

ECONOMIC PERFORMANCE OF TRAWLERS IN KERALA

SINITHA XAVIER

Assistant Professor, Department of Economics, P M Govt College, Chalakudy, Kerala, India

ABSTRACT

Economic performance of the trawlers in fishery depends upon the profit that they attain. The nuances of profit distinguished in the study are gross profit and net profit. Gross profit should be non negative for the short run viability of the trawlers and for the long run viability, net profit should be positive. In the present study 30.15 per cent of the owners were not able to meet the total cost of trawl operation in Kerala Fishery and only 6.53 per cent of the owners were able to attain a profit margin of above ₹ 21 lakhs. To identify the factors behind the variations in profit, regression is worked out and the result indicated that the standardized co-efficient 'fishing hours' was having the highest value followed by fixed cost and fuel. The lowest value is marked for the 'experience of the owner'. Profit ratio, net profit ratio and rate of return were also calculated. The rate of return calculated is 12 per cent which was found to be lower than the rate of interest paid by the owners (14.5%) and hence the operation of trawl boats becomes a tedious task.

KEYWORDS: Fishing Hours, Experience of the Owner, Kerala Fishery

INTRODUCTION

Kerala, one of the advanced maritime states of India, has been in the forefront in catch, landings and in absorbing innovations in the capture of fish. The introduction of trawlers has been a breakthrough in the mechanization process in Kerala fishery. The trawlers play a decisive role in the economy of Kerala through production, export and employment. Recently the trawler technology has become highly complex and ramified. The volume of investment got accelerated to commensurate with this technological complexity. If the investment was two lakhs in the early 1980s, now it is around 60 to 70 lakh rupees. Adding to this, the total fish catch has declined and resource depletion crisis has taken place as is revealed from the review of literature. These crucial issues which form the linch-pin of the several thousands of livelihood and the viability of Kerala Fishery is to be analysed in depth.

REVIEW OF LITERATURE

A comprehensive review of literature facilitates the researcher to modify and improve analytical frame work for current research problem. A brief review is brought forth here.

Smith et. al (1982), portrays that the net profit is negative in the context of the Philippine fishery. They have found out that there exists excess capitalization in the trawl fishery industry leading to high exploitation of the resource base. The study highlighted that fact that technical change is costly but it often promises benefits to individuals willing to take risk.

Kurian and Wilaman (1982), using the cross section data of 1980-81 survey on cost and earnings of 22 combinations of crafts and gears in Kerala the net profit of the trawl fishery was negative. They stated that the operating

cost of the mechnized boats in April 1980 was ₹ 1,94071 and gross earning was ₹ 1,95,8777. In March 1981, the operating cost was ₹ 1,77,989 and gross earnings ₹ 1,44,532. The study pointed out that it should be repeated in the near future with the scale of efforts, size of sample and methodology modified as may be deemed necessary or desired.

Panayotou (1985) is an interesting work that discusses Socio-economics, cost and earnings, productivity and economic efficiency aspects of small scale fisheries of Asia. The most important of fresh findings of the study were (a) Marginal producticity of the net used in fishing was negative (b) There has been over investment in fishing because of the wrong signal given by tha rate of return of attained by owners of fishing assets and that the returns were inflated.

Subha Rao (1986) found out that excess concentration of mechanized boats in the inshore regions which resulted in depletion of fish stocks and decrease in fish productivity and income in the context of the state of Andrapradesh fishery. The overwhelming and ever increasing cost of fuel, oil and lubricants, exhorbitant rates of spare parts, low prices of fish and shrimp have caused decrease in the profit of the trawlers.

Chandrasekhar et. al (2001), made an economic evaluation of the multiday trawlers that had operated at the distance of 30-40 k.m. South of Vishakapattanam. The trawlers brought in high catches at the beginning and declined drastically. The study found out that the remuneration to the crew depended on the commercially important (Seer fish, mackerel and carangids) fishes caught.

