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ECONOMICS OF GILL NET FISHING BY OBM UNITS AT SELECTED CENTRES IN NORTHWEST COAST

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There has been an increase in the trend of mechanisation in fishery in northwest coast of India in recent years. More than two-third of fish catch both in Maharashtra and Gujarat is contributed by mechanised sector. About half of the crafts in both the states are fitted either with in-board or out-board engines. The capital investment on boat fitted with in-board engine is very heavy and it is beyond the reach of common fishermen to procure it without getting financial help from institutional agencies or private money lenders. It is noted that the fishermen prefer OBM units wherever feasible to operate since the capital investment is of lesser magnitude and profit investment ratio is supposed to be higher. In northwest coast fitting of outboard engines to dugout canoes has been getting popularity. These units mainly operate gill nets. Three to five persons including owner of the boat form the crew.

The Central Marine Fisheries Research Institute, Cochin has undertaken a study to measure the economic efficiency of OBM units operating gill nets in northwest coast. An effort has been made to assess the profitability of these units and to compare the income levels of owner of the boat and the labourers forming crew on these units.

After the preliminary survey of gill net landing centres in northwest coast, Kochra-Nivti in Sindhudurg district of Maharashtra and Dhamlej in Junagadh district of Gujarat were selected for costs and returns study of gill net operation by OBM units. Kochra-Nivti is a backward fishing village with meagre fishing infrastructure facilities whereas Dhamlej has comparatively better infrastructure developments. A sample of 20 units was selected at each centre giving proper representation to the different sizes of units. The data collection was confined to five systematically selected days in each month for a period from September, 1986 to August, 1987. The data were collected with the help of two schedules, one containing details of craft, gear, labour, infrastructure, credit, marketing and preservation of catch and the other containing details of fixed cost, operating expenditure, catch composition and price of fish. The income of a unit was taken as the sum total of catch value based on landing centre fish prices. The year of observation was divided into four equal quarters, referred hereafter as monsoon (June–August), pre-monsoon (March–May), post-monsoon (September–November) and winter (December–February). The data were analysed quarterwise and pooled together to obtain the results for the year 1986–'87.

General information about selected villages/centres

The fishing is an occupation of 'kolis' (Metar caste) a backward community in Kochra-Nivti, a village about 20 km away from Kudal, district headquarter of Sindhudurg. It is a small village having about 160 fishermen families with a population of about 1,500. In Dhamlej, about 300 Hindu families *(Kharwas, Ghoghalias* and *Kolis)* and 30 Muslim families *(Machhiaras)* with a total population of about 3,000 are engaged in fishing and fishery allied activities. The village is about 37 km from Veraval Taluk headquarter. It is connected with the coastal highway by *pucca* road. Both the villages have limited fishery infrastructure facilities. A fishermen co-operative society is functioning in each of these villages.

Craft and gear

The boats, used to fit the outboard engines (OBE) are dugout canoes at both the centres. About 100 units fitted with OBE at Kochra-Nivti and 150 at Dhamlej are operating surface and bottom-set gill nets. The boats are comparatively smaller at Kochra-Nivti (5.5–8.5 x 0.6 x 0.9 m) and given additional support by wooden log frames (out-rigger) to avoid overturning during rough sea conditions. At Dhamlej, about 30 per cent of the boats are 32 footer and the rest 22–28 footer. In some of the boats, planks are fitted all

around the sides to make them more spacious. Majority of the boats at both the centres are fitted with 8 HP Yamaha engine.

