Fish Productivity and Associated Factors among Fishermen Operating FRP Crafts

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The socio-economic variables of artisanal fishermen in Veraval (Gujarat) and Quilon (Kerala) are presented. Variables such as size of craft operated, fishing experience, annual maintenance cost of craft, net and engine, sale value of fish catch obtained per fishing day and annual income did not vary significantly between the fishermen in Veraval and Quilon fishing centres. The results revealed that on an average, the fishermen at Quilon had obtained a fish productivity level of 155 kg per fishing day with a value of Rs.1,794/-. For the fishermen at Veraval centre, the fish productivity level was 91.5 kg per fishing day with a sale value of Rs.1,690/-. The multiple regression analyses revealed that the 13 variables taken together had significantly accounted for about 96 per cent of the variation in the fish productivity levels at both centers. The constraints reported by these fishermen operating smaller FRP crafts (8-9 m LOA) were recorded.

Key words : Fish catch, FRP crafts, artisanal fishermen, socio–personal variables, constraints, sale value, fishing day

The steady growth or stagnation in the marine fish production sector could be assessed through the periodical evaluation studies on the productivity levels of various types of fishing crafts operated. By identifying the critical areas where the productivity levels are potentially lower, it is possible to develop suitable extension schemes so as to provide the required infrastructure facilities and organizational support services (Sagar & Ray, 1984; Mishra & Jha, 1985; Naik & Jayaramaiah, 1997). A study of the fish catch obtained by fishermen in a specified period through the operation of a set of fishing craft and gear, will be able to assess the fish productivity levels. Keeping this in view, the present study was undertaken with the following specific objectives:

1) To find out the socio-economic characteristics of fishermen operating smaller FRP crafts.

2) To determine the fish productivity levels of fishermen operating FRP crafts in a specified period.

3) To determine the association and influence of the selected independent variables on the fish productivity levels of fishermen operating FRP crafts.

4) To find out the constraints in improving the fish productivity levels of fishermen operating FRP crafts.

Materials and Methods

The study was conducted in Quilon fishing centre of Kerala State and Veraval fishing centre of Gujarat State. A random sample of 31 fishermen operating FRP crafts were selected in Quilon centre and at Veraval, the sample consisted of 40 FRP fishermen.

Through structured interview schedules, the data on independent variables such as age, number of fishing days operated per year, experience in fishing, size of FRP craft operated, investment on craft, investment on nets, investment on engine, annual maintenance cost of craft and net, annual maintenance cost of engine, annual income and

average quantity of fuel consumption were collected. Information source utilization was measured through an index developed for the study.

The fish productivity was operationally defined as the extent of fish catch obtained by a fisherman per day of fishing and it was calculated for each respondent. The average sale value of fish catch per fishing day was also estimated for each respondent by dividing the total value with the total number of fishing days. In Quilon centre, the fish catch data were collected for a period of four months and in Veraval centre, the data were collected for a period of five months and this covered samples of 33-42 % of total number of fishing days in a year. Overall average fish catch per day of fishing was calculated for each respondent in the two fishing centers and used in the regression analysis as dependent variable (Y). Statistical analyses for determining correlation and regression coefficients were done using computer and the results are presented.

Results and Discussion

The socio-economic variables of artisanal fishermen operating FRP crafts in the two fishing centres viz., Quilon and Veraval are given in Table 1.

The fishermen selected at Quilon and Veraval were middle aged, had about 19 years of experience and operated 8-9m LOA FRP crafts for fishing. At Quilon, the fishermen had an average of 258 days of fishing in a year while at Veraval, it was about 191 days in a year. The crew size was 5 to 6 with an investment of about Rs.1.7 to 2 lakhs on a fishing unit. They spent about Rs.500 daily on fuel alone. Annual income was about Rs.43,000 to Rs.46,000. The information source utilization index was lower in both centres and they had not utilized many sources of information.

The 't' tests revealed that of the 12 variables, the means of seven socio-personal variables were significantly different at 1% level between the fishermen at two centers.

Table 1. Socio-economic variables of fishermen operating FRP Crafts

Socio-economic variables	Quilon (n=31)		Veraval (n=40)		t'
	Mean	SD	Mean	SD	
Age (Yrs)	44.903	10.179	39.709	9.585	2.966**
Number of fishing days per year	257.935	41.306	191.290	28.342	3.667**
Experience (Yrs)	19.096	9.778	18.387	8.643	0.395
Size of FRP Craft operated (m)	8.467	0.380	9.262	1.077	1.066
Investment on craft (Rs. in 1000s)	52.412	18.515	58.903	17.247	2.896**
Investment on nets "	94.129	43.901	69.322	24.511	5.321**
Investment on engine "	51.879	6.631	41.038	16.007	14.426**
Annual maintenance cost of craft & net (Rs. in 1000s)	20.689	9.905	9.258	4.726	1.791
Annual maintenance cost of engine "	6.064	6.834	4.516	2.528	1.511
Annual Income "	42.943	21.362	46.129	16.718	0.932
Average quantity of fuel consumption (L/day)	36.935	13.238	46.290	13.15	5.014**
Information source utilization (Index)	39.677	21.052	20.32	4.81	6.143**

