

Economic viability of motorization of traditional fishing crafts along Andhra Pradesh coast

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Abstract

Economic viability of the non-motorized (NM) fishing craft in relation to motorized-outboard motor (M-OBM) and inboard motor (M-IBM) fishing crafts at three selected coastal marine fishermen villages- Bandaravanipeta in Srikakulam district, Danavaipeta in East Godavari district and Kothapatnam in Prakasam district belonging to three distinct coastal zones of Andhra Pradesh for a period of two years (2003 and 2004). Among the motorized crafts, the returns from M-OBM crafts is fairly good since there flexibility of fishing in the near-shore as well distant-waters. But in the case of M-IBM crafts, the operations are strictly meant for distant water fishing and there is risk of venturing into the deeper regions and also low rate of return on investment (RRI). High operational cost of about 35% to 42% of fuel (diesel) involved in the fishing trips in case of motorisation. Net return per trip by NM was the highest (Rs 15,428) at Danavaipeta at Bandaravanipeta (Rs 42,290) by M-OBM and by M-IBM at Kothapatnam (Rs 43,495). Rate of return was higher in NM boats (33.49%) than in M-IBM (13.99%). Break-even catch were also estimated.

Keywords: motorization, traditional fishing crafts, economic viability, Andhra Pradesh

Introduction

Success of any technology depends on its suitability and economic viability. It is a well known that those technologies, which can replace the old and traditional practices, are treated to be more adaptable and their sustenance is time-tested through propagation and endurance. Some of the novice technologies may take new shapes in the course of time before they are finally accepted. Motorization of traditional fishing crafts is such an attempt, which has been introduced in the year 1986 in Andhra Pradesh. It has taken many turns before it has finally taken roots into the system but the economics of the fishing operations by NM, M-OBM and M-IBM is still lacking along Andhra Pradesh coast and hence the present study has been carried out.

Krishna Iyer^[1] analyzed the cost-benefit of fishing trawlers in Kerala. In a study undertaken on the economic efficiency of the gears operated by the sailboats in Tamil Nadu coast, Sathiadhas^[2] has reported that non-mechanized sailboats operating gill nets were economically more efficient than the engines fitted boats. Annamalai^[3] studied investments and returns of traditional fishing crafts of twelve selected fishing villages in Kerala and recorded 11.2%, 18.06% and 30.05% by large craft, small craft and medium crafts respectively. According to Sehara *et al.*^[4] medium trawlers are economically more efficient in Saurashtra region (Veraval, Mangrol, Porbandar and Okha) of Gujarat coast. Sathiadhas and Panikkar^[5] observed the enhancement of earnings of the boat owners by increasing number of gears during their study economics of catamaran fishing along Madras coast. Siluvai Raj *et al.*^[6] studied the economic performance of fishing units

in the backwaters of Kerala. Manohar Doss *et al.*^[7] conducted a study on the economic performance of fishing crafts in the coastal villages of Veraval coast in Gujarat.

Other investigators also concentrated on the economic performance of the traditional fishing crafts^[8, 19]. The present study analyzes the comparative economic performance of non motorized and motorized fishing crafts.

Material and methods

The nine coastal districts of Andhra Pradesh have been divided into three distinct zones- South, Central and North. The north zone consists of Srikakulam, Vizianagaram and Visakhapatnam districts. The central zone includes East Godavari, West Godavari and Krishna. The south zone comprises Guntur, Prakasam and Nellore. Basing on different fishing practices by traditional fishing crafts (NM, M-OBM and M-IBM) and the implementation of motorization three fishing villages one in each zone namely Bandaravanipeta (Latitude 18° 21' N; Longitude 84° 08' E) of Srikakulam district in the north zone, Danavaipeta (Latitude 17° 10' N; Longitude 82° 27' E) of East Godavari district in central zone and Kothapatnam (Latitude 15° 27' N; Longitude 80° 12' E) of Prakasam district of south zone have been selected as sampling stations for the study (Fig.1). A survey has been carried out at these three fishing villages and primary data collected from 744 samples during 2003 and 2004 have been used for a comparative economic analysis and evaluation of the economic viability of the different traditional fishing crafts. The variables selected for the study are described below

