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Fish Catch Variations and Associated Variables among Fishermen Operating Plank-Built Crafts

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The fish catch variations in terms of the quantity of catch per day and the socio-personal variables of fishermen operating plank-built crafts (15-17 m) were analysed in three fishing centres. Of the 15 socio-personal variables, there were no significant differences between the artisanal fishermen respondents. The overall average fish catch for three centres varied between 526.81 to 533.46 kg per day of fishing among the fishermen and statistically, the fish catch differences were not significant between the fishing centres over a period of five months. In the correlation analysis, five variables viz., investment on craft, investment on net, investment on engine, size of fishing net used and total engine hp used were found to have significant positive correlation with the fish catch variation levels. In the regression analysis, R^2 value was high (74.11%) and non-significant. Further, the independent variables including the fish catch variation levels did not have significant positive association with the innovation proneness index scores.

Key words : Fish catch variations, plank-built crafts, socio-personal variables, innovation proneness, artisanal fishermen

In Kerala, there are about 147875 active marine fishermen operating 30459 traditional fishing crafts including 4950 plank-built crafts (Anon, 1992). Periodical evaluation and identification of the technological and socio-economic variables are important for the improvement in the fish catch variation levels of artisanal fishermen, who contribute about 60 per cent of total marine fish landings, and it would directly increase the export earnings, fish consumption, employment opportunities and standard of living of people associated with the fishing sector. With this view, the present study was undertaken with the following objectives: (i) To determine the fish catch variations among fishermen operating plank-built crafts (ii) To find out the variables influencing the fish catch variations (iii) To determine the association between innovation-proneness, catch variation levels and other key variables, and (iv) To find out the constraints in improving fish catches.

Materials and Methods

The study was conducted in three major fishing centres in Alappuzha district, Kerala, viz., Thaikkal, Chethi and Punnapra. A random sample of 32 fishermen respondents (10 from Punnapra, 11 from Thaikkal and 11 from Chethi) who were owners/heads of shareholders of plank-built crafts were selected through preliminary pilot studies.

Through structured interview schedules, the data on independent variables such as age, number of years of education, number of days of fishing in a year, experience, size of fishing craft operated, number of days of operation of craft, investment on fishing craft, fishing nets and engines, maintenance cost of craft, size of fishing net used, average depth of fishing ground, number of fishing nets used, average operating hours of engine per day, total engine hp used, annual income and number of communication channels used were collected.

Innovation proneness referred to the extent of positive or negative orientation of individual fishermen towards the adoption of selected technological innovations and it was measured through an index developed for the study. Extent of adoption of technological innovations for respondents were also determined through an adoption index developed for the purpose.

The fish catch variations were measured in terms of the quantity of fish catch (kg) obtained per day of fishing. To determine the average fish catch (kg) obtained per day of fishing, fish catch data were collected from 32 respondents for a period of five months during July 1995 to June 1996 covering representative samples of 28-34 per cent of total number of fishing days in the year. Month-wise averages of fish catch per day were calculated for each month. Overall average catch per day of fishing was also calculated for each respondent in three fishing centres and used in the analysis as dependent variable (Y). Similarly, sale values of fish catch obtained were collected from 32 respondents during the same period and month-wise averages of sale values of fish catch were calculated. Statistical analyses for determining correlation and regression coefficients were done through the computer and the results are presented.

Results and Discussion

Table 1 presents the socio-personal and economic variables of fishermen operating plank-built crafts in three fishing centres. The F values revealed that of the 19 variables, the mean scores of only four variables viz., average operating hours of engine, number

Table 1. Socio-personal and economic variables of fishermen operating plank-built crafts in three fishing centres

Variables	Punnapra		Chethi		Thaikkal		
	$\bar{X}$	SD	$\bar{X}$	SD	$\bar{X}$	SD	F
Age (years)	43.90	8.97	38.81	13.09	38.45	8.31	0.88
No. of years of education	5.00	0.81	7.18	4.16	6.90	2.46	1.75
No. of days employed in fishing per year	242.10	38.61	250.90	36.25	254.09	33.07	0.31
Experience (years)	24.80	8.39	20.45	14.75	20.63	8.82	0.50
Size of fishing craft operated (metres)	15.87	3.22	14.64	2.26	16.72	2.30	1.76
No. of days of operation of craft	222.10	36.90	180.45	57.63	228.63	53.94	2.89
Investment on craft (Rs. in '000s)	128.50	84.88	81.54	41.43	108.50	43.54	1.68
Investment on nets (Rs. in '000s)	273.10	97.36	348.86	237.25	325.06	177.05	0.46
Investment on engines (Rs. in '000s)	181.04	87.72	189.72	105.84	166.97	28.67	0.22
Maintenance cost of craft (Rs. in '000s)	12.55	8.33	15.96	10.55	14.43	6.15	0.41
Length of fishing net used (metres)	422.20	152.36	366.54	148.76	403.09	104.86	0.45
Average depth of fishing (metres)	49.20	23.10	53.90	23.91	37.36	8.74	2.04
No. of fishing nets used	1.10	0.31	1.45	0.52	1.36	0.50	1.63
Average operating hours of engine per day	9.00	1.82	11.18	2.70	8.72	1.55	4.48*
Total engine hp used	46.89	20.79	44.09	14.96	50.90	4.90	0.58
Annual income (Rs. '000s)	36.74	29.58	37.67	13.09	61.08	42.66	2.14
No. of communication channels used	4.20	0.91	5.72	1.55	3.81	1.77	5.09*
Innovation proneness index	48.00	13.98	61.81	14.01	69.09	13.75	6.16**
Adoption index	66.00	16.46	80.00	15.49	85.45	12.93	4.64*

