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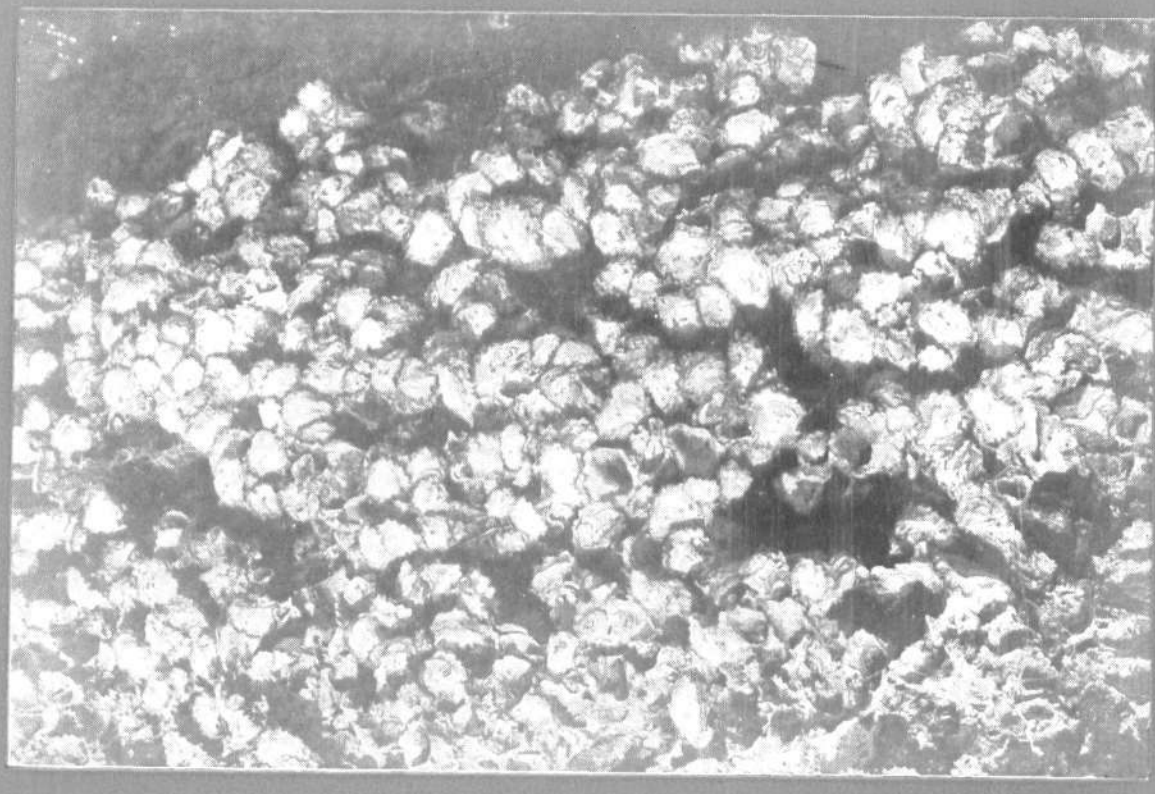

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COSTS AND EARNINGS OF TRAWLERS OPERATING AT TUTICORIN FISHERIES HARBOUR (TAMIL NADU)

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Introduction

Modernisation of indigenous crafts and introduction of mechanised fishing boats have been accorded high priority for the development of marine fishery sector from the very beginning of our National Five Year Plans. The export demand coupled with high unit value realisation of prawns added to the speed of the growth of mechanised fleets. The enhanced mobility of fishing crafts on account of motorization, led to increased exploitation of fish and induced many fishermen to shift from traditional to mechanised fishing. Mechanisation not only led to intensification of fishing but also paved the way for the growth of an organised sea food export industry and consequent increase in employment opportunities. However, the mechanised fleets were highly depending on trawl fishing and prawn catches for their sustenance. Initially the 7.6 and 9.1 metre long boats were designed and introduced for gillnetting. But the high profitability of shrimp trawling led the fishermen to use these boats also for trawling with modifications. Now a stage has come to realise that the excessive trawling in some of the regions of our coastal waters has led to over-exploitation of resources warranting regulatory measures for attaining better economic returns in the long run. The frequent clashes between the traditional and mechanised boat owners over the area of operation also emerged as a serious problem emphasising the need for fishing regulations. In this context, basic information on catch composition, costs and earnings of different craft-gear combinations is very much essential for policy decisions. The Central Marine Fisheries Research Institute has undertaken a number of micro level studies with regard to the economics of mechanised and artisanal fishing units in different regions of our country. The present study deals with the economics of trawlers of different sizes operating at Tuticorin Fisheries Harbour in Tamil Nadu. Tuticorin is one of the most important trawling centres in Tamil Nadu having a major fisheries harbour with berthing capacity of about 400 small mechanised boats and 10 deep sea trawlers with boat building yard and service centres.

