

Marine Fisheries Sector in Pakistan Development Strategy



Small and Medium Enterprise Development Authority
Government of Pakistan
www.smeda.org.pk

HEAD OFFICE

Waheed Trade Complex, 1st Floor , 36-Commercial Zone, Phase III, Sector XX, Khayaban-e-Iqbal, DHA Lahore
 Tel: (042) 111-111-456, Fax: (042) 5896619, 5899756
helpdesk@smeda.org.pk

REGIONAL OFFICE PUNJAB

Waheed Trade Complex,
 1st Floor, 36-Commercial
 Zone,
 Phase III, Sector XX,
 Khayaban-e-Iqbal, DHA
 Lahore.
 Tel: (042) 111-111-456
 Fax: (042) 5896619,
 5899756
helpdesk@smeda.org.pk

REGIONAL OFFICE SINDH

5TH Floor, Bahria
 Complex II, M.T. Khan
 Road, Karachi.
 Tel: (021) 111-111-456
 Fax: (021) 5610572
 helpdesk-
khi@smeda.org.pk

REGIONAL OFFICE NWFP

Ground Floor
 State Life Building
 The Mall, Peshawar.
 Tel: (091) 9213046-47
 Fax: (091) 286908
 helpdesk-
pew@smeda.org.pk

REGIONAL OFFICE BALOCHISTAN

Bungalow No. 15-A
 Chaman Housing
 Scheme
 Airport Road, Quetta.
 Tel: (081) 831623,
 831702
 Fax: (081) 831922
 helpdesk-
qta@smeda.org.pk

Table of Contents

<u>INTRODUCTION</u>	5
<u>METHODOLOGY</u>	6
<u>TERMS</u>	7
MAINLY THREE GROUPS OF MOLLUSCS CHARACTERIZED BY INTERNAL SKELETON, TENTACLES SURROUNDING MOUTH AND QUICK MOVEMENT BY MEANS OF WATER, JET PROPULSION, NAMELY CUTTLEFISH, SQUID, AND OCTOPUS	7
<u>WHAT IS SEAFOOD: PRODUCTS AND RELATIVE VALUE ADDITION</u>	8
<u>WORLD SEAFOOD TRADE : TRENDS AND PAKISTAN'S SHARE</u>	9
<u>PRODUCTION AND STATE OF FISHERIES RESOURCES</u>	9
<u>FISH UTILIZATION</u>	11
<u>RECENT TRENDS IN INTERNATIONAL FISH TRADE</u>	13
<u>PAKISTAN'S SHARE IN INTERNATIONAL MARKET</u>	15
<u>COMPOSITION OF PAKISTAN'S EXPORTS</u>	16
<u>PAKISTAN'S FISH EXPORT AS % OF TOTAL EXPORT</u>	16
<u>FISH QUANTITY EXPORT AS % OF TOTAL CATCH, T.M.CATCH, T.E.CATCH</u>	17
<u>STATE OF PAKISTAN'S MARINE FISHERIES SECTOR</u>	17
<u>FISHING SETTLEMENTS/GROUNDS</u>	17
THERE ARE ON THE SEACOAST OF PAKISTAN MORE THAN 30 SPECIES OF SHRIMP, 10 SPECIES OF CRAB, 5 SPECIES OF LOBSTER AND ABOUT 70 COMMERCIAL SPECIES OF FISH INCLUDING SARDINE, HILSA, SHARK, MACKEREL, BUTTERFISH, POMFRET, SOLE, TUNA, SEA BREAM, JEW FISH AND CAT FISH, SHARK, EEL AND SHRIMP.	17
<u>FISH LANDING POINTS/HARBORS</u>	18
<u>KARACHI FISH HARBOUR</u>	19
<u>KORANGI FISH HARBOR</u>	20
VESSELS(CATEGORIES)	22
1991	22
SINDH	22
BALOCHISTAN	22
S#.....	24
F.A.O GROUP	24
<u>FAO REPORTS</u>	24
YEAR.....	24
<i>Marine</i>	24
INLAND.....	24

AREA.....	25
<i>Quantity (1998)</i>	25
<i>Quantity (1997)</i>	25
<i>Quantity</i>	25
<i>(1996</i>	25
<i>Quantity</i>	25
INLAND.....	25
<u>AQUACULTURE</u>	27
<u>SHRIMP CULTURE</u>	27
<u>CEPHALOPOD RESOURCES AND LANDINGS</u>	27
<u>EXISTING FISHERIES RESOURCES AND INCREMENTAL POTENTIAL</u>	29
RESOURCES.....	30
<i>Biomass</i>	30
M.S.Y.....	30
THE MARKETING CHANNEL OF THE FISH IS MORE OR LESS SIMILAR TO THOSE OF AGRICULTURAL PRODUCTS, WHERE LAND LORD PROVIDES A LAND AND THE PEASANT GROWS THE COMMODITIES. THE PRODUCE IS THEN SOLD IN THE MARKET THROUGH COMMISSION AGENTS TO WHOLESALERS AND THEN TO RETAILERS AND FINALLY TO CONSUMERS. THE INCOME AFTER DEDUCTING THE COST OF DIRECT INPUTS IS SHARED BY THE LANDLORD AND THE PEASANT.....	31
<u>CHANNELS OF DISTRIBUTION FOR FISH AND FISH PRODUCTS</u>	32
<u>STRUCTURAL PROBLEMS OF MARKETING</u>	33
<u>CHANNELS OF DISPOSITION OF THE CATCH</u>	33
<u>CHANNELS OF DISPOSITION OF FISH (MARINE & INLAND)</u>	34
DISPOSITION CHANNELS.....	34
1994.....	34
1995.....	34
<u>PRODUCTION OF MARINE EDIBLE/INEDIBLE FISH</u>	34
YEAR.....	35
<i>Total Marine Catch</i>	35
<u>TOTAL PRODUCTION OF EDIBLE MARINE AND INLAND FISH AVAILABLE</u>	35
YEAR.....	36
MARINE EDIBLE FISH.....	36
<i>Inland Fish</i>	36
<u>HARVESTING</u>	37
<i>Fishing Technology</i>	37
<u>VOYAGE TIME:</u>	37
AVERAGE VOYAGE TIME	38
<u>POST HARVESTING</u>	38

The fish holds of these trawlers are not insulated. For preservation of catch the insufficient crushed ice is applied. Since no plastic crates are used for storing the catch on board, the catch is piled up in the fish hold with the result that the two third of the piled up fish of the whole catch is crushed and de-shaped under

pressure. All these factors lead to deterioration of the quality of landed fish. Due to the post harvest losses, the poor quality fish fetches less price to the fishermen. Therefore to contain these post harvest losses, the fish holds of the traditional boats urgently needed to be insulated. A cooling and refrigerated system must be installed and use of plastic crates for storing the catch in the fish hold should be mandatory. Careful handling at the port should also need to be encouraged..... 38

LANDING (AT HARBOR).....38

AUCTIONING.....39

TRANSPORTATION.....39

PROCESSING39

Value Addition Process 40

 FREEZING 40

 INDIVIDUAL QUICK FREEZING..... 40

 BLAST FREEZING 40

PROCESSING CAPACITIES.....41

FISHERIES RELATED RULES AND ACTS42

LEGISLATION OF THE COUNTRY42

A SUMMARY OF PROBLEMS44

TECHNICAL SUPPORT47

UPGRADATION OF EXISTING TRADITIONAL FLEET.....48

IMPROVING POST HARVESTING METHODS.....49

ANNEXES50

FAX: 51 - 922124650

GOVERNMENT OF PAKISTAN.....50

MR. MOAZZAM KHAN50

 GOVERNMENT OF NWFP 51

 GOVERNMENT OF SINDH..... 51

LIST OF FISHERY RELATED INDUSTRY AND ASSOCIATIONS52

 20. Mole Holder Association..... 52

FISHERY RELATED RESEARCH & EDUCATIONAL INSTITUTES52

(Some international Fisheries Organizations/Groups) 53

 P O BOX 0896, UN CENTRE, MEDTERMOLLEN 3, DK-2100 COPENHAGEN, DENMARK 53

 DEPARTMENT OF FISHERIES..... 53

 31 MINFENG LANE, XIDAN, BEIJING, CHINA..... 54

 ICH TRADING AB, VASTMANNAGATAN 9, SE-111 54

Introduction

Pakistan has a total coastline of 1,050 km and a total fishing area of approximately 300,270 sq. kms. Pakistan's fishing grounds are termed as highly rich in marine life with a vast variety of species having commercial value. However, this potential is not reflected in the export earning from fisheries sector, which has remained stagnant around 150 million US\$, during last decade. This situation is mainly attributed to highly unorganized nature of private sector, lack of focus in Government policies and little institutional investment (in public and private sector projects) in this sector.

Pakistan's export stood at 171 million US\$ in 1997-98. Whereas, a rough estimate based on maximum sustainable yield figures, existing value addition, and foreign benchmarks (Indian, Bangladesh and Malaysia benchmarks for %age of landed catch exported) puts our total export potential from this sector to around 1.0 billion US \$ from existing natural resources. Including a high potential area, i.e., aquaculture, in our fisheries sector, can yield even higher export earnings from fisheries sector in Pakistan.

Pakistan's domestic consumption of fish is termed as one of the lowest in the world at 1.6 KG per person/Year. This consumption pattern coupled with increased inland fish production (91,631 tons in 19987 to 167,530 tons in 1997) leaves little room for domestic marketing of marine fish. Therefore, the focus remains to be foreign markets mainly Europe, US, Japan and Middle Eastern countries. A brief analysis of Pakistan's export products in fisheries sectors reveals over dependence on few species with little value addition. In particular, overexploitation of shrimp species, reflected by over 66% share in export by value, poses a very strong threat to the industry as shrimp landing figures are declining and there are no signs of shrimp aquaculture development in the country. The dependence on a limited number of species causes an imbalance resulting in over exploitation of few and under-exploitation of other species. This imbalance is also reflected in fishing grounds with over 99% of landed catch being generated from continental shelf (0-35 NM) while EEZ (35-200NM) contributing less than 1%. Also our decreasing average unit prices (2.85 US\$/kg in 19987-88 to 2.22 US\$/kg in 1997-98) puts extra pressures on the industry for increased volumes. All of the above situation results in a fishing industry where we are catching more and more of limited number of species in already overexploited fishing grounds and selling these at low prices to our foreign buyers. Marine resources mismanagement is also aided by an obsolete fishing fleet and fishing methods, use of banned nets, fishing in prohibited breeding areas, poor landing conditions, highly unskilled fishermen and non-existent of modern fishing, handling and processing industry.

The negligence in exploiting marine fisheries resources is highly regrettable given the state of world markets. The world market stood at 52 billion US\$ in 1997 with Pakistan's share as less than 0.33%. Given the changing eating habits and depleting natural resources, world seafood market is termed as mainly "sellers market". The focus in fishing is shifting from already exploited regions to under-exploited areas because of conservation and environment pressures. However, despite such favorable circumstances, Pakistan's seafood exports have decreased during recent past with 1992 showing highest figures, i.e., 181 million US\$.

The fisheries sector in Pakistan offers direct employment to over one million people, most of which work as fishermen. There are a large number of fishermen's villages all along Pakistan's coast line where fishing is primary source of earnings for centuries. The stagnant fisheries sector directly effect standard of living of this community. In addition, these large socioeconomic group face economic survival problems due to marine resource mismanagement, decreased landing figures and problems faced by seafood processors (who buy their produce) in export marketing because of poor quality product.

Based on the export potential, current and potential employment opportunities and threats to survival of seafood industry in Pakistan, SMEDA decided to review the industrial value chain from harvesting to processing, with the objective to develop a strategy for optimal utilization of our marine resources. The Fisheries Development Strategy incorporates public and private sector interventions in all effecting areas, i.e., regulation, technology, management, marketing and human resources with a view to increase export earnings, create and sustain employment and bring about qualitative change in lives of millions of people involved in this trade.