At Kochra-Nivti, both surface-set gill nets (locally called *nahi jal*) and bottom-set gill nets (locally known as *budi jal*) are operated but former are more in number. The bottom-set gill nets are usually damaged by trawlers during night. In winter and pre-monsoon season fishing operations take place in the areas 15–30 km away from the shore whereas in post-monsoon season it is upto 15 km. The *vagul jal* measuring about 45 x 3 m and having mesh size of about 30 cm is used for shark fishing during January–May. Each piece costs about Rs. 250 and 10-12 such pieces make one gill net unit. Sometimes rays and skates also get entangled in *vagul jal*. Another type of bottom-set gill net is called *tiyani* or *kandali* and operated from January to April. The net made up of monofilament, measures about 55 m in length and 2.5 m in height and costs about Rs. 300. Its mesh size is about 5 cm and used for entangling carangids, clupeoids, ribbon fish *etc.* To make one net ready for operation 20–25 pieces are joined together. The surface gill net called *nahi* or *wavri* is generally used in post-monsoon season. It is about 55 m in length and 9–10.5 m in height with mesh size of about 12 cm. Each piece costs about Rs. 800 and one full gill net comprises 15–20 pieces. *Nahi* is used for gilling seer fish, ghol and silverbar. *Dhangla*, another surface-set gill net with 15 cm mesh size, is used in post-monsoon season for catching bigger sized seer fish. It is made up of three plier garfil filament (nylon) and measures 36 x 9 m. Single piece costs about Rs. 1,000 and 8–10 pieces are put together for fishing operations. Third type of surface gill net is known as *pasa jal* which is used for gilling pomfret and cat fish. It varies from 55 to 60 m in length and 9 to 10.5 m in height and costs about Rs. 900. It is operated from December to May and 15–20 pieces form one net. During April–May casual catch of lobster is obtained in *shavand jal* which is prepared by using old surface-set gill nets and operated in an area within 2–3 km from the shore.

Similarly, many types of surface and bottom set gill nets are used at Dhamlej landing centre. Big boats use *zada jal* both as surface and bottom set gill nets. While operating, 70 pieces are joined together, each piece being 33 m in length and 6.6 m in height, with a mesh size of 16 cm. Smaller boats use *zina jal* (also termed as *thobdi jal)* with a mesh size of 9 cm and *pakha jal* with a mesh size of 16 cm. *Thobdi jal* is used to gill seer fish, clupeoids, carangids, croakers and *Hilsa*, whereas *pakha jal* is mainly used for pomfret. The catch of *zada jal* mainly comprises ghol, threadfins, big sized seer fish, cat fish, and carangids. Fabrication cost of the gill net comes to Rs. 425 for *zada jal*, Rs. 350 for *pakha jal* and Rs. 400 for *thobdi jal*, the last two nets being owned by almost all the units.

Marketing of catch

In Kochra-Nivti there is only one trader purchasing pomfret and other costly fishes. The catch is iced and transported to Goa and Ratnagiri to sell it to the fish processing plants. Rest of the catch, mostly in fresh condition, is sold locally by fisherwomen or taken to sell in Kudal market. In case of heavy landings the cheaper varieties of fish are salted or sundried. There is a fishermen co-operative society, the activities being confined to twine selling to its 400 odd members.

The catch at Dhamlej is sold to private fish traders who advance money to the fishermen. Small portion of the catch is sold locally by fisherwomen. About 25 per cent of the boats sell their catch to Gujarat Fisheries Central Co-operative Association Ltd. (GFCCA) which in turn finances the boat owners. The selling of the catch and financing are arranged through primary fishermen co-operative society at the centre. The society charges two per cent commission on the catch sold to GFCCA. Also, the society is providing fishing requisites to its members.

Results and discussion

a) *Details of catch, fishing days and revenue:* In the northwest coast, gill net catch mainly includes pomfret, seer fish, cat fish, sharks, *Hilsa*, croakers, silverbar, perches and ribbon fish. Besides this, lobster in post-monsoon at Dhamlej and prawns in monsoon at Kochra-Nivti are landed as commercially important species of gill net fishing, though for a short period. Catch composition at both the centres is presented in Table 1 for different quarters. In post-monsoon quarter important contributors towards catch were seer fish (27.3%), cat fish (17.8%), croakers (14.9%) and silverbar (14.0%) at Kochra-Nivti and pomfret (22.3%), sharks (15.8%), seer fish (14.3%) and cat fish (13.3%) at Dhamlej. At Kochra-Nivti the percentage contribution of pomfret, cat fish, shark, *Hilsa* and ribbon fish increased in winter whereas in case of seer fish, croakers and silverbar it decreased, The species/groups, contributing more than 10% of the catch in winter at Dhamlej, included seer fish sharks, croakers and silverbar. In pre-monsoon quarter, pomfret (16.0%), seer fish (12.3%), cat fish (12.8%) and shark (13.7%) at Dhamlej and croakers (15.7%), silverbar (12.4%) and ribbon fish (14.0%) at Kochra-Nivti

were the main components of the catch. During monsoon there is no fishing at Dhamlej centre. At Kochra-Nivti about 20% of the boats are going for prawn fishing. On an average 110 kg of prawn (white) was caught per boat during monsoon at this centre.

