

DOMESTIC-MARKETING AND INFRASTRUCTURE DEVELOPMENT OF MARINE FISHERIES IN INDIA

R. Sathiadhas, R. Narayana Kumar, Sheela Immanuel and Bastin Fernando
Central Marine Fisheries Research Institute, Cochin-14.

Introduction

The harvesting technology in open access marine fisheries and marketing pattern of marine products have undergone rapid structural change in the post liberalisation era of the Indian economy. Product development, market diversification and consequent infrastructure developments in fishery sector have been oriented mainly towards the enhancement of exports and forex earnings. The thrust on exports led to the growth of preservation and processing sector of seafood industry. The commercial importance of most of the primary markets (landing centres) in the rural coastal areas have been shifted to a few urban centres. The rural-urban divide is further widened as the movement of fish is channelised to the long distance urban markets. High consumer preference of quality fishes with assured demand in urban markets coupled with the increase in fin fish exports deprived the availability of the same in the local rural markets. Even the limited development of infrastructure in handling, transportation and preservation of fish in the domestic marketing system is mainly confined to the urban markets. With this theme in focus, an attempt has been made to discuss the following issues in domestic and external fish marketing systems.

- 1) Growth of fish production, export and the price behaviour of commercially important marine fishes in the domestic and external marketing system.
- 2) Distribution pattern of fresh and processed fish and price spread in the domestic marketing
- 3) Sectoral infrastructure development, capital investment, capacity utilisation and impact of market promotion activities
- 4) Utilisation pattern of fish wastes and byproducts
- 5) Role of women in post-harvest operations
- 6) Problems of rural marketing and remedial measures
- 7) Development of domestic vis-a-vis export marketing and rural vis-a-vis urban markets in the fish marketing systems.

The data collected from both primary and secondary sources are utilised for this study. The primary data on fish arrivals and prices were collected from the selected landing centres (primary markets), wholesale and retail markets located at Vishakapatnam, Kakinada, Chennai, Mandapam, Tuticorin, Vizhinjam, Cochin, Calicut, Mangalore, Karwar, Mumbai and Veravel. The secondary data were collected from the National Marine Living Resources Data Centre (NMLRDC) of CMFRI and publications of Marine Products Export Development Authority (MPEDA) and Ministry of Agriculture.

Production and supply trends

The major source of supply for the export market is from marine capture fisheries and to a certain extent from aquaculture sector. The contribution of marine and inland

sectors in total fish production during the last five decades is presented in Table 1.

The marine fish catch has witnessed a marginal increase during this decade, but the annual growth rate has declined by four per cent between 1990 and 1996. Compared to this, inland fish catch has increased substantially during this period. This may be mainly because of the increase in production from fresh and brackish water aquaculture.

The growth of Indian sea food export is presented in Table 2. About 15-20 per cent of the total marine fish production is channeled for export marketing. The quantity of sea food exported increased from about 75,000 tonnes in 1980-81 to 3.40 lakh tonnes in 1999-2000. The forex earnings also increased from Rs. 234.84 crores to Rs. 5096 crores during the same period. The unit value realised increased from Rs. 31 per kg to Rs. 150 per kg during the past two decades. The increased export demand of shrimps and inclusion of live items in the export basket, besides product diversification like squids, cuttle fish, and fin fish varieties along with the economic reforms, associated with Exim policy have helped to bring about this phenomenal increase.

Price behaviour

The price of fish fluctuates widely because of their uncertain production, perishable nature and variation in short run supply. As the fish supply is of highly inelastic nature, a bumper catch on any one-day will slash the price to floor level and a small catch will increase the price to high level.

(a) Domestic market

A case study on marine fish marketing in Tamil Nadu indicated that the average retail price recorded manifold increase between 1974-75 and 1997-98 (Table 3). The price of seer fish increased about eight times during this period while mackerel and sardines increased about 10 times. Besides, the diversion of quality fishes like seer fish, mackerel, pomfrets and sardines to export markets has not only hiked their prices but also made their availability scarce in local markets. As a result, though the consumers are ready to pay for these quality fishes they are not available to them.