Methodology

The process of strategy development for fisheries sector was based on data collection from all available resources. In addition to other information, following sources were reviewed for strategy development purposes:

- International Trade Commission data for fisheries trade
- FAO data and reports on fisheries sector
- Marine Fisheries Development (MFD) reports
- Export Promotion Bureau data on fisheries sector
- Karachi Fisheries Harbor Authority (KFHA) reports
- Fishermen's Cooperative Society landing and auction/commission data
- Infofish reports on Fishery sector profiles of different countries
- Relevant federal and provincial regulations for fisheries sector in Pakistan
- Relevant national and international regulations on seafood quality control
- Stock survey reports

Another important element of SMEDA's methodology was close liaison with stakeholders, i.e., fishermen, boat owners, middlemen, seafood processors and relevant government agencies. This ensured that the strategy is based on existing ground realities and that the stakeholder's point of view is incorporated for future development. In this context various office bearers were consulted from following organizations:

- Marine Fisheries Department (MFD), Ministry of Food, Agriculture and Livestock (MINFAL), Government of Pakistan (GOP)
- Export Promotion Bureau (EPB), Ministry of Commerce, GOP
- Korangi Fish harbor Authority (KoFHA), MINFAL, GOP
- Fisheries Department, Government of Sindh (GOS)
- Karachi Fisheries Harbor Authority (KFHA), GOS

- National Institute of Oceanography (NOI)
- Center of Excellence in Marine Biology, Karachi University
- Fishermen's Cooperative Society (FCS)
- Pakistan Seafood and Industries Association (PSIA) – both factions
- Sindh Trawler Owners and Fishermen Association (STOFA)
- Karachi Trawler and Boat Owners Group

Numerous meetings were held with personnel representing above organizations. In particular, the private industry was consulted at every step of the strategy development process. In addition, primary research was also conducted to develop value chain of fishing sector. SMEDA interviewed a sample of people and closely observed the following areas to develop an understanding of the existing processes and facilities:

- Fishing boats
- Unloading areas and the processes at Karachi Fish harbor (KFH)
- Auction halls and the process at KFH
- Chiller Rooms at KFH
- Processing plants
- Shrimp Peeling Sheds

Number of meetings were held with representatives on NCB's for discussing financing arrangements for funding public and private sector initiatives in fisheries sector.

A reference list of reports consulted and contacts for relevant agencies are attached as annexes for future reference.

Terms

Cephalopods:

Mainly three groups of Molluscs characterized by internal skeleton, tentacles surrounding mouth and quick movement by means of water, jet propulsion, namely cuttlefish, squid, and octopus.

Molluscs:

The group of species Abalones, winkles, conchs, Oysters, Scallops, Pectens and fresh water molluscs.

Jaira Shrimp:

Local name for the group consisting of *Penaeus merguensis*; *P. penicillatus* the three most valuable species of shrimp. It is also called white shrimp.

Kalri Shrimp:

Local name for the group of nine species of shrimp commercially next in importance to Jaira shrimp. It is also called brown shrimp.

Kiddi Shrimp:

Local name for the group of three least valuable shrimp species.

Penaeid and non penaeid shrimp:

The commercial importance marine shrimp species that fall under the biological family called Penaeidae are referred to as a penaeid shrimp while the rest including small acetes shrimp as well as fresh water prawn.

Shrimp & Prawn:

The marine water species are referred to as either shrimp or prawn while fresh water species as prawn.

Tuna & Tuna like Species:

Five major tuna species – Skipjack, Yellowfin, Albacore, Bigeye and Bluefin are treated as tuna while the others like kawakawa, longtail tuna, marlins, bonitos, seerfish, and so on of scombridae family are treated as tuna-like species or small tunas.

Keropok:

Cracker often containing minced fish and a common snack in Southeast Asia.

Block Frozen:

Frozen in blocks of 4 lb/1.8 kg or 2 kg or more for further processing.

Frozen Fish:

The frozen shrimp or fish at the temperature of above minus 40.

Fresh Fish:

The fresh shrimp or fish at the temperature or below minus 20.

IQF:

Individual quick freezing a technique for sea food processing, in which food is freeze with in 3-5 minutes.

MSY:

Maximum sustainable yield, in which one country is not allowed to go beyond its MSY.

Capture Fishery:

The catch of fish through the natural resources like Seas, Rivers, etc.

Aquaculture:

The production of fish by culturing it, like culture of shrimp farms, fish farms, ponds etc.

What is Seafood: Products and relative Value Addition

Any marine biomass whether fished from natural environment or developed through man made farms in any form, i.e., live, chilled/fresh, frozen or cooked is called seafood. The table below

highlights the relative commercial importance of major categories of marine biomass. The table only accounts for commercial categories regardless of individual specie prices. The categories are ranked on a 10 (highest) to 1 (lowest) scale according to their value addition.

TABLE -1

Product Category	Relative Value Addition
Live / Assorted Ready to Eat	10
Fresh	8
Processed (Simple Ready to Eat)	8
Processed (Ready to Cook)	7
Frozen (IQF)	5
Frozen (Blast)	4
Dried / Salted	3
Fish Meal	1

World Seafood Trade : Trends and Pakistan's Share

In 1995 and 1996 total world fish production expanded rapidly, reaching 121 million tones in the second year. Aquaculture output grew dramatically during the biennium while capture fisheries production registered a slight increase. Supplies for human consumption increased considerably, rising from 14.3 kg per caput (live weight equivalent) in 1994 to 15.7 kg in 1997.

Trade increased during the 1996-1997 biennium, although at a slower pace than in the previous two years, and the value of world exports of fish and fishery products reached US\$52.5 billion in 1996, with developing countries achieving a net trade surplus of US\$16.6 billion.

Production and state of fisheries resources

Capture fisheries

Total capture fisheries production in 1996 amounted to 94.6 million tones. China, Peru, Chile, Japan, the United States, the Russian Federation and Indonesia (in that order) were the top producer countries in 1996, together accounting for more than half of world capture fisheries production in terms of tonnage. Marine capture fisheries continued to account for more than 90 percent of world capture fisheries production, with the remainder coming from inland waters.

World marine capture fisheries production reached a new record of 87.1 million tones in 1996. However, as in previous years, the rate of increase continued to slow during the biennium. In the 1950s and 1960s, total world marine fisheries production increased on average by as much as 6 percent per year, doubling from 17 million tones in 1950 to 34.9 million tones in 1961, and doubling again in the following two decades to reach 68.3 million tones by 1983. In the following decade, the average annual rate of increase dropped to 1.5 percent and to a mere 0.6 percent during the 1995/96 biennium. The Northwest Pacific remains by far the most important fishing area in terms of both volume and value of landings

TABLE-2
World fisheries production and utilization

1

	1990	1992	1994	1995	1996	1997 ¹
	<i>(million tones)</i>					
PRODUCTION						
INLAND						
Aquaculture	8.17	9.39	12.11	13.86	15.61	17.13
Capture	6.59	6.25	6.91	7.38	7.55	7.70
Total inland	14.76	15.64	19.02	21.24	23.16	24.83
MARINE						
Aquaculture	4.96	6.13	8.67	10.42	10.78	11.14
Capture	79.29	79.95	85.77	85.62	87.07	86.03
Total marine	84.25	86.08	94.44	96.04	97.85	97.17
Total aquaculture	13.13	15.52	20.77	24.28	26.38	28.27
Total capture	85.88	86.21	92.68	93.00	94.63	93.73
Total world fisheries	99.01	101.73	113.46	117.28	121.01	122.00
UTILIZATION						
Human consumption	70.82	72.43	79.99	86.49	90.62	92.50
Reduction	28.19	29.29	33.47	30.78	30.39	29.50

State of marine fish resources. Overall, the state of exploitation of the main fish stocks (in fisheries for which assessment information is available) has remained more or less unchanged since the early 1990s. Recent reviews tend to confirm that, among the major fish stocks for which information is available, an estimated 44 percent are fully exploited and are therefore producing catches that have reached or are very close to their maximum limit, with no room expected for further expansion. About 16 percent are overexploited and likewise leave no room for expansion; moreover, there is an increasing likelihood that catches might decrease if remedial action is not undertaken to reduce or suppress overexploited. Another 6 percent appear to be depleted, with a resulting loss in total production, not to mention the social and economic losses derived from the uncontrolled and excessive fishing pressure and 3 percent seem to be recovering slowly.

Inland capture fisheries production. Nominally, exploitation of inland fisheries resources amounts to 7.6 million tones, equal to 8 percent of total capture in 1996. Exploitation is mainly of finfish, although molluscs (7 percent) and crustaceans (6 percent) may be locally important. Six of the ten top producers for inland capture fisheries are in Asia: China, with a production of nearly 1.8 million tones, produces 23 percent of the world total and nearly three times as much as

the second largest producer, India. Altogether, the top ten producer countries account for about 62 percent of world landings from inland capture fisheries.

Aquaculture

Aquaculture provided 20 percent of global fisheries production (and 29 percent of food fish) in 1996. Most aquaculture production (15.1 million tones) originated in freshwater. Of the remainder, 9.7 million tones were produced in marine environments and about 1.6 million tones in brackish water environments. These figures are excluding the production of aquatic plants, which amounted to 7.7 million tones in 1996.

Fish utilization

Fish for food

In recent years, the volume of fishery products marketed in their fresh state has increased not only in absolute terms but also as a percentage of all uses of fish. In 1996, about 33 percent of all fish was marketed fresh compared with 20 percent in 1986.

The supply of frozen fish is growing in both developed and developing countries. The production of frozen fish fillets, shrimps and prawns has increased in volume, as has the supply of fish in the form of ready-to-eat meals and other convenience food products.

Fish for feed

After 1994, when nearly 32 million tones of fish (representing nearly 30 percent of the total world fisheries production) were used for feed, there was a decrease in this usage in 1995. As a consequence of the El Niño phenomenon, the stocks of small pelagics in the Eastern Pacific are expected to shrink and the volumes landed in the course of 1998 may consequently be several million tones below those recorded in 1996.

Trade in fish and fisheries product

Fish, shellfish and fishery products are widely traded, with no less than 195 countries having exported part of their production and some 180 countries having reported fishery imports of varying amounts in 1996. In parallel with the increase in production, international trade has continued to grow, and at an accelerating rate in recent years. The largest part of this growth is real in that it is linked to the expansion of the world's economies and also reflects the increased availability - owing mainly to aquaculture production - of species in high demand as well as the sustained demand for fishmeal.

Export volumes reached 22 million tones in 1996, which is nearly three times the volume traded in 1976 and, when reconverted into the estimated live weight equivalent, represents 40 percent of overall fisheries production. This level has been reached after a period of relative stability, with foreign trade accounting for around 30 percent of production.

In 1996, the export sector earned US\$52.5 billion, representing 11 percent of the value of agricultural exports and about 1 percent of total merchandise trade. The share of trade in fish and fishery products in all agricultural trade has increased somewhat over the last decade.

Although fishery trade is not prominent at the global level, in some countries its contribution to foreign currency earnings is vital to the national economy; for example, fish and fishery products represent more than 75 percent of total merchandise exports for Iceland, the Faeroe Islands, Greenland, Maldives and Seychelles. In a further 20 countries, including Chile, Ecuador, Kiribati, Madagascar, Mauritania, Morocco, Mozambique, Namibia, Peru and Senegal, fisheries exports account for between 75 and 10 percent of total merchandise exports.

In terms of value, fishery exports are almost entirely (95 percent) composed of food products, although, in terms of volume, fishmeal and fish oil account for a much greater share. In value terms, more than half of the fishery export trade originates in developing economies and consists largely of imports into developed economies. While Thailand was the leading world exporter of fish products between 1993 and 1996, at a value of US\$3.4 billion, Norway's fishery exports were the highest in 1997. Japan, with US\$15.5 billion worth of imports in 1997, is the leading importer while the United States absorbs about 10 percent of world fish imports. These two countries and the European Community (including the value of the intra-EC trade) import 75 percent (in value terms) of internationally traded fishery products.

Recent Trends In International Fish Trade

1. World fish production expanded substantially from 117 million t in 1995 to 121 million tons in 1996. Estimates for 1997 indicate a lower level, due to lower pelagic catch as in South America. China is now the top producer with some 32 million tons in 1996. Peru was the second major fishing nation with catches exceeding 9 million tons.

