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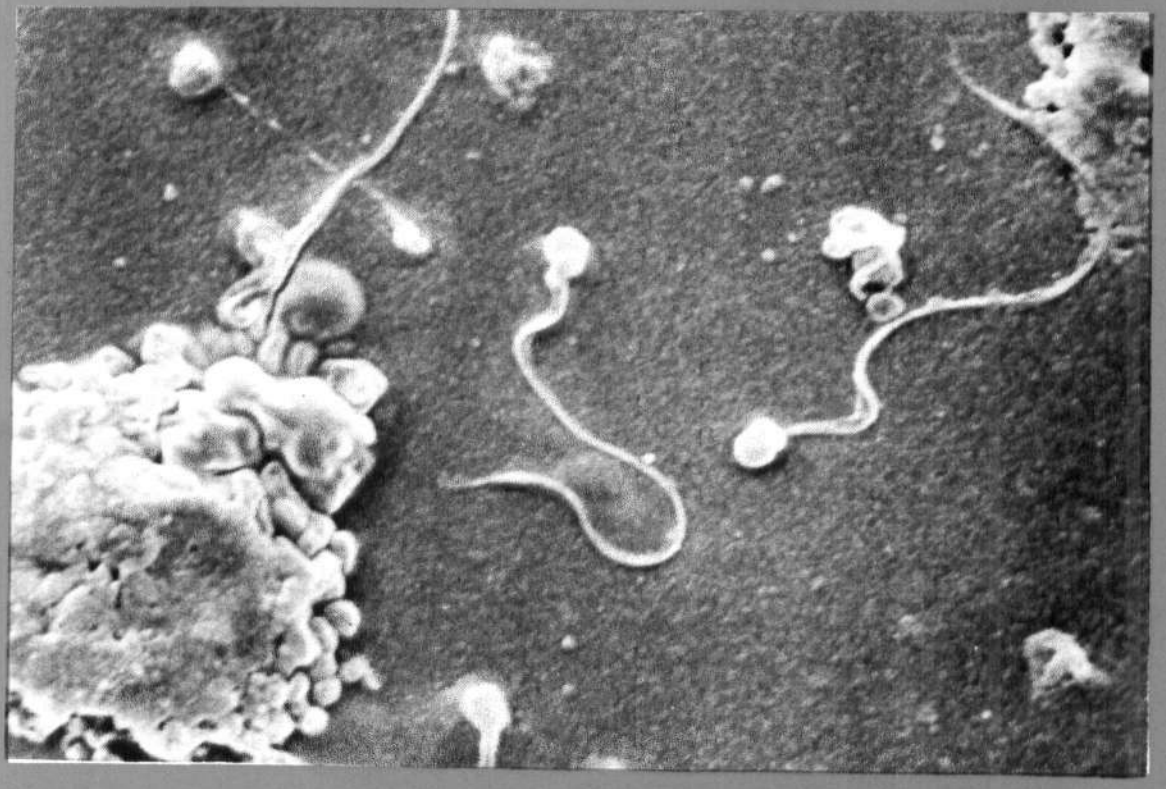

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COSTS AND EARNINGS OF TRAWL OPERATIONS ALONG NAGAPATTINAM COAST OF TAMIL NADU

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Introduction

Marine fisheries sector of India has undergone a rapid change during the last three decades. The introduction of synthetic nets coupled with high export demand for shrimps has intensified mechanised fishing along our coastal waters. The lucrative external market for shrimp and constant rise in the mechanised trawl fishing fleets not only enhanced the marine fish production of our country but also showed the way for the growth of an organised sea food export industry and increase in employment opportunities in the subsidiary sector. There are at present about 2500 trawlers operating along Tamil Nadu coast and 50 per cent of the total marine fish catch of the state is accounted by them. The coastline of the State runs to about 1000 km with 352 landing centres having facilities to land mechanised boats at 23 centres. Pudumanikuppam, Cuddalore, Nagapattinam, Mandapam, Rameswaram and Tuticorin are the major trawl landing centres of the State. With declining catch rates in recent years in bottom trawling, the diversification of fishing by introducing high opening trawl and fish trawl was observed along this region. A detailed evaluation of the changing pattern of craft-gear combinations, their catch composition and comparative economics of operations are considered highly useful for formulating management policies for marine fisheries. In this context, a study was undertaken at Nagapattinam centre of Tamil Nadu coast where the operation of ordinary trawlers and pair trawlers is common.

