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COSTS AND EARNINGS OF TRAWLERS IN KERALA — A CASE STUDY

D. B. S. Sehara and A. Kanakkan

Central Marine Fisheries Research Institute, Cochin - 682 014

In regard to marine fishery resources, catch landings and the innovations in capture fisheries, Kerala has been one of the advanced maritime states in India. Over the years, a change has been noticed in the fabrication of nets and designing of various types of crafts. Technically more efficient and effective gears and fast moving inboard and outboard motorised craft have replaced most of the traditional fishing craft and gears. The introduction of trawlers has been a major break-through in the history of mechanisation not only in Kerala but also throughout the Indian coasts. In the sixties and seventies, hundreds of trawlers were introduced in Kerala and the number is still on increase though the speed of introduction is reduced.

With the immense increase in the number of trawlers, a competition is noticed between different mechanised units and within the trawl units in different regions. These units not only

share common inputs but share almost same resources also and that too in the already exploited zone, upto 80 m depth. For all the new entries there is always a risk of investing in a trawl unit. In some regions there is fear of over exploitation of resources caught by these units. Recently there is a significant shift from prawn catch to fish catch when it is seen by the point of export earnings provided there is a good demand and reasonable price of non-shrimp catch in and outside the country.

Looking into the risk and uncertainty involved in availability of catch and its price in domestic and international markets, increasing number of trawlers and heavy investment in trawl units it is of great significance to assess private profitability of trawl operation. Cochin Fisheries Harbour is one of the important trawl landing centres in Kerala. The Central Marine Fisheries Research Institute, Cochin has selected Cochin

Fisheries Harbour for surveying of trawl units in 1991. The main objectives of the study is to find out the economics of trawlers which will help in development planning and the fishermen.

Data collection and method of analysis

During 1991, economics data at Cochin Fisheries Harbour were collected from randomly drawn 10 trawl units on 10 selected days every month. Systematic random sampling technique was adopted for fixing observation days. Remark- ing same units for repeated data collection on sample days was not practically possible, so a sample of 10 units on each observation day was covered at random which included all sizes and types of trawlers landing their catch at Cochin Fisheries Harbour.

Two types of schedules were designed for data collection. Schedule I contains information regarding make, size and values of craft, engine and gear, type of ownership, details of crew, seasonal catch trend, marketing of catch, insurance, rent etc. Schedule II has provision of details of specieswise catch and its value and all items coming under the category of variable cost like, wages of crew, fuel (quantity & cost), marketing charges, ice and food and batak to the crew.

To calculate the fixed cost, depreciation on boat, engine, net and other accessories was calculated based on 'Straight-Line Method'. Other components of fixed cost include interest on initial investment @ 18% and insurance of trawlers. The annual variable expenses are total sum of quarterly expenditure on variable items. The I quarter is confined to Jan.-March, II April-June, III June-Sept. and IV Oct-Dec. 1991. Net annual profit is the residual margin left after deducting total annual operational cost (fixed & variable cost) from the gross revenue. To know the recovery period of investment, capital pay back period has been calculated. Rate of returns to capital has also been compared with the opportunity cost of investment.

Outcome of the study

Most of the trawlers operating from Cochin Fisheries Harbour are 32 footers. Recently some bigger vessels have been used. During 1991 about 320 trawlers landed their catch at Cochin Fisheries Harbour and most of them have single ownership. The main brand of engine fitted in the boat is Ashok Leyland. Except a few boats

all units observe one day fishing trip and operate upto 70 m of depth in the sea.

Initial investment

The cost price of new boat engine in a trawl unit has been estimated at Rs. 4 lakh (Table 1). Trawl net, numbering about 3 in each unit and other accessories have been valued at Rs. 0.7 lakh. Thus, a total investment of Rs. 4.7 lakh has been found in a trawl unit at Cochin Fisheries Harbour during 1991.

TABLE 1. Capital investment of a trawl unit operating at Cochin Fisheries Harbour during 1991

Item	Investment (Rs.)
a) Boat & engine	4,00,000
b) Nets	30,000
c) Accessories	40,000
Total	4,70,000

Components of fixed cost

The craft and engine have been depreciated at the rate of 10% per annum. Major accessories work well for 3 years and thus one third of their value has been accounted towards annual depreciation. Nets may work on an average for one year. A total amount of Rs. 83,333 has been set apart towards total annual depreciation of a trawler. Loan for purchase of trawlers has been availed from the Union Bank, UCO Bank and State Bank of Travancore. A simple interest of 18% has been applied to the investment and the total interest comes to Rs. 84,600 in a year on the capital investment. Though all the values are not insured but for proper accounting of profit an amount of Rs. 28,200 per annum has been fixed towards insurance for a trawl unit. As shown in Table 2 the total fixed cost has been calculated at Rs. 1,96,133.

