

Economic Performance of Marine Fishing Methods in Ramanathapuram District of Tamil Nadu

Johnson, B.,¹ R. Narayanakumar² and P. S. Swathilekshmi³

ABSTRACT

Marine fisheries provide livelihood and nutritional security to the fishermen households in the coastal states of our country. Ramanathapuram district is an important coastal district in Tamil Nadu in terms of marine fish landings as well as the raft-gears employed. The analysis of economic performance of the fishing methods is very important for formulating any marine fisheries management measure. Hence, the study on economic performance of marine fishing methods in Ramanathapuram district of Tamil Nadu was carried out. In the mechanized, motorized and non-mechanized craft-gear combinations, the economic performance of mechanized single day trawling for fish resources is better since it indicated the highest capital productivity, labour productivity, net operating income, gross value added and lesser input-output ratio. The economic performance of motorized single day fishing is not as good as other methods, since the net income per trip is less.

Keywords: Capital productivity, economic performance, gross value added (GVA), labour productivity, net operating income, input-output ratio.

INTRODUCTION

Tamil Nadu ranks first in marine fish production, with 7.75 lakh tonnes (10.4% increase in comparison to 2018 production) contributing 21.8 per cent of the total landings in the country. The estimate of the value of marine fish landings in Tamil Nadu during 2019 at landing centre level was ₹10,054 crores. At the retail level, the estimated value was ₹16,695 crores (FRAD, CMFRI, 2020).

Among the 14 coastal districts in Tamil Nadu, Ramanathapuram district is an important coastal district contributing 27.3 per cent of total fish production of the State. The district has 237 km coastline and accounts for about 23.7 per cent of the state fisher population. The

district has 1,948 (32.7 % of total fishing unit) mechanised boats, 4,673 (14.9%) motorised and 420 (6.9%) non-mechanised fishing units (CMFRI-DoF, 2020). In mechanized fishing method, two types of trawl nets are used namely shrimp nets and fish nets. Apart from this, gillnet and other gears are operated in country craft with inboard engine & plank built with outboard engine.

Marine fisheries in India are characterized by multi-species, multi-gear fishery. Over a period of time the number of craft and gear is increasing. Hence, certain fishery resources have been over-exploited and catch per unit effort is decreasing (Devaraj and Paralkar, 1988; Narayana kumar *et al.*, 2009). As fishermen have open access to marine resources, there is uncertainty in fisheries management (Narayanakumar, 2012). In this

¹ Scientist, Mandapam Regional Centre of CMFRI, Marine Fisheries Post, Mandapam, Ramanathapuram District, Tamil Nadu, ² Principal Scientist & Head, SEETTD, Madras Research Centre of CMFRI, No.75, Santhome High Road, Raja Annamalaipuram, Chennai ³ Principal Scientist, Vizhinjam Research Centre of CMFRI, P.B.No.9, Vizhinjam P.O, Thiruvananthapuram, Kerala

context, the assessment of economic performance of the fishing methods is crucial for both the individual and the government from the point of resource allocation to develop appropriate supporting policies (Narayanakumar *et al.*, 2009). Hence, in the present study, an effort was made to study the economic performance of different fishing methods followed in Ramanathapuram.

METHODOLOGY

The present study, Ramanathapuram District was selected, since the factors like number of fishing villages (178), landing centre (72), fisher population (1,88,915), fishing activities and marine fish production were comparatively higher than other coastal districts in Tamil Nadu (CMFRI-DoF, 2020).

The study was conducted at Mandapam, Pamban, Rameswaram, Erwadi, Keezhakarai, Thondi and Devipattinam landing centres of Ramanathapuram district. Data on the investment details was collected as one time data collection. The details of operational cost incurred for fishing, revenue generated based on the species wise fish landings per unit was collected from 10 mechanized, 10 motorized (vallam) and 10 non-mechanized fishing units every month on selected sample days using pre-tested schedule. The following indicators were studied to assess the economic efficiency of the fishing unit.