Both primary and secondary data have been collected and used for the study. The available data on mechanised and non-mechanised fish landings, crafts and gears and other basic information relating to major mechanised centres of Tamil Nadu have been collected from the NMLRDC of CMFRI. An overall review of production trend of marine fisheries over the years along Tamil Nadu coast has been attempted. The review revealed that Nagapattinam in Tanjavoor District is one of the major centres in Tamil Nadu coast practising both ordinary and pair trawling and hence purposely selected for detailed study.

Two types of schedules were prepared to collect data. Information pertaining to initial capital investment on hull, engine, nets and other accessories, year of purchase, resale value of the unit, source of finance, sharing pattern of crew wages, annual repairing expenses and other details of boat characteristics were collected in schedule I. Data on the daily operational cost, specieswise catch and revenue were collected from the selected 10 sample units each of trawlers and pair trawlers for ten days in each month during October 1987 to September 1988.

Most of the boats under operation at the time of investigation were old and had undergone lot of repairs and replacements over the years which sometimes increased the resale value of the boat. Hence for computation of capital investment, resale value of the boat at the time of observation has been considered for the present study. However, an attempt has been made to work out the projected cost and earnings of a new trawler and pair trawler during 1990-'91.

With regard to fishing wages, the usual sharing practice is followed in Nagapattinam in which 40 per cent of net income (gross income-operational expenses excluding repair charges) is divided equally among crew members. Depreciation of hull, engine and gears worked out on the basis of the life expectancy of 10 years for crafts and 2 years for gears and one year for accessories. The interest for initial investment was worked out at 15 per cent per annum.

Review of production trend

The mechanised fish landings of Tamil Nadu showed a steady upward trend over the last few years. The landings from mechanised and non-mechanised boats and their percentage of the total marine fish landings of the State during the 15 year period 1976 to 1990 are given in Table 1.

TABLE 1. *Marine fish landings by mechanised and non-mechanised boats in Tamil Nadu (1976-1990)*

Year	Fish landings (tonnes)		Total
	Mechanised units	Non-mechanised units	
1976	63,621 (28)	162,457 (72)	226,078
1977	50,359 (24)	155,687 (76)	206,046
1978	81,495 (38)	131,404 (62)	212,899
1979	101,758 (43)	133,250 (57)	235,008
1980	94,131 (43)	123,263 (57)	217,394
1981	106,664 (48)	114,632 (52)	221,296
1982	127,542 (52)	118,419 (48)	245,961
1983	146,225 (52)	134,514 (48)	280,739
1984	116,190 (46)	135,930 (54)	252,120
1985	95,549 (48)	105,002 (52)	200,551
1986	117,898 (49)	124,143 (51)	242,041
1987	173,747 (57)	129,886 (43)	303,633
1988	168,564 (57)	127,100 (43)	295,664
1989	164,481 (58)	116,819 (42)	281,300
1990	187,765 (62)	115,510 (38)	303,275

Figures in paranthesis denote percentages.

Marine fish landings of Tamil Nadu increased from 2.26 lakh tonnes in 1976 to 3.03 lakh tonnes in 1990. The mechanised landings with about 28 per cent of the total landings during 1976 increased to 62 per cent during 1990. The landings by trawlers alone accounted for about 90 per cent of the mechanised catch. The remaining was mostly contributed by motorised country craft. The intensive introduction of mechanised trawlers during the seventies and increased tempo of the same during the early eighties were highly responsible for the rise in production contributing about 50 per cent of the total marine fish landings of the state.

The catch rates of the traditional fishing units declined drastically during the last 15 years. Many traditional fishermen felt that their returns were affected by the intensive fishing operations of mechanised units in the inshore waters. The damaging of the nets of traditional fishermen in the sea by mechanised fishing fleets was also a general complaint. In some of the fishing centres conflict between mechanised and non- mechanised fishermen was also noticed demanding some sort of regulation over the area of fishing operation.