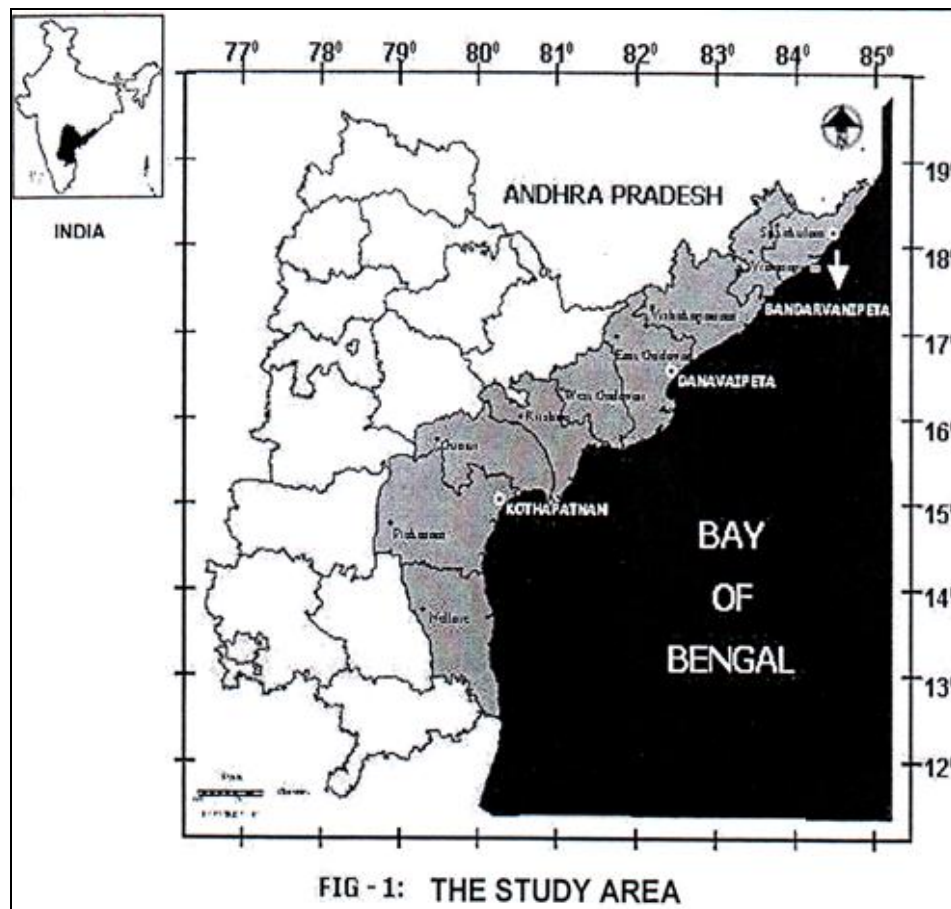


Fig 1: The Study area.

Initial Investment

The initial investment comprises the present market value of the components like boat, engine, nets and other accessories during the survey period.

Fixed costs

This includes depreciation on boats, engines, tax (if any), and interest on fixed cost. It is assessed with the depreciation values of wooden crafts with 33.33%, Fibre glass Reinforced Plastic (FRP) crafts with 20% engine with 20%, nets with 50% and other accessories with 50%²⁰. Further, the actual rate of interest paid and the cost of annual repairing charges met by the each category of the boat owner was gathered from the respondents and added to the depreciation.

Operational costs

This included the expenses towards fuel, wages, food, ice, salt, repairing, maintenance charges and miscellaneous expenditure.

