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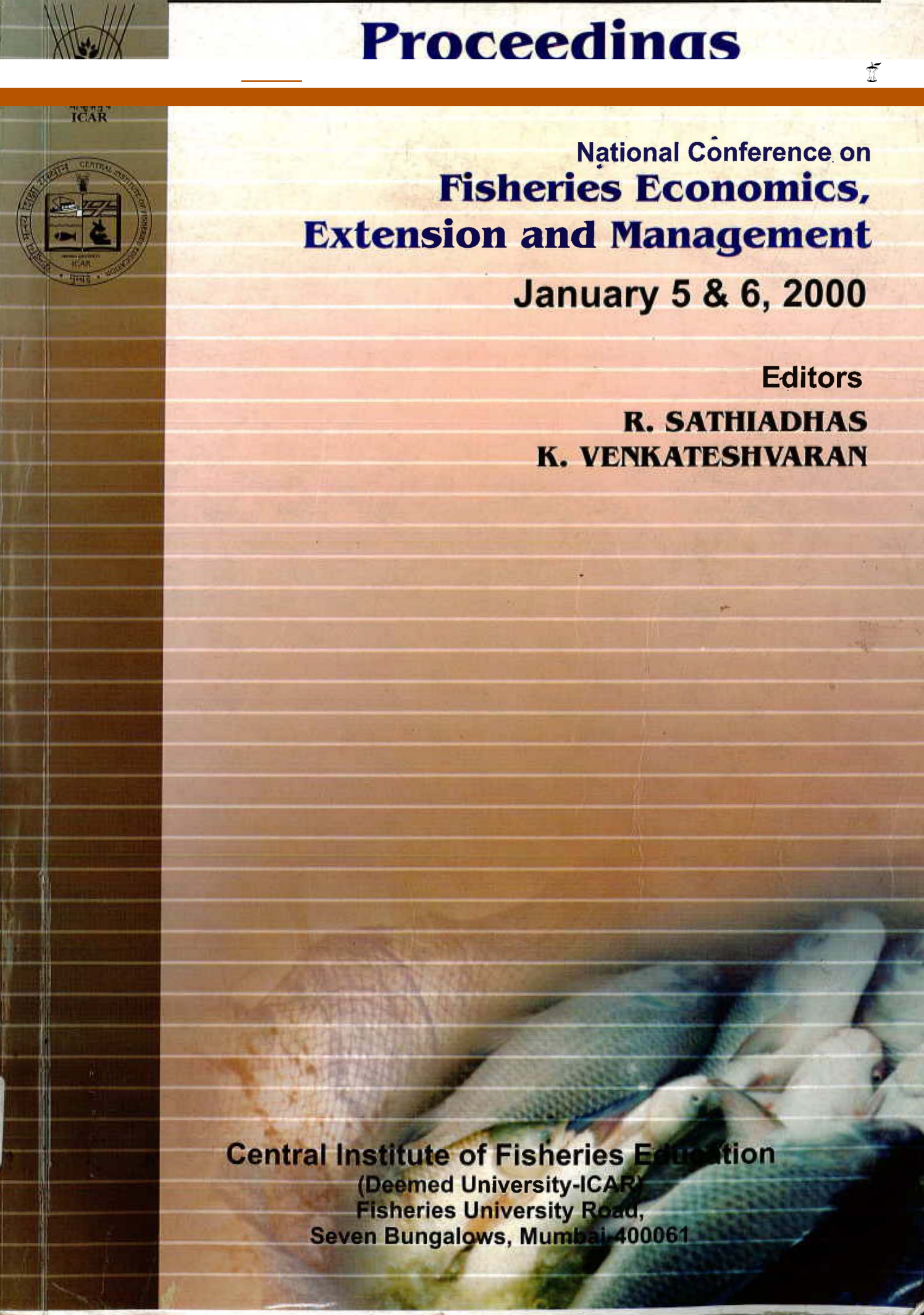

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9 ECONOMICS OF DIFFERENT MARINE FISHING CRAFTS IN TAMIL NADU

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Abstract

The marine fisheries sector of India has grown from the subsistance level to that of an industry mainly through the introduction of mechanised crafts and the subsequent developments in the craft technologies. Though the overall landings have increased, a low catch per unit effort and the increased cost of fishing have left some units to run on loss. Thus, it is imperative to study the economic performance of various fishing units to help in judicial allocation of resources and to suggest suitable policy prescriptions. Hence, the economics of major fishing units was studied in Ramanathapuram District of Tamil Nadu.

