TECHNICAL AND ECONOMICAL FEASBILITY IN THE OPERATION OF RAFT CATAMARAN OF KRISHNAPATNAM COAST, ANDHRA PRADESH

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ABSTRACT

Fishing with low energy receives considerable significance in India. It utilizes the indigenous resources with less expenditure. A survey was conducted at Krishnapatnam coast of Andhra Pradesh to study the technical and economic feasibility of traditional crafts used in this region. However, in this paper, significance was given only to raft catamaran since it is one of the popular traditional crafts of this coast. The study dealt with various aspects like design of raft catamaran, its size, and material used for fabrication, mechanization, type of gears operated from this craft, various fishing methods and its economics. The predominant size of the raft catamaran existing in this region is 6 logged and 9 m Over All Length (OAL). This study further describes the fishery, season of operation and various costs and returns involved in the operation of the crafts. The input and output ratio of fishing craft was 1:1.57. Problems and remedial measures required for the development of low energy fishing techniques are discussed with some suggestions.

***Key words*:** Catamaran, technical measures, economics, Low energy fishing, Raft design.

INTRODUCTION

In India, two-third of the marine productions is obtained from inshore fishery. Crafts and gears used in Andhra Pradesh for artisanal fisheries are indigenous and still primitive in nature. Conventional traditional crafts which exist in this state are Shoe Dhonies, Navas, Dugout canoes, Catamarans and Masula boats. The country crafts contribute notable quantity of harvest of fishery resources in inshore waters. The catamaran is predominant craft in this state. Andhra Pradesh has a coastal length of 962 km with 9 maritime districts, of which Nellore district has the greatest coastal length of 169 km. There are 93 fishing villages with 14,252 households in this district. Fishing

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in this district is not an intense one and active fishermen are only 11,500. The total number of country crafts of this region is 6,845. Of them, mechanized and non-mechanized catamarans are 1962 and 4753, respectively. Boat and raft type catamarans are used in the Nellore coast though later is widely used by the local fishermen. Gears used in this coast are gillnet (1,350), drift net (10,685), shore seine (70), and boat seine (331) (Admin.Report, 2009). Andhra Pradesh gives importance to artisanal fishery at present since it dominates the state by utilizing the low energy and further it is in declining trend. This study emphasizes on the economic efficiency and technical improvement of catamarans of the Krishnapatnam coast.

MATERIALS AND METHODS

In this study, attention paid to the technical and economic aspects of operation of raft catamaran since it is the popular craft in the state. A survey was conducted at various fishing villages of Krishnapatnam colony, Krishnapatnam basin and Mypadu of Nellore coast, Andhra Pradesh using pre-tested questionnaire to collect data pertaining to design of crafts, gears, fishing operations and mechanization, costs and earnings of operation of raft catamaran, etc. There are about 300 catamarans available in the study centres. Of which, 35 crafts were selected for collecting the data. The data were collected during the year 2010-11. Gillnets made up of mono filaments were the predominant gears used for fishing various fishes like sardines, pomfrets, seer fish, tuna, scomberoids, skates, sharks etc. and few multifilament nets were also in use. Ownership of the craft is shared bythe fishermen. It varied from 2 to 4. Actual earning and profit of the fishermen were also registered and analysed in this study. The cost, returns, net returns and input-output ratio were worked out. It included the cost of boat, gears, engine, etc. Depreciation rate for boat and engine was calculated at the rate of 10 % each per year while it was 2 % for the monofilament gillnets. In this study, various efficiencies like economic, capital, labour and profitability were also estimated. The economic efficiency was calculated by collecting mean value of total catch, fuel cost, operating cost, total cost, catch value and net profit. The capital efficiency was calculated as capital turn over ratio in two ways by dividing the profit with investment and operational cost. In the case of labour efficiency was worked out by taking mean number of workers, catch crew and revenue.

The profit index ratio was calculated by dividing the Total Returns with Total cost. Further, the problems and remedies of the raft catamaran operated along the Krishnapatnam coast were identified and measures suggested for its efficient operation.

