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Capacity Utilization in Fish Processing Industry – A Case Study of Gujarat

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Consumer demand for fish is increasing globally and the domestic demand of fish in India by the year 2020 is estimated to be 12 million t. Fish importing countries have been imposing stringent quality standards for fish and fishery product exports in the recent years. To meet these standards, huge investments have been made by the fish processing industry by way of additional equipment and infrastructure. Considering the ever profitable global fish trade, many fish processing plants were established with huge freezing capacity in the past few years. Gujarat is an important hub for fish processing in India, contributing 14% to the total seafood exports in terms of dollar value. Using stratified sampling design, around 35 fish processing plants were selected in Gujarat and data were collected on installed capacity and monthwise seafood production from 2006-07 to 2008-09. The results show that there is a gross under utilization of capacity installed for fish processing in Gujarat. The capacity utilization pattern by the Gujarat fish processing sector along with the problems faced and possible remedies are discussed in this communication.

Keywords: Fish processing, capacity utilization, sustainability, processing industry

Focus on health foods and rising income levels has led to increased demand for seafood globally. Catching to the global demand is the processing industry in India with processing factories conforming to international quality standards that have come up on both the west and east coast of India. The country is capable of competing with any other seafood exporting country in terms of quality, variety of products, and marketing. The growth of the Indian seafood industry in terms of size can be understood from the fact that from 47 fish processing plants during 1969 the number has grown to 276 in 1979 (Iyer *et al.*, 1981, 1982). During 2009, there were 406 fish processing plants with a capacity to process 14 877 t of seafood per day (Source: MPEDA, Cochin). Many of the processing plants had high idle capacity.

The fish processing in Gujarat sector has also kept pace with the development in the sector with a number of modern processing factories with high quality standards with a total installed capacity of 4 323 t of seafood per day during 2009 from 2 464 t in 2002 (Source: MPEDA, Cochin). Commercially important groups like shrimp, pomfret, Indian mackerel, jew fish, ribbon fish, reef cod, squid, lobsters and cuttlefish get processed into frozen, chilled and value added products. Trawl bycatches locally known as *kutta* comprising of juveniles of quality fishes, small sized prawns, crabs and squilla go for drying (Zynudheen *et al.*, 2004). Most of the fish processing plants are concentrated in and around Veraval, Mangrol and Porbander.

Earlier studies from CIFT have estimated the idle capacity in fish processing sector in the East and West coast of India (Iyer *et al.*, 1981, 1982). The idle capacity of Gujarat was estimated at 76.90% for the year 1979 taking into account the number of working days as 250 and plants operating for 2 shifts (Iyer *et al.*, 1981). The idle capacity in the Kerala fish processing industry was estimated as 85% during 1996 assuming factories adopting two shifts with 300 working days per year (Unnithan *et al.*, 1998).

This paper gives an overview of the utilization pattern of fish processing capacity by the seafood industry and highlights the issues behind the low capacity utilization in Gujarat state.

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Materials and Methods

Data on installed capacity, monthly production of fish and fishery products, number of personnel employed, factors responsible for under utilisation of plant capacity and the constraints faced by the processors were collected for the years 2006-07, 2007-08 and 2008-09 using structured schedules from 35 fish processing units of Veraval region, where majority of the fish processing plants in Gujarat are established. Through personal interview, factors responsible for under utilization, source of raw material and constraints in the business were also recorded.

Data on actual production during the period of study, were collected as per the pre-designed proforma by personally interviewing the plant managers of the selected plants. The sampling plan adopted was stratified random sampling (Cochran, 1989) and the strata constructed were based on the installed capacity of the processing plants. The fish processing plants located in Gujarat were classified into three strata *viz.*, under 30 t day^{-1} (TPD), 30 to 50 TPD and above 50 TPD. Allowing a sampling error of 20% on the total installed capacity, 9, 16 and 10 fish processing plants were selected from 1st, 2nd and 3rd strata respectively. The installed capacity of fish processing in Gujarat has been increasing over the years with new plants being established every year.

Many of the fish processing plants in India operate two shifts per day and work throughout the year. The idle capacity was estimated under two situations *viz.*, when the seafood plants are operated at 2 shifts assuming 300 working days and 250 working days a year.