Thirumilu et al (2003), studied the economic performance of trawl fishery in Madras and found out that the overall catch rate of the trawl fishery showed a decreasing trend from February to April 2003 for all the four categories of prawns, lobsters crabs and fin fishes. The catch rate of prawn lowered from 5.7 kg per hour in March 2003 to 1.59kg per hour in April 2003.

Rajamani et al (2003), made an analytical study of Tuticorin (Tamil Nadu) fishing harbour and found out that peak fishing activities extendeal only for a few months from May - June to September - October. Green Tiger prawn dominated the variety of species caught by the trawlers.

Rekha et al (2003), brought out the economic analysis of the performance of the trawlers of Cochin Fisheries Harbour for the period from 1971 to 2000. The landings of the trawlers in the Cochin Fisheries Harbour revealed a trend to increase. From 1990 onwards an increasing trend in the overall landings was noticed with about 38000 tonnes in 1990 and 62, 000 tonnes in 1994 which marked record landings from this harbour. During the period 1991-2000, Cochin Fisheries Harbour's contribution to Ernakulam district's landing ranged between 55 to 65 per cent.

Morgan (2004), is a study that covered ten years period from 1992 - 2002 of the countries Bahrain, Dijibouti, Egypt (Red Sea Coast) India (West Bengal) Iraq, Islamic Republic of Iran, Israel, Jordan, Somalia, Sudan, U.A.E. Yemen, Kuwait, Qatar, Pakistan and Southi Arabia of the economic performance of the trawlers. The total demersal fish landing have decreased by 4.8 per cent in the countries covered by the study.

Unal (2004), portrays the economics of trawl fishery in Foca (Turkey). The study analysed that nine out of the twenty vessels had losses after deducting costs related to depreciation and interest. Among the nine loss making vessels, four of them suffered operational losses and five had a positive gross profit. The costs came up to 41.3 per cent of the total earnings. In terms of the long run economic viability only half of vessels had long run existence.

Femina Hassan et. al (2004), studied the economics of the trawler fishery of Neendakara - Shakthikulangara belt of Kollam district and found out that the capital productivity ratio of the single day operating trawlers was 0.76 and multiday trawlers was 0.86.

METHODOLOGY

The secondary data is collected from C.M.F.R.I. (Cochin) Marine Products Export Development Authority (MPEDA), Fisheries Directorate Thiruvananthapuram, Port offices of Kollam and Munambam, fisheries offices of the maritime districts and from the reports of the Matsysfed.

The crucial data required is the cost and earnings data of the year 2010 - 2011 of the selected trawler units for which we depend on primary data collection.

AREA OF THE STUDY

The two districts selected for the study are Kollam and Ernakulam districts of Kerala. Neendakara – Shakthikulangara of Kollam district and Munambam of Ernakulam district are the areas selected for the study. In these two districts 61.42 per cent of the trawlers cluster.

Sample Design

The sample design is done on the basis of stratified sampling, the stratum being the length of the boat. In both Neendakara-Shakthikulangara and Munambam, the length of the boat varies from 48-70 plus footers. Ten per cent of the boats in each stratum constitute the sample. The sample size is 38 from the small, 62 from the medium and 22 from the large in Neendakara - Shakthikulangara and 28 from the small, 36 from the medium and 13 from the large in Munambam. Thus total sample size is 199 trawlers.

Data Collection, Management and Analysis

The reference period for the collection of the primary data was August 2010 to May 2011, roughly two months being the trawler closure period. The investment data was collected from the concerned boat owners through direct interviews. The operational cost data was collected from the log book maintained by the managers of the trawl boats. The catch data and the corresponding beach prices were enumerated for each trip. The duration of the data collection was once a week since trawlers undertakes stay-over fishing.

The data collected were analysed using both accounting and estimation methodology. To analyse the data, tools like Chi-Square test, one way ANOVA, Independent Samples Test (t-test), linear regression and Tamhane's T2-test in the post Hoc Frame, are used.