The investment on a traditional craft, including the gears and accessories, worked out to Rs. 37, 711 as against Rs. 1, 75, 630 for a motorised craft and Rs. 4,52,279 for the mechanised craft. The annual total cost of operation of traditional craft was Rs. 62441, while it was Rs. 357691 for motorised crafts and 7.20, 87.51, and 70.01 percent of the total cost in respect of traditional, motorised and mechanised crafts in that order. The traditional craft realised annual revenue of Rs. 59796. The earnings for motorised crafts were Rs. 362125, while the earnings of mechanised crafts was Rs. 791159. While the later two types of crafts earned net profit, the traditional crafts incurred net loss. Despite higher investment, the mechanised crafts were found more efficient as indicated by different criteria of economic viability.

Introduction

Fishing in India has been the traditional occupation of the coastal rural community. The sector has made a phenomenal progress from subsistence fishing to the status of an industry. These developments have been made possible mainly by the introduction of mechanised crafts and related developments in craft-gear technologies. The initial super normal profit earned by the mechanised crafts attracted many (including the non-fishermen) to venture into this area, which ultimately resulted in a tough competition among the different craft operators. This has led to a decrease in catch per unit effort (CPUE), though the total landing have increased. Thus the dwindling resources on one hand and the increased cost of fishing on the other has made the investment on this capital intensive fishing a risky affair. This situation warrants a detailed study on the economic performance of different fishing units, which can serve as a base for judicial allocation of resources and for formulation of suitable fishery management policies. In this regard, this paper makes a modest attempt to study the economics of viability and financial feasibility of different fishing units and the constraints in marine fishing in Ramanathapuram District of Tamil

Nadu.

Data and Methodology

Out of 13 coastal Districts in the State, Ramanathapuram was purposely selected, because of its importance in marine fishing. Initially five landing centres namely Rameswaram, Pamban, Chinnapalam Chinna Erwadi and Thondi were selected from 79 landing centres in the District. Then a sample of 50 each of traditional, motorised and mechanised owners were selected from these centres for obtaining detailed information on fishing operations. The data from the sample craft-owners collected pertained to 1997.

Cost-return analysis

The annual cost of operation was calculated by computing the annual fixed and variable costs. The annual fixed costs included the annual depreciation and interest on the initial investment. The annual variable costs comprised of labour wages, daily bata, fuel cost, expenses on food, repairs and maintenance charges and other incidental costs. The practice in the study area is that the labourers working on mechanised crafts are paid cash wages, whereas those working in the motorised and traditional crafts shares one third of catch in lieu of wages. The annual labour wages were calculated taking both the methods into account.

The gross returns per trip was calculated using the formula,

$$GR = \sum_{i=1}^{n} P_i X_i \qquad (1)$$

Where,

GR = Gross returns

P_i is the landing centre price of the i^{th} species,

X_i is the quantity of the 'I^{th}' species caught and

n is the number of species caught per trip.

The gross returns were then assessed in annual basis. The net return was calculated by subtracting the annual total cost from gross returns.

Financial analysis

The financial feasibility of different fishing units was assessed through discounted

cash flow techniques of net present worth (NPW), benefit – cost ratio (BCR) and internal rate of return (IRR) with the following assumptions.

a. The rate of interest on fixed capital is 18 per cent

b. Costs and benefits are assumed to remain at the level obtained in the initial year, as the effect of cost escalation will be offset by the increase in output price.

c. Annual number of fishing days was assumed to be 220 for mechanised crafts 240 for motorised crafts and 260 for traditional crafts.

d. The economic life of gears is three years.

e. The economic life of the mechanised crafts is 10 years and that of motorised and traditional crafts, is 15 years.

f. The salvage value of the fishing unit at the end of the economic life is 10 per cent of the initial investment.

The net present worth is the difference between the present value of the net benefits realised over the economic life of the craft and the present value of investment made on craft, gears and other accessories. For an investment to be viable, its NPW should be positive. The benefit-cost ratio is the ratio of present value of the net benefits realised over the economic life of the craft and the present value of investment made on crafts, gears and other accessories. For the investment to be viable, its BCR should be greater than unity. The internal rate of returns indicates the compound rate of earning of the investment over its entire economic life. For the investment to be acceptable, its IRR should be greater than the opportunity cost of capital.

