70 - \text{N}24040521.21 = \text{N}56094549.49$$

$$\text{Average Investment Outlay} = \text{N}125000000 + \frac{\text{N}69437309.63}{2} = \frac{\text{N}194437309.63}{2} = \text{N}97218654.81$$

$$\text{ROI} = \frac{\text{N}56094549.49}{\text{N}97218654.81} = 0.57$$

Expressed as a percentage $0.57(100) = 57\%$

Source: Survey Data, 2015

Conclusion and Recommendations

Investment in trawl fisheries is a viable undertaking given that the different classes of vessels recorded a positive net cash flow and hence were able to generate sufficient revenue for re-investment. Though the potentials of the industrial fishery sub-sector cannot be over-emphasized, yet the prevailing circumstances under which they presently operate limits their capability to have performed better.

In view of high operational cost driven by the prohibitive price of fuel (AGO), there is the need by Nigerian National Petroleum Corporation to directly allocate fuel to trawling vessels. This will seriously bring down the price of fuel per litre and hence total operational cost of vessels.

Attempts should be made to curb the operational hazards posed by pirates and sea armed robbers. Any attempt at tackling these constraints can seriously impact on the reproductive capacity of investment capital and could attract more investors to the industrial fishery sub-sector.

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