TABLE 2. Components of fixed cost

I	Depreciation	
	a) Boat & engine	Rs. 40,000
	b) Nets	Rs. 30,000
	c) Accessories	Rs. 13,333
	Sub total	Rs. 83,333
II	Interest on investment (18%)	Rs. 84,600
III	Insurance	Rs. 28,200
	Total fixed cost	Rs. 1,96,133

Quarterly break-up of operational expenses

The main components of variable cost, as presented in Table 3, are crew wages, fuel cost, auction charges, food & bata expenses, cost of ice and other miscellaneous charges. In 3 out of 4 quarters fuel cost is more than the cost in any other head. In III quarter which is monsoon season, trawlers are not going very far from the shore and the quarterly fuel expenses are worked out at Rs. 55,000 thousand for a unit. Depending on the catch availability the auction charges ranged from Rs. 7,600 in I quarter to Rs. 19,500 in III quarter. There is not much difference in the expense towards food & bata between quarters. Since it is mostly daily trip for trawlers the cost of ice was found at Rs. 2-3 thousand in a quarter.

The total annual variable cost of a trawler is calculated at Rs. 5,87,462. Of annual expenditure, about 22% is incurred in I quarter, 25% in II quarter, 29% in III quarter and 24% in IV quarter. While analysing expenses itemwise it is found that 32% of annual amount is spend on labour, 47% on fuel, 9% on auctioning, 7% on food and bata of crew, 2% on ice and 3% on miscellaneous items like rent and repairs.

Production and gross earnings of a trawl unit

a. *Catch*: Main species fished in trawl net include crustaceans, perches, carangids, cephalopods, croakers, mackerels, bill fishes, clupeids, flat fishes and lizard fishes. Besides these main groups, the miscellaneous group, as given in table 4 mainly include elasmobranchs, cat fishes and promfets. In the I quarter, important contribution to the catch are crusta-

ceans (35%), perches (17%), cephalopods (9%) and carangids (8%). In II quarter, carangids came to first position contributing 28% of quarterly catch, followed by crustaceans (26%), perches (13%) and cephalopods (10%). Other groups, individually, contributed less than 10% to the catch in II quarter.

In III quarter, 39% of total catch (37,350 kg) was contributed by perches, 37% by crustaceans, 10% by cephalopods and 4% by carangids whereas other groups did not contribute significantly. The total catch of trawler in IV quarter was calculated at 16,796 kg and the main, components of the catch were crustaceans (40%), cephalopods (11%), perches (7%), clupeids (7%), carangids (6%) and bill fishes (7%). A look of overall annual catch performance reveals that the maximum catch contribution was made by crustaceans (34% of the catch), followed by perches (23%), carangids (11%) and cephalopods (10%). Other individual groups contributed less than 5% to the total catch.

b. *Revenue*: Gross earning in I quarter totalled to Rs. 1,43,975. Crustaceans alone contributed 74% of the revenue in this quarter. In II, III and IV quarters also the contribution made by crustaceans was the maximum viz. 64%, 75% and 77% respectively. Cephalopods contributed 9-12 per cent towards the quarterly revenue. Other major revenue earning groups include carangids in II quarter (12%) and perches in III quarter (10%). The remaining groups individually contributed less than 5% towards the quarterly catch.

The analysis of annual revenue shows that of the total gross revenue of Rs. 8,51,085,

TABLE 3. Details of operational expenses of a trawl unit

Items	Expenses (Rs.)				Total
	I Qr.	II Qr.	III Qr.	IV Qr.	
Crew wages	26,322	41,035	81,736	40,280	1,89,373
Fuel cost	82,500	75,000	50,500	66,680	2,74,680
Auction charges	7,608	13,356	19,518	12,726	53,208
Food & bata expense	9,175	10,400	10,000	10,160	39,735
Cost of ice	2,600	3,150	2,000	3,060	10,810
Miscellaneous charges (jetty rent, repairs etc.)	2,075	3,450	9,750	4,380	19,655
Total	1,30,280	1,46,391	1,73,504	1,37,286	5,87,461