Operating cost ratio relates variable costs to gross income.

$$\text{Operating cost (OC), OC/trip} = (\text{Fuel charges} + \text{Crew wage} + \text{Food expenses} + \text{Other charges}) \dots\dots\dots(1)$$

The gross revenue of a unit is the sum total of value by multiplying the quantities of different species/groups with their respective price. The gross revenue per trip is estimated as follows:

$$\text{Gross Revenue per trip} = \sum_{i=1}^n Q_i \times P_i \dots\dots\dots(2)$$

where,

Q_i is the quantity of catch in kg of the i th variety

P_i is the price per kg of fish of the i th variety

$$\text{Operating ratio} = \text{Operating costs/Gross retur.} \dots\dots\dots(3)$$

$$\text{Labour productivity} = \text{Total Catch / Average crew size.} \dots\dots\dots(4)$$

$$\text{Net operating income} = \text{Gross revenue} - \text{Total operating cost} \dots\dots\dots(5)$$

$$\text{Input-output ratio} = \frac{\text{Input costs (Fuel+Auction+Others)}}{\text{gross revenue.}} \dots\dots\dots(6)$$

$$\text{Gross value added} = (\text{Net operating income} + \text{Labour wages}) \dots\dots\dots(7)$$

Gross value added as a percentage of gross revenue was worked out.

RESULTS AND DISCUSSION

Most of the 1 the fishing units in Ramanathapuram district operates single day. Except few motorized (vallam) (60units) operates for multi-day (2-3 days). According to three-four-day rule in Palk Bay region, mechanized fishing unit's fish for three days a week, while country craft boat could fish on the remaining four days. This is one of the effective management measures in this region. On an average the mechanized units operate for 100 -120 days in a year, whereas the country craft operates for around 300 days in a year. The economic performance of fishing units in Ramanathapuram district is discussed below.

Economic performance of the mechanized fishing

It is clear from Table 1 & 2 that the operating cost per trip for mechanized single day trawling for fish and shrimp resources ranged from ₹22,000/- to ₹35,000/- and ₹21,000/- to ₹30,000/- respectively. Among the operating cost per trip for mechanized single day trawling for fish and shrimp resources, major share is for fuel cost (46% - 64%), followed by crew wage (21% to 38%) (Fig 1 & Fig 2). On an average the fuel requirement for mechanized single day trawling is 250 litres per trip. Due to increase in the number of craft and gear and advancement of boat engine horsepower, there is huge competition for fishing. This in turn compels the mechanized units to increase the duration of fishing, which is the main reason for increase in the fuel requirements, similar to the findings of Narayanakumar *et al.*, (2009) and Geetha *et al.*, (2014).

Table 1: Economic performance of mechanized Single day fish trawling in Ramanathapuram 2014-15 to 2019-20

Indicators	2014 - 2015	2015 - 2016	2016 - 2017	2017- 2018	2018 - 2019	2019 - 2020
Total operating cost in ₹ (Labour + Inputs)	22,766	26,327	26,559	25,894	33,029	34,440
Net operating income in ₹	11,800	16,159	19,548	17,403	30,235	31,485
Capital productivity (Operating ratio)	0.66	0.62	0.58	0.60	0.52	0.52
Labour productivity in kg	231	266	257	240	337	264

Input-output ratio	0.52	0.44	0.40	0.41	0.35	0.34
Gross value added in ₹	17,137	23,635	28,489	25,454	42,445	45,040
Gross value added as a percentage of gross revenue	50	56	62	59	67	68

Table 2: Economic performance of mechanized Single day shrimp trawling in Ramanathapuram 2014-15 to 2019-20

Indicators	2014 - 2015	2015 - 2016	2016 - 2017	2017- 2018	2018 - 2019	2019 - 2020
Total operating cost in ₹ (Labour + Inputs)	23,357	24,197	22,764	21,632	26,348	29,119
Net operating income in ₹	13,397	12,819	11,698	10,093	16,190	22,072
Capital productivity (Operating ratio)	0.64	0.65	0.66	0.68	0.62	0.57
Labour productivity in kg	87	97	77	61	70	86
Input-output ratio	0.52	0.49	0.53	0.53	0.45	0.42
Gross value added in ₹	19,610	18,833	17,204	15,061	23,602	31,277
Gross value added as a percentage of gross revenue	53	51	50	47	55	61