TABLE -3

TABLE 1 - World Fish Production and Trade		1991	1992	1993	1994	1995	1996
Unit							
World fish production	million tons	98.9	101.7	105.2	113.5	117.3	121.0
Growth over previous year	%		+2.9	+3.4	+7.8	+3.4	+3.2
Exports of fishery products	'000 million US\$	38.9	40.2	41.4	47.6	52.4	53.1
Growth over previous year	%		+3.3	+3.0	+15.0	+10.0	+1.3
<i>Developed countries</i>	'000 million US\$	21.2	21.7	21.2	23.6	25.4	26.6
Growth over previous year	%		+2.2	-2.2	+11.3	+7.9	+4.7
<i>Developing countries</i>	'000 million US\$	17.7	18.6	20.2	24.1	26.9	26.4
Growth over previous year	%		+4.7	+9.0	+19.0	+12.0	-1.9
Imports of fishery products	'000 million US\$	43.5	45.3	44.6	51.1	56.1	56.9
Growth over previous year	%		+4.0	-1.5	+14.6	+9.8	+1.4
<i>Developed countries</i>	'000 million US\$	37.3	38.9	37.9	43.3	47.4	47.6
Growth over previous year	%		+3.3	-1.7	+14.2	+9.6	+0.3
<i>Developing countries</i>	'000 million US\$	6.2	6.7	6.7	7.8	8.7	9.3
Growth over previous year	%		+8.6	-0.2	+16.8	+10.9	+7.1
Developing countries' surplus	'000 million US\$	11.6	11.9	13.5	16.2	18.3	17.2
Growth over previous year	%		+2.5	+14.1	+20.0	+12.6	-6.2
Developed countries' net imports	'000 million US\$	16.1	16.9	16.7	19.7	22.0	21.0
Growth over previous year	%		+4.7	-1.0	+17.8	+11.7	-4.8

Source: FAO Fisheries Department

2. The increased volume of international trade in fishery products in 1996 was associated with higher trade in low-value commodities such as fishmeal and oil. The result was that the value of exports increased less than their volume to US\$ 53 100 million. First indications for 1997 show an increase in the value of fishery products traded, due to higher prices.
3. Developed countries accounted for about 84% of total imports of fishery products in 1997 in value terms. Japan was again the biggest importer of fishery products, accounting for some 30% of the global total. This share has been stable over the years. The European Community (EC) further increased its dependency on imports for its fish supply. The United States, besides being the world's third major exporting country, was the second biggest importer. In 1996, fishery imports into all three major market areas increased.
4. The increase in net receipts of foreign exchange by developing countries - deducting their imports from the total value of their exports - is impressive, rising from US\$ 5 200 million in 1985 to US\$ 17 200 million in 1996. For many developing nations, fish trade represents a significant source of foreign currency earnings.
5. Major issues of international trade of fishery products during the past two years were: the change in quality control measures in the main importing countries; the concern of the general public on overexploitation of the resource; environmental concerns with regard to aquaculture; the end of the tuna-dolphin issue; the trade discussion on turtle excluding devices and the creation of the Marine Stewardship Council (MSC), to mention just a few. Many exporting countries felt the change in quality control measure. In August 1997, the EC stopped imports of seafood from India, Bangladesh and Madagascar. In December 1997, there was a decision to prohibit the import of fresh seafood from Kenya, Tanzania, Mozambique and Uganda. The impact of these measures was severe in the seafood industry of these exporting countries, creating loss of employment and foreign exchange earnings of several hundreds of million of US dollars.

Pakistan's Share in International Market

The following table shows Pakistan's share in international seafood markets:

TABLE -4

Category	World Mkt \$	Quantity in Tons	Pakistan Export	Quantity in Tons	% of world mkt in Value	% of world in Quantity
Fresh Fish	6.11 Billion	1.5 Million	5 Million	3 thousand	0.008%	0.06%
Frozen Fish	7.50 Billion	4.1 Million	32 Million	26 thousand	0.043%	0.08%
Fish Fillets	6.50 Billion	2.1 Million	0	0	0	0
Fish Dried/Salted	1.1 Billion	0.18 Million	13.5 Million	21 thousand	0.123%	11.67%
Fish Salted			0	0	NA	NA
Fish Smoked	378 Million	50 thousand	NA	NA	NA	NA
Fish Liver	310 Million	29 thousand	NA	NA	NA	NA
Fish Meal	9 Million	4 thousand	NA	NA	NA	NA
Shell Fish	11 Billion	1.3 Million	109 Million	21 thousand	0.173%	1.62%
Invertebrates	4 Billion	1.1 Million	10.06 Million	8 thousand	0.025%	0.73%
Ready to Eat	6 Billion	1.6 Million	4.7 Million	229	0.078%	0.01%
Total	52 Billion	12 Million	174.26 Million	79226	0.34%	0.66%

Composition of Pakistan's Exports

The table below shows distribution of Pakistan's seafood export in different product categories.

TABLE -5

Category	Pakistan's Export 1997	Quantity in Tons	% of total Value	% of total Quantity
Fresh Fish	5 Million	3 thousand	3%	4%
Frozen Fish	32 Million	26 thousand	18%	33%
Fish Fillets	0	0		
Fish Dried/Salted	13.5 Million	21 thousand	8%	27%
Fish Salted	0	0		
Fish Smoked	NA	NA	NA	NA
Fish Liver	NA	NA	NA	NA
Fish Meal	NA	NA	NA	NA
Shell Fish	109 Million	21 thousand	NA	NA
Invertebrates	10.06 Million	8 thousand	6%	10%
Ready to Eat	4.7 Million	229	3%	0%
Total	174.26 Million	79226	100%	100%

Pakistan's Fish Export as % of Total Export

The table below shows contribution of Pakistan's seafood exports in total exports of Pakistan. As is evident, contribution by seafood sector is declining.

TABLE -6

Year	Pakistan's Export (US\$ million)	Total	Pakistan's Fish Export (US\$ million)	Total	Fish Export as % of Total Export
1994	8131		154.3		1.90%
1995	8707		140.7		1.62%
1996	8320		149.1		1.79%
1997	8628		171.5		1.99%
1998	7718		120.1		1.56%

Fish Quantity Export as % of Total Catch, T.M.Catch, T.E.Catch

The table below shows total catch exported as percentage of marine catch and marine edible catch. The table clearly shows a decline in %age export volumes from 1997 to 98. This is mainly because of deterioration in quality of seafood.

TABLE -7

Year	Total Catch	Marine Catch	Edible Marine Catch	Pakistan's Exports	Export as % of T.catch	Export as % of M.catch	Export as % of Edib M.Catch
	In 000 Tons	In 000 Tons	In 000 Tons	In 000 Tons	%	%	%
1994	558,099	418,574	230372	62,669	11.23%	14.97%	27.20%
1995	541,917	405,492	220004	65,773	12.14%	16.22%	29.90%
1996	555,489	395,397	206953	79,577	14.33%	20.13%	38.45%
1997	589,731	422,201	211100	77,290	13.11%	18.31%	36.61%
1998	596,980	433,456	243306	77,554	12.99%	17.89%	31.88%

State of Pakistan's Marine Fisheries Sector**Fishing Settlements/Grounds**

Major part of the fish catch in Pakistan is Marine, which forms 71 percent of the total catch. The Arabian Sea, which washes the coast of Sindh and Balochistan, has rich fish deposits of commercial significance in close proximity. Pakistan has a very long Range of coast-line with number of bays and broad continental shelf lying in front of Indus deltas and other natural factors which are ideal for growth of marine life in general and fisheries of commercial importance in particular.

The total seacoast of Pakistan is 682 miles, of which Balochistan and Sindh have 477 and 205 miles respectively. Of the Balochistan coastline Makran has 367 miles and Lasbella district of Kalat division 110 miles. Makran coast falls under Gawadar district, east of which is Lasbella district, to the west is Iran's border, to the north is Turbat district and Arabian Sea is to the south. Lasbella district has Karachi to east, Gawadar to the west, Khuzdar to north and Arabian sea is to the south. The Baluchistan coast runs east to the west while Sindh coast runs diagonally from north to south. The coastline of Karachi is more than 110 miles long. It extends from lailath on the east situated on the first channel of Korangi creek upto Beda situated on the north west of Karachi on Sonmiani Bay.

There are 30 fishing settlements out of which 19 fishing villages are of permanent nature. Temporary fishing centers are inhabited only during fishing season and abandoned later on.

There are on the seacoast of Pakistan more than 30 species of shrimp, 10 species of crab, 5 species of lobster and about 70 commercial species of fish including sardine, Hilsa,

shark, Mackerel, Butterfish, Pomfret, Sole, Tuna, sea bream, Jew fish and Cat Fish, Shark, Eel and shrimp.

Marine fishing is undertaken from right beyond the seacoast to 200 n. miles in the sea. The distance has been divided into two broad categories known as: (1) Coastal Water Fishing, and (2) Deep-sea fishing. Deep Sea is further divided in two zones. The distance specified are: up-to 12 n. miles for coastal water fishing, 12 to 35 n.miles for Zone 1 and 35 to 200 n. miles for Zone II.

Coastal water fishing is done in the villages along the coast that are predominately inhabited by fisherman whose main livelihood is fishing. The fishermen community is mainly Sindhis, Balochis, Kutchies, Zikries and Makranis. Karachi, which is the nucleus of fishing industry, is an old fishing settlement.

In Sindh the south of the Karachi Coastal area is Indus delta and has a number of fishing settlements in creeks, of which Keti Bunder is an important center.

In Balochistan the major centers for fish catching are (I) Ormara (ii) Kalamat (iii) Pasni (iv) Gawadar (v) Jiwani (vi) Kor Bandar, (vii) Ras Shumal Bundar (viii) Kapar (ix) Sur (x) Peshukan and Bandari. Lassbella district has Sonmiani, Damb and Gadani as its fishing centres.

Fish Landing Points/Harbors

The harbors and main landing points with their provincial location and relative importance, are as follows:

	Province	Relative Importance
1. Karachi	Sind	**** H
2. Korangi	Sind	*** H
3. Ibrahim Haidery	Sind	**
4. Shams peer	Sind	*
5. Lath Basti	Sind	*
6. Hawks Bay Coast	Sind	*
7. Manjhar	Sind	*
8. Sonari	Sind	*
9. Mubarrak Village	Sind	*
10. Kaitee Bandar	Sind	**
11. Shah Bandar	Sind	**
12. Kharo Chaan	Sind	**
13. Jatthi	Sind	**
14. Jhungi Sur	Sind	**
15. Badeen	Sind	**
16. Gowadar	Baluchistan	*** H
17. Pasni	Baluchistan	*** H
18. Ormara	Baluchistan	***
19. Gaddani	Baluchistan	**

20. Bhunda Wari	Baluchistan	*
21. Beroo	Baluchistan	*
22. Sonmiani Daam	Baluchistan	**

Legends: * meets local users requirements
 ** important
 *** very important
 **** most important
 H = Fishing Harbor

Karachi Fish Harbour

The Karachi Fish Harbor was built in 1955-56. It is located at a distance of 5 km from the entrance of the Karachi commercial port. The total area available in the fish harbor is approx. 310,000 m².

The infrastructure facilities available at the harbor include 10 floating piers i.e. pontoons (35 m x 5 m x approx. 2.8 m each) with a “head on” berthing capacity of 32 vessels on both sides of each pontoon. Ice / Bunker oil supply pier (35 x 55 m) is available on the west side of harbor entrance for future accommodation of 300 tons/day flake ice plant and an oil dispensing station. For maintenance and repair of large vessels one 80 m long slip way at a slope of 1:10 with a working platform of 31.5 x 12 m is available near the ice / bunker oil supply pier. For lifting and launching of smaller fishing vessels two reinforced concrete platforms (12 x 18 m each) are present on the west and north banks. Two fish market halls 115 m x 22 m and 94 m x 26.5 m respectively are located on the southern pier each having a separate cold store. Between these two fish market halls an ice store measuring 16 m x 5.5 m x 3.5 m is provisioned. On top of this store flake ice-manufacturing facility of 50 tons/day is planned. Current production capacity of the flake ice plant is 20 tons/day. 300-tons/day flake ice plant to be installed at the ice pier shall come on stream in first quarter of 2000.

Spread over the harbor, the other prevailing utility facilities include; FCS –substation in the industrial area and a substation on west bank near the ice / bunker oil supply pier which is directly connected with FCS-substation via a 11 kV cable, floodlights covering the entire harbor, two cabins for sewer pump stations, control tower on top of the old fish market, four toilet blocks with a 100 m³ capacity septic tank, two under ground concrete water storage tanks of approx. 100000 gallons and 60000 gallons and an overhead concrete water storage tank of approx. 24000 gallons with a newly provided chlorination facility upto 3 ppm, an under-construction 105 ft x 37 ft x 12 ft plastic fish crates washing shed.

Since there was no govt. agency to maintain the harbour at that time, the responsibility was of operating and maintenance was entrusted to fishermen’s cooperative society. In 1974 the harbour was transferred to Sindh Govt.

By the late 1970’s it was realized that the harbour originally designed to handle only 400 fishing vessel. And at that time the harbour was handling about 2000 vessels, resulting in serious congestion in the channel. Secondly the landing jetty was in dilapidated condition and that emergent measure s were required to rehabilitate it.

As a result the study was carried out in 1980 under the aegis of Asian Development Bank which earmarked funds for this project and the harbour was expanded at the cost of RS. 250 million. European Economic Community offered a grant of 12 million ECU to meet the project expenditure. The expansion of harbour included rehabilitation of the existing quay, storage facilities, water and power supply and dredging and widening of channel from 90 to 120 meter. New facilities included construction of floating pontoons, new fish shed of 2500 sq.metre, slipway and infrastructure of boat repair yard, new roads, open storage areas, new water supply and electricity facilities, ice supply berth, bunker fuel supply berth and the fire fighting equipment. The project was completed in 1990. Karachi fish harbour authority was established in 1984 for rehabilitation of the harbour and equipping it with accessories.

