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Economic Performance of Three Different Gillnet Fishing Units Operating along Mumbai Coast

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Abstract

Economic analysis was carried out separately for Inboard Motors (IBM), Outboard Motors (OBM) and non- motorised gillnetters operated along Mumbai coast. The economic performance of fishing operation is affected by various factors including fluctuations in revenue, diminishing catch per unit effort, sudden increase in the cost of key inputs, catch and effort restrictions. Capital and labour will continue to enter the fishery until the economic rents are totally dissipated and profits to individual units are reduced to the levels of their opportunity costs. The economic performance also plays a crucial role in the investment decisions at micro level and is deciding factor for sustainable returns of any business. The paper analyses the economic viability of gillnet fishing operations of all the three sectors viz. Outboard Motors (OBM), Inboard Motors (IBM) and non-motorised operated along Mumbai coast were running in profit.

Keywords: Economic efficiency, Gillnet, Mumbai coast

The main aim of any business is to gain profit. Fishing is considered as one of the profit-oriented business. Fisheries sector has been playing an important role in the national economy through improved food supply, employment, income and foreign exchange earnings. During 2011, the valuation of Indian total marine fish landings at the landing centre level was estimated at ₹ 24,372 cores, in which Maharashtra contributed 2,875 cores, of which 8.4% came from gillnets. So the average fishermen share in the consumer's rupee was found to be 63.88% (Anon, 2012a). Increase in the fishing fleet has increased the competition for the survival as there is day by day increase in fishing fleet, which leads to indiscriminate fishing in near coastal waters.

Gillnetting has become popular among fishers being less capital intensive, selectively operated depending on availability and demand and can be operated at areas where bottom is not suitable for trawling. Among the gear wise contribution to all India marine landings, the gillnets contributed 21% with 6% mechanised and 15% motorised sector during 2007 (Ramani *et al.,* 2010).

State wise gillnet contribution to the total marine fish landings during 2012 was maximum of Tamil Nadu (16.2%), followed by Andhra Pradesh (14%), Gujarat (13%), Maharashtra (7.3%), Kerala (6.2%) and Karnataka (3.4%) (Anon., 2013). So, it necessitates a cost-benefit analysis to assess the potential net economic benefit from marine fisheries of the country in order to frame necessary policy measures for judicious exploitation and conservation.

Maharashtra with 720 km of coastline along five maritime districts is an important maritime state with respect to marine fish production. The marine fish landings in Maharashtra during 2011 have been estimated provisionally at 4.13 lakh t of which gillnets contribute 11.2% of the total catch and 12,154 mechanised and 2,292 non-mechanised fishing units are in operation in the state (Anon, 2012b). Mumbai district alone contributed 1.43 lakh t viz., 32% of the total marine fish production of Maharashtra (Anon, 2011). It indicates that Mumbai coast is one of the most important fishing grounds of the state. On the above background, the present study has been undertaken to examine the economic efficiency of the gillnetters.

Database and Methodology

Economic efficiency of the units was calculated from the data collected on weekly basis. The indicators used for assessing the economic efficiency of different gillnet fishing sectors were capital cost, total variable cost, total fixed cost, total cost, total revenue, annual profit, capital turnover ratio, rate of return to loan amount, gross ratio, variable cost ratio, fixed cost ratio and payback period. Constituents of capital cost considered for economic analysis of gillnet operation were cost of vessel, cost of engine, cost of net and other miscellaneous items having more than one year life span. Average cost of vessel, engine, net and other items were estimated by taking means of each item separately. Total variable cost is that part of total cost those changes as the rate of output changes. The expenses on fuel, ice, lubricant, wages, repair and maintenance were the major components of variable cost of a gillnetter and were calculated by taking average expenditure of these items from the sampled gillnetters. Sum of expenditures on these items for 41 weeks gave the average cost of fuel, ice and lubricant for full fishing season.

Total fixed cost is that part of total cost that does not change as the rate of output changes. Fixed cost in case of gillnetters includes the depreciation, interest and insurance. The depreciation was calculated on the basis of expected life, i.e. ratio of the purchase cost of an item divided by the expected life of an item. Interest was calculated by simple interest formula and factors considered for calculation of interest were amount of loan taken, payback period and percentage of interest at which loan was taken. Average depreciation of each item, average interest and average insurance was calculated. The total cost per annum was calculated by adding the fixed cost and variable cost. Total revenue was calculated after personal inquiry of price of fishes per kilogram or per crate or per basket at the landing centre and multiplying it with the quantity of catch landed by a gillnetter. Weekly revenue was calculated by multiplying the number of fishing days in a week by the average value of fish landed by selected ten samples in each sector. Sum of 41 weeks revenue gave the total annual revenue.

