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Mechanized Crafts of North Andhra Coast - a study on status, operation and economic evaluation

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Results of studies conducted on two categories of mechanized vessels viz., mini-trawlers and *sona* boats operated at Visakhapatnam base are presented. A general description of the technical parameters and an economic analysis including revenue, investments, operational expenditure, operational profits or loss etc. are described. The expenditure on fuel has been observed to be the largest component of the total operational expenditure to the tune of 66% in mini-trawlers and 62% in *sona* boats. To harvest one kg of shrimp, mini-trawlers consumed 7.89 litres of fuel and incurred an operational expenditure (including fuel) of Rs. 213.61, and *sona* boats consumed 8.97 litres of fuel with an operational expenditure of Rs. 260.35. Both the types of crafts are observed to be economically viable with profit percentages of 24.5% and 17.2 % respectively during the period under report.

Key words: mini-trawlers, *sona* boats, economic viability, fuel consumption, harvest cost

Mechanization of fishing craft was initiated in India in its first five-year plan with the launching of the 'Grow More Food Campaign' (FAO, 1993). While initial attempts were directed to motorize the artisanal craft, subsequent efforts led to the introduction of new designs of boats. The increase in marine fish production over the years can be attributed to large-scale increase of mechanized boats and motorized crafts. The pattern of marine fish landings in India clearly reveals that the contribution by the artisanal sector to the total marine fish production was significant only up to the sixties and has subsequently declined mainly due to the popularization and consequent expansion of mechanized fishing along with the motorization of the artisanal craft (Rao, 2004).

The development of mechanized fishing off the north-east coast is closely related to the construction of fishing harbour facilities in Kakinada and Visakhapatnam in Andhra Pradesh. The opening of the harbour in Visakhapatnam in 1978 not only created a base for a fleet of large trawlers but also for a large number of small mechanized boats that were operating from Kakinada, till then. The introduction of large, deep sea fishing trawlers (upto 21 m LOA) in the seventies along the Andhra coast, gave a real boost to the capture of shrimp and help India acquire the status of a major shrimp producing and exporting country in the world. In the 1980's, two intermediate classes of trawlers viz., mini-trawlers (16.5 – 20 m LOA) and *sona* boats (13 – 15 m LOA) were added in the shrimping activity. This paper discusses the status, operation and economics of operation of mini-trawlers and *sona* boats fishing off the North Andhra coast. Earlier attempts have been made to study the economic aspects of larger trawlers (Unnithan et al., 1985), but detailed studies on mini-trawlers and *sona* boats are lacking. This study is an attempt to fill this gap in this context.

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Materials and Methods

In the 1960's and early 1970's, mechanized fishing fleet operating off Visakhapatnam was largely engaged in single day operations exploiting the resources at 10-40 m depth at a maximum distance of 20-30 km offshore (FAO, 1993). In 1974, the small mechanized crafts began night fishing for shrimps and landings of the same improved bringing in good returns. As a result of this, the number of these crafts increased affecting the per unit profitability. As a measure to overcome this, voyage fishing, lasting 3 to 4 days at distances 60-70 kms offshore came into vogue in the early 1980's. The crafts were able to fish all along the north-east coast down to 70 m depth, concentrating in the 10-50 m depth range. However, these boats could not exploit the rich shrimp resources of the Sandheads region (the most productive shrimp heads of India, the Sandheads of Orissa - West Bengal, were located in 1977 by the FSI vessel 'Matsya Vigyani'). The larger trawlers were the main crafts exploiting this area. A smaller variant of the large trawlers, the mini-trawler, introduced in 1981 was able to successfully exploit the Sandheads, operating at the same depths and in the same areas as the large trawlers, off north Andhra, Orissa and West Bengal coasts, usually in the depth range of 70-100 m. However, they had no freezing facilities and the shrimp catch had to be stored in ice. Another technological change that made longer sea endurance possible and exploitation of the north-eastern demersal resources was the introduction of *sona* boats in 1987. The *sona* boats were of an intermediate size with LOA in between the small mechanized crafts and the mini-trawlers operating on the north Andhra coast.