The operational costs of the three types of traditional fishing boats taken up for study (NM, M-OBM and M-IBM) were grouped in respect of the each category of boat at each place to derive the average operational cost per trip. The calculation of catch per hour was based on the average catch per trip and average fishing hours available and the calculation of annual catch was worked out by taking the average number of fishing trips per year. The average fishing period of each trip to study the fishing performance of all the three traditional fishing

crafts. The Rate of Return (RR) on investment was calculated in terms of percentage of income to the investment to assess the profit of the fishing crafts.

$$R = \text{Ln} (V_f / V_i)^{[21]}$$

Where R = Rate of Return; V_i = Initial Investment; V_f = Final investment

The Break-Even (BE) analysis of the three crafts was performed by equating the revenue (TR) with the cost of fishing (TC) in a year for which the catch, the number of fishing hours and the price were taken into consideration^[22]. The breakeven point was assessed by the formula:

$$BE = TC / TR \text{ (or) } TC = TR$$

Where

TC = Annual cost (operational cost + fixed cost)

TR = Catch per hour X total number of hours X average price of the catch

Catch per hour = TC / total number of fishing hours X price

Total number of fishing hours = TC / catch per hour X price

Price of catch = TC / catch per hour X total number of fishing hours

Results & Discussion

The costs involved in fishing with different traditional fishing crafts were

Investment

The average investment per unit of NM craft was Rs. 36248/- out of which the boats shared 42.19 percent of the investment, nets 53.9 percent and accessories 3.91 percent. In case of M-OBM crafts, the share of boats was 38.42 percent, engine was of 27.9 percent, nets were of 31.47 percent and accessories were of 2.21 percent from the investment of Rs. 1,38,186/-. The average investment per unit of M-IBM was Rs 2,77,550/- with boat share 34.7 percent, engine of 21.02 percent, nets of 43.02 percent and accessories of 1.26 percent (Fig. 2).

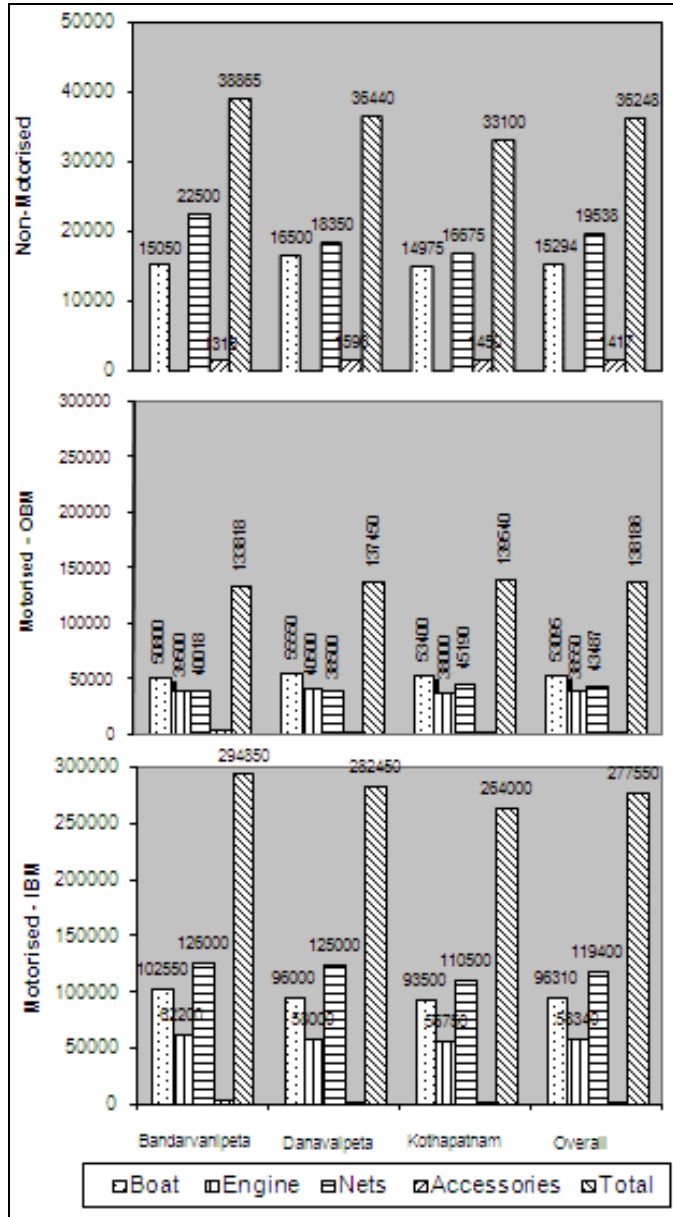


Fig 2: Capital cost of traditional fishing crafts.

