

Idle Capacity of Fish Processing (Freezing) Plants in India A Comparative Study of Plants in East and West Coasts

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The extent of idle capacity in the fish processing plants in India estimated by a stratified sampling plan for 1978 to 1981 and the comparison of the idle capacity in the west and east coasts are reported. There was no appreciable difference in the idle capacity of plants between the coasts. A marked decreasing trend in the idle capacity was observed in both the coasts for the period under study. Causes for under utilisation and remedial measures are analysed.

India has a coast line of about 6,000 km. out of which 55% is in the west coast and the rest in the east coast. Fish drying and curing were practised in this country for centuries, but freezing of shrimp for export was started only in the post independent era. A humble beginning of export of frozen prawn from India was made during 1953 with a small quantity of 13,268 kg. valued at Rs. 57,740 by a processing unit at Cochin (Pillai & Govindan, 1969). Since then, there has been rapid increase in the export of frozen marine products from India. Later on, other items like lobster tails and froglegs were added to the list of export items. In 1969, the number of freezing factories in India engaged in the freezing of prawns and other fishes were only 47. Though in the beginning the industry was centred around Cochin, the availability of exportable varieties of big prawns in other maritime states in the east and west coasts and the ever increasing demand for Indian prawns in the world market coupled with the attractive price realised for Indian prawns, resulted in the setting up of more and more new plants in other maritime states. Today, there are 276 fish processing (freezing) plants in the country engaged in the freezing of prawns, lobster tails, froglegs, cuttle fish and squid for export with an annual installed capacity of about 457,000 t, based on 250 working days with three shifts. With the increase in the number of fish processing plants, the total installed capacity also has increased considerably, but the quantity of raw material (prawn) required for processing had not increased to the total installed capacity resulting in the under-utilisation of plants. As no reliable estimate of the extent of idle capacity in the fish processing (freezing) plants was available, a sample survey was conducted during 1979-82 to estimate the extent of idle capacity existing in the fish processing plants, to identify the causes for the idle capacity and to suggest measures to reduce the same. The findings of the survey for different states were reported in two earlier communications (Iyer *et al.*, 1981; 1982) for the years 1978 and 1979. In this communication, the authors have made an attempt to compare the idle capacity of the plants

in India, both coastwise and stratum-wise, based on the estimates for the four years 1978 to 1981.

Table 1. *Distribution of fish processing (freezing) plants in India—1979-'80*

	U/5	5/10	Above 10	Total	*Annual installed capacity in '000 tonnes
Kerala	69	19	16	104	168
Karnataka	18	9	2	29	42
Goa	6	2	0	8	11
Maharashtra	11	10	11	32	83
Gujarat	1	2	6	9	27
West coast	105	42	35	182	331
Tamil Nadu	31	10	3	44	59
Andhra Pradesh	10	5	0	15	19
Orissa & West Bengal	27	4	4	35	48
East coast	68	19	7	94	126
All India	173	61	42	276	457

*Based on 250 working days and triple shift

Materials and Methods

There were 276 fish processing (freezing) plants in India during the period of survey (Table 1). Out of these, 94 were located in the east coast and the rest in the west coast. To estimate the idle capacity of these plants, a stratified random sampling was adopted, the strata being plants under 5 t, 5 to 10 t and above 10 t capacity per day. Fixing the sampling error at 20% on the total installed capacity, 93 plants were sampled for the study.

Data from the sampled plants were collected for the years 1978 to 1981 as per the proforma prepared

for the study. The idle capacity of each sampled plant was worked out by taking the difference between the installed capacity and the actual production during the year for one, two and three shifts and by taking 200 and 250 working days in a year, though under practical conditions 250 working days and two shifts per day can be taken as normal with respect to many organised industries (Mensinkai, 1969). The idle capacity of the plants in each stratum was estimated first and the stratum estimates were pooled at respective levels so as to get the estimates for each state, east and west coasts and for all India. The methods of estimation were the same as those described in two earlier communications (Iyer *et al.*, 1981, 1982).