General Particulars

The trawl boat owners of Kerala belong to the major religions of the State, such as Hindus, Muslims and Christians. Of the total respondents Christians, Hindus and Muslims constitute 78.39 per cent, 11.06 per cent and 10.55 per cent respectively.

As to the age composition of the boat owners, they belong to a mature age group of 35 to 45 years. They constitute 54.7 per cent. The study finds that 5.5 per cent of the boat owners are illiterate. It is also observed during

the study that Muslim boat owners are more illiterate (10.2%) than other boat owners in Munambam. Almost the same trend has been noticed in Neendakara - Shakhikulangara belt. Proprietorship is found to be the most dominant form of ownership.

Type of Vessels

The medium type occupies the major share followed by the small and large vessels. The general pattern is reflected in both Neendakara - Shakhikulangara and Munambam. The wooden hull boats could not be seen at all in both harbours. In total 49.75 per cent are medium vessels and 33.17 per cent and 17.09 per cent are respectively the small and large vessels.

Horse Power of Boats

It is found that in Munambam majority of the boats have 160 hp engine capacity (50.6%) followed by 200 hp of engines (26.0%) and 180 hp engines (22.1%) and other representations of the hp of engines is comparatively very less. The general observation is that the owners of Neendakara - Shathikulangara belt are more interested to acquire new vessels.

Age of Boats

Generally a trawl boat can be used up to 25 years as informed by the owners of trawl boats, the technicians in the boat yard and the officials of Central Institute of Fisheries Technology (CIFT). But this varies depending on the size and other prevailing conditions. The current mean age of boats in Munambam is 15.26 years whereas it is 14.4 years in Neendakara - Shakhikulangara belt. As to the age of boats at purchase the mean age of the small boats is 18.45 years, medium vessels 14.9 years and large vessels 7.09 years.

Trawl Net

Trawl net of the day in both locations has undergone tremendous changes. Since the catches of the Fin fishes, Flat fishes, Crustaceans, Mulluses and other fishes are diminishing and due to the increased market value of squid in the domestic and the international market, made the boat owners to design nets to catch squid that stay above the sea bed. This net instead of sinking in the muddy floor of the sea would scrape through the ocean floor because the upper side of the net would stand much above the traditional nets. The mesh size of the net used varies depending on the variety of the fish caught. Majority (86%) of the vessels use 20 to 25mm mesh size and 14 percent use 25 to 35mm mesh size.

Investment and Cost Analysis

Investment is nothing but the cost incurred for fixed assets. Hence to begin with, Fixed Cost (FC) can be considered first. It is calculated by adding up the price of hull and engine, the price of net and the amount spent on modification (accessories) immediately after the vessel is bought (in case of second hand purchases).

The Cost of Hull, Engine and Net

The acquisition cost of a trawl boat is calculated including the cost of hull, engine and trawl net. With the dawn of the last decade (2000-2010) the price of the trawler boats got accelerated. The prices of the trawlers vary depending on the size. During the survey period (2010-2011) the price of a brand new large trawler went upto ₹ 58 lakh. The cost of hull, engine and net is set forth in the following table.

Table 1: Capital Investment and Type of Vessels

Fixed Cost	Type of Vessels			
	Small	Medium	Large	Total
Price of Hull and Engine	762755	1348776	2992471	1397490
Net	7700	8800	34000	50500
Amount Spent on modification	54242	27394	22353	35437
Total Fixed Cost of Boat	824697	1384970	3048824	1483427

Source: Survey Data

The total investment of the three types of vessels distinguished in the study namely the small, medium and large are average to ₹ 8.24 lakh, ₹ 13.84 lakh, and ₹ 30.48 lakh respectively. Modification cost or the amount spent for accessories comes upto 7.04 per cent for the small vessels, 2.02 per cent for the medium vessels and 2.45 per cent for the large vessels of the total fixed cost.