Data on the initial investment of trawlers of different sizes *viz* 8.5 m (30'), 9 m (32') and 9.5 to 10 m operating at Tuticorin fisheries harbour were collected by interviewing the unit owners during July–August, 1985 in a specially designed schedule.

Most of the observed units of 9 m and 9.5 to 10 m engaged themselves in pair trawling occasionally during 1985–'86. Since two boats were involved for this type of fishing 50 per cent of the costs, species-wise catch and returns were considered as the portion of the selected unit, out of the two.

The common species of prawns caught by the trawlers at Tuticorin are *P. semisulcatus, M. dobsoni, P. stylifera* and *P. indicus. P. semiculcatus* alone contributed more than 70 per cent of the revenue realised from prawn catches. The catch and value realised by other varieties were negligible. Hence for the analysis, these 4 species were grouped together under the category penaeid prawns. Normally the trawl catches are composed of a number of varieties of fish. The number of varieties is still higher in pair trawling. In the present analysis some of the commercially important varieties of fish such as *Lethrinus* sp., silverbellies, *Thryssa* sp., threadfin breams, sciaenids, carangids, cuttle fish and white fish were recorded separately and the catch and revenue realised from them were also separately dealt with. The catch and revenue realised from the sales of all other varieties were given together.

Initial investment

The trawlers operating at Tuticorin Fisheries Harbour were mostly purchased during the period from 1973 to 1985. Due to the cost escalation of fishing boats and continuous replacements of damaged parts by the fishermen in subsequent years there was not much difference in the purchase value and the present resale value of the boats. However, the average value of the units at the time of observation was considered in working out the economics of fishing operations.

The 8.5 m trawlers (category I) were fitted with Ruston or Leyland engines having horse power ranging from 40 to 68. For most of the observed units in this category, the hull was retained with minor replacements while engines were changed in subsequent years. Each boat is having two nets; one with a length of 28 m, breadth of 12 m and mesh size of 1 to 4 cm andthe other 34 m length, 14 m breadth and the mesh size of 2 to 6 cm. The average investment of a 8.5 m trawler operating at Tuticorin was Rs. 1,00,000/- (Rs. 27,000 for hull, Rs. 65,000 for engine and Rs. 8,000 for gears).

For 9 m trawler (category 2) the h.p. of engine ranged from 54 to 88. These units possess 2 to 3 nets with mesh size of 1 to 4 cm and 2 to 6 cm. The length of the nets varies from 31 to 39 m and breadth from 11 to 14.5 m. The average investment for 9m trawler worked out at Rs. 1,20,000 (Rs. 35,000 for hull, Rs. 75,000 for engine and Rs. 10,000 for gears).

In recent years, trawlers of 9.5 to 10 m were also introduced at Tuticorin Fisheries Harbour. Most of the sample units in this category were purchased in 1984 and afterwards. They were fitted with 98 h.p. engines. These units possess 3 trawl nets with breadth of 17 m and length ranging from 36.5 to 42 m. The mesh size of the nets varied from 1 to 6 cm. The investment on these units worked out at Rs. 2,20,000 (Rs. 75,000 for hull, 1,30,000 for engine and Rs. 15,000 for gears).

Fixed cost

Depreciation of the fishing unit and interest for investment constitute the fixed cost. Depreciation is worked out on the basis of the expected life of the fishing boat and accessories and the interest is calculated at the rate of 15% per annum. The average expected life of hull and engine of the selected units was considered as 5 years and that of gears as 3 years. Depreciation was worked out on the basis of straight line method. The annual depreciation of these units worked out at Rs. 21,040 for 8.5 m, Rs. 25,300 for 9 m and Rs. 46,000 for 9.5 to 10 m. The annual interest for investment worked out at Rs. 15,000, 18,000 and Rs. 33,000/- for the three category of units respectively. The annual fixed cost came to about Rs. 36,040 for 8.5 m, Rs. 43,300/- for 9 m and Rs. 79,000 for 9.5–10 m.