(b) Export market

The average unit value realisation in the export market for commercially important varieties is presented in Table 4.

It is found that the unit value has increased for all the varieties except for sardines. The increase in price is mainly because of the consistent increase in the export market

and domestic demand. It is interesting to note that the unit value realised for certain varieties in the export market is lesser than the domestic prices but they are still exported at the cost of affecting the supply at the local rural markets.

Price spread

The efficiency of marine fish marketing system could be understood by analysing the fishermen's share in the consumer's rupee. The marketing study conducted at all India level indicated that the fishermen's share in the consumer's rupee ranged from 23 to 30 per cent for different varieties of marine fish (Table 6). The fishermen's share in the consumer rupee was high for barracudas, tunas, croakers, mullets and mackerels. The high marketing margin observed in case of ribbon fish (62.50%), sardines (76.19%), indicate the higher proportion of intermediaries involved in the distribution. This can also be considered as a yardstick for investing more in fishery infrastructure.

Fishery infrastructure

The highly perishable nature of fish, bulk production, diversity of production and consumption of fish require facilities for processing and marketing. Besides, the technological developments in production centres have also emphasized the need for specialized input industries. The existing infrastructure for marine fish marketing can be classified into two categories namely,

- a) Physical infrastructural facilities in primary markets
- b) Infra structural facilities in the distribution system

The physical infrastructure in fisheries comprises 2,244 landing centres (otherwise termed as primary markets) six major fishery harbours and 28 minor harbours. Among these 2244 landing centres only a few centres have the well-developed landing and berthing facilities. This acts as an impediment in domestic marketing since a lot of wastage occurs in handling the catches at the landing centres.

The fishery infrastructure for handling and processing in India includes freezing plants, canning plants, ice plants, fishmeal plants, pre-processing centres (peeling sheds) and cold storage. The development of fishery infrastructure is vital for improving the quality of fish sold at domestic and export markets. The growth of fishery infrastructure and their capacity between 1992 and 1998 is given in Table 7. Among the different fishery infrastructures, the capacity of freezing plants increased by 50%, ice plants by 15% and cold storage by 40% currently over that of 1992. Except ice plants, the capacity of freezing plants and cold storage have also increased during the same period. In the case of canning plants and fishmeal plants their strength and capacity have declined during this period. Although the total number of pre-processing centres has remained more or less same as that in 1992, their capacity have increased by 23%.

The increase in the number of freezing plants and their capacity is an indication of increase in frozen seafood export. This is confirmed by the proportion of frozen items in our sea food export (about 85%) compared to value added products (which involve more preservation). The need for investment in the processing sectors as a whole is negligible when compared to investment on freezing plants (The Hindu, 29-7-2000)

Further, the processed output from these is mostly channelised for the export market, which is for only 15-20% of total fish production, leaving the rest consumed on domestic market. It is to be realised that the excessive emphasis on exports, the domestic consumers should not be deprived of fishes at affordable prices. This situation can be rectified by utilizing and establishing new infrastructure to cater to the need for internal marketing systems.

Product diversification and value addition

The Indian sea food export has seen phenomenal changes in its structure and pattern over the years. The transformation of dried items to frozen ones and fresh live items (Table 8). The proportion of dried items in sea food export declined from 41 per cent in 1966 to less than one per cent in 1996, the share of frozen product increased from 49 to 92 per cent. The share of canned items vanished from the scene after 1976. These changes might have mainly due to product diversification and market expansion suiting to the consumers' preference of the import countries.

Similarly, among the different components of sea food export, frozen shrimp dominated the list in the seventies and eighties. Gradually a shift occurred in favour of finfish and live items during the nineties (Table 9). There is a spurt in the export of finfishes in recent years due to the improvements in processing/preserving methods coupled with consistent global demand for these products.