Results and Discussions

Catamaran is considered as one of the efficient crafts among country crafts used in surf beaten coast though it is rudimentary in nature. It is a keel less craft and locally called as '*teppa*' in Andhra Pradesh. This craft is

economical, easy to construct and handle. Raft catamaran is the predominant craft being operated in the waters of Krishnapatnam coast though Boat catamarans are also used for exploiting the inshore fishery. Subba Rao (1986) reported that catamarans have a length of 5 m to 12 m, width of 0.7 m to 1.4 m and depth of 0.3 m to 0.7 m. Observations of this study revealed that catamarans available in the Krishnapatnam had Over All Length (OAL) of 8-10.6 m, width of 1.3-1.9 m and depth of 0.35-0.6 m. However, the size of the craft varied from one study centre to other. A particular size dominated in each centre, though various sizes of craft were available. It was 8 m at Mypadu, 9 m at Krishnapatnam colony and 10 m at Krishnapatnam basin. Raft catamaran consisted of 5-6 logs which were lashed together with poly propylene rope. However, six-logged catamarans were found abundantly in the study region. Log mainly used for construction was *Albizia falcataria*, which is brought from Kerala. Logs were cut into square shape and thickness is reduced from stern (0.25 m) to stem (0.15 m) though it varied with size of the craft.

Six-logged catamaran had three pairs of logs. One pair of logs having the length range of 7-9.6 m was placed at centre of the craft and one log each from other two pairs having the length of 6.8-8.8 m and 5.4-7.6 m, respectively were placed on one side of the centre logs. Similarly, the other set of pairs were placed on other side of the centre logs. All these logs were lashed together with polypropylene ropes. The depth and deck depth of the crafts were 0.5-0.6 m and 0.18-0.35 m respectively. The stem raised from the ground level was ranged between 0.8-1.2 m. Three prow pieces having the length of 1.3-1.7 m were tied at the stem portion of the craft to make bow and rise for protecting the craft from waves. Minimum and Maximum circumferences of lashed prow end at front were 0.25 m and 0.35 m respectively while they were 0.75 m and 0.9 m at rear end. Raft catamaran was propelled with either oars or Out-Board Motor (OBM) having the power of 10 HP. The name of the engine is *Greaves* and fuel used is Diesel. The cost of the craft, engine and gears are Rs. 30,000 - 45,000, 48,000 and 70,000 respectively. The life of the craft and gear monofilament gillnet estimated were 7-10 years and 2 years, respectively.

Gears operated from this craft were *Appavala* for shrimp, and operated in November, Chandavuvala for pomfrets during August to September and *Discovala* for Indian mackerel in April. All these gears are belonging to gillnet. Besides, *Ayilavala* was operated in the month of January and line for fishing the seer fish during November-December. The best season found in this area was June-July. The fish normally caught were seer, silver bellies, pomfrets, sardines, sharks, rays etc. Crafts were sailed upto a distance of 10 nautical miles having the depth range of 20-40 m for exploiting the inshore fishery resources.

Total effective fishing days for a year ranged from 180-200 days. The daily catch

and income obtained from this craft were 10-50 Kg and Rs.800-4,000 respectively. Craft took 1.5-2 h to reach the fishing ground and fishing was carried out for 10-12 h per day. Fuel spent for a trip was 5-10 liters though the quantity depended on the type of fishing. Operational and annual repairs cum maintenance costs were Rs. 550-1100 and Rs. 500-8,500 respectively. Various costs involved in the operation of catamaran are given in Table 1. One unit capital cost of the raft catamaran was Rs. 1.53 lakhs. Capital invested towards craft and engine shared at the rate of 23 % and 31% each while remaining 46 % for fishing gears.

The rate of] repair and maintenance varied among the fishing unit components such as craft (5%), engine (10%) and gear (2%). In many of the cases, the net required complete replacement within one year. Among items of various fixed costs, interest accounted high (15%) for all the components of the unit in raising the cost followed by the maintenance cost as described by Doss et al (1999) in Veraval coast. Total operational cost per trip accounted for Rs.2,306, of which, crew share contributed to 73% and 20 % for fuel. In this operation, the crew share was 50 % after duly deducting fuel cost from the gross earnings. Returns obtained per trip were Rs.4000 against the total cost of Rs. 2,554. Mean rate of returns from a fishing trip accounted for Rs.1445.56. The worked out profit index ratio was 1.57 since the total returns was higher than the total costs involved. It was calculated by dividing the Total Returns with Total cost

Further, the ratio was more than one; it indicated that the craft yielded good profit at the rate of Rs.0.57 for every one rupee of investment. It is one of the key economic indicators which emphasize the economic efficiency of the fishing unit. As mere estimation of costs and earnings is not sufficient to analyse the efficiency of the craft, the other key indicators like economic, capital, labour profitability efficiencies are to be worked out (Senthilathiban *et al*., 1997; Raju, 2003). The other economic efficiency tools are presented in Table 2. The economic efficiency or input-output ratios at different costs showed variation.