Operating costs and returns

The day to day expenses incurred for the working of the boat is termed as operating expenses or variable costs. The expenses on fuel, wages and repairing & maintenance are the major components of variable cost of a mechanised boat. Generally wages are proportional to returns as sharing system is followed in these units. The cost of repairing and maintenance of the unit is entirely borne by the owner. The income after deducting operating costs such as oil expenditure, auction charges and daily bata is divided into three shares. The owner of the unit gets two shares for boat and net and the remaining is equally divided among the crew members as wages. The gross returns of a unit is the sale value of the catch landed by it.

The average operating costs and returns of a 8.5 m trawler at Tuticorin Fisheries Harbour during October 1985 to September 1986 is given in Table 1. The annual average variable cost of a unit worked out at Rs. 2,95,964 as against the gross returns of Rs. 3,90,716. The annual catch of a boat during the year was about 89.5 tonnes, of which penaeid prawns accounted for 4 %. The revenue realised by these boats were found to be minimum during October–December and maximum during July–September. Next to prawns, silverbellies contributed considerable returns (9–15%) for these units in all the seasons.

The operating cost per day worked out at Rs. 1,184 in which fuel cost alone accounted for 44 %. About 36 % of the operating expenditure was incurred for labour and 9 % for repairing and maintenance of the units. The average revenue per day of operation was Rs. 1,562. It may be seen that about 66 % of the gross revenue was realised by the bye-catch (fish) and only 34% by the contribution of penaeid prawns in the gross revenue, ranged from 33 % during January–March to 55 % during July–August.

The quarterly and daily average operating costs and returns of a 9 m trawler are given in Table 2. Annual operating cost of a boat worked out at Rs. 3,70,393 and the gross revenue realised was Rs. 4,79,811 Fuel cost alone accounted for 51 % of the operating expenses. Labour cost constituted 29 % and repairing and maintenance of the unit 10 % of the variable cost. The average annual catch of a 9 m trawler was 91 tonnes for 243 fishing days during the referred period. The penaeid prawns constituted about 4 % of total catch and 33 % of the gross revenue. Minimum gross revenue was obtained by these boats during October–December period and maximum during April–June. The average revenue realised per day of operation ranged from Rs. 1,527 to Rs. 2,475 for different seasons. The contribution of penaeid prawns in gross revenue ranged from 9 % (January–March) to 54 per cent (July–August).

Table 1. *Quarterly operating costs and returns per unit of* 8.5 *m trawlers at Tuticorin Fisheries Harbour* (1985–'86)

Items		Oct.–Dec.		Jan.–Mar.		Apr.–Jun.		Jul.–Sep.		Annual	
		Total	Per day	Total	Per day	Total	Per day	Total	Per day	Total	Per day
I. Operational costs											
Wages		8,874	153	10,230	155	21,824	341	24,800	400	65,728	263
Bata		8,062	139	9,966	151	8,768	137	9,672	156	36,468	146
Fuel		21,112	364	35,970	545	36,160	565	32,674	527	1,25,916	503
Ice		2,900	50	2,376	36	2,176	34	2,976	48	10,428	42
Auction charges		2,262	39	3,498	53	7,296	114	4,712	76	17,768	71
Jetty rent		116	2	132	2	128	2	124	2	500	2
Repairing and maintenance		9,744	168	13,068	198	6,208	97	7,688	124	36,708	147
Others		232	4	1,452	22	640	10	124	2	2,448	10
Total		53,302	919	76,692	1,162	83,200	1,300	82,770	1,335	2,95,964	1,184
II. Catch (Q-kg) and Revenue (V-Rs.)											
Penaeid prawns	Q	754	13	660	10	1,344	21	1,302	21	4050	16
	V	24,824	428	27,390	415	51,776	809	69,440	1,120	1,73,430	694
Lethrinus sp.	Q	232	4	396	6	192	3	744	12	1,564	6
	V	2,088	36	5,478	83	2,688	42	5,022	81	15,276	61
Silverbellies	Q	3,480	60	5,742	87	8,960	140	4,898	79	23,080	92
	V	7,482	129	12,210	185	17,216	269	8,990	145	45,898	183
Thryssa sp.	Q	2,784	48	3,300	50	4,160	65	1,612	26	11,856	47
	V	3,770	65	5,940	90	8,064	126	2,480	40	20,254	81
Threadfin breams	Q	2,088	36	330	5	512	8	1,364	22	4,294	17
	V	3,016	52	2,508	38	4,224	66	6,386	103	16,124	64
Sciaenids	Q	1,044	18	330	5	768	12	930	15	3,072	12
	V	5,278	91	1,980	30	3,648	57	3,534	57	14,440	58
Carangids	Q	522	9	396	6	896	14	310	5	2,124	8
	V	1,682	29	3,102	47	6,592	103	3,100	50	14,476	58
Cuttle fish	Q	232	4	198	3	128	2	186	3	744	3
	V	1,392	24	3,102	47	2,432	38	2,170	35	9,096	36
White fish	Q	—	—	—	—	384	6	186	3	570	2
	V	—	—	—	—	5,696	89	1,984	32	7,680	31
Others	Q	3,944	68	14,612	221	8,832	138	10,726	173	38,114	168
	V	11,832	204	21,384	324	18,496	289	22,320	360	74,032	296
III. Gross returns	Q	15,080	260	25,964	393	26,176	409	22,258	359	89,478	356
	V	61,364	1,058	83,094	1,259	1,20,832	1,888	1,25,426	2,023	3,90,716	1,562