The export of live items is the latest development in the Indian sea food export where the quantity of such exports increased from 575 tonnes in 1993 to 1637 tonnes in 1997 with the value realised increasing from Rs. 5.68 to 29.53 crores during the same period and current proportion of value added products in our sea food export is only around 10%. This can be attributed to the wide advanced technology and capital to produce more value added products. Any step in this direction will be of great benefit to our seafood exports.

Utilization of fish by-products

The utilization of by-products from marine fish industry will help to reduce the wastage and at the same time will prevent degradation of the environment to a considerable extent. Presently, conversion of by-products to fish meal and fish oil are the only two methods followed. But, in addition to these, there are other byproduct utilization such as chitin and its derivatives, fish bones, squalene which have potential applications in various fields including drug and pharmaceuticals (Nair, 1998).

The crustacean shell wastes contain chitin, a natural polymer having use in many industries like chromatography, paper, textiles, photograph, food and nutrition in agriculture. In India, around 50,000-60,000 tonnes of fish shells and head wastes are thrown out from processing industries annually. These wastes contain about 10% protein on dry weight basis. In India, *Squilla (Oratosquilla)* having an annual landing of more than 50,000 tonnes

(discarded by trawlers and it is a good source of chitin (Madhavan & Nair, 1975, Moorjani *et al* 1978). India has emerged as one of the leading producers of chitin and chitosan (Nair, 1998).

The utilization of shell fish and processing-waste for development of byproducts will help to provide significant quantity of protein, generate more employment opportunities and get additional income for fishermen families besides reducing environmental pollution (Nair 1998).

Utilization of bycatches and low-value fish

Discarding of bycatches and low value fish at sea is nowadays causing global concern. In India, the bycatches brought ashore by about 2.3 lakh fishing craft form a huge quantity depending upon the season. These bycatches brought ashore by traditional fishing crafts and medium sized fishing vessels are fetching good prices with further prospects of better markets (Gopakumar, 1998).

However, though large quantity of bycatches is brought ashore by traditional and motorized crafts, they are not discarded nowadays because of their local consumption in fresh form. In states like Kerala, the demand for fresh fish is very high because of the large scale export of quality fishes (Gopakumar, 1998).

The bycatch in fishing operations is unavoidable when trawl net is employed. An estimate of such bycatch has been made and categorized based on the price range and presented in Table (10 & 11) (Gopakumar, 1998). The utilization of bycatch varies across the States (Bostock, 1987) and in Gujarat a 100 per cent utilisation of bycatch is reported.

The Bay of Bengal programme (BOBP) assessed the bycatch from the east coast fleet – from Visakapatnam and north to the sandheads bank-at 100 to 30,000 million tonnes. Most of the discards were from large multi-day vessels of over 16 m. especially freezer trawlers of over 20 m (Bostock and Ryder, 1995).

The problem of bycatch can be solved if the answers to the following questions are found (Gopakumar, 1998) :

- a) How economical is it for the vessel owners to preserve and bring their catch ashore ?
- b) What is the method to transport them to interior markets to get better prices ?
- c) What are the improved methods of utilization to convert them to high value processed products ?

Role of women in fish marketing

Fisherwomen play a significant role in the retail fish marketing, especially in rural areas. The women folk of the traditional fishermen households mostly take up retail fish sales as an alternative avocation. A case study was conducted in Neendakara fisheries harbour, Kerala to assess the role of fisherwomen in fish marketing. It was found that, a group of 35-40 fisherwomen from Trivandrum comes by a MATSYAFED bus to Neendakara landing

centre. They form into group (5-6) and participate in auctions. They take a few lots and divide the same among themselves. The women return in the same bus and get down in different retail markets at Trivandrum. They have to pay a transport cost of Rs.900 /month to MATSYAFED and earn a net profit of almost Rs. 100 per day. The earnings is the motivating factor behind their long travel i.e., a distance of 75 km. Similar practice is being followed in all the major landing centres in Kerala. They can be encouraged with adequate financial and technical support. This will empower them to earn more income and ensure household security. Besides, fisherwomen can also be trained in processing activities like salting, drying, curing etc and improve their share in fish marketing.