Results and Discussion

In any business, economics plays a major role as it determines the profitability of the business. Therefore, study of economic aspects of the gillnetter operating from the Mumbai coast was the major objective of the present investigation. Capital cost, variable cost, fixed cost, total expenditure, revenue and net profit, payback period were the major components considered for economic efficiency.

Items included to calculate total capital cost were vessel cost, engine cost, gear cost, and cost of other miscellaneous items with more than one year life span. The total capital cost for OBM was (₹ 92,590), for IBM (₹ 3,79,107) and non-motorised gillnetters (₹ 30,425) as shown in Table 1. Economics of different size class of gillnetters were worked out in different years were reported by various workers. The reported capital investment ranged from ₹ 1,00,000 to ₹ 1,10,000 for two cylinder and three cylinder engine fitted gillnetters operated along the Cochin coast during years 1981 and 1982 (Silas *et al.,* 1984), ₹ 2,30,000 to ₹ 2,57,000 for OBM units operating from Maharashtra and Gujarat coast during year 1986-87 (Sehara and Karbhari, 1989), ₹ 49,973 to ₹ 82,117 for mechanised gillnetters operated along Kerala coast (Annamalai and Kandoran, 1990), ₹ 82,000 to ₹ 2,35,000 operating from Versova during the year 1985-86 (Rao and Pandey, 1990), ₹ 85,000 to ₹ 1,00,000 operated along Tamil Nadu coast during year 1985-86 (Sathiadhas and Benjamin, 1990), ₹ 2,07,000 for the OBM gillnetters of Gujarat (Chaya *et al.,* 1991), ₹ 27,000 and ₹ 42,700 for non-motorised and motorised gillnetters operated along Tuticorin coast during 1986-87 (Sathiadhas *et al.,* 1991), ₹ 10,000 to ₹ 50,000 in West Bengal during year 1983-84 (Datta and Dan, 1992), ₹ 25,400 and ₹ 52,480 for motorised catamarans and motorised navas in Kanyakumari district of Tamil Nadu State (Annamalai and Kandoran, 1993), ₹ 1,05,000 to ₹ 1,23,000 for the gillnetters operated from Cochin fishing harbour during the year 1990 (Iyer, 1993), ₹ 58,000 and ₹ 1,60,00 for the gillnetters operated from Kerala (Panikkar *et al.,* 1993). Luther *et al.* (1997) reported the capital investment of gillnetters operated during 1991-92 has ranged from ₹ 3,01,000 to ₹ 4,00,000 in Chennai.

Lot of variations were observed in the total cost reported for different types of gillnetters operated from different parts of India. These variations according to the year may be due to price index whereas, the variation in the total capital cost in different parts of the country in the same year may be due to variation in cost of raw material and labour cost of construction in those places. Sehara and Karbhari (1989) have reported the capital cost of gillnetter slightly less than the capital cost of the present study. The difference in capital cost recorded on higher side in present study may be attributed the increase in price of raw material. It can be seen from the above quoted results that all the economics calculated were prior to 1991-92. On the contrary, the data recorded for the present study is collected in the year December

2010 - November, 2011. The higher values recorded for the capital cost may be due to inflation. The difference in the capital cost of OBM, IBM and non-motorised was mainly due to the cost of vessel engine and net.

Crew salary was the major item of expenditure as it contributed 45.66% in OBM gillnetter, 37.33% in IBM and 97% in non-motorised gillnetters to the total variable cost as depicted in table 1. The system of crew payment in terms of share was prevailing throughout India in cases of gillnetter. The system was that the net return after deduction of fuel, oil and ice cost was shared between craft owner and the crew in the ratio pre-determined by tradition or by mutual consent. The total crew share was then divided among the crew members. Silas *et al.* (1984) worked out the share of crew at 13%, 32.8% (Rao and Pandey, 1990) and 55-60% (Sathiadhas *et al.,* 1991). The labour income earned per crew member per day was highest for single day purse seiners followed by single day gillnetters at ₹ 1,354 and ₹ 842 respectively. The financial analysis showed that the single day purse seiner and single day gillnetters are performing better with higher return on investment of 205% and 167 % respectively (Aswathy *et al.,* 2011).