In the west coast, much difference in the percentage idle capacity was observed between states and between years in all the three shifts. Idle capacity was more in plants located at Gujarat and Karnataka during 1978 and 1979 and at Goa and Gujarat in 1980 and 1981; while Maharashtra and Kerala had comparatively less idle capacity. There was substantial decrease in the idle capacity in all the states except Gujarat in the west coast of India in 1981 compared to 1978. In Kerala, the idle capacity of the plants showed a decreasing trend from 50.9% in 1978 to 34.7% in 1981 in one shift, 74.9% to 67.4% in two shifts and 82.9% to 78.2% in three shifts with 250 working days in a year. In Maharashtra, the decrease was from 52.1% in 1978 to 21.6% in 1981

Table 2. Percentage idle capacity for one shift

	200 days				250 days			
	1978	1979	1980	1981	1978	1979	1980	1981
Kerala	38.8	35.1	22.4	18.4	50.9	48.0	37.9	34.7
Karnataka	58.4	49.2	33.3	23.6	66.8	59.3	46.7	38.9
Goa	49.7	90.0	46.9	30.0	67.7	27.2	57.5	44.0
Maharashtra	35.6	20.0	27.7	2.0	52.1	36.4	42.2	21.6
Gujarat	54.8	42.1	61.0	53.7	63.8	53.7	68.8	63.0
West coast	42.1	32.8	29.3	18.5	53.7	46.3	43.4	34.8
% error	18.8	27.0	24.0	41.6	12.3	17.9	12.1	18.6
Tamil Nadu	23.4	12.3	5.4	Nil	38.7	29.1	24.3	Nil
Andhra Pradesh	42.4	25.2	17.2	29.0	53.9	40.1	33.7	43.2
Orissa & West Bengal	58.7	60.0	61.8	56.1	67.0	68.0	69.5	64.9
East coast	39.7	31.6	29.3	22.6	51.7	45.0	43.4	38.1
% error	17.5	15.5	16.3	26.4	12.2	9.6	9.7	13.4
All India	41.4	32.5	29.3	19.6	53.2	45.9	43.3	35.7
% error	14.6	20.4	18.2	30.1	9.6	13.5	9.3	13.9

Results and Discussion

The estimate of the idle capacity of the plants in the different states, east-coast, west-coast and all India for one, two and three shifts and the percentage error of estimates are given in Tables 2 to 4 respectively. From these Tables, it is quite clear that there is no appreciable difference in the percentage idle capacity of the plants in the two coasts. The estimates also showed a decreasing trend over the four years. Compared to 1978 there was marked reduction in the idle capacity in 1981. In the west coast, the idle capacity has decreased from 53.7% in 1978 to 34.8% in 1981 in single shift, 76.9% in 1978 to 67.4% in 1981 in two shifts, and 84.6% in 1978 to 78.3% in 1981 in three shifts, with 250 working days in a year. In the east coast, the idle capacity of the plants has decreased from 51.7% in 1978 to 38.1% in 1981 in one shift, 75.9% to 69.1% in two shifts, and 83.9% to 79.4% in three shifts, with 250 working days in a year. The all India estimates of idle capacity also showed a decreasing trend from 53.2% in 1978 to 35.7% in 1981 in one-shift, 76.6% to 67.8% in two shifts and 84.6% in three shifts with 250 working days in a year.

in one shift, 73.8% to 60.8% in two shifts and 82.4% to 73.9% in three shifts with 250 working days. In Karnataka, it has decreased from 66.8% in 1978 to 38.9% in 1981 in one shift, 85.3% to 69.5% in two shifts and 88.9% to 79.6% in three shifts. In Goa, the decrease was from 67.7% in 1978 to 44% in 1981 in one shift, 79.9% to 72% in two shifts and 86.5% to 81.3% in three shifts. But in Gujarat, there was not much difference in idle capacity for the four years from 1978 to 1981.

The states in the east coast of India also showed a decreasing trend in the idle capacity. Plants located in West Bengal and Orissa recorded the highest percentage idle capacity among east coast states and plants in Tamil Nadu showed the least followed by Andhra Pradesh.

In Tamil Nadu, the idle capacity was estimated to be 38.7% in 1978 and in 1981 it decreased to nil in one shift. In two shifts, it has decreased from 69.4% to 57.1% and in three shifts from 79.6% to 71.5% when 250 working days are taken into account. For the plants in Andhra Pradesh, the idle capacity has decre-

ased from 53.9% in 1978 to 33.7% in 1980, and then slightly increased to 43.2% in 1981 for single shift. In double and triple shifts it has decreased to 77% and 84.7% in 1978 to 66.8% and 77.8% in 1980 and then slightly increased to 71.5% and 81% in 1981 respectively. For the plants in West Bengal and Orissa, it has showed a marginal decrease from 67% in 1978 to 64.9% in 1981 in single shift. In two and three shifts it has increased from 83.5% and 89% in 1978 to 84.8% and 89.9% in 1980 and slightly decreased to 82.5% and 83.3% in 1981 respectively.