Insurance

Insurance of the owners is relatively high amount and if paid regularly it would add to the woes of the owners as revealed by them. The owners of both locations were frank enough to share that they do not pay the insurance of the vessels regularly. Instead they pay the insurance of the crew. The mean of the cost of insurance for Munambam is ₹ 7922.72. The total (average) comes up to ₹ 7783.92.

The actual insurance to be paid by the owners of the vessels as per the insurance companies is ₹ 2,6946.38 (average) and ₹ 2,7240.85 for Neendakara - Shakthikulangara belt. The total comprises of ₹ 2,7128.07. The actual amount of insurance to be paid by the owners is not included in the study.

Depreciation

In trawler fishery the cost of depreciation is the cost incurred for the replacement of the wear and tear of hull, engine and net of the trawler boat. The amount of depreciation is calculated at the rate of 10 per cent for hull and engine, 50 per cent for net, 25 per cent for modification i.e. accessories of the fixed cost of capital.

Table 2: Depreciation

Depreciation	Small	Medium	Large	Total
Hull and Engine	76276	134878	299247	139749
Net	3850	4400	17000	25250
Amount Spent on modification	13560	6849	5588	8859
Total	93686	146127	321835	173858

Source: Survey Data

Annual Fixed Cost

Annual Fixed cost is calculated by splitting up the investment cost. As an analysis of the locations is made it is noticed that fixed cost is more for the N.S.belt than Munambam. The rate of interest of the survey year is also included in the annual fixed cost and it is ₹ 385281, ₹ 492967 and ₹ 759370 for the small, medium and large vessels respectively. It is observed that money lenders play a dominant role in meeting the requirements of even the fixed capital.

Table 3: Annual Fixed Cost by Location and Type of Vessels

	Type of Vessels							
	Small		Medium		Large		Total	
	Location		Location		Location		Location	
	Munambam	N.S. Belt	Munambam	N.S. Belt	Munambam	N.S. Belt	Munambam	N.S. Belt
Annual Cost for Fixed Capital	217402.08	327922	300726.72	424850.72	321526.88	437135.88	279865.68	396390.72

Source: Survey Data

Variable Costs

The items of variable costs are fuel, wages, batta and food, ice and basket, landing charges, auction fees, repair and maintenance cost, others or miscellaneous cost and the cost of working capital. The total variable cost (TVC) for the year 2010 - 2011 is calculated as ₹ 29.87 lakh. Taking the locations separately Munnambam has a higher variable cost than Neendakara -Shakthikulangara belt. The reason for this is that the percentage share given to the crew is only 35 per cent in Neendakara - Shathikulangara, (here after N.S. belt) whereas it is 40 per cent in Munambam. In Munambam 87 per cent of the labourers are from the locality. The bargaining power is more in Munnambam. Though all the three seas (Arabian Sea, Bay of Bengal and Indian Ocean) are accessible to both locations, in majority of the fishing days, fishermen in Munnamban have to make Voyage for a longer period.

Total Cost

Total cost is the sum of total variable cost and (TVC) and Total Fixed Cost (TFC). The average total cost is ₹ 3525807.6 in Munambam and ₹ 3223962.75 in the N.S. belt. The total cost for both locations together is ₹ 36.57 lakh for the year 2010 - 2011. The location Munambam has more variable cost than the N.S. belt. The possible reasons have been explained earlier.

Total Costs and Type of Vessels

The total cost varies between the type of vessels as the TVC and TFC. The total cost, TFC and TVC is presented in table 4

Table 4: TC and Type of Vessels

Costs (in ₹)	Small	Medium	Large	Total
TFC	536889	718072.89	750457.13	668422
TVC	2297462.61	2853869.11	4735366.12	2997237.00
TC	2834357	3571942	5485823.12	3657875.6

Source: Survey Data

Table 4 narrates that total cost is more for the large vessels. The large vessels in both locations are comparatively new vessels and the fixed cost is more which is evident from the discussions made in the previous pages.