In Kerala the role of women in fisheries, fish marketing and related activities are very significant. About one lakh fisherwomen out of the total labour force of about 1.6 lakh, (Table 12) are involved mainly in shore based activities

About 50 per cent of the total work force is women. Among the different categories of works, fish curing (66.47%) and peeling (90.32%) are the major areas where women are involved. This indicates the potential of this sector and the scope for intervention to ensure improvement of the role of women in fisheries and related activities.

Cooperative fish marketing

In common property resources like marine fisheries, the exploitation, marketing and management can be executed well by collective action of the fishermen community. This type of cooperative action will be an effective tool for attaining sustainable production, maintaining distributive justice and gaining maximum social benefit. The contribution of cooperatives to the development of agriculture and to various other sectors is noteworthy. The National Federation of Fishermen Cooperatives is the apex body of fishermen cooperatives, dedicated to the development and growth of fishery sector. There are about 9,500 primary societies with a membership of about one million in the fishery cooperative sector linked with 108 central (district/regional) level federations and 17 state level federations, under this national federation. Although consistent efforts had been taken to form fishermen cooperatives and involve them for the common benefit of production and marketing, the success at the national level is not quite laudable due to the intrinsic socio-economic problems in the marine fisheries sector.

Fishery cooperatives have to play a vital role in production and marketing sectors of marine fisheries to improve the socio-economic status of coastal rural fisherfolk. Cooperative fish marketing will be immensely helpful to enhance the standard of living of fishermen by ensuring a fair share of consumer's rupee to the producers and to reduce the influence of intermediaries in the marketing system.

However, despite the increasing demand and high price of marine fish both in internal and external markets, the influence of intermediaries in the marketing process could not be challenged. Still 32 - 68% of the consumer's rupee for different varieties of fish is going toward marketing margins. During the last three decades, marketing of marine

fish was undertaken through fishermen cooperatives and corporations by various state governments. But, a little success was gained only in Gujarat, Maharashtra and a few pockets of other maritime states. Fish marketing conducted by fishermen societies in the districts of Tuticorin and Kanyakumari of Tamil Nadu State during the last decade indicated that the fishermen receive 60 – 80% of consumer's rupee for different varieties of fish. Hence, to protect the interests of both the producer and consumer, it is essential to introduce and expand the cooperative fish marketing system throughout the country.

A successful fishermen cooperative society is running in Versova fishing village of Greater Mumbai in Maharashtra. This cooperative was formed in 1944 as Versova Koli Samaj Sangh and was registered as Vesova Machimar Vividh Karyakari Sahakari Society Ltd in 1948. The society undertook regular supply of inputs to the fisherfolk. Later, the activities of the society expanded to include formation of two transport societies and setting up of ice plant and cold storage units. Presently, the activities undertaken by the society include generation and utilization of resources, support activities and promotional activities. The performance of the society can be seen from diversified sales activities undertaken by the society during 1994 – 95 and 1996-97 (Table 13).

The Society is a successful role model in the fisheries sector by providing immense support to the socio-economic improvement of fisherfolk in the following ways :

1. The cooperative helps in providing and processing of credit facilities speedily from various institutions.
2. As cooperatives does bulk buying of essential items and charges only marginal profit, fisherfolk are benefited as regards to the cost and ease in the purchase of these items
3. The cooperatives help in transport, marketing as well as storage of fish . The middle persons are more or less non-existent.
4. Local fisherfolk are employed in ice factories and diesel pump- repair shop, etc.
5. The co-operative also helps for other charitable causes.

Marketing in rural and semi rural areas:

It is a well known fact that in many rural and semi rural areas, as well as in small town fish marketing has declined. For example, even in coastal and small towns with approximately one lakh population like Dindigul, Erode, Dharmapuri, Kovilpatti, supply to fish markets has declined much despite very good transport and road facilities.