Trawlers versus pair trawlers

Four types of trawlnets are operated by mechanised boats along Nagapattinam coast. They are known as shrimp trawl, fish trawl, single boat high opening trawl and two boat high opening trawl or pair trawl. The size of an ordinary trawlnet is usually 22 metre in length and 7 metre in breadth with mesh size ranging from 10 to 40 mm. The fish trawl which is known as *mixturemadi* or *ropemadi* in some other regions of Tamil Nadu is 25 metre in length and 8 metre in breadth with mesh size ranging from 10 to 80 mm. The single boat high opening trawl with 36 metre length and 12 metre breadth and pair trawl with 40 metre length and 15 metre breadth and mesh size ranging from 40 to 200 mm are also under operation in this region.

The continuous escalation of capital investment on fishing equipments, coupled with rising operational costs and decline in catch rates for trawlers created a dire need to diversify existing fishing methods and to redeploy some of the inshore trawlers to catch under-exploited fin fishes. This led to the introduction of single and two boat high opening trawlnets along Tamil Nadu coast for the operation of mechanised fishing boats. The two boat high-opening trawls or pair trawling enabled substantial catch of commercially important high priced varieties of pomfrets, perches, caranx and cat fish, apart from silverbellies and sciaenids. The extensive migration of boats in search of shrimps to other centres has been drastically reduced due to the introduction of pair trawling. The basic differences between traditional trawls and pair trawls are explained by various authors. The vertical mouth opening of high-opening trawl is about 3 metres and above, compared to the opening of less than a metre in traditional trawls. Because of the larger mesh size of these nets, the friction caused by the nets is much less than the conventional trawls enabling an increase in trawling speed and catch rate. The success of

pair trawling is also due to the higher distance between the boats and the gear. The boats do not pass directly over the path of the nets and thus do not disturb the fishes in shallow waters with the noise generated from engine and propulsion.

Capital investment

The average capital investment per unit works out at Rs. 1.35 lakhs for trawlers and Rs. 3.15 lakhs for pair trawlers operating from Nagapattinam centre during 1987-'88 (Table 2). Most of the boats are 32 footers and the average investment of hull alone works out at Rs. 65,000 for the unit engaged in bottom trawling and Rs. 1.5 lakhs for the two boats unit engaged in pair trawling. The average cost for engine varies from Rs. 55,000 for trawlers to 1.3 lakhs for pair trawlers. However, the investment required for the purchase of new units increased more than two fold during the current year.

TABLE 2. *Average initial investment (Rs.)of trawlers and pair trawlers (1987-'88)*

	Item	Trawlers	Pair trawlers
1.	**Craft**		
	i) Hull	65,000	1,50,000
	ii) Engine	55,000	1,30,000
2.	**Gear**		
	i) Shrimp trawl	5,000	—
	ii) Fish trawl	5,000	5,000
	iii) Pair trawl	—	20,000
3.	**Other accessories**	5,000	10,000
	Total	1,35,000	3,15,000

Fishing trips

Boats doing bottom trawling leave the shore in early morning engaging themsevles in day-fishing and arrive in the afternoon whereas the pair-trawlers leave either early morning or late evening and engage in day and night fishing before their arrival to the shore. Hence, fishing trip of a trawler consists of a day alone while that of pair trawlers about two days. The average annual fishing trip of a trawler came about 240 and that of a pair trawler 101 at Nagapattinam during 1987-'88 (Table 3). The conversion of trawlers into pair trawlers and vice versa is very often noticed here depending upon the seasonal availability of prawns and quality fishes.

For trawlers, the maximum number of 67 fishing trips each were observed during January-March and April-June quarters and minimum of 43 trips during July-September. The pair trawlers operated 35 trips during July-September and only 12 trips during April-June. Since the catch rates of prawns and gross returns per trip were higher for trawlers during January-June period, many boats engaged in pair trawling also shifted to usual trawling in these six months. But it was noticed that the returns per trip of pair trawlers were very high during July-September period and many trawlers shifted to this type of fishing.