Annual Fixed costs

The average fixed cost of the NM boats at three stations was Rs. 17,153/- with 87.77 percent of depreciation, 2.97 percent of repairs and 10.53 percent of interest (Fig. 3). In case of M-OBM boats it was Rs 70,442/- with respective percentage for depreciation, repairs and interest was 60.46, 1.90 and 37.32 (Fig. 4). The average annual fixed cost in case of M-IBM was

Rs. 1,35,586/- with depreciation of 66.84 percent, repairs of 1.28 percent and interest of 31.95 percent (Fig. 5).

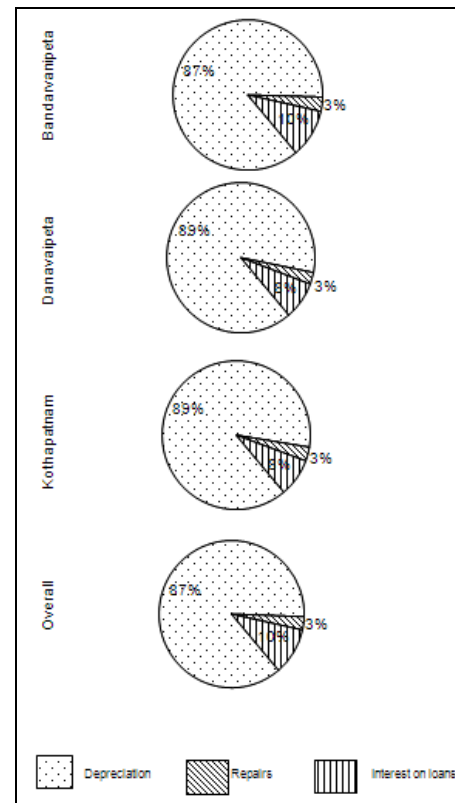


Fig 3: Composition of the annual fixed costs of non-motorized crafts.

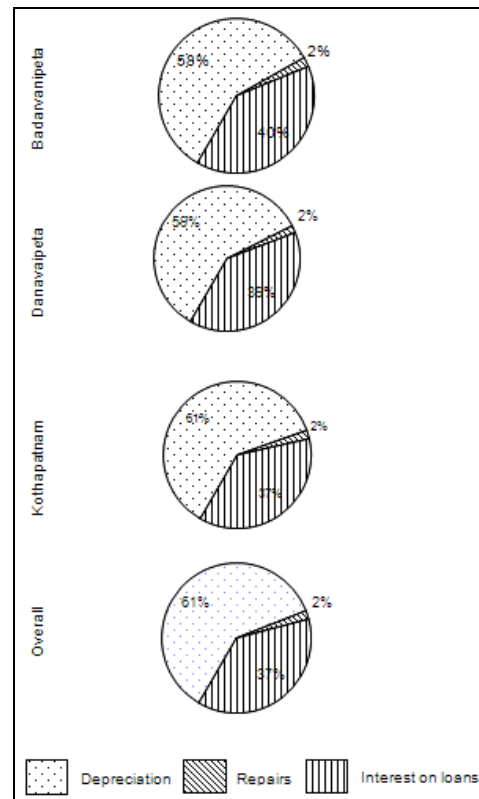


Fig 4: Composition of the annual fixed costs of Motorized-OBM crafts.