The mathematical formulae of the discounted measures are given below

$$NPW = \sum_{n=0}^{T} B_n (1+d)^{-n} - \sum_{n=0}^{T} C_n (1+d)^{-n} + V_T (1+d)^{-T} - \sum_{n=0}^{T} I_n (1+d)^{-n} \quad ---(2)$$

$$BCR = \frac{\sum_{n=0}^{T} B_n (1+d)^{-n} - \sum_{n=0}^{T} C_n (1+d)^{-n} + V_T (1+d)^{-T}}{}$$

$$\sum_{n=0}^{T} I_n (1+d)^{-n} \quad \text{---(3)}$$

IRR is that discount rate which makes the NPW equal to zero

$$\text{IRR: } \sum_{n=0}^{T} B_n (1+r)^{-n} - \sum_{n=0}^{T} C_n (1+r)^{-n} + V_T (1+r)^{-T} - \sum_{n=0}^{T} I_n (1+r)^{-n} = 0 \quad \text{---(4)}$$

Where,

B_n cash inflows in period **n**

C_n cash outflows in period **n**

V_T the salvage value realised in the terminal year of the investment

I_n investment made in year **n**

d discount rate

n number of years of economic of investment

T terminal year

Constraints in marine fishing

The different craft owners were asked to rank the constraints faced in marine fishing as they feel it. Later using Garret's ranking technique (Garret, 1952) these ranks were converted to percents using the formula

$$\text{Per cent position} = \frac{100 (R_{ij} - 0.5)}{Nj} \quad \text{---(5)}$$

where,

R_{ij} = rank for 'I' the factor by 'j^{th}' individual

N_j = number of factors ranked by 'j^{th}' individual

Here 0.5 is subtracted from each rank because the rank is an interval on a scale and its mid point best represents an interval. The percentage scores were converted to mean score value and then ranked.

Result

Cost and returns

It can be pursued from Table 1 that, the initial investment was the highest in the mechanised crafts (Rs. 4,52,279) compared to motorised (Rs. 1,75,630) and traditional crafts (Rs. 37,711) - the maximum share being accounted for by cost of the craft. The annual variable cost accounted for about 80 percent of the annual total cost in all the crafts. Wages and fuel accounted for a major share in the total cost, the respective share being 63 percent and, 62 per cent in mechanised and motorised crafts and 43 percent in traditional crafts. The high share of fuel cost in mechanised crafts is because of the distance travelled and the use of mechanical power for both a propulsion and fishing. The traditional crafts harvested 2308 kg.of fish per annum realising an annual revenue of Rs. 59796 (Table 2). Sardines, mud crab, mullets and sepia accounted for about 60 per cent of the catch and about 55 per cent of the revenue. The motorised crafts harvested 15,386 kg. of fish realising an annual revenue of Rs. 3,62,125 (Table 3). While anchovies, carangids, sardines and rainbow sardines shared 60 per cent of the catch; anchovies, carangids and lobsters accounted for 71 per cent of the revenue. The mechanised crafts brought ashore 56,386 kg. of fish yielding a revenue of Rs. 7,91,159 (Table 4). While sardines and silverbellies accounted for 63.72 per cent of the catch, they accounted for about 80 per cent of the catch including prawns. Prawns though contribute for only 1.74 per cent of the catch, their share in the revenue was 37 percent which is mainly because of their higher unit price.

The motorised and mechanised crafts earned a net profit of Rs. 4434 and Rs. 83991 respectively, while the traditional crafts incurred a net loss of Rs. 2109.

Financial feasibility

Though the initial investment was high, the mechanised crafts were found to

be more efficient as indicated by the different criteria of economic viability (Table 5, Appendix I, II and III). The mechanised crafts had a high Net Present Worth of Rs. 5,50,400 against Rs. 1,00,712 for motorised crafts and Rs. 5,708 for traditional crafts. A similar trend was observed in ranking these crafts by BCR and IRR criteria. All these three criteria show that the investment made on any of the crafts is financially feasible. The investment on mechanised crafts is found to be more beneficial than that on the other two crafts. But at the same time, the high investment on mechanised crafts makes it unaffordable for a conventional fisherman. The next option is to go for traditional or motorised craft. Among these two, the motorised craft seems ideal because of its comparatively higher NPW, BCR and IRR. Besides, the subsidy given by the State Government for motorization makes it affordable for the conventional fisherman to go for it.

Productivity of different fishing units

The different economic parameters were worked out to compare the economic efficiently of different fishing units. The mechanised crafts had the highest rate of return to capital (49.61 %) and shortest pay back period (2.02 years) compared to the traditional and motorised fishing units. (Table 6). This is in line with the observations of Sehara and Kanakkan (1993).

The break-even harvest and break-even price were less than the actual harvest and price realised per Kg. Of fish for motorised and mechanised crafts. The other efficiency measures established the supremacy of mechanised crafts.