Korangi Fish Harbor

Because the congestion at he Karachi fish harbour it was strongly felt that another harbour nearby should be developed. Accordingly in august 1978 Asian Development Bank approved a project and engaged M/s Norconsult to conduct feasibility studies for the second fisheries development project in Paksitan. The consultant completed the assignment in 1979. Consequently ADB provide loan in December 1980 of 25.338 US million dollars for the construction of this harbour. Th basic objective of the harbour is to increase the foreign exchange earnings through new catch by accommodating large size vessels by exploiting the untapped fisheries resources in the sea.

The total project cost incurred so far is Rs. 916 million. The project facilities includes 709 meter long jetty, an auction hall an administrative building, a generator building, provision of service and utilities, power and utilities, sewerage and water, reclamation of 180000 sq. meter port area. Including 40,000 sq. meter for establishing processing units. And 50,000 sq.metre for boat building and repair facilities. Construction of 2.5 km of access road and 3200 sq.metres gravelled areas and port roads, provision for navigational aid equipment, internal development of industrial area etc.

The harbor was completed in 1992 but till today it is not operative,although, in recent past some deep sea fishing vessels are using Korangi's landing facilities. The KFHA authority was established in 1982 and started functioning in 1983.

There were two main objective of the harbour , one was to remove a congestion at the Karachi fish harbour and another was to promote deep sea fishing by accommodating larger size vessels for exploiting fishing vessels beyond 12. N miles. Neither of these objectives have yet been achieved.

Gawadar Fish Harbor

Compared to Sindh, Balochistan has a longer coastline, offering fish resources at a large coast. However the quantity landed in Balochistan is less than the sindh. This is attributed to lack of infrastructure and basic marketing facilities.

One important fish harbor in Baluchistan is Gawadar which is situated at about 290 miles west of Karachi on the Balochistan coast. About 23 percent of the total fish catch for the country is obtained from Balochistan. Out of which the share of Gawadar is 37 percent. The construction of the Gawadar port was completed 1992. The project includes construction of 416 meter long and 65 meter wide jetty. To provide marketing facility for the daily fish landing, an auction hall of 3000 sq. meter is built over the jetty. For the safe and fast handling of fish catch, 500 hand trolleys and 1000 fish containers are also provided in the auction hall.

A storage shed covering an area of 1000 sq. meters is provided at the end of the jetty to facilitate the fishermen to get their needs like nets, spare parts etc. The powerhouse is equipped with 3nos 750 KVA generators. An underground tank of 150000-gallan s capacity is constructed. The port has its own dredges and support equipment comprising of dredge discharge line 4 km long, booster station, tug boat, work boat, launch and barge.

Pasni Fish Harbor

In order to increase fish production by providing improved fishing technology and basic infrastructure and marketing facilities to improve the socioeconomic conditions of fishermen community along the Mekran coast, the ADB agreed to provide financial assistance for construction of a compact fishery harbour at Pasni, because of its best suited location.

The project was started in 1987 and completed in 1989. The total cost of the project was Rs. 563 million of which Rs. 495 million was provided by ADB and the rest by Balochistan Govt. The project included construction of 1225 meters long jetties, 647 long berthing jetties, 150 meter long berth and cargo jetty, 100 meter long quay, 150 meter south berthing jetty, 60 meter unloading jetty, 120 meter north berthing jetty. 67 meter causeway jetty, 150 meter landing beach, 1300 sq.metre market hall and 800 sq.met port authority building. Power supply is 320 KVA through diesel generating set.. There are two tanks of 800000 liters of diesel 250,000 litter of kerosene oil. Beside this there are six small ice plants with total production of 5000 ice blocks per day.

Some Facts About Fish Harbors in Pakistan

It was observed that all the four fish harbors are under different administrative control. For example Karachi fish Harbour is under Government of Sindh., Korangi fish harbor under the MINFAL, Government of Pakistan, Gawadar fish harbour-cum mini port is under Ministry of Communication, Govt. of Pakistan and Pasni fish harbor is under

Balochistan Govt. This causes lack of coordination and consistency in the government policies wrt to harbours management.

An important factor common to three fish harbors namely Korangi, Gawadar, and Pasni is the lack of electricity connection from main transportation lines of KESC or WAPDA. The electricity obtained through generators is not sufficient for the needs of harbors. Private sector is reluctant to construct processing plants due to shortage of power and other utilities.

There is no direct export facility from the Gawadar and Pasni harbors, the catch is brought to Karachi for export which is a main reason for the deterioration of the catch, because of poor road conditions and the time required for transportation, e.g., 30-40 hours.

Fishing Vessels

The following types of vessels are currently operating in fishing sector:

1. Trawlers
2. Gill-netters
3. Long liners
4. Howra for fresh trash fish
5. Dhonda (gill-netters)

Consolidated summary of Registered Fishing Vessels is tabulated below:

TABLE -8

Registered Fishing vessels (1991-98)

(Unit: Numbers)

Vessels(Categories)	1991	1992	1993	1994	1995	1996	1997	1998
SINDH								
Trawlers	2007	2009	2028	2245	2252	2310	2427	2522
Gill-netters	1480	1513	1604	1865	1871	1945	2015	2236
Motorized cum-Sailing	2940	3153	3211	3424	3430	3526	3611	3695
Sail Boats (Marine)	5505	5598	5651	5884	5895	5922	6253	6285
Total	11932	12273	12494	13418	13448	13703	14306	14738
BALUCHISTAN								
Trawlers	-	-	-	-	-	-	-	-
Gill-netters	633	682	765	860	941	1019	1111	1162
Motorized cum-Sailing	3086	3239	3313	3552	3826	4022	4195	4250
Sail Boats (Marine)	159	142	142	89	23	26	39	39
Total	3878	4063	4220	4501	4790	5067	5345	5451
Total Marine	15810	16336	16714	17919	18238	18770	19651	20189
Total Inland	17934	14473	14645	20402	16439	16760	16882	17689
Grand Total	33744	30809	31359	38321	34677	35530	36533	37878

Progressive addition		2935	550	6962	3644	853	1003	1345
-----------------------------	--	-------------	------------	-------------	-------------	------------	-------------	-------------

Source: MFD

Although there are around 20189 vessels registered for marine fishing but it is estimated that in actual the number of vessels in active operation can be as low as 4000.

Vessel's Description

Trawlers

This vessel uses a trawling net for targeted shrimp catching. The net size (eye) varies according to the need of the owner and crew and weighs around 0.6 tons. These boats require powerful and well-maintained engines for pulling the trawling net (gujja). The size of these trawlers varies from 30 to 45 feet keel length and the crew ranges between 12 – 20 men. Trawlers remain continuously in operation from August till May. These trawlers are required to be registered with MMD (Mercantile Marine Department). These trawlers are fitted with 66 –240 HP marine diesel engines as well as non-marine engines. For cost effective trawling operations on long voyage it is imperative that the vessel is fitted with marine engines capable of continuous running throughout the voyage.

Gill-netters

This vessel uses net for catching fish, these nets are relatively big and weigh around 0.6 to 2.5 tons. The size of these trawlers varies from 45 – 60 feet keel length and the crew ranges between 15 and 34 men. They remain continuously in operation throughout the year except June, July and August. During gill netting their engines remain idle. These vessels are required to be registered with MMD (Mercantile Marine Department).

Long liners

These are mainly deep sea fishing vessels over 100 GRT rating and are similar to trawlers but are equipped with winches for net pulling. Capacity is large and have powerful engines. These trawlers are required to be registered with MMD (Mercantile Marine Department).

Howra for fresh fish

These vessels are same as gill-netters with average overall length varying between 30 – 40 feet. Used for fishing voyage of one to three days. Use of ice is rather limited due to short duration. Most of these have removable fish holds.

Dhonda (gill-netters)

These vessels are small lifeboats converted into fishing gill-netters. They use small nets and mostly kundi. Their size is below 30 feet and voyage ranges between one to three days.

Fishing Methods

Landed Catch and Incremental Potential

Pakistan is rich in marine fishery resources, where catching is done in the coastal areas of Sindh and Baluchistan. According to a survey there are more than 45 species of shellfish and over 70 species of commercial finfish including Sardine, Hilsa, and Sharks are available in the Pakistani coast. The major varieties of fish include Mackerel, Butterfish, Pomfret, Indian Salmon, Beekti, Sole, Tuna, Jew fish, Sea Bream, catfish, Shark and Eel.

Following table indicates the commercial importance of various species of fish in Pakistan. For example the top two groups namely Herrings/sardines/Anchovies and Red fishes/basses/Congers consist of over 50% of total catch in Pakistan, the top five categories consist of over 81% of total catch, and top eight categories consist of over 90% of total catch.

Percentages of Fish catch in Pakistan

TABLE -9

S#	F.A.O Group	Percentage
1.	Herrings, Sardines, Anchovies	33.3
2.	Red fishes, Basses, Congers	17.5
3.	Tunas, Bonitos, Bill fishes	12.0
4.	Jack mullets, Sauries	11.4
5.	Sharks, Rays, Cimaeras	6.3
6.	Shrimp, Prawns	7.0
7.	Squids, Cuttle fishes, Octopii	1.2
8.	Mackerels, Snoeks, Cutlass fishes	0.8
9.	Flounders, Halibuts, Soles	0.4
10.	Shads	0.2
11.	Lobsters, Spiny, rock Lobsters	0.1
12.	Sea Spiders, Crabs	0.1
13.	Diadromous fishes	0.1
14.	Miscellaneous marine fishes	9.6
	TOTAL	100.0

FAO reports

The total fish catch in Pakistan in 1997 was 589,731 m. tons, of which 422,207 tonnes (71%) was marine fish and 167,530 (29%) m. tons was Inland fish. Of the 422,207 marine fish 285,767 (68%) came from Sindh, 130,406(31%) came from Balochistan, and 6,028(1%) came from EEZ.

Fish Production (in tonnes)

TABLE -10

Year	Marine	Inland	Total
1993	499,159	122,536	621,695

1994	418,574	139,525	558,099
1995	405,492	136,425	541,917
1996	395,397	160,092	555,489
1997	422,201	167,530	589,731
1998	433,456	163,524	596,980

Source: MFD

Fish catch in Pakistan by Area and Source (In tonnes)

TABLE -11

Area	Quantity (1998)	Quantity (1997)	Quantity (1996)	Quantity (1995)
Inland				
Sindh	106,611	102,508	91,367	75,380
Punjab	53,924	61,098	64,482	56,966
NWFP	840	743	1,271	1,503
Northern Areas	83	110	195	181
Dams and Reservoirs	2,066	3,071	2,777	2,395
Subtotal	163,524	167,530	160,092	136,425
Marine				
Sindh	295,648	285,767	267,841	280,756
Balochistan	130,799	130,406	125,099	122,515
EEZ	7,009	6,028	2,457	2,221
Subtotal	433,456	422,201	395,397	405,492
Grand Total	596,980	589,731	555,489	541,917

Source: Marine fisheries Department

The above figures clearly show imbalance in exploitation of marine resources. Despite having 70% of Pakistan's coast line, Baluchistan's share in our total landed catch is only 30%. The reasons are that Balochistan fish harbors at Gawadar and Pasni are much less developed and infrastructure facilities like cold storage, ice making, and road networks are virtually non-existent or non-operational. The Exclusive Economic Zone (35-200NM) comprises of about 85% of our total fishing grounds and add only 1% to our landed marine catch. This situation is mainly attributed to our obsolete fishing fleet which is not equipped to exploit marine resources in high seas.

Distribution of Landed Catch in Major Fish Types

From the total catch of 589,731 m.tons in 1997, the total marine catch is about 422,201 MT. According to the MFD sources out of this 211,100 Mt about (50%) was inedible known as trash fish which is mainly use for manufacturing fishmeal. (According to the industry sources the inedible fish catch counts about 70% of the total marine catch). The 211,100 Mt marine edible fish consist 27,4 44(13%) of shrimp and 183656 Mt (87%) consist of edible fish in volume. But the ratio is reverse in value. The 17,499 tonnes of shrimp exported in 1997, fetch about US\$ 104,986(61%) and 59,791 of fish exported fetch US\$66,599 (39%) of the total export value.