TABLE 3. *Average fishing trips for trawlers and pair trawlers (1987 October-September 1988)*

Quarter	Average annual fishing trips per unit	
	Trawlers	Pair trawlers
Oct.-Dec.	63	30
Jan.-March	67	24
April-June	67	12
July-Sept.	43	35
Annual	240	101

The employment generated in active fishing alone by trawlers and pair trawlers works out at 1440 and 2424 man days per annum respectively.

Fixed cost

The fixed cost consists of the depreciation of fishing equipments which depends on its life expectancy, the interest for initial investment, insurance and any other costs which are incurred even if there is no operation. Interest for the invested capital is worked out at the rate of 15 per cent per annum. The computed average fixed cost for trawlers and pair trawlers during October 1987 to September '88 is given in Table 4.

The average annual depreciation is worked out at Rs. 22,000 for trawlers and Rs. 50,500 for pair trawlers. The annual interest for initial investment comes about Rs. 20,250 for trawlers and Rs. 47,250 for pair trawlers. Thus, the annual average fixed cost of trawler worked out at Rs. 42,250 and pair trawlers Rs. 97,750.

Variable cost

Variable cost is defined as all those costs which are incurred only when the units are under operation and liable to vary with every fishing operation of units. Fuel expenditure, wages for

TABLE 4. *Average annual fixed cost for trawlers and pair trawlers (1987-'88)*

Item	Average fixed cost			
	Trawlers (Rs.)		Pair trawlers (Rs.)	
	Annual	Per trip	Annual	Per trip
1. **Depreciation**				
Hull @ 10%	6,500	27	15,000	148
Engine @ 10%	5,500	23	13,000	129
Net @ 50%	5,000	21	21,500	124
Other accessories @ 100%	5,000	21	10,000	99
Sub total	22,000	92	50,500	500
2. **Interest on initial investment @ 15%**	20,250	84	47,250	468
Total	42,250	176	97,750	968

fishing labour, repair and maintenance and auction charges are some of the important items of operating expenditure or variable costs of fishing units. The average variable cost (AVC) for a trawler and pair trawler for the period October 1987 to September1988 is worked out and given in Table 5.

TABLE 5. *Average variable cost of a trawler and pair trawler (1987-'88)*

Item	Variable cost			
	Trawlers (Rs.)		Pair trawlers (Rs.)	
	Annual	Per trip	Annual	Per trip
1. Wages to crew	81,260	339	169,583	1,679
2. Food and bata	34,800	145	64,000	634
3. Fuel	91,050	379	168,044	1,664
4. Repair & maintenance	10,000	42	20,134	199
5. Auction charges	5,700	24	6,200	61
6. Ice	1,750	7	9,772	97
7. Other expenses	10,800	45	7,050	70
Total	235,360	981	444,783	4,404

The AVC per unit per annum comes to about Rs. 2,35,360 for trawlers and Rs. 4,44,783 for pair trawlers. Fuel expenditure and wages for fishing labour are the major items constituting about 73 per cent of the AVC of trawlers and 75 per cent of pair trawlers. Along the Nagapattinam coast of Tamil Nadu, sharing of the catch is the prevailing system of payment of wages for fishing labour. Both for trawlers and pair trawlers, 40 per cent of the value of catch after deducting all operating costs except repair and maintenance is paid as wages to the crew. Wages constitute about 34.5% of the operating cost of trawler and 38% that of the pair trawler. The daily bata contributes 4 to 15% of the operating cost of trawler and 14% that of pair trawler.

Season-wise catch and revenue

The catch and revenue of fishing units in capture fisheries are highly influenced by the seasonal availability of different species of fish and the prevailing price structure at the landing centre. Hence the season-wise average catch and revenue of trawlers and pair trawlers are worked out and given in Table 6 and 7.