For studying the comparative economic efficiency, data were collected from mini-trawlers and *sona* boats operated at Visakhapatnam base during the fishing period 2001-2002 (April 2001- March 2002) and analyzed for their status, operation and economic parameters. The relevant information was collected from boat operators using questionnaire and observation methods. Information on the capital investment, operating costs, sale proceeds of the landing and other aspects of fishing activity were recorded. The gross revenue, total variable cost (cost of fuel & lubricants, repair & maintenance charges, crew bata & ration, cost of ice, berthing charges, miscellaneous charges etc.), profit or loss etc. were worked out based on the number of fishing days for each class of vessels. Constraints expressed by the boat operators were also recorded.

The approach for estimation of various economic parameters was followed as in the case of an earlier study by Unnithan *et al* (2004). The present study is based on 20 fishing trips of mini- trawlers and 70 fishing trips of *sona* boats, which accounts for 6% and 1.5% of the total fishing trips respectively of these two categories of vessels at Visakhapatnam base.

Results and Discussion

Thirty seven mini-trawlers and 236 *sona* boats are operational off Visakhapatnam as per the records of State Fisheries Department (Table 1). Of the total mechanized crafts operating there, it accounts for 5.20% and 33.15%, respectively.

The general particulars of the two types of crafts studied are presented in Table 2. Mini-trawlers are of 16.5-20 m LOA with a wooden hull and an average gross tonnage of 42. They operate with inboard engines of 145-210 hp. The crew strength is about 8-10. These trawlers have a sea endurance of

Table 1. Number of mechanized crafts operating off Visakhapatnam base

Category of Vessels	Numbers operating
Small mechanized	375
Sona boats	236
Mini-trawlers	37
Trawlers	64

18-25 days, and on an average, they make 9 trips in a year with duration of 21 days per trip.

The *sona* boats are wooden boats of 13-15 m LOA with an average gross tonnage of 18, operating one trawl net from the stern. They operate with inboard engines of 90-110 hp. The crew strength is about 6-8. On an average, these crafts make 20 trips in a year with duration of 13 days per trip. It has been observed that longer voyages of upto 15 days have led to reduction in per day fuel utilization, consequently reflecting on the expenditure on fuel. Although most of the *sona* boats are registered in Kakinada and Visakhapatnam, they operate along the entire north-east coast, including Orissa in the depth range of 30-100 m.

The data on capital investments for the two categories of vessels and data on operational expenditure, fuel consumption, total variable costs, etc. per trip have been presented in Tables 3 and 4 respectively.

It has been observed that in the case of mini-trawlers, the diesel consumption per trip of 21 days was 10,200 litres costing Rs. 1,83,600/- (at the then prevailing fuel price of Rs. 18/- per litre), accounting for 66% of the total expenditure. In the case of *sona* boats, the diesel consumption per trip of 13

Table 2. Specifications of Mini-trawlers and *Sona* boats operating in North Andhra Coast

Specifications	Mini-Trawlers	Sona Boats
Overall length (m)	16.5-20	13-15
Breadth (m)	5.08	4.20-4.34
Hull	Wood	Wood
Gross tonnage	42	18
Make of engine	MWM, Ashok Leyland	Ashok Leyland
HP of engine	145-210	90-110
Crew size	8-10	6-8
Fish hold capacity (t)	7.5-15	5
Sea endurance (days)	18-25	10-15
Fuel capacity (kL)	9-12	5
Freshwater capacity (kL)	6	2
Freezing type	Ice	Ice
Number of fishing trips/ year	9	20
Duration of trip (approx.) - days	21	13
Fishing grounds-Location	Off North Andhra, Orissa and West Bengal coasts	Off north Andhra and Orissa coasts
Depth of fishing	40-100 mts	30-100 mts
Electronic instruments	Compass, RT, Mobile phones, Echo Sounder, VHF, GPS	Compass, RT, Mobile phones, Echo Sounder, VHF, GPS
Landing	Paradeep/ Visakhapatnam	Visakhapatnam

Table 3. Investment particulars (fixed costs in Rs.)

Particulars	Category of Vessels	
	Mini-Trawlers	Sona Boats
Investment on vessel	35,20,000	8,90,000
Investment on engine	5,30,000	2,57,000
Investment on instruments	89,000	76,000
Investment on fishing gears and accessories	1,34,000	63,000
Total investment	42,73,000	12,86,000

Table 4. Operational expenditure per trip (variable costs in Rs.)