* Significant at 5% level ** Significant at 1% level

Table 2. Fish catch variations among fishermen in three fishing centres

Months (1995-96)	Punnapra			Chethi			Thaikkal			F
	No. of fishing days	Fish catch/day		No. of fishing days	Fish catch/day		No. of fishing days	Fish catch/day		
	$\bar{X}$	$\bar{X}$	SD	$\bar{X}$	$\bar{X}$	SD	$\bar{X}$	$\bar{X}$	SD	
July	22	706.75	282.95	14	437.70	84.04	21	509.55	467.11	1.96
October	13	1368.54	391.99	22	1153.51	572.87	12	1050.57	187.51	1.57
February	11	215.64	69.11	7	318.98	130.56	8	268.54	85.94	2.82
May	10	223.13	40.76	9	437.23	126.77	13	601.13	78.39	45.87**
June	12	253.24	32.48	9	286.59	72.02	9	227.84	52.97	3.09
Overall Average fish catch		553.46	111.12		526.81	103.03		531.53	93.55	0.19

** Significant at 1% level

of communication channels used, innovation proneness index and adoption index were found to vary significantly between the fishermen in three centres. On the remaining 15 variables, there were no significant differences between them.

The results revealed that the respondents in three centres were middle aged (38-44 years), well experienced (20-25 years) and employed in fishing for 242-250 days in a year. It is seen that they had operated 15-17 metres larger plank-built crafts (*disco vallam* (46.87%), *thangu vallam* (43.75%); both types of crafts (9.38%) and some respondents (15.62%) had also used smaller crafts (Mini *vallams)* for mini trawling. On an average, the investment on fishing crafts varied from Rs. 81540 to Rs. 128500 among the fishermen while the investment on fishing nets varied from Rs. 273100 to 348860. Due to the operation of two or three engines (total Hp 44-51), the investment on engines varied from Rs. 166970-189720.

Respondents had used fishing nets such as *disco vala* (43.75%), *thangu* vala (31.25%); both type of nets (25%), mini trawls (15.62%) and *ayila vala* (6.25%). The results also revealed that the average depth of fishing

Table 3. Month-wise averages of sale values of fish catch per day of fishing among respondents

Months (1995-96)	I Centre			II Centre			III Centre			F
	No. of fishing days	Value of fish catch/day		No. of fishing days	Value of fish catch/day		No. of fishing days	Value of fish catch/day		
	$\bar{X}$	$\bar{X}$	SD	$\bar{X}$	$\bar{X}$	SD	$\bar{X}$	$\bar{X}$	SD	
July	22	7396.90	2760.68	14	5888.01	1138.26	21	6678.39	5501.25	0.45
October	13	14159.39	4439.01	22	7831.70	4387.43	12	10669.46	2343.52	7.16**
February	11	4441.99	1512.28	7	6136.18	2441.97	8	5134.01	1918.09	1.89
May	10	5462.27	1155.07	9	11243.24	3583.97	13	15897.26	1984.11	46.04**
June	12	12555.90	2066.56	9	14094.09	4666.35	9	10507.76	2560.38	3.20

** Significant at 1% level

varied from 37-54 metres and the net average annual income was found to vary from Rs. 37000-61000. Further, the results revealed that the fishermen in three fishing centres had no significant differences on account of socio-economic variables while there were significant differences on extension variables such as innovation proneness, number of communication channels used and adoption of technological practices.

The month-wise fish catch variations among fishermen in three centres are given in Table 2. The 'F' values revealed that the fish catches did not vary significantly between the fishermen in three centres on most of the months except during May. The significant differences in the month of May could be attributed to the changes in sea conditions in some areas just before the on-set of south-west monsoon. Further, the data revealed that the fish catches were highest in all the three fishing centres (1368.5, 1153.5 and 1050.6 kg per day of fishing) during the month of October.

During June, the sea used to be rough due to the onset of monsoon on Kerala coast. Though the fish catches were poor, the sale values of the catches were high on account of prawns (Table 3).

In terms of sale values of fishes caught, October and June months had higher averages than other months. February was found to be the off-season in fishing as it had lower fish catch as well as lower sale value per day of fishing. F values in Table 3 revealed that the average sale value of fishes caught differed significantly for October and May between three centres and in other months, there were no significant differences. Though October was a peak season for fishing in all the centres, the fish sale value differed due to price variations in one fishing centre as there were no significant differences in terms of fish catch between the fishing centres. During May, there were differences in average sale value due to the availability of prawn catch in two fishing centres.