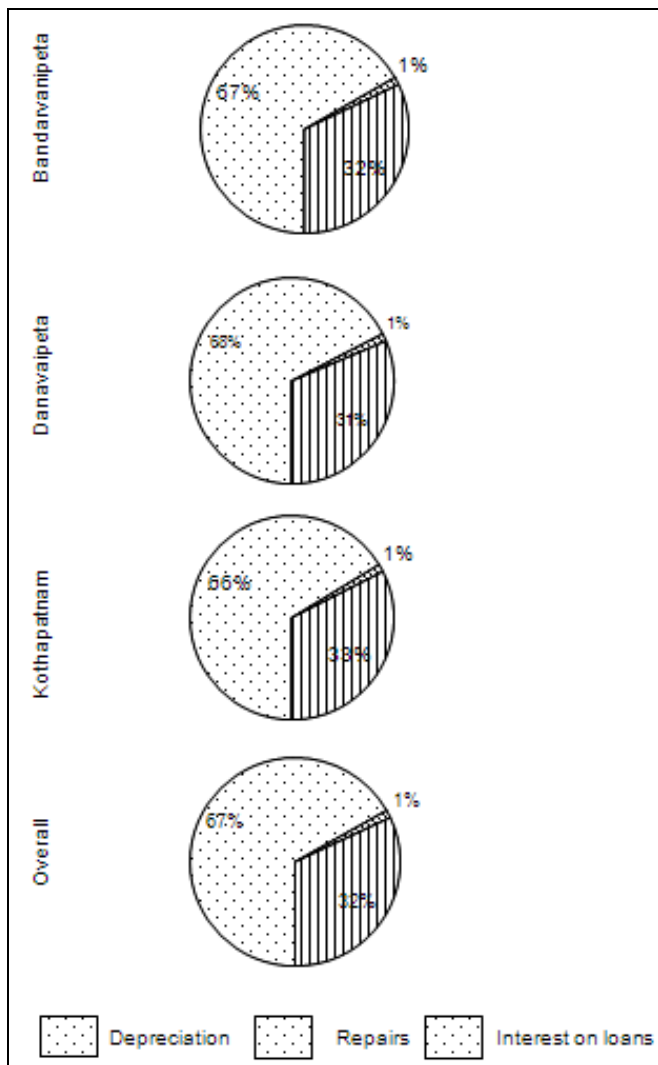


Fig 5: Composition of the annual fixed costs of Motorized-IBM crafts.

Annual Operational costs

The average annual operational costs per trip of NM boats was Rs 595.64/- out of which wages accounted for 63.4 percent, food 12.7 percent, ice and salt 10.9 percent, repairs and maintenance 4.40 percent and miscellaneous expenditure 8.6 percent. There was no expense on fuel charges since the NM boats were driven by rowing and sail power alone (Fig. 6). The operational expenses by the M-OBM was Rs 1452/- and the different components were fuel (35.2 percent), wages (30.6 percentage), food (10.3 percentage), ice and salt (11.9 percentage), repairs and maintenance (5.5 percentage) and miscellaneous (6.5 percentage) (Fig. 7). In case of M-IBM the average annual operational cost per trip was Rs 3292/- and the percentages of different types of expenditures was fuel-41.6, wages-27.6, food-10.1, ice and salt-14.0, repairs and maintenance-3.0 and miscellaneous-3.6 (Fig. 8).

63.4 percent of operational cost was towards wages of crew in NM boats, whereas it was only 30.6 percent in M-OBM and 27.6 percent in M-IBM. But fuel charges were 35.2 percent in M-OBM and 41.6 percent in M-IBM and there were no fuel charges in NM boats.

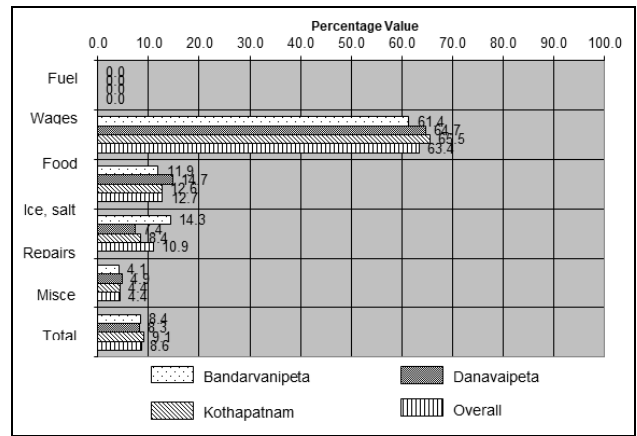


Fig 6: Operational cost of Non-Motorized crafts.