TABLE 4. Catch details of a trawler at Cochin Fisheries Harbour during 1991

Name of fish	I Qr. (Jan.-Mar.)		II Qr. (Apr.-Jun.)		III Qr.** (Jul.-Sep.)		IV Qr. (Oct.-Dec.)		Total	
	Catch		Catch		Catch		Catch		Catch	
	Q. (kg)	V (Rs)	Q. (kg)	V (Rs)	Q. (kg)	V (Rs)	Q. (kg)	V (Rs)	Q. (kg)	V (Rs)
Clupeids	585	1,755	910	2,730	250	500	1,156	2,312	2,901	7,297
Lizard fishes	130	520	840	2,520	600	1,200	272	816	1,842	5,056
Perches	1,950	5,850	3,010	6,020	14,500	29,000	1,224	3,672	20,684	44,542
Croakers	325	1,625	560	2,240	550	1,650	884	4,420	2,319	9,935
Carangids	910	4,550	6,440	25,760	1,400	4,200	1,020	4,080	9,770	38,590
Mackerels	715	4,290	910	4,550	700	2,800	340	1,360	2,665	13,000
Bill fishes	520	1,560	630	1,890	650	1,300	1,156	2,312	2,956	7,062
Flat fishes	585	1,755	350	1,400	500	1,000	612	2,448	2,047	6,603
Crustaceans	4,095	1,06,470	5,880	1,35,946	13,900	2,22,400	6,664	1,53,272	30,539	6,18,088
Cephalopods	1,105	13,260	2,310	25,410	3,550	31,950	1,904	20,944	8,869	91,564
Miscellaneous (including elasmobranchs, cat fishes pomfrets etc.)	780	2,340	1,190	2,380	750	1,500	1,564	3,128	4,284	9,348
Total	11,700	1,43,975	23,030	2,10,846	37,350	2,97,500	16,796	1,98,764	88,876	8,51,085
No. of fishing days	65		70		50		68		253	

** From 15-7-91 to 11-8-91 there was ban on fishing (monsoon fishing).

crustaceans earned 72%, cephalopods 11%, perches 5% and the others less than 5% each. Further, percentage performance of I, II, III and IV quarter in annual revenue was 17%, 25%, 35% and 23% respectively. Of a maximum revenue of about Rs. 2.98 lakh earned during III quarter, an amount of about Rs. 2.22 lakh was obtained from the sale proceeds of crustaceans.

Net earnings

By subtracting operational cost from the gross revenue, net operating income has been calculated for each quarter and presented in Table 5 along with the annual net operating income. The income has been found maximum in III quarter (Rs. 1.23 lakh) and minimum in I quarter (Rs. 0.14 lakh). A total of Rs. 2.64 lakh is the net operating income of a trawl unit at Cochin Fisheries Harbour during 1991.

TABLE 5. Net operating income of a trawl unit at Cochin Fisheries harbour (000' Rs.)

Particulars	I Qr.	II Qr.	III Qr.	IV Qr.	Annual
Gross revenue	144	211	297	199	851
Operational cost	133	146	174	137	587
Net operating income	14	65	124	62	264

Aggregate measures

For 253 fishing days the annual catch for a trawl unit during 1991 was 88,876 kg, valued at Rs. 8,51,085. The annual operational cost is

worked out at Rs. 7,83,594 including variable and fixed cost. The net annual profit of a trawler is calculated at Rs. 67,491.

Economic measures per fishing day

The average catch per day fished comes to 351.3 kg which earns an amount of Rs. 3,363.97. The variable and total fishing cost averages to Rs. 2,321.98 and Rs. 3,097.21 per day of operation. After paying operational cost, an amount of Rs. 1,041.99 is left out with the owner in a day. Net profit per day comes to Rs. 266.76.

Costs and earnings per kg of fish production

One kg of fish fetched an average amount Rs. 9.58. To produce a kg of fish, an amount of Rs. 2.58 is incurred on labour and Rs. 3.09 on fuel. Average operating cost per kg of fish production comes to Rs. 6.61. Including fixed cost an amount of Rs. 8.82 is calculated to be accounted towards the total cost of 1 kg of fish. An owner gets a net profit of Rs. 0.76 for every kg of fish sold at landing centre.

Other economic parameters

Rate of return to capital as shown in table 6 -IV is found to be 32.4% which is much higher than the acquisition rate of the money (18%) accounted for this study. The capital investment in a trawler can be recovered in 3.1 years which indicates the pay back period. Labour productivity in term of fish production is calculated at 58.6 kg fish is obtained which earn Rs. 19.