** Significant at 1% Level.

Table 2. Fish productivity levels of fishermen operating FRP crafts in two fishing centers

Months	Quilon (n=31)						Months	Veraval (n=40)					
	No. of fishing days		Fish catch/day (kg)		Value of catch/day (Rs.)			No. of fishing days		Fish catch/day (kg)		Value of catch/day (Rs.)	
	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD		$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD
Aug.1999	16.64	8.11	160.70	100.18	2115.74	1428.69	Sep.1998	7.27	4.47	65.87	56.53	1705.12	1388.75
Sep.1999	17.41	7.79	144.62	110.30	1662.90	1202.91	Nov.1998	20.60	1.66	119.92	97.35	1911.82	1336.77
Oct.1999	17.64	7.15	161.58	111.79	1785.67	1237.99	Jan. 1999	20.22	1.71	73.07	29.02	1324.80	695.85
Nov.1999	18.77	6.22	154.51	93.31	1612.93	979.39	Mar.1999	19.65	2.24	118.45	66.41	2205.60	1573.72
							May.1999	12.02	2.14	80.23	72.53	1302.17	1703.44
Monthwise Overall average	17.61	7.31	155.35	103.89	1794.31	1212.24	Monthwise Overall average	15.95	2.44	91.50	64.36	1689.90	1339.71

However, crucial variables such as size of craft operated, experience, annual income, annual maintenance cost of craft, net and engine, and sale value of catch obtained per fishing day were not significantly different and thus, they represented the general artisanal fishermen category.

The fish productivity levels of fishermen operating FRP crafts are given in Table 2. The results revealed that at Quilon, the average number of fishing days per month was 17-18 days and the average productivity per fishing day was 155.35 kg with a value of Rs.1794. Out of the four months, the average fish catch was more during the month of October and these four months (August-November) represented the main fishing season. As the prawn catch fetched a higher price than other fishes, the extent

Table 3. Qualitative variables associated with fish productivity levels of FRP fishermen

Qualitative variables	Quilon (n=31) Fish catch ($\overline{X}$=155kg)			Qualitative variables	Veraval(n=40) Fish catch ($\overline{X}$=107kg)		
	Low (n=21)	High (n=10)	X^2		Low (n=25)	High(n=15)	X^2
Education				*Education*			
a) Primary education	14	4	1.986	a) Illiterates	13	14	7.30**
b) Secondary education	7	6		b) Primary education & above	12	1	
Area of the net used				Net materials used			
a) Below 6412 sq.m area nets	13	5	1.986	a) Nylon nets (multi-filament)	1	11	21.99**
b) Nets above 6412 sq.m	8	5		b) Nylon (multi)+PE (mono)	19	4	
				c) Other net materials	5	-	
Depth of fishing				No. of net units operated			
a) Below 39m depth	13	6	0.011	c) Below 80 net units	16	8	0.43
b) Above 39m depth	8	4		d) Above 80 net units	9	7	
4. No of days of use of nets				Depth of fishing			
a) Below 187 days	9	5	0.137	a) Upto 50m depth	21	6	8.27**
b) Above 187 days	12	5		b) 51-100m depth	4	9	
				No.of days of use of nets			
				a) Below 180 days	16	9	0.06
				b) Above 180 days	9	6	

** Significant at 1% level.

of its share among the total fish caught determined the price variations on any fishing day.

At Veraval, the average fish productivity level was more during the month of November (119.92 kg) and on an average, the extent of fish catch was 91.5 kg per fishing day with a price value of Rs.1,690. As the fish catch at the two centers were for different periods, they could not be compared.

The qualitative variables of fishermen and their extent of association with fish productivity levels are given in Table 3. It was found that at Quilon centre, the qualitative variables such as education, area of the fishing nets used, depth of fishing and number of days of use of nets did not have any association with the extent of fish productivity levels of fishermen operating FRP crafts. But in Veraval Centre, education, net materials use, and depth of fishing were found to have positive association with the

fish productivity levels of fishermen. Hence, these three variables should be monitored in order to increase the fish productivity levels of fishermen who were getting lower fish catches in Veraval Centre.

The correlation and multiple regression coefficients calculated between the fish productivity levels of fishermen in Veraval Centre and the independent variables are given in Table 4.