The annual catch per unit was calculated at 14,773 kg at Kochra-Nivti and 16,947 kg at Dhamlej. The major varieties/groups of fishes in annual catch were, seer fish (16.5%), cat fish (16.8%), shark (11.5%), silverbar (10.8%), *Hilsa* (11.5%) and croakers (12.5%) at Kochra-Nivti and pomfret (16.8%), seer fish (12.6%), cat fish (12.2%), sharks (14.2%) and croakers (10.4%) at Dhamlej. The miscellaneous catch including threadfin, carangids, prawns and lobster accounted for 10–11% of annual catch at selected centres. Of the total catch at Kochra-Nivti, 45.6% was contributed by post-monsoon quarter, 24.8% by winter, 29.6% by pre-monsoon and monsoon. At Dhamlej the catch contribution was more in post-monsoon quarter (43.6%) as compared to winter and pre-monsoon quarters which contributed almost equally (28%) towards annual catch.

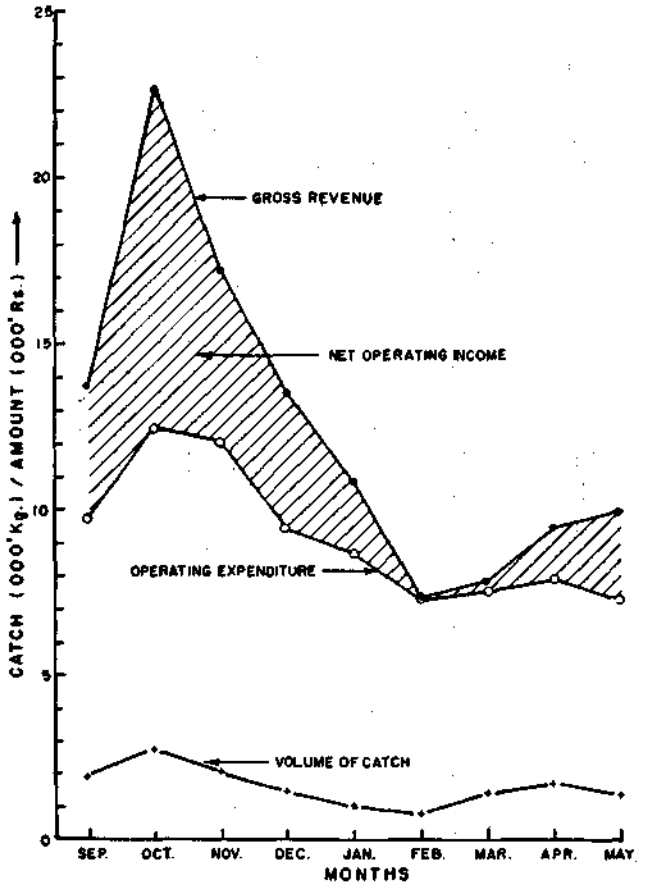

Fig. 1. Monthly volume and value of catch of OBM gill nets at Kochra-Nivti (1986–'87).

The number of fishing days at Kochra-Nivti was 64 in post-monsoon quarter, 73 in winter, 70 in pre-monsoon and 21 in monsoon, totalling 228 during 1986–'87. The number of annual fishing days worked out at Dhamlej (212 days) was comparatively less since there was no fishing in monsoon. Post-monsoon, winter and pre-monsoon, accounted for 67, 72 and 73 fishing days respectively. In general, the fishing starts in the second week of September and ends in the last week of May every year. The number of fishing days lost each month depends on the occurrence of festival, poor catch and bad weather conditions.