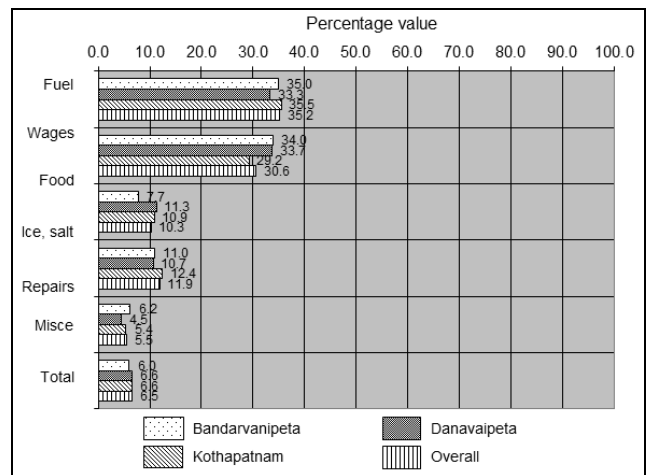


Fig 7: Operational cost of Motorized- OBM crafts.

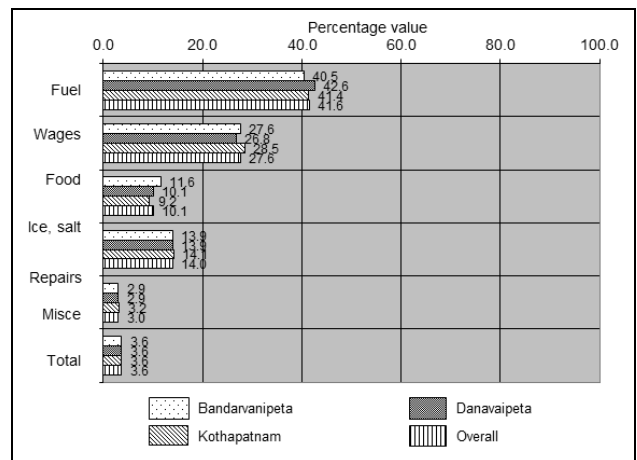


Fig 8: Operational cost of Motorized- IBM crafts.

Fishing pattern

The fishing pattern of crafts was assessed based on the average fishing hours/ trips and catch particulars. The annual fishing hours spent for fishing was different in each type of boats and they were 1651.67 Hrs (NM), 1741.90 Hrs (M-OBM) and 2060.78 Hrs (M-IBM). The income after the deduction of fixed cost and operational cost for NM boats was Rs. 12,138/-, Rs. 42,088/- in M-OBM and Rs. 38,836/- in M-

IBM crafts. Among the three places, the income by NM boats was the highest (Rs. 15,428/-) at Danavaipeta and in case of M-OBM it was Rs. 42,290/- at Bandaravanipeta whereas M-IBM boat the highest income was at Kothapatnam *i.e.*, Rs. 43,495/-.

Rate of Return

The average rate of return by NM boats (33.49 percent) was higher than that of M-OBM boats (30.46 percent) and it was low in M-IBM boats (13.99 percent) (Fig. 9).