Maximum prawn catches for trawlers are observed during January-March and for pair trawlers during October-December. The availability of lobster, ribbon fish and carangids are restricted to specific seasons both for trawlers and pair trawlers. The shrimps contribute maximum revenue for all seasons to trawlers whereas pomfret are the prime contributing to pair trawlers. Silver-bellies catch is comparatively more during October-December both for trawlers and pair trawlers. The average price realised for prawns vary from Rs. 10.73 per kg during October-December to 26.6 per kg during July-September for trawl catches and from Rs. 19.40 per kg during January-March to 23.2 per kg during April-June for pair trawl catches. Such variations are mainly due to variations in size and catch composition.

For trawlers, in terms of quantity, silverbellies dominate both the quarters of July-September and October-December, clupedis during April-June and prawns during January-March and in terms of revenue prawns earn maximum in all the quarters. But for pair trawlers in terms of quantity, silverbellies dominate during October-December croakers in January-March, April-June and rays during July-September with maximum revenue from pomfrets in all seasons.

The average annual catch of a trawler works out at 94.7 tonnes valued at Rs. 3.46 lakhs and for a pair trawler 157.8 tonnes realising Rs. 6.79 lakhs.

The catch and revenue per trip of pair trawlers are much higher than the ordinary trawlers (Table 8). The average catch per trip of trawlers works out at 394 kg as against 1562 kg for pair trawlers. The revenue earned per trip is found to be Rs. 1,443/- for trawlers and Rs. 6,724/- for pair trawlers. The silverbellies, prawns, clupeids and croakers form the major

TABLE 6. *Seasonwise average catch and revenue of a trawler at Nagapattinam*

	Oct.-Dec.		Jan.-March		April-June		July-Sept.		Annual	
	Catch (kg)	Revenue (Rs.)	Catch (kg)	Revenue (Rs.)	Catch (kg)	Revenue (Rs.)	Catch (kg)	Revenue (Rs.)	Catch (kg)	Revenue (Rs.)
Prawns	4,032	43,281	6,298	83,683	1,474	28,542	602	16,039	12,406	171,545
Lobster	63	1,512	67	938	—	—	—	—	130	2,450
Cuttle fish	63	1,323	67	1,407	201	3,082	86	1,376	417	7,188
Rays	3,654	7,875	1,005	3,015	2,345	5,226	1,806	3,870	8,810	19,986
Croakers	2,142	2,961	3,618	5,561	4,020	7,437	1,892	3,268	11,672	19,227
Ribbon fish	—	—	2,680	2,680	—	—	—	—	2,680	2,680
Carangid	693	1,638	—	—	1,139	2,278	2,795	4,773	4,627	8,689
Clupeids	2,457	3,024	1,474	2,010	7,236	20,234	1,548	2,666	12,715	27,934
Silverbellies	7,056	8,064	4,489	4,556	5,829	10,720	4,300	6,579	21,674	29,919
Pomfret	126	2,142	268	4,690	268	5,226	215	3,612	877	15,670
Other perches	1,008	2,583	335	737	1,139	2,814	301	731	2,783	6,865
Threadfin breams	2,898	9,198	938	2,278	2,680	7,303	1,075	2,666	7,591	21,445
Others	1,323	2,709	402	134	4,556	5,293	2,021	4,515	8,302	12,651
Total	25,515	86,310	21,641	111,689	30,887	98,155	16,641	50,095	94,684	346,249

TABLE 7. *Seasonwise average catch and revenue of a pair-trawler at Nagapattinam*