The idle capacity of the plants under 5 t in one, two and three shifts for each state and for the east and west coasts and for all India are given in Table 5. It is evident that for the plants located in the west coast of India, there was a substantial reduction in idle capacity, from 75.6% in 1978 to 61.6% in 1981, based on two shifts and 250 working days in a year. All the states except Goa in this coast registered a decreasing trend with Gujarat registering the lowest percentage of 29.2 during 1981. It is also observed that plants under 5 t daily capacity were having the least idle capa-

Table 3. Percentage idle capacity for two shifts

	200 days				250 days			
	1978	1979	1980	1981	1978	1979	1980	1981
Kerala	69.4	67.6	61.2	59.2	74.9	74.0	69.0	67.4
Karnataka	79.2	74.6	66.7	61.8	85.3	79.7	73.3	69.5
Goa	74.9	54.4	73.4	65.0	79.9	63.6	78.7	72.0
Maharashtra	76.6	60.1	63.9	51.0	73.8	68.2	71.1	60.8
Gujarat	77.4	71.1	80.5	76.9	81.9	76.9	84.4	81.5
West coast	71.1	66.4	64.6	59.3	76.9	73.2	71.7	67.4
% error	7.1	7.7	6.7	9.0	6.0	7.0	5.5	62.1
Tamil Nadu	62.7	55.7	52.7	46.4	69.4	64.5	62.2	57.1
Andhra Pradesh	71.2	62.6	58.5	64.4	77.0	70.1	66.8	71.5
Orissa &								
West Bengal	79.3	80.0	80.9	78.1	83.5	84.0	84.8	82.5
East coast	70.3	65.6	64.7	61.3	75.9	72.5	71.7	69.1
% error	7.8	5.5	5.9	7.3	6.9	4.7	4.6	5.6
All India	70.8	66.2	64.6	59.8	76.6	73.0	71.7	67.8
% error	5.6	5.9	5.1	6.9	4.8	5.3	4.3	4.8

Table 4. Percentage idle capacity for three shifts

	200 days				250 days			
	1978	1979	1980	1981	1978	1979	1980	1981
Kerala	79.6	78.4	74.1	72.8	82.9	82.7	79.3	78.2
Karnataka	86.1	83.1	77.8	74.5	88.9	86.4	82.2	79.6
Goa	83.3	69.6	82.3	76.7	86.5	75.7	82.8	81.3
Maharashtra	78.1	73.5	75.9	67.3	82.4	78.8	80.7	73.9
Gujarat	84.9	80.7	87.0	84.6	87.9	84.6	89.6	87.7
West coast	80.7	77.6	76.4	72.8	84.6	82.1	81.1	78.3
% error	5.4	5.5	4.9	5.1	4.9	5.3	4.4	4.7
Tamil Nadu	74.5	70.5	68.5	64.3	79.6	76.0	74.8	71.5
Andhrar Padesh	80.8	75.1	72.3	76.3	84.7	80.1	77.8	81.0
Orissa &								
West Bengal	86.2	86.7	87.3	85.4	89.0	89.3	89.9	88.3
East coast	89.9	77.1	76.5	74.3	83.9	81.5	97.9	79.4
% error	6.4	4.2	4.2	3.2	6.0	3.9	3.8	4.8
All India	80.5	77.5	76.4	73.2	84.4	81.9	81.1	78.6
% error	4.3	4.2	3.7	4.0	3.9	4.0	3.4	3.7

The percentage error of estimates of idle capacity worked out for the east and west coasts and for all India (Tables 2 to 4) showed that they were well within reasonable limits indicating the reliability of the estimates.

city in all the states in the west coast. The east coast also showed almost the same pattern as that of the west coast, an idle capacity of 69.1% in 1981 compared to 75.5% in 1978. Plants in Tamil Nadu showed the lowest

percentage (56%) followed by Andhra Pradesh (65.3%) and West Bengal and Orissa (83%). The all India estimates of idle capacity in this stratum ranged from 75.6% in 1978 to 64.1% in 1981. The pattern of idle capacity in this size range in the two coasts remained more or less the same.

capacity of the plants between the two coasts. The state-wise analysis of idle capacity figures showed high difference between states of west coast. High percentage (90.1% in 1981) was observed in plants located in Karnataka state while plants of similar size range in Maharashtra and Kerala (61.3% and 73.9% respectively).

