Economic Analysis of 22m and 23m Deep Sea Trawlers

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The cost-benefit analysis of 23m and 22m trawlers operated from Visakhapatnam base is presented. The study indicated that the deep sea fishing in Indian waters is a profitable venture. The profit over capital investment for a 23m trawler worked out to about 18% whereas the same was about 10% for a 22m trawler. Catch per trawling operation, cost of production, productivity per man year, energy yield etc. establish the economic superiority of 23m vessel.

India ranks first among the shrimp landing countries of the world. A major share (about 60%) of the landed prawns is contributed by the mechanised sector and the rest by the artisanal sector. Majority of the mechanised fishing craft is in the range of 9.3 to 11m OAL. Large sized deep sea trawlers for the capture of prawns from deeper waters were introduced in 1970. Presently several trawlers of 22 to 23m OAL are under operation mainly from the Visakhapatanam base, of Andhra Pradesh in the east coast. When this study was initiated by us during 1982-83, there were about 58 such vessels under operation from this base. Eventhough considerable attention has been paid on the economic analysis of bigger trawlers in other countries (Torbjorn Digernes, 1978) our information on this very important aspect of trawler operation is still very fragmentary and inadequate. It is thought worthwhile to carry out such a case study and we have selected the larger trawlers operated from Visakh base for this purpose. The findings of this study, it is hoped, would be of much use to the planners and policy makers for the exploitation of fishery resources of the country.

Methods

Out of the 58 Visakh based trawlers in 1982-83, 13 trawlers of 23m and 4 trawlers of 22 m OAL were taken up for the case study. Data pertaining to various aspects of cost and revenue of the trawlers were collected as per a structured proforma based on 160 and 74 voyages for 23 and 22 m trawlers respectively.

Cost factors

As per 1977-78 prices, the capital cost of a 23m trawler is about 45 lakhs and of a 22m about 40 lakhs rupees. The cost of 10 trawl nets required for use in a 23m amounts to Rs. 1 lakh and for 8 nets in a22 m trawler 0.64 lakhs. A 23 m trawler propelled by a 380 BHP engine makes an average number of 12-13 voyages, whereas a 22m with a 365 BHP accomplishes about 18 trips per annum. The duration of each voyage, trip cycle (duration of voyage + harbour stay between trips), area and depth of operation, nature of the sea-bottom, number and duration of trawling per voyage, the quantity of HSD and engine oil consumed are presented in Table 1. For computing the fixed cost, the depreciation of capital investment on trawler was taken as 5% and the trawl net as 20% (each trawler require 8 to 10 trawl nets and the average life of each net is reported to be 6 months). The bank interest works out to 8% of the capital cost of the vessel, according to the trawler operators. Cost of fuel, salary, wages and incentives to crew, repair and maintenance cost of the vessel, cost of implements, port and administrative charges chiefly contributed to the operational costs.

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Table 1. *Particulars regarding large trawlers* (Average values)

OAL, m	23	22
Cost of the trawler, Rs.	45 lakhs	40 lakhs
Year of built	1977–78	—
Engine HP, BHP	380	365
Make of the engine	Caterpillar	Caterpillar
Life of tralwer, yrs	20	20
Type of gear	Out rigger shrimp trawl	Out rigger shrimp trawl
Cost of the gear, Rs. (each unit)	10,000/-	8,000/-
No. of trawl nets	10	8
Life of the net, months	6	6
No. of crew	12	12
No. of voyages/year	12–13	18
Duration of each voyage, days	20	16
Trip cycle, days	30	20
Area of operation	Vizag to Bangladesh	Orissa to Bangladesh
Distance from the shore, km	23-45	23-45
Depth of operation, m	30 to 120	30 to 100
Nature of bottom	Muddy and sandy	Muddy and sandy
No. of trawling operation/voyage	80	75
Duration of trawling, h	3–4	3–4
Qty. of HSD/voyage, kl	25	15.1
Qty. of engine oil/ voyage, l	400	280
Average catch (prawn)/ trawling operation, kg	44.0	25.5

Table 2. *Economic analysis of larger trawlers* (23m *and* 22m)

	23 m* Rs. lakhs	Total Rs. lakhs	22 m+ Rs. lakhs	Total Rs. lakh
Capital investment (CI)				
1. Cost of trawler	45.00		40.00	
2. Cost of gear	1.00	46.00	0.64	40.64
Fixed cost (A)				
i) Vessel depreciation (at the rate of 5%)	2.25		2.00	
ii) Gear depreciation (at the rate of 20%)	0.20		0.13	
iii) Bank interest (at the rate of 8%)	3.68		3.25	
iv) Insurance (at the rate of 1.4%)	0.64	6.77	0.57	5.95
Variable cost (B)				
i) Fuel HSD	11.90		8.64	
ii) Engine oil	0.67		0.48	
iii) Salary and wages (crew)	1.50		1.30	
iv) Incentives	2.50		2.30	
v) Administration	0.80		0.80	
vi) Repair and maintenance	1.50		1.50	
vii) Cost of implements	1.10		1.58	
viii) Port charges	0.24	20.21	0.24	16.84
Total cost (A + B)	26.98		22.79	
Gross revenue	35.35		26.97	
Profit (gross revenue– total cost)	8.37			4.18
% Profit over CI		18.20		10.30

*Data based on 13 trawlers operated for 160 voyages in the year

+Data based on 4 trawlers operated for 74 voyages in the year

Results and Discussion

Table 2 presents the capital investment, fixed and variable costs and percentage profit over capital investments. A glance of Table 2 reveals the percentage of profit for 23 and 22m trawlers as 18.2 and 10.3 respectively accounting more profit for 23m trawler. Table 3 depicts the detailed analysis carried out by calculating operational profit, net profit, cost recovery factors, ratios pertaining to total cost and revenue, operating profit and operating cost, and net profit and gross revenue. The annual operating profit arrived at by taking the difference between total annual revenue and operating cost with respect to 23 and

22m trawlers worked out to 15.14 and 10.13 lakhs of rupees respectively. The corresponding figures pertaining to each voyage were 1.23 and 0.56 lakhs rupees.