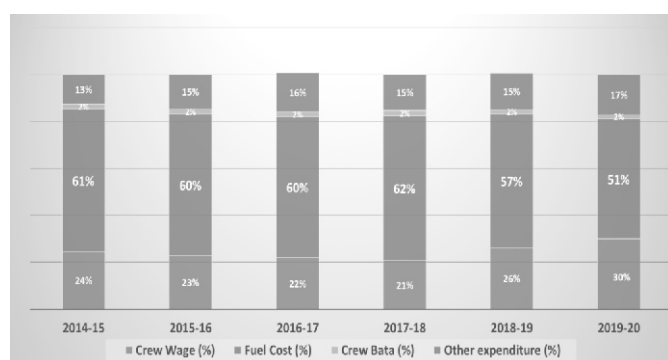


Fig 1. Operating cost of mechanized single day trawling (shrimp) in Ramanathapuram district of Tamil Nadu (2014-2020)

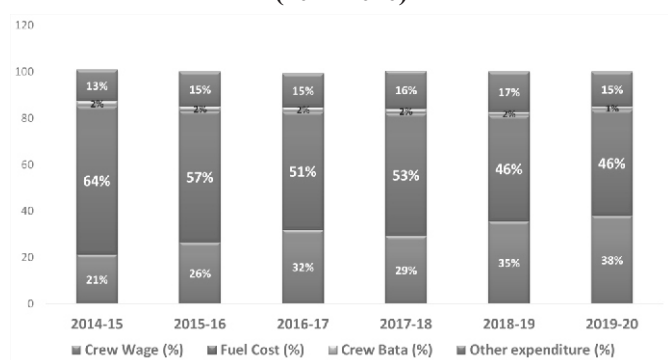


Fig 2. Operating cost of mechanized single day trawling (fish) in Ramanathapuram district of Tamil Nadu (2014-2020)

The average crew size in mechanized fishing units is five. In Ramanathapuram district, the sharing pattern of income (Gross revenue minus fuel & other expenses) from fishing among the crew and owner in mechanized trawling is as follows:

Up to Rupees one lakh of income per trip – (30 per cent of income is shared to crew members, 10 per cent to driver and remaining 60 per cent for owners). 1 to 1.5 lakhs of income per trip – (20 per cent of income is shared to crew members, 10 per cent to driver and remaining 70 per cent for owners). More than 1.5 lakhs of income per trip – (15 per cent of income is shared to crew members, 10 per cent to driver and remaining 75 per cent for owners).

The capital productivity was more in the trawling for fish resources with a lower operating ratio of 0.52 to 0.66 than the trawling for shrimp resources at 0.57 to 0.68. The net operating income per trip for mechanized single day trawling for fish and shrimp resources ranged from ₹11,800/- to ₹31,485/- and ₹10,093/- to ₹22,072/- respectively. The net operating income per trip for mechanized single day trawling for fish resources is better during 2019-20. The main reason is catch of oil sardine, silver pomfret, leatherjacket, goatfish and mackerel were higher during this period. Moreover, the labour productivity is higher (230-270 kg/trip/person) than other fishing methods (Table 1). This is conformity with the findings of Kalidoss *et al.*, 2018, who reported that mechanized crafts had greater net profit than the motorized and traditional crafts.

The input-output ratio is worked out by adding the input costs like fuel, auction charges and other expenditure and dividing it with gross revenue. Lower the input-output ratio, the better is the economic performance of a fishing method. The study found that the input-output ratio was better in the mechanized single day trawling for fish resources (0.34 to 0.52). The gross value added as a percentage of gross revenue was maximum for the mechanized single day trawling for fish resources (68%). The gross value-added ranges between ₹17,000/- to ₹45,000/-.