Name of fish	Oct.-Dec.		Jan.-March		April-June		July-Sept.		Annual	
	Catch (kg)	Revenue (Rs.)	Catch (kg)	Revenue (Rs.)	Catch (kg)	Revenue (Rs.)	Catch (kg)	Revenue (Rs.)	Catch (kg)	Revenue (Rs.)
Prawns	1,800	41,040	480	9,312	360	8,376	910	18,970	3,550	77,698
Lobster	60	1,800	96	2,256	—	—	—	—	156	4,056
Cuttle fish	120	2,340	96	1,344	72	816	140	1,890	428	6,390
Rays	10,260	21,120	1,872	5,904	984	2,160	20,790	42,000	33,906	71,184
Croakers	9,840	10,620	14,448	23,328	1,608	2,568	5,110	8,050	31,006	44,566
Ribbon fish	—	—	1,824	1,824	96	96	—	—	1,920	1,920
Carangid	3,420	7,140	—	—	744	1,200	2,450	5,250	6,614	13,590
Clupeids	6,300	6,540	4,176	5,328	1,248	1,752	1,820	3,010	13,544	16,630
Silverbellies	13,560	12,000	9,072	9,024	1,992	2,016	7,500	8,050	32,184	31,090
Pomfret	3,240	45,180	11,088	229,968	1,416	30,624	4,410	74,900	20,154	380,672
Other perches	540	1,800	720	1,968	960	1,344	140	420	2,360	5,532
Threadfin breams	2,040	5,760	960	2,208	1,008	2,112	2,730	5,390	6,738	15,470
Others	2,400	5,640	768	768	552	528	1,470	3,290	5,190	10,226
Total	53,590	160,980	45,600	293,232	11,040	5,3592	47,530	171,220	157,750	679,024

catch of trawlers as against rays, silverbellies, croakers and pomfrets in pair trawlers. About 50% of gross revenue is earned by prawns in trawlers and by pomfrets in pair trawlers. Substantial revenue is earned by silverbellies, clupeids and threadfin breams in trawlers and by prawns, rays, croakers and silverbellies in pair trawlers.

Contribution of shrimps

Several studies over the last few years have indicated that there is a gradual decrease in the average size of prawns in the commercial landing along the Indian coast coupled with reduced catch rates. There are reports that the littoral prawn stock all along the Indian coast are being

TABLE 8. *Average catch (Kg) and revenue (Rs.) per trip of a trawler and pair trawler at Nagapattinam (Oct. 1987 to Sept. 1988)*

Name of fish	Trawler		Pair trawler	
	Catch	Revenue	Catch	Revenue
Prawns	51	715	34	770
Lobster	1	20	2	40
Cuttle fish	2	30	4	64
Rays	37	83	336	704
Croakers	49	80	304	442
Ribbon fish	11	11	20	20
Carangids	19	36	66	134
Clupeids	51	117	136	164
Silverbellies	90	125	318	308
Pomfret	4	65	200	3,768
Other perches	12	29	24	54
Threadfin breams	32	89	66	154
Others	35	43	52	102
Total	394	1,443	1,562	6,724

fished intensively and there is practically no scope for increasing the fishing effort any further. The continuous induction of small mechanised trawlers into the coastal fishery had led to diminishing CPUE and also conflict with the artisanal fisheries sector. The species composition of shrimp catches with revenue realised for trawlers and pair trawlers along Nagapattinam coast is given in Table 9.

M. dobsoni and *M. stridulans* dominate in the shrimp catches of ordinary trawlers whereas *M. stridulans* and *P. semisulcatus* in pair trawlers. About 84% of revenue realised by shrimp was from *P. semisulcatus* in pair trawlers. But in ordinary trawlers 37% was from *M. dobsoni* followed with 33% by *P. semisulcatus*. Seasonal occurance of *P. hardwickii*, *P. indicus*, *M. brevicornis* and *M. affinis* in trawlers and *M. monoceros* in pair trawlers are also observed. The average shrimp catch per trip during the year works out at 51 kg for trawlers and 34 kg for pair trawlers realising Rs. 715 and Rs. 770 respectively. However, the catch of *P. semisulcatus* which fetch comparatively higher price are more in pair trawlers than the ordinary trawlers.

Productivity, profitability and economic efficiency

Various economic efficiency measures have been worked out for trawlers and pair trawlers operating at Nagapattinam on the basis of costs and earnings data and are given in Table 10.

