

NOTE

Operational efficiency of two major artisanal fishing gear of Kerala

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ABSTRACT

This study is aimed at comparing the technical and economic efficiency of two artisanal gear which have become popular among the Kerala fishermen during the post motorisation period *viz.* ring seines and the mini-trawl net. The parameters taken for the study are catch per man hour and operating ratio. The results of the study show that the ring seines are technically the more efficient gear but mini-trawls showed greater economical viability with respect to operating costs.

Edwin and Hridayanthan (1997) reviewed the fishery by the small scale artisanal sector and the large scale industrial sector with reference to the catch contribution and also the conflict between the two. Alagaraja *et al.* (1994) and Balan and Andrews (1995), Hameed *et al.* (1988) and Vijayan *et al.* (1990) have dealt with in detail the fishery by the mini-trawl unit. The common feature between the ring seine and the mini-trawl units is that both came into operation after the post motorisation period and both are smaller versions of the same type of gear used in the industrial fisheries sector. This study is aimed at comparing the technical and economic efficiency of mini-trawl and ring seine, the two important gear of the artisanal fishery sector in Kerala.

Eight units were selected for study of which five were mini-trawl units and

three ring seine units popularly known as *choodavala* and *discovala* respectively. All units were operated from Ambalapuzha of Alleppey district in Kerala. The study was conducted for a period of three months from January 1996 to March 1996 during which 72 operations were conducted by each unit. The details of the fishing units taken for the study are given in Table 1. The parameters taken for the comparison of the operational efficiency *ie.* technical and economic, are the catch per manhour and the operating ratio. The catch per manhour includes the actual time for fishing and the time taken for reaching the fishing ground and back. The operating ratio is the operating costs divided by the gross profit. The operating costs include the cost of fuel *ie.* petrol, kerosene and motor oil, cost of ice, daily expenditure of crew and transportation expenses. The catch per man hour was

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TABLE 1. Details of the fishing units

Fishing units	Craft LOA in m	Gear	Engine	No. of crew
Ring seine	12	350 x 50 m min. mesh 12mm	25 hp Suzuki	20-22
Mini trawl	6	15 m head rope length min. mesh 20 mm	15 hp Suzuki	2 or 3

compared using ANOVA.

It can be seen that there exists significant difference between the catch per man hour values of the two gears at 5 % level ($F=7.044$, $df=111$). The ring seines landed more catch in one man-hour (11.39 kg) when compared to the mini-trawl units which on an average landed 9.74 kg. However, no significant variation existed in the *c/mh* values of both the gear when compared with different weeks. The operating ratio calculated for the different ring seine units and mini-trawl units are given in Table 2. It is seen that in the case of ring seines the operating ratio ranged from 0.13 to 0.28 *ie*, the operating costs formed 13 to 28 % of the gross profits per month. In the case of mini-trawl units there was not much variation in the operating ratio values. It ranged between 0.04 and 0.07. The low percentage value of operational costs to the gross profit is a direct indication of the profitability of such type of units.

The catch per manhour is the most universally accepted index for assessing the efficiency of any gear and the results of the study show that ring seining is a method technologically more efficient. The productivity in terms of quantity is high in the case of ring seines. Earlier studies show that among four classes of

ring seines the *choodavala* units using 25 hp engines were the most efficient (Edwin and Hridayanathan). Hence these units which showed the maximum efficiency were used for the present study. The superior technical efficiency of ring seines has been proved by earlier authors. Kurien and Willmann (1982) showed that encircling net-plank boat combination, the predecessor of the present day ring seine, showed maximum efficiency with regard to catch per manhour. It was observed that the *cpue* was three times more than that of hooks and line-plank canoe combination. Later studies by Anon. (1991) also give supporting evidence. When compared to the boat seine units, the ring seine were the most productive in the studies conducted by the South Indian Federation of Fishermens' Societies. Among the ring seines the *choodavala* units show maximum efficiency and are presently the most popular. Chacko (1993) while discussing the traditional fishing along the Alleppey coast, was of the opinion that owing to investment, lower operational cost and repair cost along with longer life and higher returns the fishermen of Alleppey prefer *choodavala/discovala* units to the larger *thanguvala* units. It should be noted in this connection that the mini-trawl units produced only a modest 9.74 kg/mh (Fig. 2).