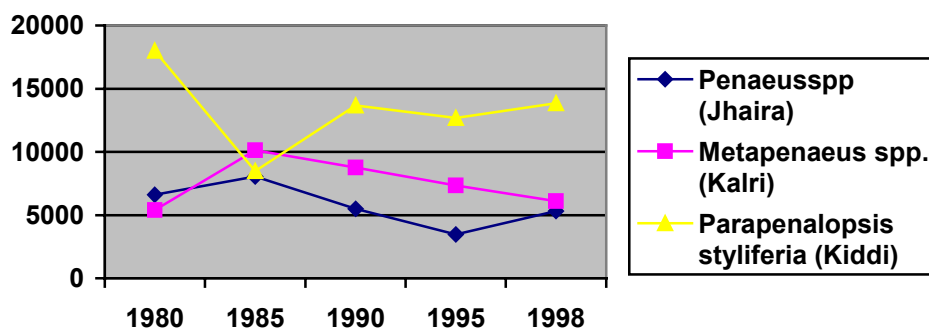
Specie wise Landing

Shrimps

In the absence of shrimp farming activities of any significance, fishery export industry in Pakistan is mainly dependent on capture fishery for shrimp operation from the coast of Sindh and Balochistan provinces. Altogether there are 15 species of marine shrimp in Pakistani waters under two families of Penaeidae and Solenoceriadae of which commercially important species fall under the Peneidae family. Of these Kiddi shrimp alone accounts for nearly 49 percent of the total shrimp production. However banana shrimp, Indian white shrimp and red-tail prawn form the so-called ‘Jaira’ shrimp is commercially the most important category. Shrimp of *Metapaneous* spp are collectively called ‘Kalri’ in local languages. All these species occur at different salinity’s and depth ranging from brackish waters and coastal waters to a depth of some 170 m.

Shrimp fishery is active from August to February, mostly in shallow waters. Yearly shrimp’s landings have been fluctuating widely from last 10 years ranging from 27921 Mt in 1990 and 25269 Mt in 1998. It is clear that the maximum sustainable level of exploitation has already been reached in the available resources. This has also been confirmed by stock assessment studies indicating the jhaira shrimp in Pakistan was overfished even as early as 1986. It is obvious that there is little scope for any substantial increase in shrimp production from capture fisheries in Pakistan.

Landing Trend of Shrimps (1980-98)



AQUACULTURE

SHRIMP CULTURE

The first major attempt to culture shrimp in Pakistan was made in 1982 when the Department of Fisheries, GOS started a shrimp farming pilot projection Richhal Creek, Gharo as part of the ADB-financed Aquaculture Development project. Private sector investors namely Lipton Farm, Baloch farm and Mansour Sheriff farm also invested in the projects.. Though all these projects had demonstrated the commercial feasibility of shrimp culture in Paksitan, none has susucceeded in continuing the operations.

TUNA RESOURCES AND LANDINGS

The volume of Tuna landed in Pakistan has fluctuating widely during the past decade. From a meager 8541 MT recorded in 1980 the quality nearly doubled the next year, rapidly increasing to peak of 31854 MT by 1988, and it continue in this range till 1995. The catch of Tuna and Tuna like species in 1998 were recorded 23075 MT. According to the gathered data from the total landings around 55 percent is the long tail tuna.

The Species of Tuna and Tuna like fishes in Pakistan are:

- Yellowfin tuna
- Longtail Tuna
- Kawakawa tuna
- Skipjack tuna
- Frigate and bullet tuna
- Other tunas of scombroidei
- Seerfishes
- Bilfishes

The fishing vessels engage in Tuna catching are motorized gill-netters that carry out fishing operation in traditional way. Since most of the boat for tuna catch do not carry ice, the catch is gutted and salted on board and landed in wet salted condition, the fishing trip along the coast ranges from 15-25 days, sometime more than a month.

In Pakistan tuna fishery is a relatively neglected activity. The GOP has taken steps to encourage commercial exploitation of oceanic tunas by encouraging foreign tuna long liners as per the new Deep Sea Fishing Policy.

CEPHALOPOD RESOURCES AND LANDINGS

Among the three common groups of cephalopods mostly squids and cuttle fish is being exploited with only stray catches of octopus, mostly from coastal waters. This fishing is mostly taken by haila a one-day fishing. There is no targeted fishery for cephalopods and almost the entire quantity landed is obtained as a bycatch from shrimp fishery.

SPECIES WISE NOMINAL CATCH (FINFISH/SHELL FISH) Qty in MT

TABLE -12

Species(English name)	1994	1995	1996	1997	1998
Bombay Duck	121	98	101	95	91
Seacat fishes	42112	45444	49428	54437	55934
Greater Lizard fish	87	43	45	28	22
Dragger-tooth pike-conger	5725	4692	4901	5637	5080
Groupers	7617	8600	9793	10474	13991
Sillago whittings	365	423	289	266	218
False trevally	4	3	2	4	5
Snappers	2524	3145	2002	2394	3192
Japenese threadfin breams	752	952	516	1783	969
Grunts	4849	5537	5268	6010	6221
Spotted croakers	6674	8133	7348	8751	9762
Croakers nei	16134	17068	12586	11677	9863
Emperors	1660	1643	1549	1911	2334
Longsspine kingsoldier bream	3092	2440	2176	2252	2717
Seabreams nei	774	918	921	806	1255
Scats	2	3	3	3	9
Indo pacific flathead	2	2	2	5	9
Barracuda	2923	2342	2878	2683	2664
Mulletts	19039	17280	17631	18935	17580
Threadfins	853	812	825	884	969
Hairtail scad	5244	6511	4010	3325	3505
Queenfishes	13760	16495	15957	19002	18689
Travallies	4003	4631	3972	5391	6523
Black Pomfret	2199	3066	2221	2322	2109
Common dolphin fish	2054	2570	1841	1658	1892
Silver pomfret	2985	4156	2799	3788	4089
Cobia	1541	2306	1574	1449	1254
Indian Oil sardinellas	65050	55177	52290	51930	44079
Thryssas	18111	17564	14091	16113	13165
Dorab Wolfherrings	1204	2289	1580	1931	2051
Clupeoidei nei	37209	31426	27576	26650	25487
Seerfishes	10536	12330	10108	12009	12980
Long tail Tuna	2384	1860	4121	4073	4161
Tuna nei	17176	13063	14760	17949	18914
Sailfishes	843	691	675	710	2086
Black Marlins	2089	1993	2159	1620	1780
Hair tail	6320	6093	9073	11583	12232
Requiem Sharks	30226	32888	34337	31179	35261
Guitar fish	1442	1208	1422	1481	1564
Rays	18481	16445	15563	15769	17576
Sawfishes	50177	49964	51432	48429	51335
Finfishes nei	8821	17700	16306	16600	17033
Swimming Crab	650	1877	3200	3989	5680

Palinurid spiny lobsters nei	669	615	724	765	782
Panaeus shrimps nei (white)	6021	5723	6123	6115	5311
Metapenaues shrimps (brown/pink)	7120	6981	7602	6801	6204
Kiddi shrimps	16023	12919	14047	16722	13854
Cephalopods nei	18482	5287	5908	8988	6525
TOTAL	418,574	405,492	395,357	422,201	433,098

Source: Marine fisheries Department

Existing Fisheries Resources and Incremental Potential

Assessing accurate figures for the biomass of different types of fish is a difficult task, because it requires large vessels with electronic and other devices, depth measuring equipment and also the services of highly qualified experts etc.

Various Government agencies, FAO, UN agencies, and Marine fisheries department of Govt. of Pakistan have undertaken in-depth studies to determine fishery resources in Pakistan but all have come up with different estimates. After the stock survey in 1987 Marine Fisheries department has however arrived at a certain figure for different species of Fish.

The following table depicts the biomass, maximum sustainable yield (MSY), landings and incremental potential.

TABLE -13 (in tonnes)

Resources	Biomass	M.S.Y	Landings (1998)	Incremental Potential
Small Pelagic Species	700,000	300,000	86,847	213,153
Large Pelagic Species	80,000	60,000	39,285	20,715
Demersal Species	500,000	300,000	26,7985	32,015
Shrimp	88,000	35,000	25,369	----
Cephalopods	20,000	12,000	6,525	5475
Mollusks	8,000	4,000	625	3,375
Crabs	10,000	6,000	5680	320
Lobster	1,300	600	782	----
Mesopelagics	10,000,000	5 000,000	---	5,000,000
TOTAL	11,407,300	5,717,600	433,098	5,275,053

Source: Marine fisheries Department

It will be noted from the above table that shrimp cephalopods, mollusks, crabs and lobsters do not have much incremental potential. Therefore the only additional benefits to be derived from these species is to have value added processing. Considerable incremental potential exists in small pelagic species like sardines and anchovies and in large pelagic species such as tuna and mackerel. These species can be used for canning and other forms of processing of sardines, anchovies and tunas. Tuna and mackerel can also be processed raw (sashimi) and loin (frozen).

The large incremental potential of about 5 million tons exists in mesopelagic lantern fish of one inch to two inch long which is found in 300 to 1000 meters depth in day time and 50 to 500 meters during nighttime. It is good only for making fish meal or fish paste, preferably on board.

Exploitation of Un-tapped Resources and Prservation

Most of the marine catch is done within 12 nautical miles from the coast. As most of the boats are small with little catching and preserving equipment on board. This reduces the catch per boat and therefore increases the cost of fish per kg.

Zone 1 (12 to 35 nautical miles) although reserved for local fisherman remains under utilized for paucity of modern boats equipped with necessary gadgets for catch and preservation.

The area between 35 to 200 nautical miles declared as EEZ Zone 2 is reserved for foreign as well as Pak Flag vessels, which operate under license from the Government of Pakistan. The catch in zone 2 is very nominal and therefore it remains to be exploited. Foreign vessels have been found to operate in zone 2 without license from the government and even enter into zone 1 with collaboration with local firms.

The immediate need in the shrimp fishery is to enforce measures, which will stop over fishing because of too many trawlers. This will allow the stocks of “jhaira” and “kalri” Shrimp to recover and production to rise. These measures should also minimize the danger of depletion of shrimp stock (including “kiddi”) through overexploitation.

The problems that shrimp aquaculture along creeks and shallow waters near the coast have not been developed. Fish processors are apprehensive about the future prospects of shrimp catch because of pollution hazards decreasing discharge of the Indus River due to the construction of dams and barrages and over exploitation.

Un-exploited available yield of demersal species is 74,000 tons a year. Most of this is located in the portion of the continental shelf beyond the 20-meter depth line. Financial and Technical assistance is needed at this stage to convert the shrimp trawlers to gill netting, and long lining for exploiting under-utilized demersal stocks. Potential exists for catching pelagic such as Tuna, Mackerel and Shark. Cuttlefish and squid resources exist on the continental shelf and oceanic squid beyond the shelf.

A large amount of mesopelagic resources remains un-exploited and an annual catch of several hundred thousand tons can be expected. No effort has been made to explore the commercial possibilities of alternate fisheries. These include Seaweed's, Crustaceans (other than shrimp) Mollusks, and Echinoderm.

Marine resources such as seaweed, small coastal and pelagic shrimp and clamps Inhabiting mangrove areas are not presently exploited. It is felt that some significant economic potential is tied up in these resources and further investigations are justified.

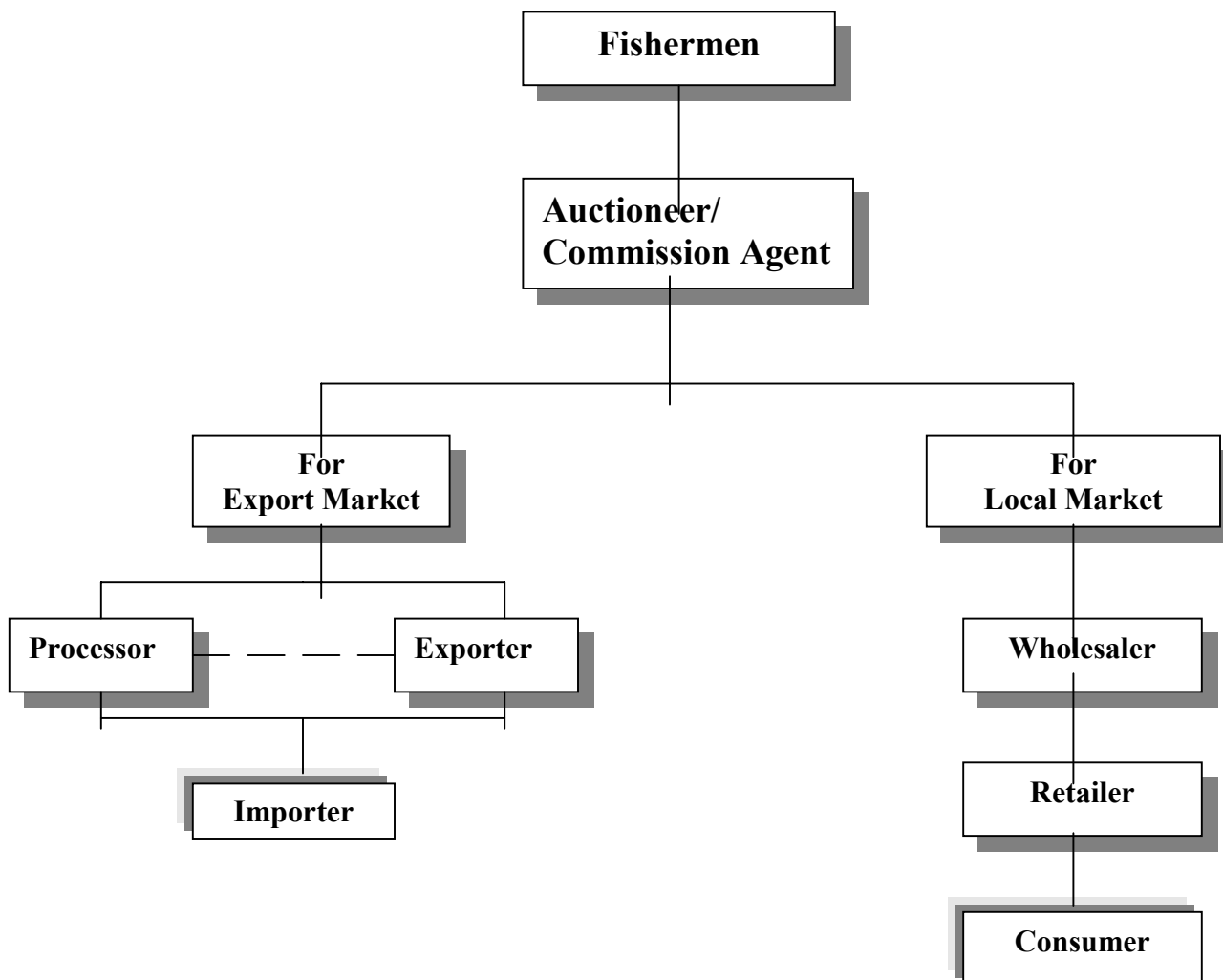
Disposition of Landed catch

The marketing channel of the fish is more or less similar to those of agricultural products, where Land lord provides a Land and the peasant grows the commodities. The produce is then sold in the market through commission agents to wholesalers and then to retailers and finally to consumers. The income after deducting the cost of direct inputs is shared by the Landlord and the peasant.