Constraints in marine fishing

The reduction in catch composition has been ranked first by mechanised (64.42 mean score value) and motorised (74.91) craft- owners while the traditional craft owners ranked it at number three (Table 6). Low price realisation (71.36) and lack of institutional finance (61.84) were the prime constraints faced by the traditional craft owners. The reduction in catch composition per craft is by itself on indicator of excess fleet strength, which warrants proper regulation of operation of the fleet. The demand for extra-navigational equipment expressed by the mechanised craft-owners (61.34) shows their willingness to fish in the offshore and deep-sea areas.

Conclusion and Policy Implications

Fishing supports the livelihood of about 10 million people in India (Anonymous, 1996). Though there is lack of a uniform stream of income every month, there are occasional windfall profits as well as losses. A proper understanding of the economic performance of these fishing units becomes essential that to make their operation economically viable. It is found from this study, of the three units, no doubt the mechanised crafts have established their supremacy over the other two. But at the same time, several studies have indicated that encouraging the mechanised crafts might deplete the resources at a faster rate. Hence, from the point of view of conservation and equity the traditional and motorised crafts may be allowed for inshore fishing of these two, from the study it can be found that motorised crafts are economically more efficient compared to traditional ones.

Thus, motorization of traditional crafts may be encouraged to help the traditional craft owners. Besides, adequate institutional financial support should be made available and with strict follow up measures to recover the loans. Above all, a comprehensive fishery management policy needs to be formulated considering the above issues for the long-term sustenance of this sector.

References

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Table 1: Annual cost (in rupees) and returns of sample fishing units

Particulars	Traditional Crafts	Motorised Crafts	Mechanised Crafts
Initial Investment			
Craft	25631	78944*	322215
	(67.97)	(44.94)	(70.81)
Engine	-	33489	5100
	-	(19.07)	(11.50)
Gears	7890	57,221	31621
	(20.92)	(32.58)	(6.99)
Major Accessories	2804	4541	41570
	(7.43)	(2.59)	(9.39)
Minor Accessories	1386	1435	5873
	(3.68)	(0.82)	(1.31)
Total	37,711	175630	452279
	(100.00)	(100.00)	(100.00)
Annual fixed Cost			
Total depreciation	7070	34311	67010
	(51.02)	(52.05)	(45.15)
Interest on initial investment @18%p.a.	6788	31613	81410
	(48.98)	(47.95)	(54.85)
Total (A)	13858	65924	148420
	(100.00)	(100.00)	(100.00)
Annual operating cost			
Wages	26570	131447	78704
Fuel	(54.72)	(45.08)	(14.08)
	-	89467	368110
Food and bata	-	(30.69)	(65.884)
	10557	20833	40005
Ice	(21.74)	(7.15)	(7.16)
	-	-	17471
Lubricating oil	-	-	(3.13)
	-	8303	7989
Auction	-	(2.76)	(1.43)
	2130	17038	-
Repairs and maintenance	(4.39)	(5.84)	-
	4962	24679	46271
Berthing	(10.22)	(8.46)	(8.28)
	-	-	198
	-	-	(0.04)
Total (B)	48533	291767	558748
	(100.00)	(100.00)	(100.00)
Annual total cost (A+B)	62411	357691	707168
Annual catch (in Kg.)	2308	15386	56326
Annual gross revenue	59796	362125	791159
Annual net operating Income (VI–B)	11243	70358	232411
Annual net income (VI–IV)	-2615	4434	83991
Annual days of operation	234	235	229

Table 2. ***Annual catch and revenue composition of traditional craft landing***

	Catch		Revenue	
	Quantity (in kg.)	Percent to total	Value (in Rs.)	Percent to total
Sardines	577.1	25.00	5931.6	9.92
Mudcrab	489.8	21.22	14258.9	23.85
Mullets	159.7	6.92	4465.0	7.47
Sepia	132.5	5.74	8363.5	13.99
Spinefoot	95.8	4.15	1939.7	3.24
Catfishes	89.9	3.90	2137.3	3.57
Perches	85.9	7.72	2277.7	3.81
Reefcods	71.0	3.08	714.0	1.19
Silverbellies	61.8	2.68	565.3	0.95
Rays	46.1	2.00	463.5	0.78
Prawns	45.0	1.95	8713.6	14.57
Rainbow sardines	44.7	1.94	505.8	0.85
Carangids	36.7	1.59	1106.7	1.85
Goatfish	35.5	1.54	392.7	0.66
Reticulate crab	31.9	1.38	4022.3	6.71
Mojarrahs	18.9	0.82	459.1	0.77
Others	285.7	12.38	3479.1	5.82
Total	**2108.0**	**100.00**	**59795.8**	**100.00**