Table 4. Correlation and regression coefficients calculated between the fish catch variations levels of fishermen and the independent variables (n=32)

Variables	r values	b values	t
Age (years)	-0.024	12.464	2.130
No. of years of education	0.078	-4.462	-0.497
No. of days employed in fishing per year	-0.382*	-0.798	-1.119
Experience (years)	-0.079	-11.692	-2.160*
Size of fishing craft operated (metres)	0.289	6.371	0.486
No. of days of operation of craft	-0.094	-0.228	-0.490
Investment on craft (Rs. in '000s)	0.529**	0.490	0.946
Investment on nets (Rs. in '000s)	0.389*	0.095	0.359
Investment on engines (Rs. in '000s)	0.580**	0.999	1.889
Maintenance cost of craft (Rs. in '000s)	0.014	-2.032	-0.652
Length of fishing net used (metres)	0.427*	-0.149	-0.323
Average depth of fishing (metres)	0.282	-2.313	-1.329
No. of fishing nets used	0.228	31.374	0.318
Average operating hours of engine per day	0.021	1.886	0.114
Total engine hp used	0.439*	-1.361	-0.326
Annual income (Rs. '000s)	0.268	0.375	0.471
No. of communication channels used	0.297	6.380	0.498
Innovation proneness index	-0.180	0.140	0.111
Adoption index	0.230	1.196	0.452

* Significant at 5% level
Significant at 1% level; R^2 = 0.7411; F = 1.8078

In the correlation analysis presented in Table 4, five variables such as investments on craft, net and engines, size of fishing net used and total engine hp used were found to have significant positive correlation while

the variable 'number of days of fishing in a year' was found to have negative correlation with the fish catch variations of fishermen.

Thus, investment on the fishing unit was found to be a crucial factor and it had positive correlation with the fish catch variations of fishermen. Over the last 20 years, the investment on fishing units have gradually increased and due to the higher operational costs involved, when these fishermen undertake fishing in lean seasons, it results in low fish catches and consequent low returns.

In the multiple regression analysis, of the 19 regression coefficients, only one regression coefficient was significant and the variable 'experience' was found to have negative influence on the catch variations of fishermen. Though the R^2 value was high (74.11%), the F was not significant and the prediction equation on the fish catch variations of fishermen could not be fitted.

The results of correlation analysis between the innovation proneness index scores and the independent variables are given in Table 5.

Table 5. Variables associated with the innovation proneness among fishermen

Variables	Correlation coefficient
Age	0.003
Education	0.149
No. of days employed in fishing per year	0.353
Experience	0.022
Size of fishing craft operated	-0.142
No. of days of operation of craft	0.100
Investment on craft	-0.428*
Investment on nets	-0.178
Investment on engines	-0.266
Maintenance cost of craft	-0.029
Length of fishing net used	-0.402*
Average depth of fishing	-0.271
No. of fishing nets used	0.170
Average operating hours of engine per day	-0.017
Total engine hp used	-0.189
Annual income	0.065
No. of communication channels used	-0.072
Adoption index	0.337
Average fish catch per fishing day	-0.180
Average sale value per fishing day	0.220

* Significant at 5% level

Of the 20 independent variables, the innovation proneness index scores were found to have significant negative correlation with two variables such as investment on fishing craft and length of fishing net used. On the remaining 18 variables, there were no significant association between the independent variables and the innovation proneness index scores. Thus, the results revealed that the fishermen respondents who had higher investment on fishing crafts and also who had larger fishing nets were found to have lower scores on innovation proneness. This might be because the artisanal fishermen who had traditional beliefs and negative attitude towards the adoption of improved technological practices, were also found to use larger crafts and fishing nets.

It was observed that innovation proneness could be positively changed through the operation of extension schemes and by strengthening the support system activities such as adequate distribution of inputs, availability of credit through cooperatives and the developmental efforts of non-governmental organisations.

As constraints in improving the fish catches, the fishermen respondents had reported the following : i) higher operational costs of fishing unit (68.75%) ii) over dependence on one fishing method (seining) throughout the year (62.5%) iii) lack of information support (56.25%) iv) lack of

price support and fluctuations in fish prices (46.87%) v) competitive nature of fishing operations (37.50%) vi) lack of ownership of boats and nets (31.25%) vii) adverse weather and sea conditions (28.12%) viii) high cost of inputs viz. kerosene, net, wood, engine spares, etc. (25%) ix) over exploitation of onshore fishery resources in some areas (25%).

The results revealed that the socio-economic characteristics of fishermen operating plank-built crafts did not vary significantly from centre to centre. The overall average fish catch varied between 526.81 to 533.46 kg per day of fishing among fishermen in these fishing centres, though, statistically the F value was not significant. Investment on the fishing unit such as fishing craft, nets and engine was found to be a key variable and it had positive association with the fish catch variations of fishermen. In order to improve the fish catches, appropriate extension schemes are suggested in key fishing centres to provide organisational support and to manage the constraints faced by the artisanal fishermen.

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