Similarly, the flow of the fish is channeled from boat owner/fish catcher to commission agent, to wholesaler, to retailer, to consumer for local market. It goes from commission agent to exporter/processor to importer to consumer for export market. As described in the channel distribution chart. The owner of the vessel is usually separate from the fish catcher, known as “Na Khuda”. The system is that the owner lends his boat to the “Na Khuda” on profit sharing basis, generally equally divided. Thus, if the catch is sold, let us say, for Rs.15, 000 the owner will deduct the direct cost of such items as Oil, ration to the

crew, ice, and salt. No depreciation, repair, or replacement costs are included in it. If the cost for example comes to RS. 5000 the remaining Rs. 10,000 will be divided equally, Rs.5000 each by the boat owner and fish catcher. Since the boat remains in the water for the several days, the “Na Khuda” takes a crew with him, which generally consist of his family members. But if the family members are not available, he may hire crew and pay them from his own share of earning.

Channels of Distribution for Fish and Fish Products



The fish catcher brings his catch to the auction hall, where commission agent (called mole holder) authorized by Fishermen Co-operative Society (FCS) awaits the arrival of the catch. Only the authorized commission agent can process the sale and no fishermen can sell his product directly to wholesaler, retailer, consumer, fish processor or exporter.

The commission agent arranges the auction for the catch. Purchasers assess the value of the commodity, make their bids, and the commodity goes to the highest bidder. The

fisherman pays 6.25 percent of the gross value of the commodity, which is divided equally by the Fishermen's Cooperative Society (FCS) and auctioneer.

The fish is passed on from the catcher via the commission agent to the processor/exporter to importer or the local wholesaler, then to retailer, and finally to consumer.

The fish is generally brought to the auction hall/market on the fish harbor where the processor/exporter or wholesaler purchase the catch. Almost all the processing units are located in Karachi. Therefore the catch meant for processing/export is either purchased at harbor, or is brought to Karachi immediately if purchased at other fish harbors. The purchase made for local sale is bought by wholesaler who delivers it to the retailer in local market, who ultimately sells to consumer.

Structural Problems of Marketing

Geographic Constraints

In Pakistan, primarily warm water fishing is done, and marine fishing is done in the coastal areas of Sindh and Balochistan provinces, which have severe warm climate. The fish harbor of Gawadar and Pasni are located in Balochistan, some 300-400 km away from Karachi, which puts severe constraints in marketing of fish.

Lack of Basic Infrastructure

Aside from the geographic constraints, lack of infrastructure facilities is another impediment to smooth marketing. To begin with there are virtually no road network to quickly transport the fish. For example, driving from Quetta to Turbat, Pasni, Gawadar and Panjgur there is hardly any metalled road at all. Thus transportation became extremely difficult. The inadequate number of non-refrigerated transport vehicles are also old and dilapidated. Frequent breakdowns and lack of repair facilities also affect the fish distribution. Then there is a non-existence of ice-making, refrigeration, and refrigerated transport facilities, which poses problem of quick disposal.

Paucity of Funds

The fishermen are, by and large, extremely poor. Thus, when the catch is brought for sale, they are over-anxious to cash in their catch. The middlemen takes advantage of this situation and pay as little as possible. Another factor is that commission agent generally finance the social events of fishermen such as marriages of their daughters, repairing of their houses, purchase of staples, etc. Fishermen being unable to pay off their loans in time are forced to sell their fish at the dictated prices.

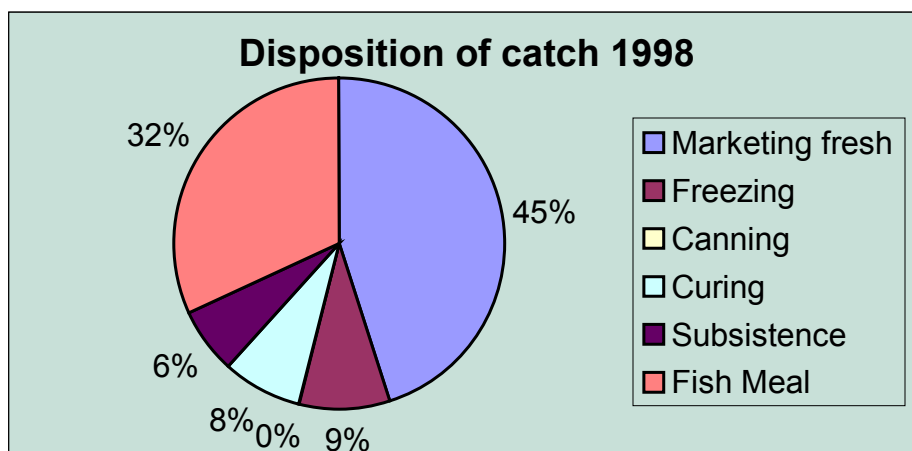
Illiteracy and Traditionalism

Since the fishermen are illiterate, they are not aware of their importance and bargaining position.

Channels of Disposition of the Catch

A substantial quantity of fish is consumed locally. In addition, small pelagic and by catch of trawl fishing is being used for production of fishmeal. Remaining balance is exported

in salted dried, frozen and chilled form. The following table gives the year wise disposition of the catch.



Channels of Disposition of Fish (Marine & Inland)

(in tonnes)

TABLE -14

Disposition Channels	1994	1995	1996	1997	1998
Marketing fresh	229,128	238,314	237,925	261,358	268,736
Freezing	52,378	41,476	48,449	56,122	53,498
Canning	160	32	120	90	-
Curing	42,546	42,149	44,448	46,545	46,046
Subsistence	44,685	34,458	36,103	36,482	38,550
Fish Meal	189,202	185,488	188,444	189,134	190,150
Total	558,099	541,917	555,489	589,731	596,980

Source: Marine fisheries Department

In an earlier study carried out by the ADB in 1986, it was estimated that only about 26% of the total catch was consumed locally as food fish. Accordingly per capita food fish supply has been worked out at 1.6 kg.

Production of Marine Edible/Inedible Fish

Due to the poor marketing practices, amongst various other reasons the production of the fish has not only stood still but if you see the figures of 1991-96 from production table it has shown a declining trend.

Due to indiscriminate catching of fish, a large portion of total fish caught turns out to be trash fish, which is either used for fishmeal or other non-edible purposes, or it is simply thrown away. This is one of the cause of low income of the fishermen, because trash fish fetches a very nominal price.

According to the figures given by Marine fisheries department the percentage of trash fish has ranged from 38% to 51% of the total fish catch for last 10 years, and the overall average for the 10 years comes to about 42%, which is very high ratio for any fish catch.

Note: (According to the industry sources the percentage of trash fish is about 60-70% of the total catch)

Quantities and percentage of Edible and trash fish of the total Marine fish Catch year (1987-1998) (in tonnes)

TABLE -15

Year	Total Marine Catch	Edible fish		Trash fish	
		Qty	%	Qty	%
1987	336,129	166,042	49	170,087	51
1988	348,897	184,254	53	164,643	47
1989	341,222	174,851	51	166,371	49
1990	369,802	196,946	53	172,856	47
1991	402,795	225,405	56	177,390	44
1992	431,465	245,758	57	185,707	43
1993	499,159	310,755	62	188,404	38
1994	418,574	230,372	55	188,202	45
1995	405,492	220,004	54	185,488	46
1996	395,397	206,953	52	188,444	48
1997	422,201	211,100	50	211,100	50
1998	433,456	243,306	56	190,150	44

Source: Marine Fisheries department

Total Production of Edible Marine and Inland Fish Available

The percentage of trash fish in the marine catch is very high, whereas Inland fish is almost all edible. Although the total quantity of marine fish is high, the quantity of edible fish is less. The following table shows the total availability of edible fish available in Pakistan.

Total Quantity of Edible fish available in Pakistan (1987-1998) (in tonnes)**TABLE -16**

Year	Marine fish	Edible	Inland Fish	Total
1987	166,042		91,631	257,673
1988	184,254		96,545	280,799
1989	174,851		105,009	279,860
1990	196,946		113,158	310,104
1991	225,405		115,907	341,312
1992	245,758		121,653	367,411
1993	310,755		122,536	433,291
1994	230,372		139,525	369,897
1995	220,004		136,425	356,429
1996	206,953		160,092	367,045
1997	219,545		167,530	387,075
1998	243,306		163,524	406830

Source: Marine Fisheries department

Auction System

Immediately after landing catch has to pass through the auction process for sale. The authorized appointees of Fishermen Cooperative Society called Moles carry out auction. On return from the voyage, the boat captain called Nakhuda informs the boat owner and the mole holder to arrange for the auction. The boat crew brings catch to auction hall where mole arranges a display of catch for interested buyers. After the display mole invites the buyers to bidding process and acts on boat owner's behalf to gain maximum price. The buyer giving the highest acceptable bid is considered the final bidder and the catch is sold to him. The mole issues a gate pass in favor of buyer allowing him to take catch to his factory and in return buyer agrees to pay the agreed sum to the mole in near future which later on mole pays to boat owner and to the crew. The mole in return of his services deducts 6.25% of the total catch as commission out of which the mole pays 3.125% to FCS as contribution by fisherman for the social development projects aimed towards fishermen.

The mole in order to attract boats also acts as a working capital financier for the voyage and also extends short term to long term financing to fishermen community for the social purposes. Running mole is a very profitable business as the running finance required to attract one boat is about Rs100, 000 and the net auction commission is more than the initial loan. Secondly the running finance is paid in form of commodities so mole also makes money in procurement of commodities.

Fish is a very fishy business, due to unorganized setup, limited number of buyers and lack of economic awareness among fishermen middlemen exploits the situation and make abnormal profits. The market is dominated by few huge buyers, who control the pricing mechanism. All middleman and genuine buyers have agreed to an informal buying cartel under which they decide what to buy and at what price. At the end of voyage the boat owner and the boat crew are

in desperate need of money, they sell their product at through away prices to middleman who then resells the product to other traders and the final products costs 3 to 4 times more expensive than the initial auction price.

Karachi is the largest fish auction point in Pakistan, it nearly handles about 400,000 tons of fish every year, but still there is no proper auction system. All auction is on word of mouth basis and all existing documents are not properly filled. The documentation standards are below international levels and there are no sources for reliable data.

Mode of Transportation

A Typical Boat Fishing Voyage

Process Flow: From Harvesting to Processing

Harvesting

The Principal craft used by coastal fisherman are known as trawlers, gill-netters, and horas. A traditional wooden trawler undertakes a fishing trip for about 10 to 25 days duration. The basic input of the industry is in a haphazard and dilapidated condition. Most of the boats are wooden, non-mechanized, old and out-dated. They have therefore outlived their utility. Facilities of On-board chilling system is missing, which are responsible for lot of waste. Third none of these fishing vessels are equipped with navigational or electronic devices like sonar, echo sounders or other fishing aids. Fourth is the lack of the education and training among boat –builders have made the matter worse.