Economic performance of the motorized (vallam) fishing

The operating cost per trip for motorized (vallam) multi-day (2-3 days) gill net fishing ranged between ₹22,000/- to ₹35,000/- (Table 3). The operating cost per trip for motorized (vallam) single day bottom-set gill net and other bottom-set gill net fishing ranged from ₹900/- to ₹1,450/- and ₹1,300/- to ₹1,500/- respectively (Tables 4 & 5).

Among the operating cost per trip, major share in motorized fishing sector is for fuel cost followed by crew wage. The average fuel requirement for motorized (vallam) multi-day (2-3 days) gill net fishing is 200 litres per trip. On the other hand, the fuel requirement for

motorized (vallam) single day fishing is 15 litres per trip. The average crew members for motorized (vallam) multi-day (2-3 days) gill net fishing are seven. The average crew members in motorized single day fishing units are three. The sharing pattern of gross revenue from fishing among the crew and owner in motorized (vallam) multi-day (2-3 days) gill net fishing is 32 per cent of revenue will be shared to crew members & drivers and remaining 68 per cent for owners.

In the motorized single day fishing units, there is no sharing pattern of income among the crew members, since the owners themselves venture in to sea for fishing. In the motorized single day & multi-day gill net fishing, the operating ratio ranged from 0.57 to 0.80. This indicated that 57 per cent to 80 per cent of the earning goes towards meeting the operating expenditure only, thus leaving 20 per cent to 43 per cent to meet the other expenses thus exerting economic pressure on the fishermen. The net operating income per trip for motorized (vallam) multi-day (2-3 days) gill net fishing ranged between ₹7,356/- to ₹22,343/- (Table 3). The net operating income per trip for motorized (vallam) single day bottom-set gill net and other bottom-set gill net fishing ranged from ₹230/- to Rs. 1,095/- and ₹549/- to ₹940/- respectively (Tables 4 & 5).

The motorized (vallam) multi-day (2-3 days) gill net fishing targets high value fishes like silver pomfret, seer fishes, barracuda and parrot fishes. Hence, they receive reasonable net operating income per trip. The motorized single day bottom-set gill net targets carb and lobsters, while the other bottom-set gill net fishing targets fishes like sardine, groupers, snappers, carangids and mullet. The input-output ratio ranged between 0.42 and 0.67. The gross value added as a percentage of gross revenue ranged between 33 to 62 per cent. Hence, the economic performance of motorized fishing units is not as good as other methods.

Table 3: Economic performance of Motorized (vallam) multi-day gill net in Ramanathapuram 2014-15 to 2019-20

Indicators	2014 - 2015	2015 - 2016	2016 - 2017	2017 - 2018	2018 - 2019	2019 - 2020
Total operating cost in ₹ (Labour + Inputs)	26,977	30,900	31,701	22,799	27,591	25,554
Net operating income in ₹	15,927	18,938	22,343	7,356	12,654	16,031
Capital productivity (Operating ratio)	0.63	0.62	0.59	0.76	0.68	0.62
Labour productivity in kg	41	45	37	21	39	54
Input-output ratio	0.52	0.46	0.46	0.65	0.52	0.50
Gross value added in ₹	22,194	27,101	31,116	10,617	18,579	21,784
Gross value added as a percentage of gross revenue	52	54	58	35	46	52

Table 4: Economic performance of Motorized (vallam) single day bottom-set gill net in Ramanathapuram 2014-15 to 2019-20

Indicators	2014 - 2015	2015 - 2016	2016 - 2017	2017 - 2018	2018 - 2019	2019 - 2020
Total operating cost in ₹ (Labour + Inputs)	1,099	962	1,055	903	1,264	1,421
Net operating income in ₹	562	326	464	230	648	1,095
Capital productivity (Operating ratio)	0.66	0.74	0.69	0.8	0.66	0.57
Labour productivity in kg	3	2	3	2	2	3
Input-output ratio	0.58	0.61	0.57	0.67	0.51	0.42
Gross value added in ₹	822	497	728	373	967	1,550
Gross value added as a percentage of gross revenue	49	39	48	33	51	62

Table 5: Economic performance of Motorized (vallam) single day other bottom-set gill net in Ramanathapuram 2014-15 to 2019-20