Table 2. *Quarterly average operating costs and returns per unit of 9 m trawlers at Tuticorin Fisheries Harbour* (1985–'86)

Items		Oct.–Dec.		Jan.–Mar.		Apr.–Jun.		Jul.–Sep.		Annual	
		Total	Per day	Total	Per day	Total	Per day	Total	Per day	Total	Per day
I. Operational costs											
Wages		9,856	176	22,701	329	24,839	421	15,517	263	72,913	300
Bata		7,616	136	8,556	124	11,092	188	8,437	143	35,701	147
Fuel		42,784	764	49,887	723	49,855	845	45,843	777	18,369	775
Ice		2,184	39	3,588	52	3,127	53	2,773	47	11,672	48
Auction charges		3,024	54	8,211	119	6,549	111	4,897	83	22,681	93
Jetty rent		112	2	138	2	177	3	118	2	545	2
Repairing & maintenance		11,088	198	9,591	139	7,906	134	7,788	132	36,373	150
Others		672	12	759	11	531	9	177	3	2,139	9
Total		77,336	1,381	1,03,431	1,499	1,04,076	1,764	85,550	1,450	3,70,393	1,524
II. Catch (Q–kg) and Revenue (V–Rs.)											
Penaeid prawns	Q	1,120	20	276	4	1,121	19	1,416	24	3,932	16
	V	32,088	573	12,075	175	57,112	968	58,646	994	1,59,921	658
Lethrinus sp.	Q	336	6	1,104	16	531	9	1,180	20	3,151	13
	V	3,528	63	14,283	207	4,366	74	7,906	134	30,086	124
Silverbellies	Q	4,368	78	7,245	105	5,251	89	5,664	96	22,528	93
	V	10,752	192	18,147	263	13,098	222	7,906	134	49,903	205
Threadfin breams	Q	1,120	20	1,173	17	1,298	22	885	15	4,476	19
	V	2,800	50	7,245	105	7,434	126	4,602	78	22,081	91
Thryssa sp.	Q	1,568	28	4,554	66	5,782	98	2,301	39	14,205	58
	V	3,024	54	9,591	139	11,033	187	4,012	68	27,660	114
Sciaenids	Q	1,232	22	1,173	17	885	15	1,062	18	4,352	18
	V	6,160	110	5,796	84	4,897	83	3,363	57	20,216	83
Carangids	Q	560	10	621	9	885	15	531	9	2,597	11
	V	5,656	101	6,003	87	9,440	160	3,894	66	24,993	103
Cuttle fish	Q	336	6	414	6	177	3	295	5	1,222	5
	V	2,688	48	5,865	85	2,360	40	3,481	59	14,394	59
White fish	Q	672	12	759	11	531	9	649	11	2,611	11
	V	4,088	73	8,280	120	5,605	95	2,950	50	20,923	86
Others	Q	4,704	84	13,317	193	9,794	166	4,130	70	31,945	131
	V	14,728	263	51,957	753	30,680	520	12,272	208	1,09,637	451
III. Gross returns	Q	16,016	286	30,636	444	26,255	445	18,113	307	91,020	375
	V	85,512	1,527	1,39,242	2,018	1,46,025	2,475	1,09,032	1,848	4,79,811	1,974

Table 3. *Quarterly average operating costs and returns per unit of trawler* (9.5–10 m) *at Tuticorin Fisheries Harbour (1985–'86)*