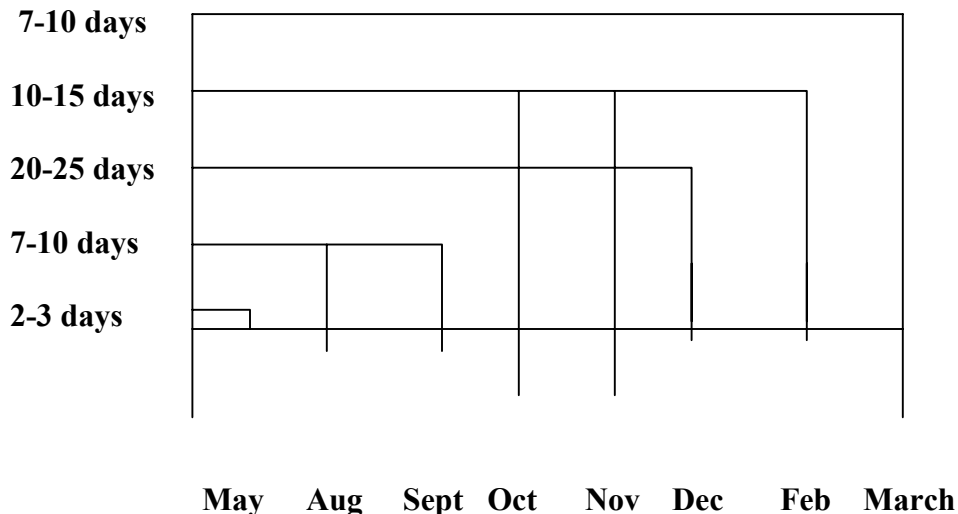
Fishing Technology

The fisherman over 90% of whom are illiterate, are still following the centuries old technology of “feel and See”. They take their wooden hull boats in the shallow water, throw their nets and leave it to the nature for getting some fish. Some time they may stay in the water for a whole week and return with very little or nothing at all. They are not even aware of the navigational aids as fish finders and echo sounders. Technology to discriminate between the edible and trash fish, species of various kinds, and size of fish, etc. must be taught to fisherman to be more productive.

Voyage Time:

Due to the non-mechanization of the boats and non-availability of the navigational or electronic devices like sonar, echo sounders or other fishing aids it was observed that 50% of the total voyage time is wasted only on finding of the fish.

Average Voyage time



Post Harvesting

The fish holds of these trawlers are not insulated. For preservation of catch the insufficient crushed ice is applied. Since no plastic crates are used for storing the catch on board, the catch is piled up in the fish hold with the result that the two third of the piled up fish of the whole catch is crushed and de-shaped under pressure. All these factors lead to deterioration of the quality of landed fish. Due to the post harvest losses, the poor quality fish fetches less price to the fishermen. Therefore to contain these post harvest losses, the fish holds of the traditional boats urgently needed to be insulated. A cooling and refrigerated system must be installed and use of plastic crates for storing the catch in the fish hold should be mandatory. Careful handling at the port should also need to be encouraged.

Landing (at harbor)

Fish harbor is one of the most important infrastructure facilities in the fishery development. It not only allows the boats to operate but also enables fishermen's to dispose off their products for local consumption and export. Karachi fish harbor was constructed in early 1960 to accommodate the fleet of about 400 vessels. At present the harbor is handling about more than 4000 fishing vessels, resulting in serious congestion in the channel. There is no any system of vessel movement after unloading its catch, after unloading of its catch the vessel stays and leaves the jetty, when it has to go for another voyage, which takes at-least 3-4 days. As the catch is arrives at the jetty, It is handled very Un-hygienically right from Unloading to Auction hall and then to market. After the catch is unloaded, there is no any preparatory area for the de-icing, sorting and the grading and it directly comes in to the auction halls. The deicing, sorting and grading is done on the floors or at the deck of the boats with the channel water. The Landing of long voyage boats is usually starts in the late evening and continue till morning, in the

mean the auction is continue according to the species landed at that time. The landings of the fresh catches of haila & Dhoonda (a short trip boats) is done after 3.00 pm in the evening and continues till 6.00 pm. There are two cold storage facilities for storing the catch are in the both auction halls but are not being properly used. There is no any arrangement of washing and proper handling of catch. The sanitary and hygienic conditions at fish harbor are not according to the international standards.

Auctioning

Auctioning of the long voyage iced boats is starts in the 6.00 a.m. in the morning and continues till 12.00 noon of both the shrimps and fish. The auction of fresh catch is done from 4.00 p.m. to 6.00 p.m. in the evening. In this time the catch remains on the floor of the auction hall without any proper chilling facility. The grading and the weighing is done in the auction hall. There is no any proper system of sorting and Grading. After the auctioning there is a lack of handling equipment and proper transportation to the processing unit or peeling shed or to the local market.

Transportation

Landing at the other fishing centers is first transported to the Karachi fish harbour for the auction then it is distributed. From the nearby centers like Ibhram Haydri and Korangi it is brought through trucks, vans and Suzuki's packed in ice, covering short distances. However for long distances transportation from Karachi fish harbour to inland markets in the Punjab and Sindh province, railways are the principal carriers, often the catch is de-headed and gutted before icing to enhance quality.this is the most famous and cost-effective mode of transportation.

Fishing boats operating off Balochistan coast also act as a fish carriers, collecting catches from Pasni and Gawadar or other fish landing points to Karachi harbour. The time taken by different mode of transport ranges from 24 to 30 hours and from boat is 15 hours, in all the cases the catch is ice and packed in wicker boxes.

Seafood Processing Industry

Processing

Fish is a perishable food item therefore need for preservation is immense. In order to maintain quality of fish, to increase shelf life of the product and to ensure continuity of supply the concept of preservation and curing have been in use in one form or the other since centuries. In fisheries sector preservation of fish quality means freezing the natural qualities and attributes of the product immediately after the catch (in developed countries) or after the landing (in developing countries). Freezing here means decreasing the temperature of the fish product from 5 degrees to – 40 degrees.

The fish processing has three major areas namely:

- Value Addition Process
- Freezing
- Packaging

Value Addition Process

As discussed earlier value addition in fish product is a combination of 3 major factors namely:

- Product Attributes
- Brand Name
- Distribution Channel

Under the processing section of the report emphasis is on Production process and Product attributes. Both product attributes and production process depends upon the selection of the final product and the target market. The market trends very clearly suggests that there is excessive demand for quality oriented ready to eat fish products. These products enjoy a premium market rate and sales are virtually guaranteed. Below are the production flow charts for most common species of shrimp and fish.

Freezing

The three major forms of freezing are:

- Nitrogen Freezing
- Individual Quick Freezing
- Blast Freezing

Nitrogen Freezing

Nitrogen freezing technique is a very recently developed technique and is currently under experimental phase. The process preserves the quality and freshness of the product with in a minute and the shelf life of the product is about 1 year. As the technique is in the experimental phase the operating costs are too high and it is very rare in use.

Individual Quick freezing

Individual quick freezing technique commonly known as IQF is most widely used method and most cost effective method of freezing. The IQF process takes only 3 to 8 minutes (depending upon the process and the product) to bring down the product temperature from 5 degrees to – 40 degrees and the shelf life of the product increases from a few days to about 6 to 8 months. IQF is the most recommended form of freezing and several countries including EU are now planning to make IQF as a pre requisite for imports. The final customer of an IQF product is household individual who purchases it for his consumption.

Blast Freezing

Blast freezing technique is the most basic form of processing which is only used in developing countries. The process takes about 8 hours to freeze the product and the costs more. The product sells at a discount and it has major selling problems. The only customer for this product is a re-processor who after some value addition finally passes it through an IQF process.

Packaging

Packaging is as important as processing. Product has to be packed in food grade, convenient, attractive economical and market oriented packs with proper brand names on it. The broad packing requirements varies from product to product but some of major types of packaging are:

- Canning
- Vacuum Bag Packing
- Shrink Wrapping
- Jumbo Packing

Current Status of Fish Processing in Pakistan

The fish-processing sector of Pakistan is in far better shape than the fishing sector. but still the processing sector had not kept upgrading with the International technological advancements, the change in demand patterns and customer preferences for which the country paid the price in form of losing market share and lower average unit prices.

Except for Blast freezing plants (so called processing units) there is no modern value added fish processing plant producing products like breaded buttered shrimps, fish fingers, fish cakes, fish paste, fish sauce or surimi products. Three major categories of exports oriented fish processing activities mechanical means in Pakistan are freezing, canning and fish meal production. In traditional sector curing is the most popular method of fish preservation method which accounts for considerable quantities of finfish, fish maws and shark fins.

Processing Capacities**Freezing**

There are 27 processing units with a total installed capacity of about 450 tones per day. Out of 27 only 21 plants of total 300 tons per day capacity are in operation with others closed down due to several reasons. The average capacity utilization for the processing sector is about 25 %.

All the existing plants have secondhand blast and plate freezers (about 10 to 15 years old) with a few as exception. These old plants consume about double of electricity (electricity is biggest portion of operating expense), as a result product does not remain competitive and the overall risk increases.

Canning

There are 11 canning plants in with a total installed capacity of 106 MT/Day, with only one in operation. The only operational plant is crab meat-processing unit, which has only survived because of being non-traditional in nature. Shrimp canning industry flourished in late sixties and early seventies but later on died very rapidly on emergence of very cheap but quality oriented products from South East Asian countries and extensive dependence on imported cans (as a well established local canning industry still does exist).

Fish Meal

The small size of pelagic and the BI-catch caught by shrimp trawlers are used for industrial purposes in the production of fishmeal. Besides, small pelagic fish caught in creeks and inshore water by small crafts are also utilized in production of fishmeal.

All fishmeal plants are located in Karachi near Ibrahim Hydri. Most of the fish meal plants are 25 to 30 years old with no oil extracting provisions as a result losing huge sum of money. The most common practice is to use sun-dried fish and fish offal, which are sterilized with steam and again dried in sun. Then it is pulverized in a grinder and packed in jute bags. Some plants also use mechanical dryer after sterilization. The net yield during this process ranges from 20% to 22 % and the protein is between 40% to 50%, which is well below international standards.

Fishmeal industry is in the decline stage of product life cycle as local industry is not able to compete with international fishmeal producers. All local fish meal producers will be wiped out by Chinese product which is better in quality and is still cheaper than the local product.

Fisheries Related Rules And Acts

1. The Pakistan Fish Inspection & Quality Control Act, 1997.
2. The Pakistan Fish Inspection & Quality Control Amendment (Ordinance), 1998.
3. The Pakistan Fish Inspection & Quality Control Rules, 1998.
4. The Sindh Fisheries Ordinance, 1980.
5. The Balochistan Sea Fisheries Act No. IX of 1971.
6. The Pakistan Environmental Protection Act, 1997.
7. The Agriculture Produce (Grading & Marketing) Act 1937.
8. The Pakistan Animal Quarantine (Import and Exports of Animal and Animal Products) Ordinance, 1979
9. The Karachi Fish Harbour Authority Ordinance, 1984.

(All the above documents are available in the MFD's document of Health conditions for European Commission.)

Legislation of the Country

(a) The Agricultural Produce (Grading and Marketing) Act, 1937.

This act provides authority and control for the grading and the marketing of the agricultural produce. Dry fish, shellfish, and fishmeal are graded under the provision of this act.

(b) The Baluchistan Sea Fisheries Act No. IX 1971: provides authority of fishing crafts, fishing license and processing of fish and fishery products in the territorial water of Pakistan along the coast of Balochistan. Contravention of any provision of the Ordinance is punishable by one month imprisonment or with a 5000 rupee fine or both.

(c) The Pakistan Animal Quarantine (Import and Export for Animal and Animal Products) Ordinance 1979: This Ordinance provides for control over Import and Export of animals and animal products and issue of “health Certificate” to regulate the trade and to prevent the introduction or spread of diseases.

(d) The Karachi Fisheries Harbor Authority Ordinance 1984: provides law to carry out efficient operation of harbor facilities and to inspect periodically hygienic conditions of processing plants, ice plants, cold storage and other related activities.

(e) The Sindh Fisheries Ordinance, 1980: This Ordinance provides rules and regulations for marketing, handling, transportation, processing and storage of fish and shrimp for commercial purpose and sale of fish used for domestic and inters provincial trade. Contravention of this Ordinance is punishable by imprisonment up to six months or with by a fine of 10,000 rupees or both.

(f) The Coastal Development Authority Act Sindh Act No. XXVIII 1994: It provides law for planning, Development operation, management and maintenance of coastal areas including development of fisheries, livestock, horticulture and agriculture.

(g) The Pakistan Environmental Protection Ordinance No XXVII: It becomes effective at the beginning 1997 provides law for protection, conservation and improvement of environment for the prevention and control of pollution including biodiversity, ecosystem, effluent, hazardous substance, emission and water pollution.

