

Structure and Performance of Marine Fish Marketing in Cuddalore District of Tamil Nadu – An Economic Analysis

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ABSTRACT

This study has been conducted in eight major coastal villages in Cuddalore district to study the structure and performance of domestic fish marketing and to estimate the seasonal variation of fish price and landings. The Gini concentration ratio using cumulative frequency distribution reveals that the domestic market structure for fish is “slightly concentrated oligopolistic and showed that domestic trade of fish is in the hands of few large traders. The linear regression analysis on influence of factors on average price of fish indicated that the costs on ice and wastage, transport, loading & unloading and marketing margin were the significant operations for deciding the price of fish. The behaviour of retail price and quantity of fish supplied to retail outlet showed that there is a decline in supply over the period (2012-16) and that is being reflected in prices of all categories of fish. The seasonal variation on quantity and price proves that the percentage of deviation is found to be more in quantity of fish supplied than the price.

Key words *Gini concentration ratio, Cumulative frequency, Concentrated oligopolistic, Fish landings, Seasonal variation*

Fish is an important part of staple diet and the major source of animal protein for a majority of countries. India accounted for 6.3 per cent of the global fish production. India is one of the major contributors in the global market as far as fish is concerned. Fisheries constitute about 1.1 per cent of the GDP of the country and 5.15 per cent of agricultural GDP (Economic survey, 2015). The total fish production in India during 2015-16 was 10.07 MT, an increase of 5.96 per cent over 2012-13. The per capita consumption of fish is 15 kg against the world average of 17 kg (45 kg in Japan and 20 kg in Myanmar). The per capita consumption is the highest (over 20 kg per annum) in coastal areas of West Bengal, Orissa, Andhra Pradesh, Tamil Nadu, Kerala, Karnataka, Goa, Gujarat and Daman & Diu. Tamil Nadu has a long coastline of about 1000 kms, accounting for about 17 per cent of the Indian coastline. Tamil Nadu coast has nearly 26 big and small urban centres and 556 marine fishing villages located along the twelve maritime districts. Marine fish landing takes place in 362 centres. Cuddalore is one of the major landing centres in Tamil Nadu.

Fishing forms the major livelihood of the people in coastal areas and the income and employment generated have greater implications on the standard of living, food and nutritional security of the fishermen and their families.

Fish is a perishable commodity and to greater extent the price depends on the demand and supply. The shelf life of fish could be extended by adopting modern technologies, which require greater investment and infrastructure that are beyond the capabilities of small fishermen. Hence, marketing of fish is an important aspect which decides the extent of revenue for the fisherman's family. An efficient marketing system should be able to reduce the cost of marketing and increase the producer's share in consumer rupee. In this context a study was undertaken to analyze the marketing structure of fish marketing and to know the determinants of average price.

MATERIALS AND METHODS

Cuddalore district was purposively selected for the present study since it ranked second largest coast and third in the overall fish productivity in Tamil Nadu. Eight fishing villages located in Chidambaram, Parangipettai and Cuddalore blocks of Cuddalore district were selected randomly to study the structure of marketing. Forty fishermen were selected randomly from eight randomly selected fishing villages at the rate of five per village. Apart from this, 30 wholesalers and 30 retailers were selected randomly for the study. Primary data required for the study were collected from the sample of fishermen, wholesalers and retailers by the personal interview method, using pre-tested structured schedule. Secondary data were collected from Assistant Director's Office, Cuddalore and The Office of Joint Director of Fisheries, Chennai.

Market structure analysis: The market structure analysis for the present study was carried out for the selected domestic fish market of the district to define the nature of market structure of the domestic market of fish. Gini concentration ratio (Gini et al., 1921) was used to analyse the concentration of market functionaries which shows the market structure. It can also be glimpsed through diagram using Lorenze curve (Lorenze, 1905). Larger the concentration, larger would be the market power. The cumulative percentages of quantity transacted by traders were plotted against the cumulative percentage of traders and the curve was drawn and compared with the line of equality.

$$G. C. R = \frac{10000 - \text{Tropizoidal Area}}{100^2}$$

The range of Gini ratio varies from zero to one, zero indicating perfect equality and one otherwise.

Linear regression Analysis: Determinants of average price of fish were analysed using the linear function $Y = a + bx_1 + bx_2 + bx_3 + bx_4 + bx_5$,

Where

Y = Unit value realization; a = Intercept; X₁= Quantity of fish; X₂= Marketing margin X₃= Transport cost; X₄= cost of icing plus wastage; X₅= Loading & unloading

Seasonal index (SI): Seasonal variations are regularly occurring upswings and downswings in that occur with some regularity during the year (Acharya and Agarwal, 1994). To estimate this, seasonal indices were constructed for the period from 2009-10 to 2013-14 for the monthly data of quantity and price of domestically traded high, medium and low value fish. The totalities of averages throughout five years are taken and standard deviation is worked out with the help of correction factor.

$$\text{ADJUSTED SPECIFIC SEASONAL INDEX} = \frac{T \times C \times S \times I}{T \times C} \times 100$$

Where, T = centred moving average; C = cyclical variation; S = seasonal variation; I = irregular variation. The average of these adjusted indices was worked out to remove the irregular variation and showed a pattern of seasonal variation alone. The resulting average for each month was corrected to 100.