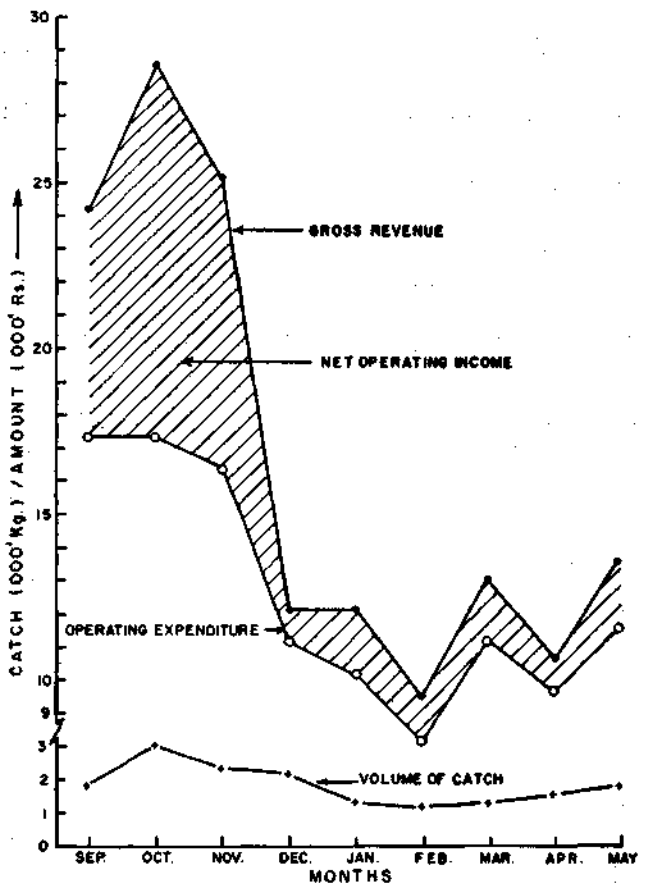

Fig. 2. Monthly volume and value of catch of OBM gill nets at Dhamlej (1986–'87).

The details of income realized from sale proceeds of different varieties of fish in each quarter are given in Table 2. Comparing the performance of four quarters, it was observed that about 46% of revenue was obtained in post-monsoon quarter, 27.2% in winter, 23.2% in pre-monsoon and 3.6% in monsoon at Kochra-Nivti. Though the quantity of catch was lesser in winter as compared to pre-monsoon quarter the percentage contribution of winter towards annual revenue was more since commercially important varieties had higher share in catch during winter. The species sharing

Table 1. *Catch composition (%) of OBM gill net unit (1986-'87)*

Name of species/groups	I Quarter		II Quarter		III Quarter		Annual	
	Kochra-Nivti	Dhamlej	Kochra-Nivti	Dhamlej	Kochra-Nivti	Dhamlej	Kochra-Nivti	Dhamlej
Pomfret	6.1	22.3	9.3	9.1	2.8	16.0	5.8	16.8
Seer fish	27.3	14.3	11.8	10.1	4.1	12.3	16.5	12.5
Cat fish	17.8	13.3	26.9	10.0	7.5	12.8	16.8	12.2
Shark	8.7	15.8	19.2	12.1	9.9	13.7	11.5	14.2
Hilsa	1.6	7.5	8.5	9.0	9.5	6.7	5.6	7.7
Croakers	14.9	9.5	4.4	13.4	15.7	8.8	12.5	10.4
Silverbar	14.0	3.8	3.1	11.1	12.4	9.1	10.8	7.4
Perches	2.1	1.5	2.1	5.5	7.6	5.1	3.7	3.6
Ribbon fish	2.0	4.6	5.4	6.1	14.0	3.5	6.4	4.7
Misc. (threadfin, carangids, prawn, lobster etc.)	5.5	7.4	9.3	13.6	16.5	12.0	9.6 0.8*	10.5
Total catch (kg)	6,736 (100)	7,399 (100)	3,519 (100)	4,747 (100)	4,408 (100)	4,808 (100)	14,773 (100)	16,947 (100)

* Prawn catch in monsoon quarter.
I Quarter = Post-monsoon. II Quarter = Winter. III Quarter = Pre-monsoon.