The total idle capacity for each stratum was estimated using the formula

$$\hat{Y}_h = \frac{N_h}{n_h} \sum_{i=1}^{n_h} Y_{hi}$$

where N_h is the total number of plants in the h^{th} stratum, n_h is the number of plants sampled from the h^{th} stratum and Y_{hi} is the idle capacity of the i^{th} plant included in the sample from the h^{th} stratum. The strata estimates were pooled at the respective levels so as to get the estimate at the state level. Therefore the estimate of idle capacity at state level was computed using the formula

$$\sum_h \hat{Y}_h$$

Variance of the estimated idle capacity of each stratum (Σ_i Yhi^2) was estimated by

$$V(\hat{Y}_h) = \frac{N_h}{n_h}(N_h - n_h) \times \frac{1}{(n_h - 1)} \left(\sum_{i=1}^{n_h} Y^2_{hi} - \frac{(\sum_{i=1}^{n_h} Y_{hi})^2}{n_h}\right)$$

By pooling the estimated strata variance, the variance of the estimate of the overall idle capacity of the state was computed. The idle capacity of each sampled plant was worked out by taking the difference between the installed capacity and actual production during the year for double shifts. The percentage idle capacity was worked out by taking the ratio of the underutilized capacity to the installed capacity for two shifts a day.

Results and Discussion

During the study period, the total number of fish processing plants in Gujarat varied from 59 to 83 with 19 to 26 plants in the 1st stratum, 25 to 34 plants in the 2nd stratum and 15 to 23 plants in the 3rd stratum (Source: MPEDA, Cochin).

The total installed capacity for processing seafood in Gujarat during the study period of three years varied from 2981.6 to 4323.4 t day^{-1}. The installed capacity in Gujarat processing plants during 1979 was only 35.6 t day^{-1} (Iyer *et al.*, 1981). The annual installed capacity and estimated idle capacity during 2006-07, 2007-08 and 2008-09 worked out for 250 normal working days and 300 working days are given in Table 1.

It is evident from Table 1 that, the idle capacity of plants (assuming 250 normal working days) estimated for the years 2006-07, 2007-08 and 2008-09 were 31.23, 63.67 and 53.29% respectively, indicating substantial under utilisation of plant capacity in the state. Further, the idle capacity of plants (assuming 300 working days) estimated for the years 206-07, 2007-08 and 2008-09 were 38.91, 68.13 and 57.83% respectively.

During 2007-08, the idle capacity was slightly higher may be due to fall in total marine catch during the period (Fig.1). The

Table 1. Annual installed capacity and the rate of idle capacity (in '000 m t) at Gujarat

Parameters	300 working days			250 working days		
	2006-07	2007-08	2008-09	2006-07	2007-08	2008-09
Annual installed capacity ('000 t)	596.32	608.12	864.68	496.93	506.76	720.56
Estimated idle capacity ('000 t)	232.02	414.34	500.05	155.17	322.69	384.02
% idle capacity	38.91	68.13	57.83	31.23	63.67	53.29
SE of estimates (%)	2.60	2.70	3.60	3.50	7.00	7.89

percentage error of estimate of idle capacity when the number of working days assumed as 250 was 3.50, 7.00 and 7.89% respectively for the years 2006-07, 2007-08 and 2008-09. The percentage error of estimates are well within reasonable limits indicating the reliability of the estimates.

The stratum-wise estimates of idle capacity are presented in Table 2. It is evident from the results that high idle capacity exists in plants with installed capacity from 30 to 50 t day^{-1}. The idle capacity recorded was maximum in the 2007-08 for this category of plants. This may again be due to the comparatively less fish landings during the period.

From the results it is evident that there is substantial under utilization of processing capacity in Gujarat. On the basis of double shift and 250 normal working days in a year overall excess capacity was 53%. Compared to plants with capacity between 30 to 50 t, plants with higher installed capacity *viz.*, above 50 t day^{-1} registered lower level of idle capacity. Some of these plants have their own fishing vessels in operation. This may be one of the reasons for lower idle capacity because raw material supply is better assured for these plants.

Though the overall idle capacity has come down by 24% when compared to three decades before, the idle capacity in the medium category of plants whose number was also large was as high as 64.91 and 52.38% for the years 2007-08 and 2008-09 respectively. When more and more plants of large capacity were added in the state over the years, the corresponding raw material requirement for processing also increased and the demand could not be met resulting in the large idle capacity. The results of this analysis are also in consonance with the results in which the working days was assumed as 300. Table 2 summarizes the results of the analysis carried out to estimate the idle capacity when it is assumed that the fish processing plants worked for 250 and 300 days in two shifts.