Table 3. ***Annual catch and revenue composition of motorised craft landing***

	Catch		Revenue	
	Quantity (in kg.)	Percent to total	Value (in Rs.)	Percent to total
Anchovies	3542.9	23.03	126799.3	35.2
Carangids	2918.8	18.97	54402.3	15.02
Sardines	142	9.55	8399.6	2.32
Rainbow sardines	1187.5	7.72	7340.5	2.03
Mackereles	898.6	5.84	12646.7	3.49
Blacktail trevally	502.9	3.27	12757.9	3.52
Perches	495.8	3.22	9307.8	2.57
Wolf-herring	361.7	2.36	5436.0	1.50
Lobster	351.0	2.29	78066.4	21.56
Chanks	313.8	2.04	10392.1	2.87
Isotop	262.7	1.71	6487.7	1.79
Sharks	210.4	1.37	3194.7	0.88
Five-spot herrings	189.0	1.23	1992.6	0.55
Cosphine	115.4	0.75	2135.7	0.59
Barracudas	110.5	072	1752.6	0.48
Reefcods	107.0	0.70	535.0	0.15
Plactorhyncus	42.8	0.28	761.8	0.21
Rays	32.1	0.21	312.6	0.09
Croakers	25.0	0.16	171.7	0.05
Others	2244.8	14.59	19232.0	5.31
Total	**15386.0**	**100.0**	**362125.0**	**100.0**

Table 4. ***Annual catch and revenue composition of mechanised craft landing***

	Catch		Revenue	
	Quantity (in kg.)	Percent to total	Value (in Rs.)	Percent to total
Sardines	18496.4	32.84	184016.9	23.26
Silverbellies	17395.5	30.88	159060.0	20.10
Mackerels	3357.1	5.96	6679.7	0.84
Mojarrahs	1920.5	3.41	4776.6	0.60
Jinga Prawns	1315.8	2.34	7854.5	0.99
Rainbow sardines	1005.4	1.78	10002.1	1.26
Prawns	977.4	1.74	294119.2	37.18
Goatfishes	711.0	1.26	13918.2	1.76
Blacktail travelly	582.9	1.03	16730.5	2.11
S.Leptolipis	261.6	0.46	4044.1	0.51
Threadfin breams	244.4	0.43	4426.1	0.56
Croakers	233.8	0.42	2849.1	0.36
Barracudas	208.7	0.37	5409.5	0.68
Sepia	194.1	0.34	6326.4	0.80
Flatfishes	139.1	0.25	2113.9	0.27
Rays	123.7	0.22	2156.7	0.27
Ilisha	119.7	0.21	2770.5	0.35
Octopus	49.7	0.09	296.8	0.04
Perches	38.2	0.07	951.0	0.12
Others	8950.7	15.89	62656.6	7.92
Total	**56325.7**	**100.00**	**791158.5**	**100.00**

Table 5. ***Financial feasibility of different fishing crafts***

Investment appraisal techniques	**Traditional crafts**	**Montorised crafts**	**Mechanised craft**
Initial investment (in Rs.)	37,711	1,75,630	4,52,279
Net Present Worth (In Rs.)	1,963	1,00,712	5,50,400
Benefit-Cost Ratio	1.06	1.57	2.271
Internal Rate of Return (in %)	19.40	31.19	48.53

Table 6. *Constraints in marine fishing*

	Traditional crafts		Motorised crafts		Mechanised crafts	
	Mean score value	Rank	Mean score value	Rank	Mean score value	Rank
Restriction of fishing area	27.20	VIII	55.55	IV	50.82	VII
Lack of adequate supply of diesel	-	-	37.66	VII	49.78	VIII
High wage rate for crew	-	-	35.67	VIII	51.06	VI
Reduction in catch composition	60.41	III	74.91	I	64.42	I
Poor landing and berthing facilities	43.47	V	52.83	V	58.88	III
Low price realisation because of indebtedness to traders	71.36	I	65.36	II	56.18	IV
Lack of institutional finance	61.84	II	58.80	III	52.38	V
Absence of extra navigational equipments	-	-	-	-	61.34	II
Poor avenues for off-season employment	32.72	VII	29.68	IX	33.96	IX
Damage of fishing equipment during fishing	56.61	IV	45.69	VI	26.28	X
Inadequate marketing and processing facilities	34.00	VI	25.60	X	-	-