The exiting sharing system of gillnetters operating from Mumbai coast fishing harbour was in such a way that 50% of the net returns after deducting the cost of fuel, ice and oil were distributed to crew members in equal proportions and rest 50% was the share of owner. If owner and his family members were working as crewman then they were equally eligible to receive the crew share. The difference in the operational cost of the OBM and the IBM gillnetters was mainly due to higher fuel requirement of IBM gillnetter than OBM gillnetters because, fishing ground of IBM gillnetter was away from landing centre as compared to the fishing grounds of OBM gillnetter. As compared to the results reported by Sehara and Karbhari (1989) along the Maharashtra coast the variable cost recorded during the present study was more. The major expense in the variable cost is constituted by salary as crew share. The variable cost reported by Sehara and Karbhari (1989) were of studies conducted in the year 1986-87 against the data of present study which was recorded in December 2010 - November 11. It is but expected that the values recorded for variable cost in the present study are higher just because increase in the diesel price and crew wages.

The fixed cost constituents were depreciation, interest and insurance. Estimated values of fixed cost were at ₹ 2,758 for the OBM unit, ₹ 1,66,126 for the IBM unit and ₹ 8,307 for non-motorised gillnetter (Table 1). To calculate the depreciation, average life of 10 years has been considered for vessels and engine whereas interest rate of 10% for both OBM and IBM gillnetters and 1% for non- motorised gillnetters was considered. Sehara and Karbhari (1989) have also considered the same interest rate and life expectancy in case of vessel but considered expected life of 20 years for engine. The fixed cost reported by Sehara and Karbhari (1989) ranged from ₹ 47,090 to ₹ 54,110 whereas ₹ 23,675 to ₹ 81,700 (Rao and Pandey, 1990) at the Versova during 1985-86, ₹ 17,128 (Sathiadhas *et al.,* 1991) along the Tuticorin during 1987, ₹ 8,820 to ₹ 19,500 for plank built boats (Sathiadhas *et. al,* 1993) and ₹ 82,750 to ₹ 1,04,666 for 12 m vessels operated along the Tuticorin coast. The cost of non-recurring items affects the fixed cost in terms of depreciation. Though there was high magnitude of variation in capital cost, its magnitude gets reduced when depreciation is calculated. The interest rate considered while calculation was almost same in hitherto reported work and present work. Thus the lesser variation observed in fixed cost as compared to capital cost is correct.

Table 1: Cost-benefit analysis of OBM, IBM and Non-motorised gillnetters

Items	OBM	IBM	Non-motorised
Total cost (₹)	160640	548652	40403
Capital cost (₹)	92590	379107	30435
Total variable cost (₹)	133062	382526	30946
Total fixed cost (₹)	27578	166126	9457
Annual revenue (₹.)	225767	679229	86368
Net profit (₹)	65012	130577	45965
Ratio			
Capital turnover ratio	2.43	1.79	2.83
Rate of return to loan (%)	1.03	0.26	9.37
Gross ratio	0.71	0.80	0.46
Variable cost ratio	0.58	0.56	0.36
Fixed cost ratio	0.12	0.24	0.11
Payback period (years)	1.10	1.60	0.56

Net annual profit for OBM was worked out at ₹ 65,012 for IBM units it was ₹ 1,30,577 while as non-motorised it was ₹ 45,965 (Table 1). The annual profit reported by other workers were ₹ 28,430 for 9.62 m to 9.14 m vessel fitted with 2 cylinder and 3 cylinder (Silas *et al.,* 1984) during the year 1981-82, ₹ 1,28,810 to ₹ 1,71,800 for mechanised vessels of size range of 31-50 ft (Rao and Pandey, 1990) along Versova coast during the year 1985-86, ₹ 16,893 for OBM units (Chayya *et al.,* 1991) during the year 1985-86, ₹ 5,201 for motorised units (Sathiadhas *et al.,* 1991) at Tuticorin coast during the year 1987 and ₹ 6,861 to ₹ 11,009 for motorised vessels (Sathiadhas *et al.,* 1993). In the report presented here the size of vessel and specification of engine fitted on them shows lot of variation. Thus there will be variations in the fishing operations. So the net profit claimed by them and net profit records of the present study cannot be compared. Economic analysis of gillnet fishing operation with all three categories of the vessels were running in profit in December 2010 - November 011.

The findings of the present study shows that the gillnet fishing is profitable business which competes with other fishing gears operated along Mumbai coast. Among the fishes caught by this gear, white sardine, seerfish and oil sardine were the major contributors of the OBM, IBM and non-motorised gillnetters respectively. Seerfish was available throughout the year in IBM gillnetters and for OBM gillnetters it was available, only during initial period of fishing season. This indicates that there is shifting of seerfish population from deeper waters to shallow waters during the months of September to November. The crewmen had a major share in the net profit after deducting the cost of oil, fuel and ice expenses from the total revenue.