As the ultimate objective of any fishing operation, the economic viability/profitability of the units is taken into consideration. The operating ratio was found to be a suitable parameter for assessing the financial viability. The ratio of the operating costs to the gross profits, provides a measure of the viability of the enterprise. The operating ratio was estimated on a monthly

basis. This study shows that the operating ratio is higher for the mini-trawl units when compared to the ring seine units by three times. The higher gross profit for the mini-trawl units must be due to the higher percentage of occurrence of penaeid prawns in the landings. Alagaraja *et al.* (1994) showed that the percentage contribution of penaeid prawns in the mini-trawl landings increased from 0.5 % in 1987 to 36 % in 1992. It is seen that during the period of study *Parapaneopsis stylifera* and *Pentaeus indicus* together contributed more than 80 % to the total landings, the rest being sciaenids, sole fishes and miscellaneous species. In the ring seines the major catch during the same period comprised anchovies, mackerel and other sardines.

Studies by Hameed *et al.* (1988) showed that the mini-trawl was a successfully operated gear and the profit of the landings helped in retrieving 170 % of the investment within the first five years of operation. From the operational details it was observed that the operat-

TABLE 2. Operating ratio of ring seine and mini trawl units

Fishing units	January	February	March
Ring seines			
1	0.18	0.28	0.16
2	0.17	0.13	0.18
3	0.18	0.21	0.20
Mini trawls			
1	0.04	0.06	0.05
2	0.06	0.06	0.05
3	0.07	0.07	0.04
4	0.05	0.05	0.04
5	0.07	0.06	0.05

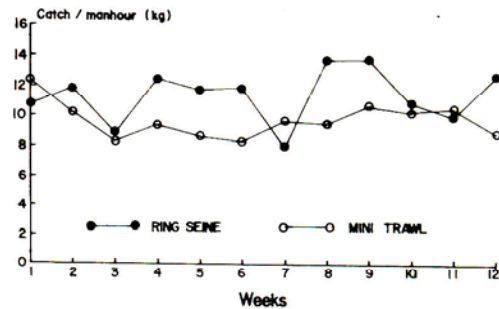


Fig. 1. CPUE of ring seine and mini-trawl units.

ing ratio for the gear during 1987-88' was 0.54 in the Munambam-Vypeen region of the Cochin coast. Vijayan *et al.* (1990) suggested a new design of two 12.77 m seam trawls for operation from traditional motorised craft which brought in 31.5 % more shrimp catch and 37 % more revenue when compared to the type being commercially operated at present. There is ample scope for improving the economic viability of this gear.

The techno-economic feasibility of any fishing unit alone is not enough for popularisation. The biological and the ecological impact of the excessive use of this gear has to be studied in detail. Much studies have not been conducted on the selectivity of seine nets unlike the trawls. Hence suitable modifications are to be made to reduce the adverse effects of the gear.

Acknowledgment

The authors wish to thank Dr. M. Shahul Hameed, Director, School of Industrial Fisheries, for the help and encouragement given in conducting the study. The first author expresses her gratitude to the Director, Central Institute of Fisheries Technology, Cochin for

granting study leave.

References

- Alagaraja, K., K.S. Scariah, Joseph Andrews, K. Vijayalakshmi and M.R. Beena 1994. Recent trends in marine fish production in Kerala with special reference to the conservation and management of resources. *Programme for Community Organisation*, Trivandrum, 46.
- Anon. 1991. Techno-economic analysis of motorisation of fishing units – a cost and earnings study along the southwest coast of India. *Fisheries Research Cell, PCO*, Trivandrum.
- Balan, K. and Joseph Andrews 1996. Marine fish production in Kerala. In : *Proc. Nat. Workshop on Fish Resources in the EEZ and Deepsea Fishing in Kerala*, Cochin.
- Chacko, T. 1993. Traditional fishing along the Alleppey coast – a study. In : *Proc. Nat Workshop in Low Energy Fishing*, SOFT (I), Cochin.
- Edwin, L. and C. Hridayanathan 1997. Comparative Technical efficiency of two types of ring seines operated from Ambalapuzha. Paper presented at the *National Symposium on Technological Development in Fisheries and Rural Development*, Cochin, December 1995.
- Hameed, M.S., K.C. Bellarmine, Asok Kumar and M. Mukundan 1988. Observations on the operation of mini trawl in the coastal waters of Kerala. In: *Proc. World Symposium on Fishing Gear and Fishing Vessel Design*, Marine Institute, Canada.
- Kurien, J. and Rolf Willmann 1982. Economics of artisanal and mechanised fisheries in Kerala – A study on costs and earnings of fishing units RAS/77/044 WP No. 34
- Vijayan, V., M.D. Varghese and Subramonia Pillai 1990. Evolution of an improved trawl net for artisanal craft. *Fishery Technology*, **27** : 83-86.