Table 2. *Contribution of different varieties of fish towards revenue of OBM gill net unit* (1986–'87)

Name of species/group	Kochra-Nivti				Dhamlej			
	I Qr.	II Qr.	III Qr.	Annual	I Qr.	II Qr.	III Qr.	Annual
Pomfret	10,713 (19.9)	10,819 (34.0)	3,991 (15.6)	25,523 (21.8)	30,300 (38.8)	9,004 (26 6)	14,489 (38.7)	53,793 (36.0)
Seer fish	19,867 (37.0)	6,924 (21.7)	2,215 (8.0)	29,006 (24.8)	10,696 (13.7)	3,900 (11.6)	5,970 (15.9)	20,566 (13.8)
Cat fish	4,270 (7.9)	3,534 (11.1)	1,324 (4.9)	9,128 (7.8)	2,936 (3.7)	1,820 (5.4)	2,145 (5.7)	6,901 (4.6)
Shark	2,598 (4.8)	3,380 (10.6)	1,244 (4.5)	7,222 (5.2)	2,507 (3.2)	1,640 (4.9)	2,207 (5.9)	6,354 (4.3)
Hilsa	706 (1.3)	1,848 (5.8)	2,014 (7.3)	4,568 (3.9)	2,775 (3.6)	1,962 (5.8)	1,703 (4.6)	6,440 (4.3)
Croakers	8,367 (15.6)	1,495 (4.7)	5,688 (20.8)	15,550 (13 3)	5,237 (6.7)	4,700 (13.9)	3,807 (10.2)	13,744 (9.2)
Silverbar	4,444 (8.3)	510 (1.6)	2,230 (8.1)	7,184 (6.2)	1,405 (1.8)	2,655 (7.9)	1,614 (4.3)	5,674 (3.8)
Perches	865 (1.6)	660 (2.1)	2,680 (9.7)	4,205 (3.6)	1,110 (1.4)	1,600 (4.7)	2,005 (5.4)	4,715 (3.2)
Ribbon fish	591 (1.2)	771 (2.5)	1,691 (6.1)	3,053 (2.6)	1,023 (1.3)	870 (2.6)	504 (1.3)	2,397 (1.6)
Misc. (threadfin, carangid, lobster prawn etc.)	1,280 (2.4)	1,898 (5.9)	4,136 (15.0)	7,314 +4,179* (9.8)	20,024 (25.8)	5,628 (16.6)	3,020 (8.0)	28,672 (19.2)
Total revenue (Rs.)	53,701 (100)	31,839 (100)	27,213 (100)	1,16,932 (100)	78,013 (100)	33,779 (100)	37,464 (100)	1,49,256 (100)

Note: Figures in paranthesis show percentages of revenue.
* Revenue obtained from sale proceeds of prawn caught during monsoon.

more than 10% of revenue included pomfret, seer fish and croakers in post-monsoon, pomfret, seer fish, cat fish and shark in winter and pomfret and croakers in pre-monsoon. In monsoon fishing was carried out only for prawn catch. The constituents of catch having major share in annual revenue at Kochra-Nivti were pomfret (21.8%), seer fish (24.8%) and croakers (13.3%).

The revenue in post-monsoon quarter at Dhamlej was mainly earned by the sale proceeds of pomfret (38.8%), seer fish (13.7%), croakers (6.7%) and miscellaneous catch (threadfin, carangids and lobster 25.8%). In winter, majority of the revenue was obtained from pomfret (26.6%), seer fish (11.6%), croakers (13.9%), silverbar (7.9%) and miscellaneous catch (16.6%). The maximum catch value in pre-monsoon quarter was observed for pomfret (38.7%) followed by seer fish (15.9%) and croakers (10.2%) and minimum for ribbon fish (1.3%). More than half of the annual revenue accrued from the catch of post-monsoon quarter. The percentage contribution of winter and pre-monsoon quarter towards the total revenue for 1986-'87 accounted for 22.6 and 25.1% respectively. The maximum contribution towards annual revenue (Rs. 1,49,256/-) was made by pomfret (36.0%) followed by seer fish (13.8%) and croakers (9.2%). The sale proceeds of threadfin, carangids and lobsters contributed considerably (19.2%).

b) *Fixed cost:* The components of fixed cost included depreciation on boat, engine, net and other fishing equipments, licence fee and insurance of craft and gears (Table 3). The average estimated cost of a boat at Kochra-Nivti was calculated at Rs. 28,000. The investment on engine, gill nets and other equipments was assessed at Rs. 17,000, 24,000 and 8,000 respectively. The total investment on a gill net unit worked out at Rs. 77,000. Taking 10% depreciation on boat, 20% on engine, 33.3% on nets and 50% on other fishing implements the annual depreciation amounted to Rs. 18,200. An average amount of Rs. 50 per year was taken for the insurance and fees. All the boats are not insured. The boats for which institutional loan had been availed were insured. The opportunity cost of the investment was assessed at Rs. 9,240, taking 12% interest.