Various economic indicators were estimated to know the economic viability of gillnet operation along the coast of Mumbai coast is depicted in Table 1. The capital turn over ratios were estimated at 2.43 for OBM gillnetters and 1.79 for IBM gillnetters and 2.83 for non-motorised. Sathiadhas and Panikkar (1988) estimated the capital turnover ratio at 2.45 for OBM gillnetters operating along the Trivandrum coast of Kerala whereas, the capital turn over ratios reported by Sehara and Karbhari (1989) along the Maharashtra coast were 1.00 and 1.04 at Khardanda and Satpati respectively. Sathiadhas and Benjamin (1990) have reported the capital turn over ratios at 2.58 and 1.80 along Cuddalore and Nagapattinam coast respectively, while, 1.61 for motorised gillnetters operated along the Tuticorin region of Tamil Nadu (Sathiadhas *et al.*, 1991), whereas, for plank built boats it was at 2.05 along the Tuticorin coast (Sathiadhas *et al.*, 1993).

Capital turnover ratio is a ratio of revenue to capital cost. The results of the present study with regard to capital turnover ratio of OBM gillnetters was in concurrence with the result of the work carried out by Sathiadhas and Benjamin (1990) at Nagapattinam and Sathiadhas *et al.*(1991) for motorised gillnetters operated along Tuticorin coast, while the capital turnover ratio of IBM gillnetter was in almost concurrence with Sathiadhas *et al.* (1993). On the contrary Sathiadhas and Panikkar (1988) have reported very high values for OBM gillnetters along Trivendrum coast while lowest values were reported by Sehara and Karbhari (1989) along the Maharashtra coast. The capital cost given by Sathiadhas *et al.* (1993) was ₹ 27,000 and gross revenue reported was ₹ 55,272 during the year 1987-90, while in present study the capital investment for OBM was ₹ 92,590 for IBM gillnetter it was ₹ 3,79,107 and non motorised units ₹ 30,435. The gross revenue estimated was ₹ 2,25,767, ₹ 6,79,229 and ₹ 86,368 for OBM , IBM and non-motorised units respectively during December 2010 to November 2011.There is large variation in capital cost and revenue of the present study and hitherto study. From this, it may be concluded that the capital cost and revenue increases year after year.

The gross ratio for OBM, IBM and non-motorised were estimated at 0.71, 0.80 and 0.46 in the present study. Sathiadhas and Panikkar (1988) reported the gross ratio in the similar range (0.88) along Trivandrum coast of Kerala. Similar result was also reported by Sehara and Karbhari (1989) of 0.80 as a gross ratio along Maharashtra coast. Variable cost ratio and fixed cost ratio were worked out at 0.62 and 0.20 for OBM gillnetters and 0.61 and 0.17 for IBM gillnetters respectively. Similar results were reported by Sehara and Karbhari (1989) with values of 0.60 and 0.20 along the Maharashtra during year 1986-87. In the present study, gross cost ratio was below one, which proves that the gillnetters operated from the Mumbai coast were profitable during year 2010-11 as 71, 80 and 46% amount from the revenue was spent on the total cost. This has also indicated that gillnetting is viable business along Mumbai coast, as 0.58, 0.56, and 0.36% of revenue was spent towards variable cost for OBM, IBM and non-motorised gillnetters respectively but only 12, 24 and 11% were spent towards fixed cost of OBM, IBM and non-motorised gillnetters respectively.

Pay-back period estimated for OBM gillnetters was 1.10 years, for IBM it was 1.60 years and for non-motorised 0.56 years. Different pay back periods were reported by various workers as 2.2 years (Sathiadhas and Panikkar, 1988) for gillnetters along Trivandrum coast, Kerala during the year 1985-86, while, Sathiadhas

and Benjamin (1990) reported the pay-back period of 1.58 years for the fishing vessels operated along Tamil Nadu coast during the year 1985-86. Sathiadhas *et al.* (1993) reported the pay-back period at 1.7 years for plank built boats. Thomas (2001) reported the pay-back period for non- motorised (1.89 years), for OBM (3.98 years) and for IBM (5.27 years). The results of the present study indicated that the payback period of non- motorised was less than a year. Pay-back period of OBM gillnetters and non-motorised units was less as compared to IBM gillnetters. This may be because of the less operation cost and less capital investment.

Conclusion

From the following discussion, it has been found that the economic performance of fishing operation is affected by various factors including fluctuations in revenue, diminishing catch per unit effort, sudden increase in the cost of key inputs, catch and effort restrictions. Capital and labour will continue to enter the fishery until the economic rents are totally dissipated and profits to individual units are reduced to the levels of their opportunity costs. The economic performance also plays a crucial role in the investment decisions at micro level and is deciding factor for sustainable returns of any business. The paper analyses the economic viability of gillnet fishing operations of all the three sectors viz. Outboard Motors (OBM), Inboard Motors (IBM) and non-motorised operated along Mumbai coast were running in profit.

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