On examining the reasons for high idle capacity, the non availability of material (shrimps) for processing was one of the major factors for processing plants in Gujarat with 92% of respondents citing this. Among other factors, high cost of production, power shortage, competition among processors for procuring the raw material and labour shortage were found to affect the industry as perceived by the 65%, 75%, 85% and 90% of the

Table 2. Estimate of idle capacity in fish processing plants of different strata ('000 m t)

Capacity (t day^{-1})	300 working days			250 working days		
	2006-07	2007-08	2008-09	2006-07	2007-08	2008-09
< 30	41.82 (43.65)	60.84 (62.28)	74.61 (53.71)	28.52 (35.73)	45.44 (55.83)	55.38 (47.84)
30 to 50	121.37 (49.36)	173.97 (69.37)	202.37 (56.75)	88.82 (45.35)	135.64 (64.91)	155.64 (52.38)
> 50	68.83 (27.03)	179.52 (69.13)	223.06 (60.41)	37.83 (17.83)	141.60 (65.44)	172.99 (56.22)

*Figures in parantheses indicate % idle capacity

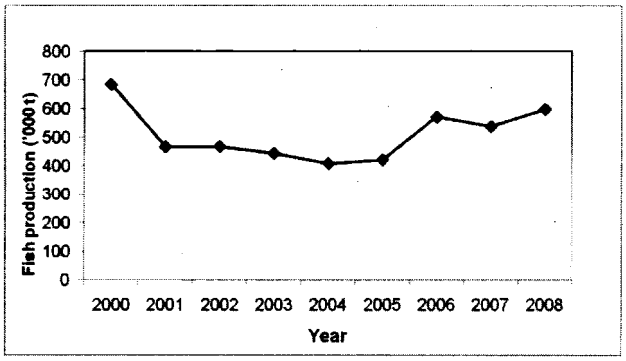

Fig. 1. Marine Fish production in Gujarat during 2000-2008

respondants. Another major reason behind the high level of idle capacity was the seasonality in the landings. In Gujarat, the peak season for catch is from September to April and the lean season from June to August.

During lean season of production, it is natural that raw material shortage exists. This can be seen from the seasonality in production by the plants during the period under study (Fig. 2). The months of June, July and August also registered low production due to trawl ban, while during November and December the production was found to be usually high.

The study reveals that there exists an overall excess capacity of 53% and 57% (during 2008-09) in the fish processing industry in Gujarat when the number of working days were assumed as 250 and 300 respectively. The study also shows that the idle capacity has increased over the years. Seasonality of fish landings also seems to play a role in the idle capacity level. The sustainability of the fish processing industry in Gujarat in the long run will be affected by this. The major constraint faced by the

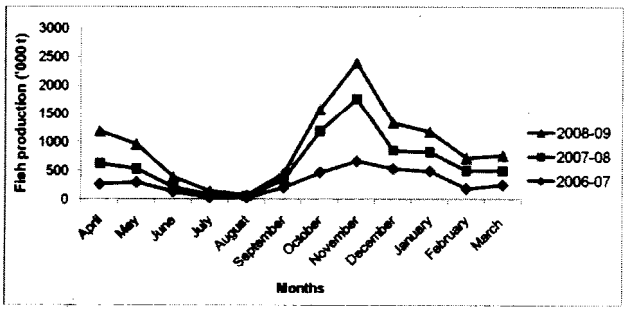

Fig. 2. Production pattern in Gujarat fish processing sector

industry is non-availability of raw material for processing. Import for re-export is one option which can be explored by the industry. A temporary ban on issuing new license to plants will reduce competition for raw material purchase among processors and check the under utilization of capacity.

By utilizing the vast untapped domestic fish market of India and introducing high end value added fish and fishery products for the emerging "middle class" having high purchasing power, diversification can be achieved. This would be cost effective compared to investing high to conform to international quality standards. Promoting aquaculture is another way to meet the raw material shortage faced by the fish processing industry. Uninterrupted power and water supply, cold storage facilities, and fixing a floor price for fisheries commodities would help the processors especially, the small and medium entrepreneurs to a greater extent and ensure sustainability of the industry.

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