Nagercoil is a town with many fishing villages, within a radius of 30 km. Yet, the quantity and variety of fish available have come down in recent years. Table fishes like seerfish and pomfrets, small fishes like threadfins and small carangids are no longer available in good quantities through out the year. The situation is still worse in most of the rural markets. Similarly in Tuticorin even though there are more than 5 established fish retail market places, good quality fishes are available only in one market (VOC market) and other markets does not at all offer quality fishes such

as seer fishes as they used to do earlier despite a very good clientele. With regard to Palayamkottai suburban markets, nowadays only very poor quality fishes are sold, resulting in the negative patronage of potential customers. The reasons can be summarised as follows :

1. Unhygienic conditions of the retail shops, which make a negative, impact on the regular as well as potential customers, in small towns.
2. Unethical and willful practice of retailers who sell spoiled and low quality fishes at optimum price when they have purchased them at throw-away prices namely leather jackets, puffer fishes, dolphin fishes, croackers and dogsharks.
3. Improper preservation owing to negligence such as insufficient quantity of ice, even though the merchant could afford.
4. Unnecessary demand of payment from police stations of towns on the way from the fish transporter, even though they do not violate any law by transporting fish. This practice actually pushes up the price of the fish and discourages the merchant to explore new markets.
5. Consumer preference for quality fishes such as bulls eye, carangid, *Elagatis bipinnulatus*, *Priacanthus species* and *Aprion bipinnulatus* owing to their unfamiliarity with those fishes.
6. The small size of the rural market may not attract large-scale fish merchants who might have invested more money in vehicles and containers.

Remedial measures suggested

1. Bank or Government loans be given to set up small but very hygienic retail shops, where fishes can be displayed as well as preserved at the same time, like refrigerated ice-cream windows.
2. Local Panchayats, and watch groups must be formed which will enforce rules so that retailers shall not sell the throwaways of landing centres as fish. Those unethical sellers shall be forbidden to sell on that day in the rural markets, by village panchayats themselves.
3. Improperly preserved fishes should not be allowed to be sold by the traders: The local panchayats alone can enforce such discipline. Once a merchant is debarred to sell fish on that particular day this action might urge the seller to properly preserve.
4. The higher echelons of police department should be informed of this unwarranted collection of toll by policemen from the fish transporters.
5. Customers' bias against good quality but unfamiliar fishes may be gradually removed by creating proper awareness

6. Establishment or expansion of rural marketing is in the hands of small-scale fish vendor and merchants. Therefore, all the help both material and money, should be extended to small-scale merchants. Small, good and durable quality insulated boxes may be given to small-scale vendors.

In Tamil Nadu, farmers' markets, farmers can carry their produce in buses free of cost. In the same vein the fish marketing women may be permitted to carry free of cost the insulated boxes to rural markets. Such a plan is being currently contemplated by Tamil Nadu Government

Failure of seasonal fishery and marketing problems:

In a fish market zone like Tuticorin, fishery has failed successively for 3 years. This naturally has increased the price of various fishes and the first casualty in this scenario, is a small scale fish vendor who carries the fishes to small villages. After buying at a higher price, a vendor shall not venture to sell it in a rural market. When seasonal fisheries fails for years on end there is a possibility of rural markets completely being eroded. To avoid this rural market erosion monetary incentives must be extended to traders during the period of extended fishery failure.

Purchasing power of rural consumers.

The term rural consumers does not mean poor people. In the rural areas of Kanyakumari, Madurai, Thanjavur, and Coimbatore districts where agriculture is very much a gainful occupation people are often armed with high purchasing power. The producers of fast moving consumer products (FMCP) are now a days targeting this semi affluent section of the people. When this being the case, that marketing of fishery products are not tried in such areas, needs our best of attention.

Sales-promotion of marine products

When millions of rupees are spent by the Govt. for sales promotion of marine products abroad, no attempt has been made to promote the same in our country. Therefore, in the lines of coffee Board and Tea Board, a separate Body must be established to promote fish consumption in our country.