At Dhamlej, the dugout canoes are comparatively bigger in size with additional support of wooden planks. The average cost of a boat was calculated at Rs. 36,000, the depreciation being Rs. 3,600 per annum. The annual depreciation for an outboard engine comes to Rs. 3,400. The fishermen were found to own several small pieces of gill nets. The average investment of Rs. 27,000 on nets resulted in an annual depreciation of Rs. 9,000 per unit. The depreciation on other fishing implements amounted to Rs. 5,500 per annum. The annual fixed cost for an OBM unit including insurance and other annual fees was pooled up to Rs. 21,560. The opportunity cost of the investment was assessed at Rs. 10,920.

Table 3. *Initial investment and components of fixed cost of an OBM gill net unit*

		Kochra-Nivti	*Dhamlej*
I.	*Initial investment* (Rs.)		
	a) Boat	28,000	36,000
	b) Out-board engine	17,000	17,000
	c) Gill nets	24,000	27,000
	d) Other implements	8,000	11,000
	Total (a to d)	77,000	91,000
II.	*Annual depreciation* (Rs.)		
	a) Boat (10)	2,800	3,600
	b) Out-board engine (20%)	3,400	3,400
	c) Gill net (33.3 %)	8,000	9,000
	d) Other implements (50%)	4,000	5,500
	Total (a to d)	18,200	21,500
III.	Insurance and other fees (Rs.)	50	60
IV.	Total fixed cost (II & III) (Rs.)	18,250	21,560
V.	Opportunity cost of capital (12%)	9,240	Rs. 10,920

c) *Operating cost:* The operating expenditure was divided into five heads. The costs of kerosene, petrol, lubricant and mobile oil were included in fuel cost. Under labour charges, the wages of active fishermen (in cash and/or kind) and charges of loading/unloading of catch were included. Cost of preservation (ice, salt), marketing (commission, marketing charges *etc.)* and transportation (from landing centre to auction place or market) were put under one category. Repairing charges comprised the amount spent on the repair and maintenance of boat, engine, net and other fishing implements. Other expenditure such as purchase of baskets, buckets, ropes, lantern, poles and floats were put under miscellaneous expenditure.

Quarter-wise analysis of the operating expenditure (Table 4) revealed that 38.6 % of annual operating expenditure (Rs. 88,643) incurred in post-monsoon quarter, 28.8 % in winter, 26.8% in pre-monsoon quarter and 5.8% in monsoon at Kochra-Nivti. The variable cost per operating day was maximum in post-monsoon quarter (Rs. 535) and minimum in monsoon quarter

Table 4. *Operating expenditure (Rs) of an OBM unit (1986-'87)*

Operating expenditure (Rs.)	Kochra-Nivti					Dhamlej			
	I qr.	II qr.	III qr.	IV qr.	Annual	I qr.	II qr.	III qr.	Annual
a) Fuel	3,625	4,593	4,700	630	13,548	5,480	6,283	6,607	18,370
	(10.6)	(18.0)	(19.8)	(12.2)	(15.3)	(10.7)	(20.8)	(20.3)	(16.1)
b) Labour	23,670	16,270	13,680	2,010	55,630	34,725	14,900	15.160	64,785
	(69.1)	(63.8)	(57.7)	(39.1)	(62.8)	(67.9)	(49.4)	(46.5)	(56.9)
c) Preservation, transportation	3,565	2,425	2,505	210	8,705	5,590	5,725	6,090	17,405
and marketing	(10.4)	(9.5)	(10.5)	(4.1)	(9.8)	(10.9)	(19.0)	(18.7)	(15.3)
d) Repairs	2,035	1,190	1,700	2,000	6,925	3,610	2,010	3,345	8,965
	(5.9)	(4.6)	(7.2)	(38.8)	(7.8)	(7.1)	(6.7)	(10.3)	(7.9)
e) Misc. items	1,360	1,035	1,140	300	3,835	1,707	1,220	1,385	4,312
(baskets, ropes *etc.*)	(4.0)	(4.1)	(4.8)	(5.8)	(4.3)	(3.4)	(4.1)	(4.2)	(3.8)
Total (a to e)	34,255	25,513	23,725	5,150	88,643	51,122	30,138	32,587	1,13,837
	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)	(100)
No. of fishing days	64	73	70	21	228	67	72	73	212
Expenditure per fishing day (Rs.)	535	349	339	245	389	763	419	446	537