Coefficient of variation: The Coefficient of variation is a well-known statistical concept and is calculated as follows

$$CV = \frac{\hat{\sigma}}{\bar{S}} * 100$$

Where, CV = coefficient of variation; $\hat{\sigma}$ = standard deviation of seasonal price indices; \bar{S} = arithmetic mean of seasonal price indices. Since the arithmetic mean of seasonal price indices is always 100, the standard deviation itself is the coefficient of variation. The standard deviation and arithmetic mean are calculated by the following formula.

$$\hat{\sigma} = \frac{\sum (S_i - \bar{S})^2}{n-1} \text{ and } \bar{S} = \frac{\sum S_i}{n}$$

Table 1. Gini Concentration Ratio (GCR)

| S.No. | % of traders | Cumulative percentage of traders | Percentage of quantity transacted | Cumulative percentage of quantity transacted | GCR |
|-------|--------------|----------------------------------|-----------------------------------|--|-------------|
| 1. | 30 | 30 | 11.42 | 11.42 | |
| 2. | 55 | 85 | 50.00 | 61.42 | 0.34 |
| 3. | 15 | 100.00 | 38.58 | 100.00 | |

Table 2. Influence of variables over average fish price

| S. No. | Variables | Regression coefficient | Standard error | T value | Significance |
|--------|-----------------------------|------------------------|----------------|---------|--------------|
| 1. | Fish quantity | 0.001 | 0.001 | 1.63 | NS |
| 2. | Marketing margin | 2.38 | 1.27 | 1.87 | * |
| 3. | Transport cost | 6.5 | 0.53 | 12.25 | ** |
| 4. | Cost on ice and wastage | 13.4 | 3.04 | 4.41 | ** |
| 5. | Loading and un loading cost | 7.00 | 1.65 | 4.22 | ** |

R² = 0.96** Multiple R² = 0.96** Standard error = 1.74

Note: ** - Significant at 1 per cent level, * - Significant at 5 per cent level, NS - Non-significant

Where, S_i = the seasonal index for ith month (i=1 to 12) and n = number of months.

RESULTS AND DISCUSSION

Market structure

The selected traders were grouped into three categories viz. small, medium and large based on the quantity of fish handled per day. The market structure identified in the study area is presented in Table 1.

It is clear from the table that 55 per cent of the whole sale traders of fish were under medium category with a transaction of one to two tonnes of fish per day with an average of 1.03 tonnes of fish per day per trader. On the other hand the small traders contributing 30 per cent of the total number of traders transacted only about eleven per cent of quantity and an average; they handled only 0.44 tonne per day. Larger traders who occupied fifteen per cent of the total number of whole sale traders transacted almost 39 per cent of the quantity and the average deal per day for larger trader was 3.38 tonnes. The Gini Concentration Ratio thus indicated that the domestic market structure for fish is “slightly concentrated oligopolistic”.

Determinants of Average price

The estimated linear regression function for finding the influence of factors on average price of fish in Cuddalore district is furnished in Table 2. It is clear from the table 2 that the variables like quantity of fish, marketing margin, ice cost and wastage, transport cost and loading & unloading costs were taken into consideration for running the function to scan the influence of variables over the average price.

It could be seen from the table 2 that the coefficient of multiple determinations (R²) was 0.96 revealing that the price function model was a good fit. The R² value of 0.96 indicates that about 96 per cent of the variation in fish price is influenced by the explanatory variables included in the

Table 3. Year to year fluctuations in fish price (Rs/kg)

| S. No | Var | 2011-12 | | 2012-13 | | 2013-14 | | 2014-15 | | 2015-16 | | | | | | |
|-------|--------------|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|----|-------|-----|----|-------|
| | | Actual | Change % | | | | | |
| 1. | Seer (HV) | 190 | 20 | 11.76 | 205 | 15 | 7.89 | 225 | 20 | 9.75 | 270 | 45 | 20.00 | 350 | 80 | 30 |
| 2. | Sankara (MV) | 60 | 10 | 20.00 | 72 | 12 | 20.00 | 85 | 13 | 18.06 | 90 | 5 | 5.88 | 100 | 10 | 11.11 |
| 3. | Murrel (LV) | 30 | 5 | 20.00 | 35.00 | 5 | 16.67 | 40 | 5 | 14.30 | 45 | 5 | 12.50 | 55 | 10 | 22.22 |