Quality control

Elsewhere in this paper, consumer bias, and consumer resistance against fish in rural areas have been mentioned. These consumers' bias and resistance are ascribed to unethical practices of merchants, short weighing and unhygienic product display. For our export products there is a quality control. When the same quality control is introduced in the inland market also, naturally the marine product shall be more welcomed to consumers. When quality products are sold naturally the consumers' resistance shall wear down.

Rural market is an insurance against the fall / decline of export market

Export market of marine products is liable to crumble or slacken at any time owing to political reasons or

enforcement of new laws in the foreign lands. Now we are aware that many export products are linked to social and hygienic issues. Some times back, U.S. Govt. linked the prawn imports from India to turtle escape device in the trawl nets of Indian trawlers. In such events, market may see glut or even a collapse. When there is a well developed urban and rural markets such market collapse can be avoided and all concerned, from the fishermen to the trader shall be benefited. Thus, rural market is a sustainable insurance against any export market upheavals.

Conclusion and policy implications

The fish prices fluctuate widely in the domestic marketing system, with only a few varieties fetching a substantial share of consumer's rupee to the fishermen. High marketing margins indicate the intervention point for the government to make appropriate investments in fishery infrastructure so as to benefit the producer and consumer. Besides, market penetration into the interior markets should be popularized taking advantage of the preservation facilities.

The involvement of a number of middlemen in the marketing chain adversely affects the interest of both fishermen and consumers. The basic amenities are not present in many of the markets. No proper grading or weighing is done for fresh fish and there are no proper sheds for auctioning. Inefficient collection and distribution of fish results in concomitance of surplus and deficit in the internal marketing system.

In the export marketing, the gain achieved already should be consolidated and new markets for our seafood should be explored. By the implementation of systematic market promotion measures, the export of quality fishes and value added products (which is now only less than 10% of our exports) can be improved. Market intelligence studies should be undertaken to assess comparative advantage of exporting different products. The local bodies to improve the domestic trade may provide the establishment of adequate number of essential fishery infrastructure facilities like ice plants and freezing units at least for a cluster of landing centres.

The role of fishery cooperatives now in fish marketing is very minimal barring one or two aspects. This situation has to be improved by encouraging the formation of fishery cooperatives by providing adequate technical and financial support. Awareness among the fishing community should be created about the importance of cooperatives in fish marketing. The participation of women in fishery and related activities like fish retail sales, pre processing should be encouraged. This will help to increase their disposable family income as well as improve their standard of living.

Above all, fish marketing in India should be viewed from a holistic approach comprising the supply factors, distribution channels, pre and post harvesting operations, utilization pattern and related fields. Our success lies in the identification of an appropriate mix of all these factors.

Table 1. Fish Production in India (in lakh tonnes)

Sl.No.	Year	Marine	Inland	Total
1	'1950-51	5.34	2.18	7.52
2	'1960-61	8.80	2.80	11.60
3	'1970-71	10.86	6.70	17.56
4	'1980-81	15.55	8.87	24.42
5	'1990-91	23.00	15.36	38.36
6	'1991-92	23.47	17.10	41.57
7	'1992-93	25.76	17.89	43.65
8	'1993-94	26.49	19.95	46.44
9	'1994-95	26.92	20.97	47.89
10	'1995-96	27.07	22.42	49.49
11	'1996-97	29.67	23.81	53.48
12	'1997-98	29.25	24.38	53.63

Source : Gopakumar, 1998

Table 2. Growth of sea food export in India 1980-81 to 1999-2000

Year	Sea food export		Average
	Quantity(tonnes)	Value(Rs.crores)	Unit value (Rs/kg)
'1980-81	75591	234.84	31.07
'1981-82	70105	286.01	40.80
'1982-83	78175	361.36	46.22
'1983-84	92187	373.02	40.24
'1984-85	86187	384.29	44.59
'1985-86	83651	398.00	47.58
'1986-87	85843	460.67	53.66
'1987-88	97179	531.20	54.66
'1988-89	99777	597.85	59.92
'1989-90	110943	634.99	57.29
'1990-91	139419	893.37	64.08
'1991-92	171820	1373.85	80.08
'1992-93	209025	1768.56	84.61
'1993-94	243960	2503.62	102.62
'1994-95	307337	3575.27	116.23
'1995-96	296277	3501.11	118.17
'1996-97	378199	4121.36	108.97
'1997-98	385818	4697.48	121.75
'1998-99	302934	4627.00	152.74
'1999-00	340000	5096.00	149.88