Figures in paranthesis show the percentages

(Rs. 245). The fuel consumption was more in pre-monsoon quarter (Rs. 4,700) as compared to post-monsoon (Rs. 3,625) and winter (Rs. 4,593). In pre-monsoon quarter the fishermen operate gill nets in deeper waters which results in higher consumption of fuel. Labour engagement was found positively correlating with the fishing intensity and catch availability. Similarly, preservation, marketing and transportation charges were maximum in post-monsoon (Rs. 3,565) and minimum in winter (Rs. 2,425). Fishing was conducted for 228 days during 1986-'87 and the average operating expenditure per day was calculated at Rs. 389. Of annual expenditure, 15.3% incurred on fuel, 62.8% on labour, 9.8% combinedly on preservation, marketing and transportation, 7.8% on repairs and 9.3% on miscellaneous items. Since, most of the costly varieties of fish were purchased by a local trader, the annual expenditure on preservation, marketing and transportation was Rs. 8,705 only.

At Dhamlej centre, maximum operating expenditure of Rs. 51,112 was noted in post-monsoon quarter, and minimum of Rs. 30,138 in winter. The annual operating expenditure worked out at Rs. 1,13,837, the average expenditure being Rs. 537 per fishing day. The fuel cost varied from Rs. 5,480 in post-monsoon quarter to Rs. 6,607 in pre-monsoon quarter. The labour charges in post-monsoon quarter (Rs. 34,775) were more than double the charges of winter and pre-monsoon quarter. An amount of Rs. 5,000 - 6,000 incurred on preservation, marketing and transportation. The repairing charges ranged from Rs. 2,010 in winter to Rs. 3,610 in post-monsoon quarter. Of annual recurring expenditure, 16.1% incurred on fuel, 56.9% on labour, 15.3% jointly on preservation, marketing and transportation, 7.9% on repairs and maintenance and 3.8% on miscellaneous items.

d) *Income of gill net unit:* The annual gross income of an OBM gill net unit at Kochra-Nivti worked out at Rs. 1,16,932 (Table 5). A boat owner earned Rs. 28,289 during the referred year after deducting operational charges (Rs. 88,643) from the gross income. Thus, the net operational income was 24.2 % of the gross income. The residual income of a unit, which was derived on deducting variable and fixed cost from the total revenue, amounted to Rs. 10,039, averaging Rs. 44 per fishing day. On comparing the residual income with the opportunity cost of the capital (Rs. 9,240) an annual profit of Rs. 799 was found for the owner of the unit.

For a fishing season of 212 days the gross income of an OBM gill net unit was Rs. 1,49,256 at Dhamlej. The income over operating expenditure was calculated at Rs. 35,419 which accounted for 23.7% of the gross income. On substracting the total cost (fixed + variable cost) from the gross revenue the residual income amounted to Rs. 13,859 (9.3% of gross income). The owners'

net profit as calculated on deducting opportunity cost of the capital from the residual income, worked out at Rs. 2,939, accounting for about two per cent of the gross income.

The labour charges, shown in the Table 4, include the share of owner of the boat since he also joins the crew for fishing. The share of the owner for his labour worked out at Rs. 13,908 at Kochra-Nivti and Rs. 12,957 at Dhamlej. The returns to labour and management of the owner was calculated at Rs. 14,707 at Kochra-Nivti and Rs. 15,896 at Dhamlej.

To have an assessment of recovery time of the capital investment, the payback period was calculated on dividing the initial investment by the sum of depreciation and net profit. The payback period of an OBM unit comes to about four years at both the centres. Returns to investment is another indicator for judging the economic efficiency of the capital investment. It was calculated on dividing the sum of net profit and opportunity cost of capital by the investment amount. The return to investment worked out at about 13.0% for Kochra-Nivti and 15.2% for Dhamlej.