Particulars	Category of Vessels	
	Mini-Trawlers (for a trip of 21 days)	Sona Boats (for a trip of 13 days)
Fuel	1,83,600	50,040
Lubricants	10,400	720
Wage and incentives for crew	31,000	14,520
Ration for the crew	9,500	4,580
Cost of ice	20,200	5,900
Cost of water	3,500	1,500
Berth charges, repairs & maintenance and others	18,000	3,450
Total operational expenditure	2,76,200	80,710

days works out to 2780 litres costing Rs. 50,040/-, which was 62% of the total expenditure. On an average, mini-trawlers consumed 486 litres of fuel per day at the rate of 32 litres per hour and sona boats used 214 litres of fuel per day at the rate of 14 litres per hour. The consumption of lubricants per trip of 21 days was 104 litres costing Rs. 10,400/- for mini-trawlers and in the case of *sona* boats, it was 7.2 litres per trip costing Rs. 720/-. Expenditure on fuel being the major component in operational expenditure, as has been observed for both categories of crafts, has also been reported in an earlier study along the west coast (Unnithan *et al.*, 2004). Fuel is subsidized by the Govt. of Andhra Pradesh @ Rs. 4.08 per litre of fuel, subject to 3000 litres/ month for mechanized boats (Commissioner of Fisheries, Govt. of Andhra Pradesh, 2005).

The catch details, gross revenue and profit per trip have been presented in Tables 5 and 6.

Table 6. Total operational expenditure, revenue and profit per trip (in Rs.)

Particulars	Category of vessels	
	Mini-trawlers	*Sona* boats
Total operational expenditure	2,76,200	80,710
Total revenue	3,43,750	94,625
Operational profit/ trip	67,550	13,915

From the table, it could be observed that the revenue accrued from a trip of 21 days was Rs. 3,43,750/- for mini-trawlers, and for *sona* boats, the total income accrued from a trip of 13 days was Rs. 94,625/-. For harvesting 1 kilogram of shrimp, the mini-trawlers expended Rs. 213.61 and the *sona* boats, Rs. 260.35. Vis a vis fuel used, it has been observed that, to harvest 1 kilogram of shrimp, mini- trawlers used 7.89 litres of fuel

Table 5. Catch particulars (in Kgs) and revenue (in Rs.)

Category of vessels	Duration of each trip (in days)	Average catch/ vessel / trip		Revenue/ vessel/ trip		
		Shrimp	Fish	Shrimp	Fish	Total
Mini-Trawlers	21	1293	2000	3,23,750	20,000	3,43,750
Sona Boats	13	310	1700	77,625	17,000	94,625

and *sona* boats, 8.97 litres of fuel. Profit percentage was 24.5% for mini-trawlers and 17.2% for *sona* boats.

Graded pricing system was followed in the case of shrimps while a flat rate system was followed for fish. Fish was not an important target species as far as these two categories of vessels are concerned. Most of the fish caught by mini-trawlers, except high cost fish like pomfrets and seer, was discarded, due to non-availability of space. 50% of the miscellaneous fish catch that was actually brought on-shore was distributed to the crew as an incentive and only the rest was landed for sale. In the case of sona boats, 10% of the fish catch was distributed as incentive for the crew and remaining was landed for sale. Another interesting observation was that the crew dries a considerable quantity of fish caught during the voyage on-board and distributes it among themselves after the trip.

It could be observed that the operational profit realized from a trip of 21 days was Rs. 67,550/- for mini-trawlers, and in the case of *sona* boats, it was Rs. 13,915/- from a trip of 13 days. Inspite of a great pressure exerted on the resources, resulting in dwindling catches per unit effort, the above classes of vessels reported a reasonable level of operational profit. The constraints observed were, falling shrimp catches, unremunerative prices and the rising operational costs, especially the fuel costs. Declining profit margins make the fishing activity uneconomical. Since expenditure on fuel is the largest contributing factor, adopting suitable measures to optimize fuel use can, to a certain extent, enhance profits. The focus on shrimping needs to be changed and other species like cephalopods must be targeted, especially since the crafts have better sea endurance having multi-day fishing capability. Since there is an abundance of tuna resources in the region (Pillai and Srinath, 1986 and James, 2004), conversion to tuna long lining is also a viable option. Policy initiatives like optimization of the fishing fleet and differential fuel subsidy for different classes of fishing vessels are to be implemented.

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