Items		Oct.–Dec.		Jan.–Mar.		Apr.–Jun.		July–Sep.		Annual	
		Total	Per day	Total	Per day	Total	Per day	Total	Per day	Total	Per day
I. Operational costs											
Wages		15,344	274	21,892	421	30,394	309	37,760	590	95,390	401
Bata		11,032	197	11,388	219	16,104	244	12,288	192	50,812	214
Fuel		56,672	1,012	42,484	817	62,634	949	64,832	1,013	2,26,622	952
Ice		3,248	58	3,016	58	3,960	60	3,712	58	13,936	58
Auction charges		6,328	113	11,336	218	7,326	111	10,560	165	35,550	149
Jetty rent		112	2	104	2	198	3	128	2	542	2
Repairing & maintenance		7,056	126	10,400	200	7,590	115	11,840	185	36,886	155
Others		280	5	780	15	660	10	—	—	1,720	8
Total		1,00,072	1,787	1,01,400	1,950	1,18,866	1,801	1,41,120	2,205	4,61,458	1,939
II. Catch (Q-kg) Revenue (V-Rs.)											
Penaeid prawns	Q	1,176	21	676	13	1,118	18	2,240	35	5,280	22
	V	41,720	745	30,316	583	43,956	666	91,264	1,426	2,07,256	871
Lethrinus sp.	Q	2,240	40	1,612	31	1,518	23	2,176	34	7,546	32
	V	10,808	193	14,872	286	12,276	186	17,024	266	54,980	231
Silverbellies	Q	6,644	119	5,876	113	8,184	124	5,184	81	25,908	109
	V	11,312	202	12,844	247	15,708	238	10,688	167	50,552	212
Thryssa sp.	Q	4,928	88	4,004	77	5,610	85	1,344	21	15,886	66
	V	6,944	124	8,112	156	11,484	174	2,368	37	28,908	121
Threadfin breams	Q	1,176	21	572	11	924	14	2,944	46	5,616	24
	V	5,712	102	3,900	75	6,996	106	13,312	208	29,920	126
Sciaenids	Q	2,744	49	572	11	1,056	16	1,644	26	6,036	26
	V	10,640	190	3,536	68	4,026	61	6,208	97	24,410	102
Carangids	Q	504	9	676	13	594	9	448	7	2,222	9
	V	3,024	54	6,448	124	5,874	89	5,440	85	20,786	88
Cuttle fish	Q	448	8	1,040	20	924	14	384	6	2,796	12
	V	3,696	66	14,560	280	13,134	199	5,824	91	37,214	156
White fish	Q	—	—	312	6	330	5	320	5	962	4
	V	—	—	3,432	66	3,564	54	2,944	46	9,940	41
Others	Q	5,768	103	7,824	150	6,138	93	7,680	120	27,410	115
	V	30,128	538	36,608	704	34,914	529	50,880	795	1,52,530	642
III. Gross returns	Q	25,648	458	23,164	445	26,466	401	24,384	381	99,662	418
	V	1,23,984	2,214	1,34,628	2,589	1,51,932	2,302	2,05,952	3,218	6,16,496	2,590

The average annual opreating cost of a trawler of 9.5 to 10 m worked out at Rs. 4,61,458 realising a gross revenue of Rs. 6,16,496 (Table 3). On an average there were 238 fishing days for these boats with an annual catch of about 100 tonnes per unit. About 34 % of the gross revenue was contributed by penaeid prawns with a range of 23 % to 44 % over the four quarters. In the operating costs, fuel constituted 49 % labour 32 % repairing and maintenance of the unit 8 % and other expenses like auction charges, ice, and jetty rent 11 %. The average daily operating expenses ranged from Rs. 1,787 during October–December to Rs. 2,205 during July–September with corresponding gross revenues of Rs. 2,214 and Rs. 3,218 respectively. Silverbellies contributed towards 8 % of the gross revenue and it was available throughout the year.

Annual income and expenditure

The annual income and expenditure statement for different sizes of trawlers operating at Tuticorin fisheries harbour is given in Table 4. The total cost per annum (fixed + operating cost) was worked out at Rs. 3.32 lakhs for 8.5 m trawlers, Rs. 4.13 lakhs for 9 m trawlers and Rs. 5.40 lakhs for 9.5 to 10 m trawlers. In the total cost, the operating expenditure alone accounted for 85 to 90 % for these boats. The net operating income per annum (income over operating expenses) was worked out at Rs. 94.7 thousand for 8.5 m Rs. 1.09 lakhs for 9 m and Rs. 1.55 lakhs for 9.5 to 10 m. The annual net profit was obtained by subtracting the total of fixed and variable costs from the gross income of a unit in a year. Net profit of 8.5 m boats worked out at Rs. 58,712, 9 m Rs. 66,118 and for 9.5–10 m Rs. 76,033 during October, 1985 to September, 1986.