Among the cost ratios, the fixed ratio showed good performance while operating ratio was high which indicated that technological development is required to increase the profit of the fishing unit. The capital efficiency showed a good ratio for the profit to investment and comparatively less for the ratio of profit to operational cost. It might be due to huge amount spent for crew share. Labour efficiency was found to be good. The profitability margin was Rs.28.91 and indicated good profit per kg of fish production at the rate of fuel cost of Rs.9. Further, there is scope for increasing of profitability due to seasonal fluctuation in the value of catch and its quantity. Financial assistances are also offered to fishermen through co-operative banks, societies and commercial banks on recommendation from state fisheries department. Subsidy is also provided for OBM at 50 % of the engine cost and it is restricted to the maximum of Rs.10,000.

Problems and Remedial Measures

The main problem faced by the fishermen with this craft is poor stability which often leads to toppling of craft thereby loss of engine. It is found that toppling occurs less frequently in the case of catamaran having the length of more than 9 m when compared with smaller ones. Therefore, it is suggested that larger craft may be constructed to avoid toppling. Fishermen of this area do not have much knowledge about engine and its maintenance. So, training may be organized to teach them engine and fuel maintenance. Infrastructural facilities like fish landing or auction centers, ice, cold storage facilities and engine repair yard need to be provided since they are absence in the study centers. Almost all the crafts operated in these regions are diesel engines. Diesel engines are costly, more in weight and require permanent inboard installation. This installation increases the boat's draft and beaching problems (Ben yami, 1991). Use of diesel engine increases the operational cost also. It may be reduced through introduction of kerosene run engines, provided sufficient quantity of kerosene in subsidiary rate is available. Suitable preservative or coating may be provided to craft to prolong its life since fungi attacks it easily due to alternative drying and wetting of logs. Similarly, chemical treated wood may be used to keep the wood log abstaining from borers.

The study found that the operation of raft catamaran is economically feasible if little technological input is given to improve the operation. Further, it is suggested that the OAL of the craft may be increased to maintain the stability of the craft and training to the fishermen in the maintenance of OBM is also important.

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Table 1. Various Costs and Earnings of the Raft Catamaran per Annum

S.No.	Items of Cost	Cost (Rs.)	Cumulative cost (Rs.)
I	**Capital cost**		
	a. Catamaran	35,000	
	b. Engine	48,000	
	c. Fishing gear	70,000	1,53,000
II	**Fixed cost**		
	a. Repair and Maintenance of craft	2000	
	b. Repair and Maintenance of gears	1,500	
	c. Repair and Maintenance of engine	5,000	
	d. Depreciation of boat	4,500	
	e. Depreciation of fishing gears	1,500	
	f. Depreciation of engine	4,500	
	g. Interest on boat	6,750	
	h. Interest on fishing gears	10,500	
	i. Interest on engine	6,750	
	j. Insurance @ 2%	1800	44,800
III	**Variable cost**		
	a. Oil expenses	81,000	
	b. Crew share	3,05,000	
	c. Ice	27,000	
	d. Miscellaneous	2,000	4,15,000
IV	Total Returns		7,20,000
V	Total cost (II +III)		4,59,800
VI	Net Returns (V-IV)		2,60,200
VII	Input-Output ratio (Index) (IV/V)		1.57

Table 2.
Various Efficiencies of Cost and Earnings in Raft Catamaran Operation

S.No.	Items	Ratio
I	**Cost Ratios**	
	a. Operating ratio	0.58
	b. Fixed ratio	0.06
	c. Gross ratio	0.64
II	**Capital Efficiency**	
	a. Capital turn over ratio (profit/investment)	1.7
	b Capital turn over ratio (profit/operational cost)	0.63
III	**Labour Efficiency**	
	a. Average number of workers	2
	b. Average catch crew	25 Kg
	c. Average revenue	Rs. 2000
IV	**Economic Efficiency per Kg of fish catch per day**	
	a. Total catch (Kg)	50
	b. Fuel cost (Rs.)	9
	c. Operating cost	46.11
	d. Total cost (Rs.)	51.09
	e. Catch value (Rs.)	80
	f. Net profit (Rs.)	28.91