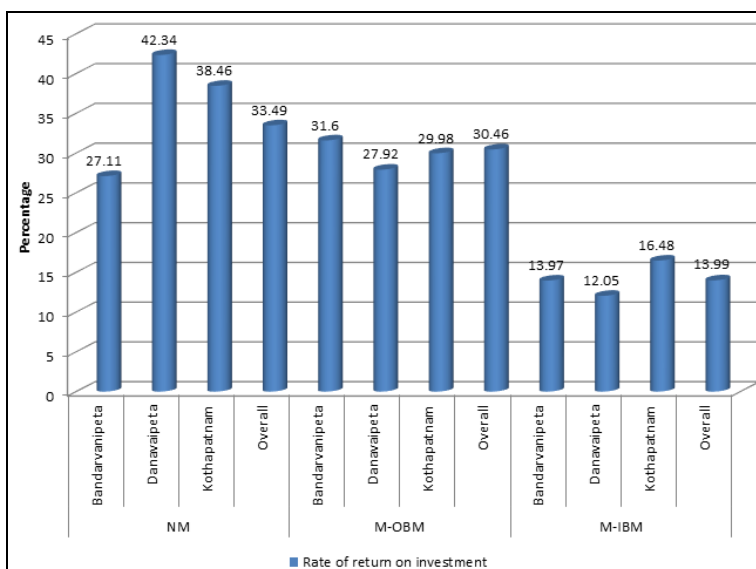


Fig 9: Rate of return on investment of Non-motorized, Motorized-OBM & Motorized-IBM Crafts.

Break-even level

The average annual overall break-even levels at three stations by NM, M-OBM and M-IBM boats were Rs 14/-, Rs 13.6/- and Rs 54.8/- respectively when three parameters (catch per

hour, total fishing and the price of the fish) were taken into consideration while keeping the two parameters at constant level to fulfill the condition of TR=TC (Table 1).

Table 1: Breakeven level of the fisheries by NM, M-OBM and M-IBM at Bandaravanipeta, Danavaipeta and Kothapatnam.

Variable		Per hour catch (Kg)	Total annual fishing hours (nos)	Price of fish	
NM	Bandaravanipeta	Existing level	7.1	1624.1	15.7
		Breakeven level	6.7	1531.8	14.8
	Danavaipeta	Existing level	5	1656	18.1
		Breakeven level	4.5	1486.2	16.3
	Kothapatnam	Existing level	6.7	1681.7	12.7
		Breakeven level	6.1	1532.3	11.6
Overall	Existing level	6.4	1651.7	15.1	
	Breakeven level	5.9	1527	14	
M-OBM	Bandaravanipeta	Existing level	9.5	1744.3	16.1
		Breakeven level	8	1466.1	13.5
	Danavaipeta	Existing level	9.4	1795.7	15.9
		Breakeven level	8.1	1542.3	13.7
	Kothapatnam	Existing level	7.6	1733.5	16.8
		Breakeven level	6.2	1406.1	13.6
Overall	Existing level	8	1741.9	16.6	
	Breakeven level	6.6	1428.9	13.6	
M-IBM	Bandaravanipeta	Existing level	2.8	1897.2	65.2
		Breakeven level	2.5	1670.9	57.4
	Danavaipeta	Existing level	2.3	2095.2	59.5
		Breakeven level	2	1845.6	52.4
	Kothapatnam	Existing level	2.2	2108.2	62.6
		Breakeven level	1.9	1793.8	53.3
Overall	Existing level	2.3	2060.8	63	
	Breakeven level	2	1794.2	54.8	

The sustenance of the technology depends not only on the basis of utility but also on the economic viability to facilitate

the use of improved system and to renounce the age-old unworthy traditional practices. The average capital cost of the

NM was very low compared to the M-OBM and M-IBM as many of these boats are manufactured with economically available wood stipulated short lengths (4 to 5 m). On the contrary, motorized boats are made up of FRP material with average lengths (6 to 8 m) with high costs. The accessories like paddles, oars, anchors, sail etc. are the same on both the non motorized and motorized boats, but cost of sea safety equipment was more in case of motorized boats reflecting an increase of capital cost *i.e.*, capital cost in M-OBM and M-IBM (NM - Rs 1,417/-; M-OBM - Rs. 3,055/- and M-IBM - Rs. 3,500/-). Krishna and Rajiv^[23] have stated that the use of life saving and communication appliances in mechanized fishing crafts involving the additional expenditure in operational cost, in order to use them regularly.