Source : Marine products export review, MPEDA various issues

Table 3. Retail price behaviour of selected varieties of fish in domestic markets

Sl.No	Varieties	Average price Rs / kg				
		'1973-74	'1984-85	'1989-90	'1993-94	'1997-98
1	Seer fish	9.00	27.00	35.50	66.00	100.00
2	Pomfrets	2.50	22.80	29.50	40.00	120.00
3	Tuna	3.00	16.50	18.50	39.00	25.00
4	Sharks	2.50	17.00	17.00	31.00	60.00
5	Mackerel	3.00	9.85	12.50	25.00	30.00
6	Sardines	2.00	6.70	10.00	16.00	25.00
7	Ribbon fish	2.50	8.50	10.00	19.00	16.00

Source : SEETTD, CMFRI

Table 4. Average unit value of realisation of commercially important varieties of fish in export market [1989-90 - 1997-98]

Sl.No	Varieties	Price in Rs / kg				
		'1989-90	'1993-94	'1994-95	'1995-96	'1997-98
1	Seer fish	-	51.23	52.41	58.49	67.00
2	Pomfrets	42.81	107.08	57.92	58.90	172.00
3	Tuna	16.85	27.11	29.54	25.85	38.00
4	Sharks	-	25.03	31.30	34.67	41.00
5	Mackerel	-	21.23	32.77	30.93	40.00
6	Sardines	-	31.93	38.83	42.57	34.00
7	Ribbon fish	-	21.36	21.67	23.45	27.00

Source : Marine Products Export Review - various issues

Table 5. Fish distribution pattern in India (1989-1995)

Year	Fresh	Frozen	Cured	Canned	Reduced	Others
1989	64.20	7.29	16.48	0.80	8.79	2.43
1990	65.18	7.46	15.63	0.76	8.41	2.56
1991	66.91	6.58	15.18	0.74	8.24	3.34
1992	67.06	6.82	14.14	0.62	8.53	2.83
1993	68.31	6.81	14.18	0.22	8.20	2.29
1994	68.64	6.55	13.77	0.26	8.39	2.40

Source : Government of India, 1996.

Table 6. Marketing margin and price spread for major fish varieties in India 1992-98

Sl.No	Variety	LP	RP	Price spread	Fisherme share
1	Seer fish	100	150	50	67
2	Pomfrets	100	150	50	67
3	Baracudas	40	60	20	67
4	Tunas	20	37	17	54
5	Sharks	60	90	30	67
6	Cat fishes	30	40	10	75
7	Mackerel	20	30	10	67
8	Sardines	5	22	17	23
9	Ribbon fishes	10	26	16	38
10	Rays	12	26	14	46
11	White baits	8	27	19	30
12	Lizard fishes	11	33	22	33
13	Goat fishes	20	30	10	67
14	Thread fin bream	20	30	10	67
15	Croakers	34	54	20	63
16	Silver bellies	5	25	20	20
17	Big-jawed jumper	100	150	50	67
18	Mulletts	28	37	9	76
19	Half & full beaks	20	40	20	50

LP : Average Landing Centre Price

RP : Average Retail Price

Table 7. Growth of fishery infrastructure 1992-98

Sl.No	Category	1992		1998		2008
		Registered	Capacity (tonnes/day)	Registered	Capacity (tonnes/day)	
1	Freezing plants	248	2779	372	6600	424 14600
2	Canning plants	23	82	14	52	↓
3	Icc plants	129	1894	148	1800	62 1800 ↑
4	Fish meal plants	21	376	15	330	
5	Pre- processing centres	921	2150	900	2700	581 5207
6	Cold storage	321	49775	450	80000	497 163404