Table 3. *Summary of revenue and cost* (23 *m and* 22 *m*)

	23 m		22 m	
	Single year Rs. lakh	Single voyage Rs. lakh	Single year Rs. lakh	Single voyage Rs. lakh
Gross revenue	35.35	2.87	26.97	1.50
Operating cost	20.21	1.64	16.84	0.94
Total cost	26.98	2.19	22.79	1.27
*Operating profit	15.14	1.23	10.13	0.56
Net profit	8.37	0.68	4.18	0.23
Ratio of total cost to gross revenue	1:1.31		1:1.18	
Ratio of operating cost to net profit	1:0.41		1:0.25	
Ratio of net profit to gross revenue	1:4.22		1:6.45	
Ratio of operating profit to operating cost	1:1.33		1:1.66	
+Capital recovery factor	0.18		0.10	
++Cost recovery factor	0.31		0.18	

+Net profit/CI; ++Net profit/total cost

*Gross revenue—variable cost

The ratio of gross revenue to total cost for the 23 m trawler is 1.31 which indicates a revenue return of 1.31 rupee for every rupee spent. The corresponding ratio with respect to 22 m trawler worked out to 1.18. The ratio of net profit to operating cost is 0.41 for 23m and 0.25 for 22m which indicates a net profit of 41 paise per rupee spent on 23m and 25 paise per rupee for 22m. The ratios of gross revenue to net profit were 4.22 (for 23m) and 6.45 (for 22m). This indicates that for a net profit of one rupee, the gross revenue to be 4.22 and 6.45 respectively for 23 and 22m trawlers. The capital recovery factor (net profit divided by capital investment) worked out to 18% for 23m and 10% for 22m and the cost recovery factor (net profit divided by total cost) as 31 and 18%.

The productivity and cost analysis of the data are presented in Table 4. The total work force in both the trawler sizes is the same, being 12. The productivity index (annual production divided by total work force) worked out to 5.16 and 2.66 metric ton per man year for the 23m and 22m trawler sizes. It is evident that productivity is better for 23m trawlers. It is interesting to note that the energy yield (total catch divided by total fuel consumption) for the 23m trawlers is 1 kg prawn per every 7.14 litres of HSD consumed and it is 1 kg per 8.5 litres in 22m trawlers. This may account for the better profitability of 23m trawlers compared to 22m ones.

Table 4. *Productivity and cost*

	23 m	22 m
Cost of production, Rs. in lakhs/MT	0.622	0.72
+Total work force	12/trawler	12/trawler
*Productivity per man yr	5.16 MT	2.66 MT
++Energy yield	1 kg prawn/ 7.14 litre HSD	1 kg prawn/ 8.5 litre HSD

+Number of man year

*$\frac{\text{Annual production}}{\text{Total work force}}$

++$\frac{\text{Total catch}}{\text{Qty. of energy consumed}}$

Table 5 presents the percentage breakup of fixed and variable costs for the two groups of trawlers. A perusal of Table 5 shows higher fixed costs for the 22m trawlers (26.1%) while it is 25.1% in the other group. Under variable costs, the cost of fuel accounts for the major share (46.6% for 23m and 40% for 22m). The salary, wages and incentives to crew, ranks next in expenditure, 14.8% and 15.8% of

the total cost in 23 and 22m trawlers respectively. Repair and maintenance contributes to 5.5% (for 23m) and 6.6% (for 22m).

Table 5. *Break-up cost (in percentages)*

		23 m %	22 m %
Fixed cost (A)		25.1	26.1
Variable cost (B)			
i) HSD	Fuel	46.6	40.0
ii) Engine oil			
iii) Salary and wages		14.8	15.8
iv) Incentives			
v) Administration		3.0	3.5
vi) Repair and maintenance		5.5	6.6
vii) Cost of implements		4.1	6.9
viii) Port charges		0.9	1.1
Total		100.0	100.0

Catch per year, catch per voyage and breakeven are tabulated in Table 6. For breakeven, a 23m trawler has to land 2.74 t of prawn per voyage, while for a 22m trawler it is 1.58 t and this would cost Rs. 2.19 lakhs and Rs. 1.27 lakhs respectively.

Table 6. *Catch details*

	23 m (Qty in MT)		22 m (Qty in MT)	
	Single year	Single voyage	Single year	Single voyage
Present catch				
Prawn	43.25	3.51	31.91	1.77
Fish	18.65	1.52	—	—
Total	61.90	5.03	31.91	1.77
**Catch at breakeven point*				
Prawn	33.73	2.74	28.49	1.58

*Average price of prawn = Rs. 80,000/MT
No. of voyages = 12 for 23m
18 for 22 m

The results of the present study indicate that deep sea fishing in Indian waters is a viable proposition at present. The capital investment may be realised in the course of 5 years and 10 years for 23m and 22m vessels respectively as indicated by capital recovery factors. Catch per trawling operation, cost of production, productivity per man year, energy yield etc. show the superiority of 23 m over the 22 m. Also, as the fixed cost remains constant, there is further scope for enhancing the profitability of 23m trawlers by reducing the trip cycle and thereby increasing the number of voyages.

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Reference

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