Table 4. Year to year fluctuations in fish quantity (in tonnes)

| S.No. | Var | 2011-12 | | 2012-13 | | 2013-14 | | 2014-15 | | 2015-16 | | | | | | |
|-------|-----|---------|----------|---------|----------|---------|----------|---------|----------|---------|----------|--------|-------|--------|------|-------|
| | | Actual | change % | | | | | |
| 1. | HV | 413.71 | 22.51 | 5.75 | 403.68 | -10.03 | -2.42 | 400.74 | -2.94 | -0.73 | 390.64 | -10.14 | -2.52 | 395.40 | 4.76 | 1.21 |
| 2. | MV | 890 | 24 | 2.77 | 1040 | 150 | 16.85 | 775 | -265 | -25.4 | 760 | -15 | -1.97 | 885 | 125 | 16.44 |
| 3. | LV | 19297 | 1839 | 10.53 | 21670 | 2373 | 12.29 | 18180 | -3490 | -16.10 | 18075 | -105 | -0.57 | 19244 | 1169 | 6.46 |

model. The coefficients of cost on ice and wastage, transport and loading & unloading were positive and found to be highly significant at one per cent level with 13.4, 6.5 and 7 respectively. Thus the result indicated, the costs on ice and wastage, transport, loading & unloading and marketing margin were the significant operations for deciding fish price.

Temporal behaviour of retail Price and Quantity

The behaviour of retail price and quantity of fish supplied to retail outlet over period in the study area has been analysed through year to year variations and the same is furnished in Tables 3 and 4. An insight into the tables portrays, there is a decline in supply over the period (2011-12 to 2015-16) and that is being reflected in prices of all categories of fish. To get a better understanding the price per unit of Seer fish (chicken of the sea), Sankara and Murrel has been taken as a proxy to represent high, medium and low value fish. Though in percentage terms the increase in price comes within 20 per cent, there is a sharp increase in high value fish (Seer fish) from that of 2010-11.

The reason could be, besides shortage of supply, it is being demanded by the consumer with higher purchasing power because of its tastes and preferences. The overall increase in all the categories in general attributed to the inflationary pressure, costs on production and marketing as well and there is rapid expansion of retail outlets of fish market from the landing centre to around the state due to the addition of fish consuming population because of increase in the health consciousness, since fish meat is an easily digestible protein. Further, it has been observed (Sekar *et al.*, 1998) that increased income is reflected in higher consumption of fish in urban areas indicating a positive income elasticity of demand for fish.

Seasonal variation:

The year to year variation in quantity and price of fish gives an annual average picture. In order to know the uninterrupted supply and demand of fish, the monthly seasonal indices for price and quantity of fish during 2011-

12 through 2015-16 were formed and the results obtained are shown in Table 5.

A scan over the Table 5 implies the indices ranged from 53.90 during April to a maximum of 132.94 during November for quantity and the values of price ranged from 85.58 during May to 119.39 in April. The results give interesting information that the indices for prices are highest during both the lean and peak season of fish. This is mainly due to the reason it is not alone quantity, the size of the fish also contribute for price realization i.e. to say a unit quantity of large numbers of particular variety of fish fetches low price than that of small numbers per unit in the same variety. During April fishing is banned to allow for replenishment but however line and hook fishing is allowed since they catch grown adult fish, usually bigger in size. The month of November is the season for big varieties, fetching higher prices in the market. Since the demand is always uniform and on the increasing trend, the arrivals and the pattern of arrival of fish to the retail outlet decides the fluctuation in prices. This is being further confirmed by percentage of deviation which is found to be more in quantity of fish supplied than the price (Imran *et al.*, 2014).

CONCLUSION

The study revealed that the fishermen were in the clutches of auctioneer and had no say in the price fixation. Though domestic fish marketing holds a huge potential, it is still highly unorganized and unregulated in the study area. It has long been neglected for various reasons and serious efforts have not been made on marketing of fish as compared to its production. Less effort has been taken on the processing and retailing side of fish. There is a strict barrier for entry of any new professional into it. Greater interventions have to be made by the government in fish marketing to enable fishermen to have a say in the price of the landing and also provide them with necessary storage, transport and processing facilities so that they can realize better price for their landings. Hence efforts should be taken by fisheries department to reduce the dominance of

Table 5. Seasonal indices of quantity and price

| Month | Quantity | Price |
|-------------|-----------------------|-----------------------|
| JAN | 95.29 | 88.73 |
| FEB | 87.81 | 92.41 |
| MAR | 89.42 | 106.10 |
| APR | 53.90 | 119.39 |
| MAY | 84.05 | 85.58 |
| JUN | 104.03 | 97.29 |
| JUL | 99.60 | 95.55 |
| AUG | 91.37 | 96.42 |
| SEP | 110.47 | 100.05 |
| OCT | 125.56 | 103.35 |
| NOV | 132.94 | 118.37 |
| DEC | 125.50 | 97.31 |
| S.D. | 21.84 per cent | 10.45 per cent |

middlemen under fish trade and to increase the income of small scale fisher folks by way of adopting processing units for higher unit value realization and employment.

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