Total Cost per Fishing Day

In trawler fishery, there is stay over fishing and the days of each trip varies from vessel to vessel and season. Hence cost per fishing day is also undertaken. Cost per fishing day is put forth in table 5.

Table 5: Cost per Fishing Day (in ₹)

Location			
Cost per fishing day	Munambam	N.S belt	Total
TFC per fishing day	583.74	1535.54	1167.26
TVC per fishing day	18273.31	15871.04	16800.56
TC per fishing day	18857.05	17406.58	17967.82

Source: Survey Data

ANOVA is carried out to find out the difference in the mean values of TFC, TVC and TC per fishing day among the three types of vessels. The f-statistics are 6.41, 100.60 and 106.93 respectively for the TFC, TVC and TC per fishing day and the asymptotic significance values are 0.002, 0.000 and 0.000 respectively for the three types of costs. Since the level of significance is below 0.05 for all the three, there is statistically significant difference in the mean values of the three types of costs.

Earnings and Profit of Trawl Boats

All the trawlers in the study join the bandwagon of stay over fishing and the days of the trip vary from seven to ten days with a combined average of 8.91 days which is lowest in post monsoon and highest in winter season. The reason for this is that during post monsoon season the days of the voyage is less because of the availability of fish and favourable currents of sea water. It is opined by trawler owners that small trawlers hibernate from trips during winter season.

Earnings

Earnings in trawl fishery are the money value of the catch obtained during the trawl operation. Earnings in trawl fishery are a crucial factor, determining the profit, the short run viability and the long run economic sustainability of the trawl fishery.

Earnings by Season and Type of Vessels

The earnings of three types of vessels categorized and their performance within the three seasons is set forth in table 6

Table 6: Earnings of Types of Vessels within Season

	Seasons			Total	Small	Medium	Large	Small	Medium	Large	Small	Medium	Large
	Winter	Pre Monsoon	Post Monsoon										
	Type of Vessels	Type of Vessels	Type of Vessels										
Earning per trip (Rs)	114166.67	129212.12	201764.71	108893.94	148474.75	227323.53	155196.97	173555.56	285264.71	126085.86	150414.14	238117.65	
Seasonal earnings	805984.85	962212.12	1706176.47	936924.24	1413626.26	244950.11	159503.30	1847666.67	3435058.82	1112646.46	1407835.02	2530245.10	
Seasonal earnings fishing day	16976.91	18592.35	31484.59	16168.74	23334.90	34664.80	26000.36	27813.37	47623.60	19715.34	23246.87	37924.33	

Source: Survey Data

The table 6 gives a detailed analysis of the earnings of the small, medium and large vessels within the three seasons. The earnings of the medium vessels are better than the small vessels but not as much as the large vessels. One way 'ANOVA' is used to examine the differences in the mean values of earnings per trip, seasonal earnings and seasonal earnings per fishing day among the three types of vessels within the three seasons. Analysis of variance test results shows that there are differences in the averages of earnings per trip, seasonal earnings and seasonal

earnings per fishing day among the three types of vessels within the three seasons since the level of significance is below 0.05 for all mean values.

Tamhane's T2 test is also carried out to look into the differences in mean values comparing two categories each since equal variance cannot be assumed across the categories. The results show that there are significant differences in earnings per trip between winter season and post monsoon and winter and pre monsoon seasons. As to the seasonal earnings per fishing day there are significant differences between the three seasons since the significance values are below 0.05.

Profit

The nuances of profit explained here are the Gross Profit and Net Profit. Gross profit is the difference between total revenue (TR) and operating or Variable Cost (VC). Gross Profit is calculated by deducting the total variable cost from the total earnings or total revenue (Panayotou, 1986).

$$\text{II gross} = \text{TR} - \text{VC}$$

A trawl fishing unit is expected to continue operating as long as positive gross profit is earned. In the present study 17.08 per cent of the trawler owners are not able to meet even the operating or variable costs. Their short run economic viability is questionable. The study also reveals that only 21.6 per cent of the owners get gross profit above ₹ 21 lakhs.