Findings

Majority of the boats are fitted with 8 HP Yamaha outboard engine and operate surface and bottom set gill nets at both the centres. The boats vary from 5.5 to 8.5 m in length at Kochra-Nivti and 6.6 to 10 m at Dhamlej. The capital investment of an OBM unit ranged from Rs. 77,000 to 91,000. The catch mainly comprised pomfret, seer fish, cat fish, shark, *Hilsa*, croakers, silverbar and ribbon fish. Availability of lobster in post-monsoon quarter at Dhamlej and prawns in monsoon at Kochra-Nivti are the important features of catch at these centres. Most of the catch is sold fresh to private fish traders who advance money to the boat owners and compel to sell the catch at lower than the prevailing rates to them as an obligation of financing. About 30 boats were found to sell their catch to GFCCA through primary fishermen co-operative society at Dhamlej. The activities of the society at Kochra-Nivti are very limited.

More than one-third of the quantity of catch was obtained in post-monsoon quarter at both the centres. There was no fishing in monsoon at Dhamlej. Lean fishing season was observed in winter at Kochra-Nivti whereas winter and pre-monsoon were at par in term of catch availability at Dhamlej. Quarterly distribution of fishing days, except in monsoon, was almost similar at the selected centres and the number of annual fishing days varied from 212 to 228. The annual catch of a gill net unit ranged from 14,773 to 16,947 kg. The major contribution towards annual revenue was made by post-monsoon quarter (46–52%). Winter contributed 22–27% and pre-monsoon 23–25% towards the total revenue.

Table 5. *Parameters of economic efficiency of OBM gill net unit*

Items	Kochra-Nivti	Dhamlej
a) Gross annual income (Rs)	1,16,932	1,49,256
b) Gross income per fishing day (Rs.)	513	704
c) Annual fixed cost (Rs.)	18,250	21,560
d) Annual operating expenditure (Rs.)	88,643	1,13,837
e) Per day operating expenditure (Rs.)	389	537
f) Operating cost as % of gross income	75.8	76.3
g) Annual net operating income (Rs.)	28,289	35,419
h) Income per fishing day (Rs.)	124	167
i) Net operating income as % of gross income	24.2	23.7
j) Residual annual income (Rs.)	10,039	13,859
k) Residual income per fishing day (Rs.)	44	65
l) Residual income as % of gross income	8.6	9.3
m) Annual net profit (Rs.)	799	2,939
n) Profit per operating day (Rs.)	4	14
o) Annual income of a labourer (Rs.)	13,908	12,957
p) Per day income of a labourer (Rs.)	61.0	61.1
q) Annual returns to labour and management of owner (Rs.)	14,707	15,896
r) Per day returns to labour and management of owner (Rs.)	65	75
s) Owners returns as % of gross income	12.6	10.6
t) Pay back period (yrs.)	4.0	3.7
u) Returns to investment (%)	13.0	15.2

The gross income of an OBM gill net unit ranged from Rs. 1.17 lakhs to 1.49 lakhs in the selected villages. The annual operating expenditure of a unit averaged 1,13,837 at Dhamlej and Rs. 88,643 at Kochra-Nivti. The per day operating expenditure was maximum in post-monsoon quarter (Rs. 535) and minimum in monsoon (Rs. 245) at Kochra-Nivti. At Dhamlej, the per day operational expenditure ranged from Rs. 418 to 764 in different quarters. Of variable cost, 57–63% accounted for labour, 15–16% for fuel, 10–15% for marketing, preservation and transportation, 8% for repairs and 4-9% for miscellaneous items.

The net annual operational income of a unit was 24.2% of the gross income at Kochra-Nivti and 23.7% at Dhamlej, the net profit at these centres being Rs. 799 and 2,939 respectively. Each crew member earned an annual income of Rs. 13-14 thousand in gill net unit. The returns to labour and management of the boat owner amounted to Rs. 15–16 thousand. The payback period of an OBM gill net unit at selected centres was assessed at about four years. The returns to investment worked out at 13–15%. Based on various economic parameters the gill net fishing by dugout canoe fitted with outboard engine was found to be profitable in northwest coast during 1986–'87.