Both trawlers and pair trawlers are found to be highly efficient in terms of productivity and profitability. The average catch per trip of a trawler is 394 kg and a pair trawler 1434 kg. Although the catch per trip of a pair trawler is about 3.5 times higher than that of ordinary trawler, the annual catch of the former is 95 tonnes as against 158 tonnes of the latter. The cost of production per kg of fish by trawlers worked out at Rs. 2.93 and for pair trawlers Rs. 3.44 and the price realised per kg being Rs. 3.66

TABLE 9. *Contribution of shrimps (Kg) in catch and revenue (Rs.)*

Name of species	Trawlers				Pair trawlers			
	Annual		Per trip		Annual		Per trip	
	Catch	Revenue	Catch	Revenue	Catch	Revenue	Catch	Revenue
P. semisulcatus	547	56,604	2	235	654	65,242	6	646
M. stridulans	4,022	15,555	17	65	2,740	9,624	26	96
P. hardwickii	315	4,032	1	17	—	—	—	—
P. indicus	244	18,482	1	77	—	—	—	—
M. dobsoni	6,746	63,797	28	266	—	—	—	—
M. brevicornis	264	9,263	1	39	—	—	—	—
M. affinis	268	3,752	1	16	—	—	—	—
M. monoceros	—	—	—	—	156	2,832	2	28
Total	12,406	171,545	51	715	3,550	77,698	34	770

and Rs. 4.30 respectively. The fuel cost per kg of fish production is 96 paise for trawlers and Rs. 1.07 for pair trawlers. The fish catch per litre of fuel is 3.82 kg for trawlers and 3.56 kg for pair trawlers.

Net operating income is obtained by subtracting operating costs from gross income. This is the major factor in decision making in day to day operations of marine fishing involving heavy risk and uncertainity. Any unit will continue to work even during lean season as long as it could cover the operational expenses. The annual operating income worked out at Rs. 1,10,889 for a trawler and Rs. 2,34, 241 for a pair trawler, the same per day of operation being Rs. 462 for the former and Rs. 1,065 for the latter. The net profit (deducting fixed cost from operating income) for trawlers worked out at Rs. 68,639 and for pair trawlers Rs. 1,36, 491 per annum which is Rs. 286 and Rs. 620 per day of operation.

The annual rate of returns to capital (ratio between the surplus over all costs except opportunity cost of capital and the initial investment) worked out at 66 per cent for trawlers and 58 per cent for pair trawlers. Capital turn over ratio which indicates the rate at which income is generated for each rupee invested, is found to be Rs. 2.56 for trawlers and 2.16 for pair trawlers. The pay back period of the investment is found to be 1.5 years for trawlers and 1.7 years for pair trawlers.

Labour efficiency is often measured by dividing total output by units of labour engaged. It may be seen that the average production per man day is 65.7 kg in trawlers and 65 kg in pair trawlers fetching Rs. 241 and Rs. 280 respectiively. The wages of a crew per man day worked out at Rs. 81 in trawlers and Rs. 96 in pair trawlers. The labour cost per kg of fish catch worked out at Rs. 1.2 in the former and Rs. 1.48 in the latter. Considering all the economic efficiency parameters, both the trawlers and pair trawlers operating along Nagapattinam coast shows encouraging results. However, the optimum production and maximum profit are obtained by shifting the appropriate technique either of bottom trawling or pair trawling depending upon the seasonal availability of prawns and pelagic quality fishes. No doubt the diversification of trawl fishing along this region has helped to increase economic efficiency of mechanised fishing boats.

TABLE 10. *Key indicators of economic efficiency*

Item	Trawlers	Pair trawlers
1. Annual operating income (Rs.) (gross earnings - operating expenses)	110,889	234,241
2. Annual net profit (Rs.) (operating income - fixed cost)	68,639	136,491
3. Rate of returns to capital (%)	66	58
4. Capital turnover ratio (%)	256	216
5. Pay back period (years)	1.5	1.7
6. Average catch per trip (kg)	394	1,562
7. Gross revenue per trip (Rs.)	1442	6,723
8. Break even price (Rs./kg)	2.93	3.44
9. Break even price to cover operating expenses (Rs./kg)	2.49	2.82
10. Price realised per kg of fish (Rs.)	3.66	4.30
11. Net operating income per day (Rs.)	462	1,160
12. Net Profit per day of operation (Rs.)	286	676
13. Number of crew required per operation	6	12
14. Average production per man day (kg)	65.7	65
15. Value of production per man day (Rs.)	240.5	279.5
16. Average wages and bata per man day (Rs.)	80.6	96.4
17. Labour cost per kg of fish (Rs.)	1.2	1.48
18. Fuel cost per kg of fish (Rs.)	0.96	1.07
19. Fish catch per litre of fuel (kg)	3.82	3.56