Table 8. Structural changes in the seafood export 1966-1996 (Percentage share)

Year	Dried Items		Canned items		Frozen items	
	Quantity	Value	Quantity	Value	Quantity	Value
1966	41.00	15.00	8.00	14.00	49.00	71.00
1976	20.00	6.00	6.00	8.00	73.00	86.00
1986	7.00	2.00	0.00	0.00	90.00	95.00
1996	0.90	0.80	-	-	92.00	93.00

Table 9. Itemwise exports of marine products from India-percentage share (1991-97)

Q : Quantity in Tonnes
V : Value in Rs. crores

Items		1993	1994	1995	1996	1997	
1	Frozen shrimp	Q	83720.00	105395.00	92851.00	103427.00	106297.00
		V	1543.38	2552.44	2337.60	2631.13	3109.53
2	Frozen fish	Q	88774.00	114659.00	109513.00	142764.00	198445.00
		V	277.58	429.00	381.91	530.63	753.63
3	Frozen squid	Q	36038.00	38129.00	39859.00	44560.00	34742.00
		V	194.48	240.14	286.87	304.90	261.54
4	Frozen cuttlefish	Q	21255.00	27045.00	29386.00	34080.00	35097.00
		V	146.38	210.06	233.23	281.23	297.14
5	Frozen lobsters	Q	1462.00	1303.00	1410.00	1266.00	1344.00
		V	39.57	43.82	46.71	45.10	49.71
6	Chilled Items	Q	-	3.00	2398.00	1963.00	2614.00
		V	-	0.08	21.37	21.86	40.18
7	Live items	Q	575.00	852.00	1601.00	2221.00	1637.00
		V	5.68	2.63	17.48	34.96	29.53
8	Dried items	Q	3057.00	3123.00	6753.00	9914.00	6120.00
		V	5.10	7.27	30.37	45.07	36.84
9	Others	Q	5027.00	10706.00	5753.00	13480.00	12681.00
		V	40.63	80.08	39.16	85.13	83.48
TOTAL		Q	239918.00	301278.00	289524.00	353675.00	398977.00
		V	2252.80	3565.52	3394.70	3980.01	4661.58

Table 10. Bycatch landed by shrimp trawlers in India

Sl.No	Price range (Rs / kg)	Quantity (mt)	In relation to total Production by trawlers (%)
1	'07 - 10	176000	16
2	'10 - 20	561000	50
3	'20 - 50	21800	19
4	'>50	169000	15
TOTAL		1124000	100

Source : Gopakumar, 1998.

Table 11. Discards of East Coast trawlers

Category	Type vessel	Gross tonnage of the vessel	No of vessels	Voyage time (approximatee days)	Annual discards (tonnes)
1	Double rig trawler of 20m length (freezer)	'150	150	'30-40	'40 - 60000
2	Double rig trawler of 16-19m (mainly ice)	'40-50	70	'21	'21 - 32000
3	Sona stern trawlers	'20-25	70	15	'14000
4	Mechanised fishing boats (10-11m)	'7-16	320	'1-7	'18000
5	Mechanised boats (Andhra Pradesh)	'OAL 10-15	8911	'1-7	Nil

Table 12. Working population in ancillary fishery sector - Kerala 1998

Sl.No	Category of workers	No. of women workers	Total No. of workers
1	Beach workers	5612 (26.93%)	20843
2	Small scale fish sellers	20220 (29.94%)	67527
3	Fish curers	14028 (966.47%)	21103
4	Peeling workers	39397 (90.32%)	43620
5	Processing plant workers	6504 (58.75%)	11051
	Total	85671 (52.19%)	164144

Source : Velayuthan, 1999. (Figures in parenthesis indicate the percent to the total number of workers)

Table 13. Sectional sales from Versova cooperative fish society

Section 1	'1994 - 95	'1996 - 97
1. Diesel Section sale	441.54	576.2
2. Main Division sale	55.82	63.52
3. Ice sale and rent sale	81.52	109.89