Revenue from prawns and other varieties

It is widely believed that the trawlers are heavily depending on the prawn catches for their sustenance. The present study indicates that about 56 % of the annual gross revenue of 8.5 m 67 % of 9 m and 66 % of 9.5 to 10 m. were derived from the catches of fin fishes. The monthwise trend of gross revenue realised per day along with the revenue from prawns alone for 8.5 m, 9 m and 9.5-10 m is given in Fig. 1, 2 and 3 respectively. The daily average revenue for each month realised by these boats from prawns and other varieties was higher with higher catches of prawns. But the revenue received from fishes was higher than that of prawns during most part of the year. The increase in price of fish in recent years in the internal market may be mainly responsible for this.

The daily gross revenue and prawn revenue were minimum during October and maximum during July for 8.5 m trawlers (Fig. 1). Even with the peak prawn catches during July, almost 37 % of the revenue was obtained from other varieties. During December about 81 % of the daily gross revenue was realised from other varieties. The higher dependance on prawn catches was explicitly known for the months of April to August and in the remaining period its contribution was comparatively less in the total revenue.

For 9 m trawlers also prawn catches contribute substantially in the gross revenue only during May–August period (Fig. 2). Even with less catch and revenue from prawns (9 %) during March each unit realised on an average about Rs. 3,100 per day of operation. During this period most of the trawlers other than 8.5 m size operated pair trawling and the quality fishes they brought fetched good prices. The gross revenue of 9.5 to 10 m trawlers was maximum during July associated with maximum prawn revenue (Fig. 3). But overall it indicates that these units were highly depending on the revenue of other varieties caught during the remaining period.

Key economic indicators

Some of the key economic indicators for the three types of units operating at Tuticorin fisheries harbour have been worked out on the basis of costs and earnings data and given in Table 5.

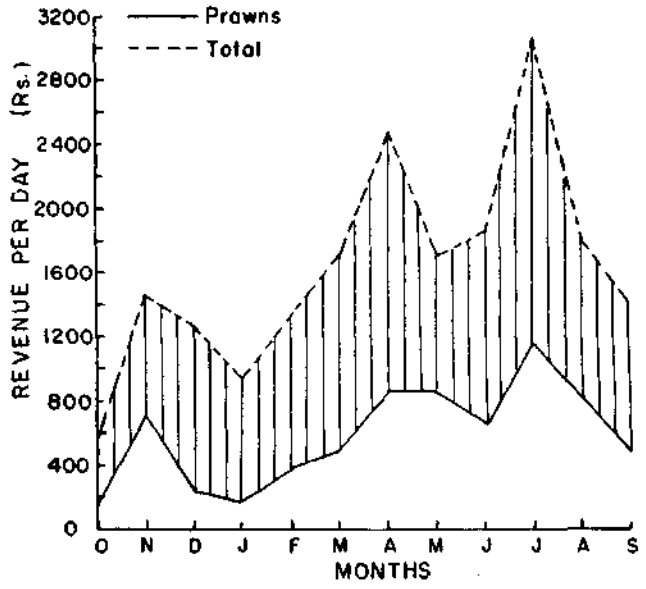

Fig. 1. Monthwise gross revenue per unit per day from prawns alone and total for 8.5 m trawlers.

Table 4. *Annual income and expenditure statement of trawlers of different size at Tuticorin Fisheries Harbour (October-September, 1986)*

Item	Trawlers		
	8.5 m	9 m	9.5–10 m
1. Initial investment (Rs.)			
a) Hull	27,000	35,000	75,000
b) Engine	65,000	75,000	1,30,000
c) Gears	8,000	10,000	15,000
Total	1,00,000	1,20,000	2,20,000
2. Annual fixed cost (Rs)			
a) Depreciation			
i) Hull & Engine (20%)	18,400	22,000	41,000
ii) Gears (33%)	2,640	3,300	5,000
b) Interest for investment (15%)	15,000	18,000	33,000
Total	36,040	43,300	79,000
3. Operating costs (Rs.)	2,95,964	3,70,393	4,61,458
4. Total costs (2 + 3)	3,32,004	4,13,693	5,40,458
5. Gross revenue (Rs.)	3,90,716	4,79,811	6,16,496
6. Net operating income (Rs.) (5–3)	94,752	1,09,418	1,55,038
7. Net profit (Rs.) (6-2)	58,712	66,118	76 038

The average number of fishing days was 250 for 8.5m, 243 for 9 m and 238 for 9.5 to 10 m trawlers during the year and average catch per day of operation worked out at 356, 375 and 418 kg respectively. The average revenue received per day was Rs. 1,562 for 8.5m, Rs. 1,974 for 9m and Rs. 2,590 for 9.5 to 10 m, the average value received per kg of fish being Rs. 4.39, Rs. 5.26 and Rs. 6.2 for these units respectively. The catch composition differs as the boats of 9 m and 9.5 to 10 m engage in pair trawling occasionally. Since the bigger size boats bring more quality fishes they receive comparatively better prices. The catch per man day varies from 59kg valued at Rs. 260/- for 8.5m to 70kg valued at Rs. 432 for 9.5 to 10 m trawlers. The quantity of fish produced per litre of fuel worked out at 3.0, 2.2 and 1.8 kg for 8.5 9 and 9.5 m boats respectively, the fuel cost per kg of fish caught being Rs. 1.41, Rs. 2.07 and Rs. 2.28 for these units respectvely.