TABLE 6. Measures of units income and profit efficiency

I. Aggregate measure	
i Total No. of fishing days	253
ii Annual catch (kg)	88,876
iii Annual gross revenue (Rs)	8,51,085
iv Total variable cost (Rs)	5,87,462
v Fixed cost (Rs)	1,96,133
vi Total annual cost (Rs)	7,83,594
vii Total investment (Rs)	4,70,000
viii Income over operating cost (Rs)	2,63,634
ix Net annual profit (Rs)	67,491
II. Per fishing day	
i Catch (kg)	351.30
ii Revenue (Rs)	3363.97
iii Variable cost (Rs)	2321.98
iv Total cost (Rs)	3097.21
v Income over operating cost	1041.99
vi Net profit (Rs)	266.76
III. Per kg of fish production	
i Revenue (Rs)	9.58
ii Labour cost [including food & bata (Rs)]	2.58
iii Fuel cost (Rs)	3.09
iv Operating cost (Rs)	8.82
vi Income over operating cost (Rs)	2.97
vii Net profit (Rs)	0.76
IV. Other economic indicators	
i Rate of return to capital (%)	32.4
ii Pay back period (yrs)	3.1
iii Fish production per man day (kg)	58.7
iv Revenue earned per man day (Rs)	560.7
v Fish production per litre of fuel (kg)	2.0
vi Revenue earned per litre of fuel (Rs)	19.0

Summary

With the increasing trend in the number of mechanised trawlers and other fishing crafts there is a competition between and within different mechanised units to share inputs and fishery resources in Kerala coast. In the light of changing mechanism of domestic and international markets and looking at the heavy investment in trawl units was felt necessary to analyse catch, revenue and cost relationships of trawlers and thus an important centre in Kerala namely Cochin Fisheries Harbour was selected during 1991 to study the economic feasibility of trawl units. Every month economic data from 10 randomly selected units were collected on 10 systematic random sample days and the data collected continued for one full year starting from January 1991. Besides collecting catch, value and cost of fishing data the details of boat, engine and other accessories were collected to know

components of annual fixed cost. To know the effect of each quarter, income operating cost was calculated for all the 4 quarters each of 3 months duration starting from the month of January.

Most of the trawlers are 32 footers and operate upto 70 m depth. The cost of a trawler has been recorded at Rs. 4 lakh. An amount of Rs. 83,333 has been worked out towards depreciation on boat, engine, net and other accessories. At the rate of 18% on capital investment an annual interest is found to be Rs. 84,600 whereas annual insurance has been taken at Rs. 28,200 for a trawl unit.

Of total annual operational expenses of Rs. 5.87 lakhs, 22% incurred in I quarter, 25% in II quarter, 29% in III quarter and 24% in IV quarter. The major components of variable cost are labour and fuel charges which account 47% and 32% of variable cost respectively.

The trawl catch mainly include crustaceans, perches, carangids, cephalopods, croakers, mackerels, bill fishes, clupeids, flat fishes and lizard fishes. The crustaceans contributed a maximum of 34% of annual catch, followed by 23% perches, 11% by carangids and 10% cephalopods whereas other groups individually contributed less than 5%.

The gross annual revenue of a trawl unit at Cochin Fisheries Harbour during 1991 was Rs. 8,51,085. Towards gross earnings 72% was added by crustaceans, 11% by cephalopods, 5% by perches, and less than 5% by each of the other groups. I, II, III and IV quarters shared 17%, 25%, 35% and 23% of the gross annual revenue respectively.

A maximum income over operating cost was calculated for III quarter (Rs. 1.23 lakh) and minimum for I quarter (Rs. 0.14 lakh). Annual net operating income is found to be Rs. 2.64 lakhs for 253 fishing days. The net annual profit of a trawl unit is calculated at Rs. 67,491 during 1991 average being Rs. 266.76 per day of fishing. One kg of fish earned a net profit of Rs. 0.76.

Returns to one man labour day is found to be Rs. 58.6 kg or Rs. 560.7 whereas his share in revenue is about Rs. 94 per day. One litre of fuel burning produces 2 kg of fish valued Rs. 19. Based on the annual net profit, rate of return to capital (32.4%) and pay back period (3.1 years) it is concluded that trawlers were running in profit during 1991 at Cochin Fisheries Harbour.