A situation in which not all costs are met is not tenable in the long run. Net profit is the difference between total earnings or total revenue and total costs.

$$\text{II Net} = \text{TR} - \text{TC}$$

A trawl boat cannot go on too long if the net profit is negative. The study brought out that 30.15 per cent of the owners are not able to meet the total cost of trawl operation. Majority (44.28%) of the owners fall in the category of earning net profit below ₹ 15 lakhs. The ones who attain profit margin of above ₹ 21lakhs are only 6.53 per cent.

Regional Difference in Gross Profit and Net Profit

The study reveals the significant variations in profit across the two locations and the types of vessels. Table 7 is set forth to explain the location differences in gross and net profit within the three types of vessels.

Table 7: Location and Type of Vessels

Profit (in ₹)	Type of Vessels							
	Small		Medium		Large		Total	
	Location		Location		Location		Location	
	Munambam	N.S.Belt	Munambam	N.S.Belt	Munambam	N.S.Belt	Munambam	N.S.Belt
Gross profit	1225559.46	311262.68	1078923.39	848612.23	2223922.61	2106077.39	1359969.31	938362.30
Net profit	870293.4	111421.43	601951	599946.1	1609238.88	1605906.48	950034.25	605157.39

Source: Survey Data

Profit Ratios

The ratio is calculated by dividing the net profit with operating cost (Panayotou, 1986). Net profit ratio is 23 per cent.

Net Profit Ratio

Net profit ratio is calculated by dividing net profit with total revenue. The net profit ratio is 17 per cent.

Rate of Return

The rate of return is computed by finding out the difference between return and the capital investment and dividing it with capital investment. The rate of return is 12 per cent. When compared with the rate of interest (14.5%), the rate of return is less and hence the operation of trawl boats becomes a difficult task.

Factors behind the Variations in Profit

To identify the variables that are influencing profitability of trawl boat fishing, regression analysis was carried out. In the linear regression carried out, gross profit is the dependent variable and following independent variables are specified.

Gross Profit = f (Fixed cost (X1), Boat size (X2) Horse power (X3), Gear size (X4), Fishing hours(X5), Fuel (X6), Fishing trips (X7), Age of boat owner (X8), Experience of boat owner (X9)

$$EM = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + e$$

The model was found infected with the problem of multi co-linearity. So the respecified model can be expressed as

$$EM = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + e$$

Table 8: Regression Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.855 ^a	0.732	0.725	558673.87190

a. Predictors: (Constant), Experience of owner, Fuel, Fixed cost, Fishing hours, Boat size

Source: Survey data

- ANOVA tested the acceptability of the model and found significant.
- In the standardized co-efficient fishing hours' is found having the highest value.

It is followed by Fixed Cost and Fuel. Experience of the owners has the lowest relative influence because it has the lowest standardized co-efficient value.

To conclude the discussion on profitability the trawl fishing units with negative gross profits are not clearly viable especially if the situation has continued for some time. Trawl fishing units with positive gross profit and negative net profit are either undergoing temporary problems or simply living off their capital. In the latter case, switching off to more profitable ventures or richer fishing grounds will be necessary at the end of the economic life of current fishing assets. If under fished grounds do not exist, the government of Kerala may utilize the intervening time between the present and the obsolescence of the fishing assets to develop non fishing employment opportunities for the trawler owners and the fishermen to move into.

CONCLUSIONS

To conclude the discussion on profitability the trawl fishing units with negative gross profits are not clearly viable especially if the situation has continued for some time. Trawl fishing units with positive gross profit and negative net profit are either undergoing temporary problems or simply living off their capital. In the latter case, switching off to more profitable ventures or richer fishing grounds will be necessary at the end of the economic life of current fishing assets. If under fished grounds do not exist, the government of Kerala may utilize the intervening time between the present and the obsolescence of the fishing assets to develop non fishing employment opportunities for the trawler owners and the fishermen to move into.

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