Table 5. Percentage idle capacity-U/5 stratum for 250 working days

	One shift				Two shifts				Three shifts			
	1978	1979	1980	1981	1978	1979	1980	1981	1978	1979	1980	1981
Kerala	50.9	37.0	35.0	26.4	74.1	68.6	66.5	63.2	81.8	79.1	77.7	75.5
Karnataka	50.2	52.7	23.1	12.3	79.2	76.3	61.5	56.2	83.4	84.2	74.4	79.6
Goa	32.8	0.5	51.1	31.2	49.7	50.2	75.5	65.6	55.4	66.0	83.7	77.1
Maharashtra	56.8	57.9	50.5	19.7	78.5	78.9	75.3	59.9	85.7	85.9	83.5	73.2
Gujarat	—	—	Nil	Nil	Nil	Nil	40.0	29.2	—	—	60.0	52.8
West coast	51.2	39.7	35.5	23.2	75.6	69.9	66.7	61.6	83.7	79.9	77.8	74.4
Tamil Nadu	21.1	21.8	26.3	11.9	60.6	60.9	63.2	56.0	73.7	73.9	75.5	70.7
Andhra Pradesh	62.6	47.0	21.8	30.7	81.3	73.5	60.8	65.3	97.5	82.3	73.8	76.8
Orissa & West Bengal	74.8	66.6	66.2	66.0	87.4	83.3	83.1	83.0	91.6	88.9	88.7	88.7
East Coast	51.0	44.6	43.2	38.2	75.5	72.3	71.6	69.1	93.7	81.5	81.1	79.4
All India	51.1	41.5	36.8	28.4	75.6	70.7	68.4	64.1	83.7	80.5	78.9	76.1

Table 6. Percentage idle capacity—5/10 stratum for 250 working days

	One shift				Two shifts				Three shifts			
	1978	1979	1980	1981	1978	1979	1980	1981	1978	1979	1980	1981
Kerala	9.5	20.9	35.9	32.5	54.7	60.4	68.0	66.2	69.8	73.6	78.7	77.5
Karnataka	75.7	54.1	54.7	49.0	87.9	77.0	77.3	74.5	91.9	84.87	84.9	83.0
Goa	78.4	73.9	68.9	66.9	89.2	87.0	84.4	83.5	92.8	91.3	89.6	89.0
Maharashtra	56.9	26.3	37.1	19.3	69.9	63.1	68.5	59.7	79.9	75.4	79.0	73.1
Gujarat	76.5	55.4	74.7	82.0	88.3	73.7	97.4	81.0	92.2	85.1	91.6	94.0
West coast	36.4	33.1	43.6	37.2	68.2	66.5	71.8	68.6	78.8	77.1	81.2	79.1
Tamil Nadu	66.2	28.9	8.6	Nil	83.1	64.5	54.3	49.1	88.7	75.3	69.5	66.1
Andhra Pradesh	42.2	30.1	45.3	55.3	71.1	65.1	72.7	77.7	80.7	76.7	81.8	85.1
Orissa & West Bengal	70.7	71.6	71.9	68.1	85.4	85.8	86.1	84.2	90.2	90.5	90.8	89.5
East coast	62.4	39.3	32.4	28.4	81.2	69.7	66.2	64.2	87.2	79.2	77.5	76.2
All India	44.4	34.9	40.3	34.5	72.2	67.4	70.1	67.3	81.5	78.1	80.1	78.1

Regarding plants whose capacity ranged between 5 and 10 t per day, the percentage idle capacity showed a decreasing trend from 81.2% in 1978 to 64.2% in 1981 in the east coast. But there was no apparent decrease in the west coast (Table 6). Among the states, Gujarat in the west coast and West Bengal and Orissa in the east coast were found to have the highest percentage idle capacity. All India estimate ranged between 72% and 67% during the period under study.

The idle capacity of the plants above 10 t capacity range are given in Table 7. It can be seen from this Table that there is no noticeable difference in the idle

capacity in 1981) were having comparatively low idle capacity. The east coast also showed appreciable difference between states. High percentage idle capacity was observed in West Bengal and Orissa (80.5% in 1981) and low in Tamil Nadu (70.1% in 1981). There was a decrease in the idle capacity from 81% in 1978 to 72% in 1981 on all India basis for this stratum.