The average total cost per day of operation worked out at Rs. 1,328 for 8.5 m, Rs. 1,702 for 9 m and Rs. 2,271 for 9.5 to 10 m trawlers during October, 1985 to September, 1986 and cost of production per kg of fish worked out at Rs. 3.73, Rs. 4.54 and Rs. 5.43 respectively.

Capital turnover ratio indicates the rate at which income was generated for each rupee investment and it was found to be Rs. 3.90 for 8.5 m, Rs. 4.00 for 9 m and Rs. 2.80 for 9.5 to 10 m. The rate of return to capital was 74, 70 and 50% respectively. Since the normal nterest rate of capital being 15 to 20%, the investments on all the three types of units were found to be profitable. The pay back period for all these three types of units was found to be less than two years. The expense income ratio is useful to measure the input-output efficiency of any business. As indicated by the total cost ratio for each rupee of gross income earned, 85 paise of 8.5 m, 86 paise of 9 m and 88 paise of 9.5 to 10 m trawlers were spent for production.

Table 5. *Key economic indicators*

Item	Size of trawlers (m)		
	8.5	9	9.5–10
Average number of days fished in a year	250	243	238
Average catch per day of operation (kg)	356	375	418
Average revenue per day (Rs.)	1,562	1,974	5,902
Average value realised per kg of fish (Rs.)	4.39	5.26	6.20
Quantity of fish produced per man-day (kg)	59.30	62.50	69.67
Value of production per man-day (Rs.)	260	329	432
Average remuneration received by a labourer per day (Rs.)	68	75	103
Quantity of fish produced per litre of fuel(kg)	2.97	2.26	1.82
Average fuel cost per day of operation (Rs.)	503	775	952
Fuel cost per kg of fish (Rs.)	1.41	2.07	2.28
Average operating cost per day of operation (Rs.)	1,184	1,524	1,939
Operating cost per kg of fish (Rs.)	3.33	4·06	4.64
Average total costs per day of operation (Rs.)	1,328	1,702	2,271
Total cost per kg of fish (Rs.)	3.73	4.54	5.43
Capital turn over ratio	3.90	4 00	2.80
Rate of return to capital %	74	70	50
Pay back period (years)	1.25	1.31	1.80
Fixed cost ratio	0.09	0.09	0.13
Operating cost ratio	0.76	0.77	0.75
Total cost ratio	0.85	0.86	0.88

Conclusion

The average initial investment of trawlers operating at Tuticorin fisheries harbour worked out at Rs. 1 lakh

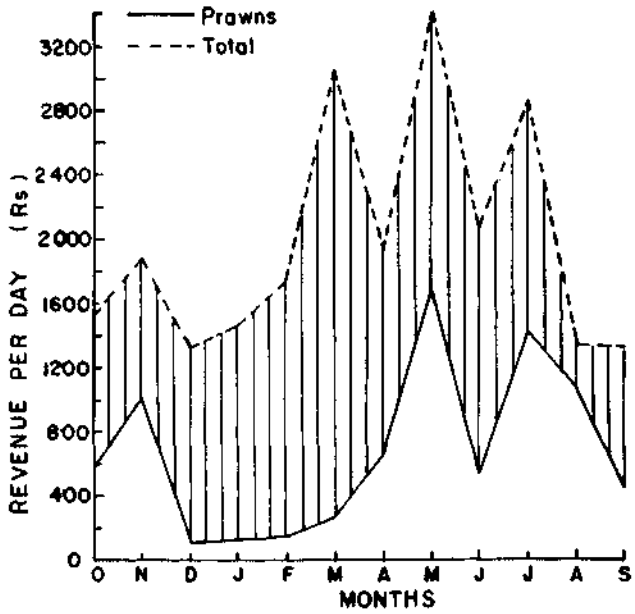

Fig. 2. Monthwise gross revenue per unit per day from prawns alone and total for 9 m trawlers.