Boat repairing charges have been more in case of NM boat and less in motorized boats, since the former is made of wood and the latter of FRP material. The average annual engine repairs are more in case of motorized boats *i.e.*, Rs. 503/- (NM), Rs. 1,339/- (M-OBM) and Rs. 1,633/- (M-IBM). According to Surapu Raju^[16] maintenance and repair charges are more in mechanized boats than the indigenous developed wooden crafts. There are no fuel charges in the case of NM boats and the fuel charges in M-OBM boats at 35.2% and in M-IBM boats 41.6%. It indicates that the involvement of diesel in motorized boats is very critical as it influences greatly the economic stability of the operation of the boats at every time of increase of diesel price in the current market. Sathiadhas² reported that non-mechanized sailboats operating gill nets were economically more efficient than the boats fitted with engines. The fuel costs are the additional burden in the operational expenses of motorized fishing crafts in Kerala^[11]. Similar observations have been made by Shibu and Hameed^[17] who have studied the relative fuel consumption and effective fishing time of small-scale mechanized gill-netters. In spite of this, the reason for motorization is to reach the fishing grounds and landing centers on time. It may not be possible in case of non-motorized boats, which are operated manually and with the help of wind power. The slight difference of the fuel charges at each of the places and within the place may be attributed to different fishing times, fishing grounds, resorting to sail power, wind direction, velocity etc.

In the years 2003 and 2004 a maximum catch of 11,562 kgs with a value of Rs 1,81,291/- has been observed at Bandaravani by NM boats. High valued fish and shrimp worth of Rs 15,428/- have been fished at Danavaipet by NM boats in Kakinada Bay which has been supported by the nutrient rich waters of Godavari estuary^[24] as indicated by more hours for fishing / trip (9.2 hours). Maximum income in respect of the M-OBMs and M-IBMs are observed at Kothapatnam and Badarvanipeta respectively indicating viability and popularization of motorization with M-OBM and M-IBM boats at those places. The study report on the impact of motorization undertaken by TFCS^[13] on all India basis reveals that on an average the motorized craft has made 224 trips while it is only 196 for non-motorized craft in a year. The fishing time has also been increased. An increase of fishing hours by motorized boats has been noticed and the fishermen are able to venture in to deeper areas and are able to spend longer periods on sea.

The high rate of returns on investment in non-motorized boats

indicates dominance of non-motorized fishing compared to the motorized fishing and inclination of traditional fishermen to prefer the age old practices even the technology, which provides hassle-free fishing practices^[13]. The lowest return of 13.99% in M-IBM boats is not at all attractive when compared to the NM (33.49%) and M-OBM (30.46%) boats. Annamalai^[3] has explained the rate of returns in the studies conducted on the different sizes of crafts in Kerala coast. According to him the investment made in large craft has earned 11.2% compared to the small crafts with 18.06% and medium sized crafts with 30.05%, giving the reasons for variations in the depreciation. SIFFS^[11] reported that motorization has resulted in a 5 to 10 fold increase in the investments in fishing units. However, the loans available at low rate of interest (12%) from government and banks and subsidies might have encouraged the fishermen to take up the fishing operations with M-IBM boats. The aspirations of many fishermen to modernize the fishing craft have been fulfilled by implementing the motorization scheme of the government and the subsidy for the motorization of country craft is to be continued with a goal of motorizing at least 50,000 crafts in the country^[13]. Though an initial investment required for M-OBM boats, the return of 30.46% is a fairly good when compared to any traditional fishing boats.

It may be concluded from the analysis of the data that fishing operations by NM boats are more economically viable followed by M-OBM category and low rate of returns have been found with M-IBM boats.

The breakeven levels are the indicators of potentiality of fishing by all types of traditional fishing crafts in Andhra Pradesh and provide a kind of information and guidance on the sustainable economic viability of these crafts in different seasons and options for the management of fishing operations in respect of fishery, fishing period and market price. The fishing operations may be targeted to the areas of under exploitation by motorization as emphasized by Comprehensive (Indian) Marine Fishing Policy^[25] due encouragement to the fishermen by the government and non-governmental organizations in that direction.

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