The constraints faced by the fish processing (freezing) plants in the east and west coasts are listed in Table 8. It is evident from this Table that non-availability of raw material (prawn) for processing was the prime factor responsible for the underutilization of plants in both

the coasts. Among other factors, high cost of production, frequent power failures/shortage, competition among processors for procuring the raw material, labour troubles, shortage of ice and potable water during peak season were found to affect the industry adversely. It is evident that the percentage idle capacity in one, two and three shifts does not show any appreciable difference between coasts indicating that the conditions prevailing in both the coasts were almost the same.

in both the coasts. But later on when more plants were added on both the coasts, the availability of the raw material required for processing did not increase to meet the requirements of the plants, which resulted in the large capacity of the plants. The percentage idle capacity estimated for all India for 1978, 1979, 1980 and 1981 were respectively 76.6%, 73%, 71.7% and 67.8% based on two shifts, and 250 working days in a year. On all India basis, freezing plants having above 10 t capacity

Table 7. Percentage idle capacity for 10 to 250 working days

	One shift				Two shifts				Three shifts			
	1978	1979	1980	1981	1978	1979	1980	1981	1978	1979	1980	1981
Kerala	80.4	80.8	45.9	47.7	90.2	90.4	73.0	73.9	93.5	93.6	82.0	82.6
Karnataka	92.9	90.1	85.7	80.3	96.5	95.1	92.8	90.1	97.7	96.7	95.2	93.4
Goa	—	—	—	—	—	—	—	—	—	—	—	—
Maharashtra	49.5	35.5	42.4	22.6	74.3	67.8	71.2	61.3	82.6	78.5	80.8	74.2
Gujarat	60.3	53.2	72.3	65.1	80.2	76.6	86.2	82.6	86.8	84.4	90.8	88.4
West coast	66.4	59.6	51.0	42.4	83.2	79.8	75.5	71.2	88.8	86.6	83.7	80.0
Tamil Nadu	31.5	43.1	42.0	40.2	65.1	71.6	71.0	70.1	77.2	81.0	80.7	80.1
Andhra Pradesh	—	—	—	—	—	—	—	—	—	—	—	—
Orissa & West Bengal	43.9	68.5	74.4	60.9	72.0	84.2	87.2	80.5	81.3	89.5	91.5	87.0
East coast	37.0	54.1	58.1	50.5	68.5	77.0	79.1	75.3	79.0	84.7	86.0	83.5
All India	62.0	58.8	52.1	43.7	81.0	79.4	76.0	71.8	87.3	86.3	84.0	81.2

Table 8. Constraints faced by the fish processing (freezing) industry

	West coast %	East coast %
Non-availability of raw material	89.6	82.2
High cost of production	52.1	53.3
Frequent power failures/shortage	29.1	62.2
Labour troubles	16.7	20.0
Unsteady foreign markets	10.4	4.4
Shortage of potable water	10.4	15.6
Competition for procuring the raw material	8.3	4.4
Shortage of ice	8.3	24.4
Lack of transport facilities	8.3	13.3
Lack of cold storage facilities	6.3	4.4
Investment in holding the material up to shipment	2.1	—
Delay in getting the purchase order	2.1	—
Lack of technical hands	—	2.2

Freezing plants were established along west coast as early as in 1953 but in the east coast it was established only in the late 1960's. In the beginning, the plants were getting sufficient raw material (prawns) for processing because there were only limited number of plants

per day are found to have maximum percentage of idle capacity compared to U/2 and 5/10, under during the period of study. There was a decreasing trend in idle capacity over the 4 years. This was mainly due to freezing of large quantities of cuttle fish, squid, pomfrets, seer etc. by a few processors.

One of the possible ways to reduce the idle capacity of fish processing (freezing) plants in India is to diversify the products. Fisheries technological research institutes can do a lot in this matter by developing suitable processing techniques and also by developing cheaper and durable containers and packaging materials for the export of the diversified products so that exporters of these products can compete successfully in the international market. Agencies like Marine Products Export Development Authority can also do a lot in this matter by exploiting new markets for the diversified products.

Promoting mass aquaculture of prawns is another way to meet the raw material shortage faced by the fish processing industry. High cost of production can be reduced if subsidy on diesel oil is extended to all classes of fishing vessel. Abolition of purchase tax on raw material can also help to reduce the cost of production. Uninterrupted power supply, water supply, cold storage facilities, shipping facilities, liberalised financial aid to processors, fixing a floor price for fisheries commodities and a control on issuing licence to new plants will help

the processors, especially the small and medium entrepreneurs to a larger extent.

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References

- Iyer, H. K., Srinivasa Rao, P., Unnithan, G. R., Kesavan Nair, A. K. & Nair, R. G. (1981) *Fish. Technol.* **18**, 109
- Iyer, H. K., Srinivasa Rao, P., Unnithan, G. R., Kesavan Nair, A. K. & Nair, R. G. (1982) *Fish. Technol.* **19**, 9
- Mensinkai, S. S. (1969) *Can. Fish. Rep.* **11**, 18
- Pillai, V. K. & Govindan, T. K. (1969) *Indian Food Packer* **23**, 40