The results revealed that out of the 13 variables, the variables such as the age, size of FRP craft operated, investment on nets, annual income and average sale value of catch were found to have positive and significant correlation with the fish productivity levels. Annual maintenance cost of craft and net was found to have negative and significant correlation with the fish productivity level. In the regression analysis, the regression coefficients of two variables such as the size of FRP craft operated and the average sale value of fish catch had shown

Table 4. Correlation and multiple regression coefficients calculated between the fish productivity levels of FRP craft fishermen and the independent variables in Veraval Centre (n=40)

Socio-economic variables	'r' Values	'b' values	SE of 'b'	't'
Age (Yrs)	0.315*	-0.475	0.715	-0.664
Number of fishing days per year	-0.307	-0.099	0.101	0.973
Experience (Yrs)	0.236	0.148	0.780	0.190
Size of FRP Craft operated (m)	0.544**	12.295	4.841	2.539**
Investment on craft (Rs.in 1000's)	0.235	-0.614	0.215	-2.850**
Investment on nets (Rs.in 1000's)	0.441**	0.214	0.134	1.593
Investment on engine (Rs.in 1000's)	0.269	0.321	0.201	-1.601
Annual maintenance cost of craft & net (Rs.in 1000's)	-0.426**	-0.625	0.273	-2.289*
Annual maintenance cost of engine (Rs.in 1000's)	-0.278	-1.669	1.019	-1.637
Annual Income (Rs.in 1000's)	0.372*	-0.080	0.214	-0.376
Average quantity of fuel consumption (Litres/day)	0.045	-0.071	0.211	-0.338
Information source utilization (Index)	0.305	0.131	0.442	0.295
Average sale value of catch per fishing day (Rs.)	0.956**	0.044	0.002	15.396**

* Significant at 5% level

** Significant at 1% level; $R^2 = 0.962$ F = 51.884**

Table 5. Correlation and multiple regression coefficients calculated between the fish productivity levels of FRP craft fishermen and the independent variables in Quilon   (n=31)

Socio-economic variables	'r' Values	'b' values	SE of 'b'	't'
Age (Yrs)	-0.043	-1.910	2.423	-0.788
Number of fishing days per year	-0.107	0.391	0.201	1.938
Experience (Yrs)	-0.045	0.777	2.723	0.285
Size of FRP Craft operated (m)	-0.447*	-20.779	19.431	-1.069
Investment on craft (Rs.in 1000's)	-0.182	-0.237	0.361	-0.657
Investment on nets (Rs.in 1000's)	-0.036	0.005	0.179	0.031
Investment on engine (Rs.in 1000's)	-0.114	-0.187	1.047	-0.178
Annual maintenance cost of craft & net (Rs.in 1000's)	0.032	0.183	0.799	0.229
Annual maintenance cost of engine (Rs.in 1000's)	-0.014	1.070	0.890	1.201
Annual Income (Rs.in 1000's)	0.147	-0.009	0.348	-0.026
Average quantity of fuel consumption (L/day)	-0.106	-0.480	0.442	-1.085
Information source utilization (Index)	-0.052	0.034	0.337	0.103
Average sale value of catch per fishing day (Rs.)	0.959**	0.80	0.005	14.960**

* Significant at 5% level
** Significant at 1% level; $R^2 = 0.953$;   F = 27.103**

significant and positive influence over the fish productivity levels while the regression coefficients of investment on craft, and annual maintenance cost of craft and net had shown significant and negative influence over the fish productivity levels.

In the R^2 analysis, the F value (51.88**) was found to be highly significant and 96.2 percent of the variation in the fish productivity levels were explained by these 13 variables taken together in the multiple regression analysis. The results implied that the techno-economic variables such as larger FRP crafts with lesser investment cost and lesser maintenance cost on craft and net might have facilitated increased productivity levels among fishermen.

The correlation and regression analysis results for the Quilon centre are given in Table 5. The results revealed that though individual correlation coefficients and regression coefficients of many independent variables were not significant, the regression analysis had shown that the independent variables had jointly accounted for 95.39 percent of the variation in the fish productivity levels. The F value (27.10**) was also found to be highly significant. It was observed that the sale value of fish catch had significant positive relationship with the productivity levels and indicated that whenever the fish catch was more, the sale value was also more and thus, the market price for fish did not decline drastically during most of the times.

As constraints, the following problems were reported by the fishermen: (i) Exploitation of inshore areas by foreign trawlers and general non-availability of fish in the traditional fishing grounds (ii) Insufficient availability of kerosene at market price, and lesser profit due to high fuel cost and price fluctuations (iii) Loss of fishing nets (iv) High repairing cost and financial constraints (v) Labour problems and (vi) Lack of technical guidance.

Thus, the study revealed that on an average, the fishermen at Quilon had obtained a fish productivity level of 155kg. of fish per fishing day by operating the smaller FRP crafts (8-9m LOA) which fetched an average sale value of Rs.1794 per fishing day. For the fishermen at Veraval Centre, the fish productivity level was 91.5kg. of fish per fishing day with a sale value of Rs.1690. The multiple regression analysis revealed that the 13 variables taken together had significantly accounted for about 96 per cent of the variation in the fish productivity levels at both centers. The results implied that extension services would have to be strengthened in both centers so as to bring about overall improvements in the socio-personal variables of fishermen.

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