for 8.5m, Rs. 1.2 lakhs for 9m and Rs. 2.2 lakhs for 9.5-10 m during 1985–'86. The annual number of days fished by these units were 250,243 and 238 respectively. The annual fixed expenses worked out at Rs. 36 thousand, 43.3 thousand and 79 thousand for the three categories respectively. Annual operating expenditure was Rs. 2.95 lakhs for 8.5 m, Rs. 3.70 lakhs for 9 m and 4.61 lakhs for 9.5–10 m. Gross revenue realised by these units were Rs. 3.9, 4.8 and 6.6 lakhs and the net income over operating expenses worked out at Rs. 0.95, Rs. 1.09 and Rs. 1.55 lakhs respectively. The average net profit of these units was Rs. 58.8 thousand, Rs. 66.1 thousand and Rs. 76.0 thousand respectively.

The cost of production per kg of fish worked out at Rs. 3.73 for 8.5 m, Rs. 4.54 for 9 m and Rs. 5.43 for 9.5–10 m trawlers in which the fuel cost alone constituted about Rs. 1.41, Rs. 2.07 and Rs. 2.28 respectively, the average value realised per kg of fish being Rs. 4.39, Rs. 5.26 and Rs. 6.20 respectively.

With regard to labour productivity, the quantity of fish caught per man-day worked out at 59 kg for 8.5 m, 63 kg for 9 m and 70 kg for 9.5–10 m trawlers fetching a revenue of Rs. 260, Rs. 329 and Rs. 432 respectively. The average remuneration received per man-day was Rs. 68 for 8.5 m, Rs. 75 for 9 m and Rs. 103 for 9.5–10 m.

The capital turnover ratio, rate of returns to capital and pay back period were better for smaller boats (8.5 and 9 m) as the initial investment was comparatively less. But in terms of labour productivity, wages, quantum of catch, gross revenue and net profit, the bigger size boats 9.5–10 m were comparatively efficient. The bigger size boats fitted with engines of higher horse power can operate even beyond the traditional fishing ground, easily adopt new types of fishing techniques like pair trawling and accommodate more catch in their boats. Considering the economics of operations of different sizes of trawlers it seems that investment on bigger size boats of 9.5–10 m in the Tamil Nadu coast is advisable. The study further indicates that the fishermen of this coast in future will be more inclined to introduce this type of boats.

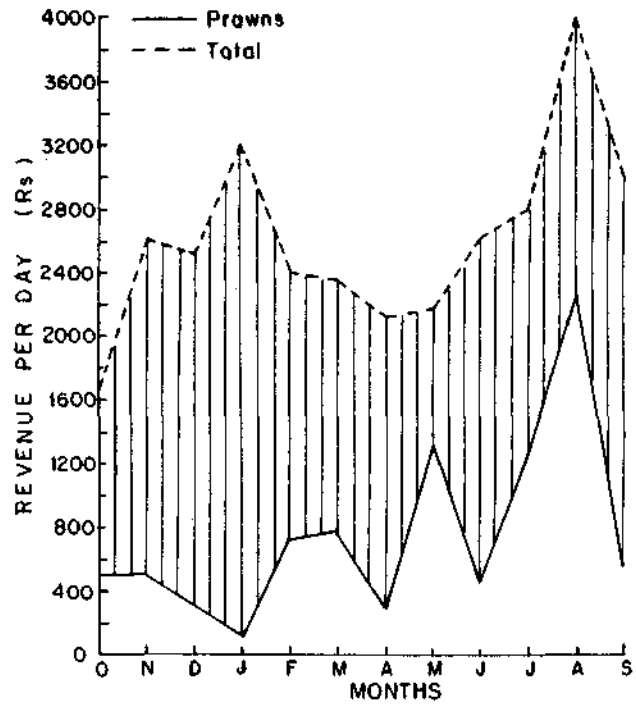

Fig. 3. Monthwise gross revenue per unit per day from prawns alone and total for 9.5–10 m trawlers.

The results revealed that the over dependence on prawn catches for the sustenance of trawlers is slowly being reduced in this region. The prawn catches contribute substantially in the revenue only during a few months of the year. It was seen that about 56 % of the annual gross revenue of 8.5 m, 67 % of 9 m and 66 % of 9.5–10 m were earned from other varieties. It has almost come to a stage that trawler can survive even without prawn catch. It is ideal to diversify the fishing techniques to reduce the fishing pressure on prawns and aim more towards catching other varieties of quality fishes. Introduction of bigger boats with longer operational range will further help to avoid the conflict between the mechanised and traditional fishermen.