Economics of Operation of Fishing Vessels for Low Energy Fishing

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Gill netting and line fishing are considered to be two most important methods of low energy fishing as vessels engaged in these types of fishing activities do not expend fuel for towing heavy nets and further, fishing grounds are not damaged by fishing activities. These types of fishing activities are seasonal and mostly depend on the types of fishery. The maintenance cost of these types of vessels ranges between 6 and 8% of capital cost per annum and the annual profit ranges from 15 to 25%. Even in the face of declining trend in energy yield and increasing trend in the variable cost of production, this type of low energy fishing activities could survive profitably.

In the face of fuel crisis which threatens the present day world, low energy fishing methods need encouragement provided they are economical. Low energy fishing techniques like gillnetting and long lining do not expend fuel for towing heavy nets. They damage the fishing ground to a very little extent compared to trawling. Further, the fish captured is of large average size and the quality is generally good since they are handled individually (Johnstone & Mackie, 1986). A case study of low energy fishing techniques comprising of gillnetters and long liners was undertaken during the year 1990 in order to assess the economic performance and the results are reported in this communication.

Materials and Methods.

Three boats of 7.62 m OAL operated from Cochin base in 1990 were selected for the study. These boats were engaged in both gillnetting and long lining depending upon the season and fisheries. The particulars of the selected boats are given in Table 1. Data on the capital cost of boat, engine and gear, the variable cost of operation, total number of fishing trips made during the year and catch composition were collected. The capital cost of the boats and engines and the year of built of these boats are given in Table 2 and the variable cost of operation of the boats in Table 3.

The total cost function C(x), the revenue function R(x) and the profit function P(x) for x Kg of fish landed by the three boats were formed separately. In order to work out the revenue, the average sale price of 1 kg of fish is taken as Rs.6/-. The breakeven quantity to be landed for the three boats were worked out by equating the corresponding cost and revenue functions. The marginal cost of landing of 1 kg of fish was worked out by differentiating the cost function with respect to x, and the average cost of landing 1 kg of fish was obtained. The energy yield (kg of fish per

Table 1. *Particulars of selected boats*

Length overall	7.62 m
Breadth	2.20 m
Material of construction	Wood
H.P.	15-20 BHP
Tonnage	4
Type of fishing	Gillnetting & lining

Table 2. *Capital cost of boat and gear*

	Boat I	Boat II	Boat III
Year of built	1983	1985	1981
Cost of boat with engine Rs.	75,000	86,000	68,000
Cost of gear (Gillnet & lines) Rs.	40,000	47,000	37,000
Total Rs.	1,15,000	1,23,000	1,05,000

Table 3. *Variable cost of production*

	Boat I	Boat II	Boat III
A	Rs.	Rs.	Rs.
Repairs & maintenance of boat	4,750	6,225	5,275
Depreciation of boat	7,500	8,600	6,800
Insurance	2,300	2,460	2,100
Depreciation of gear	10,000	12,000	9,000
Repairs of gear	1,225	1,500	1,125
Total of A	25,775	30,785	24,300
B.			
Oil expenditure (Diesel + Engine oil)	31,955	35,311	32,215
Agent's commission	3,840	3,960	3,740
Allowance for Crew	24,400	14,850	14,025
Miscellaneous charges including cost of baits	1,920	1,980	1,870
Share of Crew	49,920	51,480	48,620
Total of B	1,02,035	1,07,581	1,00,470
A + B	1,27,810	1,38,366	1,24,770

litre of fuel) of the boats were worked out by dividing the total catch of each boat by the fuel expended.

Results and Discussion

The catch composition, total fuel consumption, number of trips performed and energy yield are given in Table 4.

Among the three boats from which the data were collected, boat II had made the maximum number of trips and landed more fish compared to the other two. The cost function, revenue function and the profit function for the production of x kg of fish were worked out and given in Table 5.

The performance indicators such as marginal cost, average cost, the break-even point and % profit of the selected boats are given in Table 6. The marginal cost of production (landing every additional kg of fish) of the three boats varied between Rs.2.55 and Rs.2.80 in 1990, maximum for boat no.III and minimum for boat no.II. As per the data presented by Sadanandan *et al* (1988) the marginal cost of landing works out to Rs.1.13 per kg in 1980. The increase in the marginal cost in 1990 was due to the steep increase in the operational cost.

Table 4. *No.of fishing trips, fuel consumption, catch composition and energy yield*

	Boat I	Boat II	Boat III
No. of fishing trips	180	200	175
Fuel consumption (litres)	4962	5483	4998
Catch (kg)			
Shark	7023	6511	7126
Catfish	14045	17906	13362
Seer fish	3277	4341	4454
Leather jacket	4682	4883	4899
Pomfret	936	1628	891
Tuna	16386	17907	12471
Other fishes	468	1085	1336
Total	46817	54261	44539
Energy Yield	9.4 kg	9.9 kg	8.9 kg

Table 5. *Cost function, revenue function, and profit function for x kg of fish production*

Boat No.	Cost function C(x)	Revenue function R(x)	Profit function P(x)
I	115000+2.73x	6x	3.27x-115000
II	123000+2.55x	6x	3.45x-123000
III	105000+2.80x	6x	3.20x-105000

The average cost of production varied between Rs.4.82 and Rs.5.19 per Kg, minimum being for boat No.II. The energy yield varied between 8.9 and 9.9 kg in 1990 but in 1980 the same was between 12 and 13 kg, indicating that the energy yield was diminished considerably over the years. The break-even quantity was more for boat No.II followed by I and III.

The maintenance cost of these boats ranges between 6% and 8% of the capital cost,

Table 6. *Performance indicators*

Boat No.	Total quantity of fish landed (kg)	Marginal cost/kg (Rs.)	Average cost/kg (Rs.)	Break-even Qty. (Kg)	Profit (Rs.)	Total cost (Rs.)	% profit
I	46817	2.73	5.19	35168	38092	242810	15.7
II	54261	2.55	4.82	35652	64200	261366	24.6
III	44539	2.80	5.16	32813	37525	229709	16.3

during the period. Balasubramanian (1970) recommended Venteak for construction of fishing boats as a cost reduction measure, though the ideal one is teak wood. According to him the ratio of cost for one cubic foot of teak, aini and venteak was 3.9:2.1:1.

The percentage profit calculated for the three boats showed that the same was more for boat No.II (24.6%) followed by boat No.III (16.3%) and boat No.I (15.7%). They were above the cut off rate of interest because in nationalised banks the rate of interest for long term deposit was 11% during 1990. This indicates that these types of low energy fishing techniques could survive profitably.

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