Indicators	2014 - 2015	2015 - 2016	2016 - 2017	2017 - 2018	2018 - 2019	2019 - 2020
Total operating cost in ₹ (Labour + Inputs)	1,324	1,402	1,438	1,422	1,492	1,470
Net operating income in ₹	872	755	820	549	846	940
Capital productivity (Operating ratio)	0.6	0.64	0.64	0.72	0.64	0.61
Labour productivity in kg	15	9	8	6	10	9
Input-output ratio	0.50	0.48	0.46	0.55	0.49	0.52
Gross value added in ₹	1,277	1,128	1,250	893	1,339	1,362
Gross value added as a percentage of gross revenue	58	52	55	45	57	57

Economic performance of non-mechanized fishing

The operating cost per trip for non-mechanized bottom-set gill net and other bottom-set gill net fishing ranged from ₹195/- to ₹230/- and ₹157/- to ₹222/- respectively (Table 6 & 7). Among the operating cost per trip, major share in non-mechanised fishing sector is for crew wage. The average crew members in non-mechanized fishing units are two. In the non-mechanised fishing units, there is no sharing pattern of income among the crew members, since the owners themselves venture in to sea for fishing. The capital productivity was better in the non-mechanized fishing units with a lower operating ratio of 0.43 to 0.51. The net operating income per trip for non-mechanized bottom-set gill net and other bottom-set gill net fishing ranged from ₹263/- to ₹339/- and ₹160/- to ₹290/- respectively (Tables 6 & 7).

Table 6: Economic performance of Non-mechanized bottom-set gill net in Ramanathapuram 2014-15 to 2019-20

Indicators	2014 - 2015	2015 - 2016	2016 - 2017	2017 - 2018	2018 - 2019	2019 - 2020
Total operating cost in ₹ (Labour + Inputs)	230	232	195	205	224	219

Net operating income in ₹	287	339	263	300	327	281
Capital productivity (Operating ratio)	0.44	0.4	0.43	0.41	0.41	0.44
Labour productivity in kg	1.4	2.0	1.6	1.2	1.3	1.2
Input-output ratio	0.24	0.11	0.14	0.11	0.11	0.13
Gross value added in ₹	415	507	396	449	494	438
Gross value added as a percentage of gross revenue	80	89	86	89	90	88

Table 7: Economic performance of Non-mechanized other bottom-set gill net in Ramanathapuram 2014-15 to 2019-20

Indicators	2014 - 2015	2015 - 2016	2016 - 2017	2017- 2018	2018 - 2019	2019 2020
Total operating cost in ₹ (Labour + Inputs)	191	171	157	204	183	222
Net operating income in ₹	182	211	160	260	233	290
Capital productivity (Operating ratio)	0.51	0.44	0.49	0.44	0.44	0.43
Labour productivity in kg	4.4	4.1	3.2	4.4	4.0	5.1
Input-output ratio	0.33	0.18	0.23	0.13	0.15	0.17
Gross value added in ₹	269	316	247	404	357	447
Gross value added as a percentage of gross revenue	72	83	78	87	86	87

The input-output ratio ranged between 0.11 to 0.33. The gross value added as a percentage of gross revenue ranged between 72 to 90 per cent. Hence, the economic performance of non-mechanized fishing units is better.

CONCLUSION

The analysis of the economic performance of marine fishing methods in Ramanathapuram district of Tamil Nadu, through the selected economic indicators, revealed that the mechanized single day trawling for fish resources performed better since it indicated the highest capital productivity, labour productivity, net operating income, gross value added and lesser input-output ratio. Most of the motorised fishing units in Ramanathapuram district operate single-day fishing trips and only few units operate multi-day (2-3 days) fishing.

The comparative analysis of their economic performance showed that highest operating ratio & input-output ratio, lesser labour productivity and gross value added as a percentage of gross revenue. The economic performance of non-mechanised fishing units indicated the highest capital productivity and gross value added as a percentage of gross revenue. If the economic performance is poorer, the fishermen will not be interested to continue the activity. Hence, the economic performance of the fishing methods plays a crucial role in formulating any fisheries management measure.

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