Economic viability of new units (1990-'91)

The continuous cost escalation of fishing units has pushed up the initial investment of a new trawler to about Rs. 3 lakhs and a pair trawler to Rs. 6.2 lakhs during 1990-'91. The ever spiraling fuel prices further escalated the operational expenses of these units. However, about 25 per cent overall average increase in fish prices at the landing centre had been observed during 1990-'91 over that of 1987-'88. The species composition and catch rate of fishing boats are liable for wide fluctuations. However, a follow up study along Nagapattinam coast during 1990-'91 reveals that there is not much variation in the average catch and species composition of trawlers and pair trawlers. Assuming the new units, with higher investment levels, have the same catch rate the investment turn over ratio has been worked out and given below.

TABLE 11. *Investment - turnover ratio of new fishing units at Nagapattinam, Tamil Nadu*

Sl. No.	Item	Trawlers	Pair trawlers
1	Initial investment (Rs)	3,00,000	6,20,000
2	Annual catch (tonnes)	94.7	157.8
3	Average landing centre price (Rs/kg)	4.6	5.4
4	Gross earnings (Rs)	4,35, 625	8,52,120
5	Capital-turnover ratio (%)	145	137

The capital-turn over ratio of new units indicates that this ratio is less than that of the old boats operating during 1987- '88. These units with higher investment are still economically viable. This is mainly due to the increasing trend of fish prices in the internal markets. Since the trawl catches highly dpend upon the external market for better price, it is expected that the recent devaluation of Indian currency will further boost the price of exportable varieties and gross revenue of these units making the investment on trawlers more viable and profitable.

Conclusion

The contribution of mechanised boats in the total marine fish landings of Tamil Nadu steadily increased over the last fifteen years from about 28 per cent in 1976 to 62 per cent in 1990. The trawl catch forms more than 90 per cent of the mechanised landings and 50% of the total landings of the state. However, the induction of more and more trawlers in search of shrimps led to declining catch rates in the inshore waters. The cost escalation of capital investment for trawlers and continuous increase in its fuel expenditure enhanced the cost of production and reduced the fishing surplus. The introduction of single and two boats high opening trawlnets not only served as diversification of the existing bottom trawling but also directed to redeploy many units to catch commercially important fin fishes depending upon the seasonal abundance. The over dependance of prawn catches for the survival of trawlers has been considerably reduced. The study indicates that pomfrets contributed to more than 50 per cent of the revenue of pair trawlers and prawns about 50 per cent of the revenue of trawlers. The pair trawling further provided a new technique to fishermen of this region to harvest the hitherto underexploited valuable resources like pomfrets, rays, croakers, clupeids, carangids and perches in substantial quantity.

The study indicates that both types of fishing are economically efficient. The average initial investment of a trawler worked out at Rs. 1.3 lakhs. The average annual cost of this unit comes to about Rs. 2,77, 610 comprising fixed cost of Rs. 42,250 and variable cost of Rs. 2,35,610. Gross earning of trawlers worked out at Rs. 3,46,249 per annum yielding a net profit of Rs. 68,639. Average initial-investment of pair-trawling unit comes to about Rs. 3.15 lakhs. With fixed cost of Rs. 97,750 and variable cost of Rs. 4,44,783, the total annual cost worked out at Rs. 5,42,533. The gross earnings of pair trawling unit worked out at Rs. 6,79,024 with a net profit of Rs. 1,36, 491 per annum. The follow up study in 1990-'91 on the economic viability of units also indicated the advisability of diversified trawl fishing.

With the introduction of pair trawling the migration of boats of other centres in search of shrimps during the lean season has been drastically reduced. The convenience of shifting from trawling to pair trawling or vice-versa depending on the availability of various resources within the region has enhanced the overall catch rates of these units offering further scope to increase the trawl landings along Tamil Nadu coast by proper substitution of these two fishing methods appropriately.

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