(f) Pakistan Fish Inspection and Quality Control Act, 1997: The Government has passed a number of Acts for Inspection, Grading, quality control and marketing especially for exports. For example exports of fish was covered under Agriculture produce (Grading and Marketing) Act 1937 and Animal Quarantine (Import and Export of Animal and animal products) Ordinance 1979. The Sindh government passed fisheries Ordinance, 1980. But the latest is Pakistan Fish inspection and Quality Control Act, 1997. Which deals with the registration of the fish processing plants and fish exporters, and constitutions and functions of inspection committee. The function of the committee includes inspection of fish processing plants, fish exports, handling of fish and fishery products. It also spells out the powers, duties and functions, of fishery officers and penalties on the processors/exporters for contravention.

The Acts and Ordinances are in Vogue but are not stringently practiced. Marine fisheries Department issues certificates of quality and Origin for fresh, frozen, canned fish/shrimp, conducting pre-shipment inspection of the consignments to ensure that proper standardization of fish and fishery products are enforced.

The following criteria are used to ensure quality control of fish and fishery products.

1. Pakistan standard for fish and fishery products as defined in Pakistan Standards Institution (Certification Marks) Ordinance, 1961.
2. Code of practice for fish/shrimp-Codex Alimentarius Commission of FAO/WHO.

In order to promote the quality of fish and fishery products, following measures are suggested:

1. Fishermen and producers should make use of adequate quantity of ice for the preservation of fish/shrimp. For this purpose, economically cheap but clean ice should be made available to fishermen and processors. The use of flake ice must be encouraged.
2. Chlorinated ice is superior to ordinary use. Therefore chlorinated ice should be made available to the fishermen/producers.
3. Installation of flake ice plant be encouraged and the use of flake ice be popularized among the fishermen/processors.
4. Plastic fish boxes be introduced for hygienic handling and transportation of fish and shrimp.
5. Refrigerated seawater technology be adopted for preservation of fresh fish and shrimp on board the fishing vessels.
6. Apart from the usual shrimp products, other varieties of fish, such as Sardine and Tuna be utilized by the canning industry.
7. Marine fisheries department be entrusted with the sole responsibility for supervising the quality control and inspection program for fish and fishery products.
8. Compulsory quality control program be enforced to ensure quality assurance for fish and fishery products.
9. Modern processing technology (liquid nitrogen technology) be encouraged for freezing fish and shrimp.

Pakistan's export earnings in the fish and fish products have reached US \$ 171 million in 1997-98. The importing countries which are very much quality conscious and are now developing stringent quality standards and hygienic criteria for exportable goods. Lack of mandatory seafood inspection and quality control program in Pakistan sometimes results in selling of some detrimental products by unsavory dealers/exporters. EU is major importer of seafood products from Pakistan, however according to the regulations of European commission; the exporting countries must comply with their standards. An inspection mission of European commission visited Pakistan in December 1997 to evaluate conditions of seafood production and processing and pointed out many shortcomings especially on hygienic conditions at fish harbor and processing units and imposed a ban on sea food exports from Pakistan from July 1 this year, which lasted for over three and half months. Which gave a loss of US \$ 46.3 million to the industry in value if we compared the figure with the last year period.

A Summary of Problems

- **Imbalance in exploitation of marine resources**
- **Fishing Nets**

- **Fishing Fleet**
- **Fleet Operations**
- **Engines**

The majority of the fishing fleet incorporates under-powered used/reconditioned engines and propulsion equipment mainly because of the low financial strength of the boat owners to acquire new equipment. The used/reconditioned propulsion equipment of a trawler having a keel length of around 40-ft will cost approx. 1.5 to 2 million rupees depending upon the condition; A brand new set for the same trawler can cost around 3 million rupees.

The problems being faced with these engines are the non-availability of spare parts and inadequate repair facilities. Low BHP of engines limit speed for trawling, higher fuel consumption, overheated engine room environment and unstable seaworthiness. Majority of engines are non marine in nature thus causing increased down time and financial and maintenance burden on the user.

- **Navigation Equipment**

The fishing fleet in Pakistan is deprived of the modern navigational equipment, such as global positioning system (GPS), fish finder and UHF/VHF communication system. The crew uses their commonsense and memory to detect fish and looks for various land marks to locate the position of the vessel and at times erroneous assessment results in excess voyage and hence increased fuel costs. The modern fishing vessels in developed countries have to install a GPS for determining its position in the sea. This gadget enables fishermen to remain on course (LAT/LONG) while fishing, determine the cruising speed and memorize rich and profitable routes etc. Fishfinder effectively locates fish school(s) and reduces the overall voyage duration and economizes fuel consumption. Apart from this a common fish finder is helpful in determining the water depth thus saving the vessel from unfortunate calamity of hitting the bottom rock etc. Two way communication system is a necessity on fishing vessels and provides safety and a mode of information transfer between boats and owner/harbor authorities.

The reasons for prejudiced awareness on electronic equipment amongst common fishermen are plenty out of which the broadest is the lack of training facilities and identification of the core need of cost effective solutions to the fishermen problems. The literacy rate of our fisherman limits their acquaintance with these electronic gadgets. Thus an intensive and well-organized training program is planned.

- **Fish Finding Equipmet**
- **Fish Holds**

The existing fish holds are not according to the E.U specifications. The typical vessel's fish hold is insulated using thermopile (polystyrene) covered with galvanized iron sheets,

which are riveted, screwed or nailed to the hull frames. G.I sheets start getting corroded within a month of installation and corroded surface result in breeding grounds for the bacteria. The catch is iced with the help of unhygienic block ice usually crushed onboard. The catch is preserved in the compartments commonly known as Gallas and stowed one over the other with intermittent layers of ice, in the form of a heap as high as 6 to 8 ft. Crushed block ice has sharp corners which cause damage to the skin/tissue of fish. In heaped stowage tremendous pressure is exerted on the bottom fish and the bottom catch partially bursts open and contaminates quality of entire catch of galla.

There is an immediate need to modify fish holds as part of value addition program by ensuring proper “Care”, “Cleanliness” and “Cooling” **from the time of bringing the catch to deck upto its delivery in the processing plants.** It is planned to use polyurethane as the insulation material, which has much better insulating properties (thermal conductivity) and is thus cost/energy efficient. The G.I hold lining is to be replaced by either fiberglass or urethane/polyurea coating withstanding extreme impact and abrasion resistance, providing clean and glossy surface, eliminating the hazard of rust or corrosion and creating a vapor barrier between the insulation and catch, besides ensuring optimum sanitation environment with ease of cleaning. Future storage of catch is planned in properly iced fish crates. Fish hold modifications shall therefore incorporate proper arrangement for handling and storage of fish crates. Ice to be used shall be flake ice. It is planned to bring the temperature of catch to 5°C at the earliest and to maintain the cold chain upto delivery of catch to the processing plants. Accelerated cooling of fresh catch is envisaged through pre-chilling technique before storage in fish crates. To optimize cooling, flake ice consumption and duration of voyage, on board chilling units are also planned for vessels having keel length of over 40 feet.

- **Ice**
- **Catch Storing Methods**

As explained above the conventional method of storage of catch in the galas in the form of heaps leads to significant post catch losses and edible fish loses value into industrial fish. It is now planned to store catch in 75-liter capacity, properly engineered fish crates of international design. These crates have a carrying capacity of 50 kg iced catch. The design of fish crates ensures that the load is transferred to the walls of the fish crates and the catch remains stress free. Thus in properly iced fish crates the catch will remain fresh ensuring prime value of the catch on landing. Such fish crates of standard design have been imported in nominal quantity and tenders are under review for local manufacture of fish crates.

- **Harbor**
- **Utilities**
- **Boat Movement**

- **Catch unloading, handling and transportation**
- **Peeling Sheds**
- **Auction System**
- **Processing Industry**
- **Human Resource**

Recommendations

Improvement in Regulations

- **Deep Sea Fishing Policy**
- **Boat registration regulations**
- **KFHA regulations**

Institution Strengthening

- **KFHA**
- **FCS**

Marketing Support Programmes

- **International markets information data base**

Technical Support

- **Boat Fish hold modification**
- **Navigation Equipment**
- **Fish Finding Equipment**
- **Local development of Fish Crates**
- **Flake Ice manufacturing**
- **Provision of electricity/water at KFHA**

Management Support program

- **Boat Movement Plan**
- **Catch Unloading Program**
- **Auction management Program**
- **Receiving Hall management**
- **Catch weight/price recording and tracking system**
- **Training of:**

- **Fishermen**
- **Processors**
- **FCS staff**
- **KFHA Staff**

Action Plan

Upgradation of Existing Traditional Fleet

Boat Building, the basic input for fisheries is in a haphazard and dilapidated condition. Most of the boats are wooden, non-mechanized old and outdated. They have therefore outlived their utility. They require frequent repairing and are poor in quality. Secondly, facilities such as cold storage, and chilling on board are missing, which are responsible for a lot of waste. Third our boats are devoid of equipment such as echo sounders and fish finders and modern technology is missing. Which is used on aluminum or fiber glass boats. Fourth, the lack of education and training among the boat builders has made the matters worse.

If un-explored fisheries resources are to be exploited, existing fleet needs up-gradation. There is a very strong case for a boat with necessary gadgets such as wheelhouse equipment, fish finders, net haulers and drums gantry and tillable. The industry is hampered by lack of power and high material cost. Manpower needs to be educated and trained in use of sophisticated equipment. Solutions to these problems include tax free imports and local manufacturing of fishing equipment, pilot schemes to assist progressive boat owners and fishermen to begin using new techniques and setting up of fishermen's training center.

Boats need refrigeration facilities on board to keep the catch according to the required standardization, so that it can fetch the higher prices. There is a great need of fiber glass boats and development of ancillary industries such as manufacturing of nets, hooks, floats, ropes etc. if boats are equipped with such facilities earning could double or go up three times and export to neighboring countries and Africa could rise significantly.

There is a need to improve construction methods and quality of wooden hull boats constructed at Karachi boat yard. Presently boats are being manufactured in the unorganized sector mostly manually. Therefore, there is a need to establish boat-making industry in the organized sector so that quality boats could be built. Besides improving the manufacturing of wooden hulls pilot scale manufacturing of fiberglass boats should must begin, as is being done elsewhere in the world because wood is becoming more and more expensive.

Aside from Karachi there is also a need of boat repairing facilities at other fishing centers such as Pasni and Gawader. Government should assist fishermen in meeting the high cost of procuring gear. Benefits of electronic fishing aid must be propagated. There is need for more extension services in order to popularize new fishing methods among fishermen who are sometimes conservative in adopting new methods and to modernize the fleet.

There is no modern plant manufacturing fish nets on scientific lines. Fishermen make nets manually but these are of inferior quality. The basic raw material is namely synthetic fiber is both made locally as well as imported. Thus net manufacturing should be undertaken in the organized sector.

Improving Post Harvesting Methods

Right from the catch, the post-harvesting period starts. After the catch, fish is stored in fish hold in the plastic crates, which is totally lacking. Where ice is placed but there are no freezing facilities. After a week or so, the fish is brought on the harbor where it is placed on the floor of the jetty. Sometimes fish is thrown from the boat, which affects its quality. Then it is taken to processing units for export. The wholesaler purchases it for local sale who dispatches it to different cities but the fish is not properly handled. More important factor is the absence of refrigerated transport and freezing facilities.

Inferior quality shrimp is priced 20 to 30% lower in the international market than high quality shrimp of the same size.

According to the industry sources after following the right handling procedures

- White shrimp price can go from US\$12 to \$14
- The price of brown and pink shrimp can go up from \$7.5 to \$10(about 30% to 40% increase)
- The price of PUD can go to minimum \$2.5 from \$1.5.

There are four principle factors resulting in low quality.

- 1 Handling, processing and packing do not conform to international standards.
- 2 microbiological criterion for frozen shrimp is not maintained.
- 3 Freshness is not ensured.
- 4 Size separation is not correct.

Quality control through an effective plant inspection program is the only way for increasing export earnings.

Annexes

- List of Contacts

1. Ministry of Food, Agriculture and Livestock,

Government of Pakistan
Pak Secretariat Block 'B'
Islamabad, Pakistan

Tel: 51- 9203307

51- 9210351

Fax: 51 - 9221246

2. Marine Fisheries Department (MFD)

Government of Pakistan

Mr. Moazzam Khan

Director General MFD

Fish Harbour, West Wharf Karachi.

Tel : 21- 2312923

Fax: 21- 2316539

3. Mercantile Marine Department (MMD)

Principle officer MMD

70/4, Timber Mart

Kiamari Karachi.

Tel : 21-2851306

4. Maritime Security Agency (MSA)

Director General MSA

Maritime Security Building,

West Wharf Karachi.

Tel : 21- 9214618

5. Export Promotion Bureau (EPB)

5th Floor Block A, Finance & Trade Centre

Shahra-e-Faisal Karachi.

Tel : 21- 9202718

6. Small & Medium Enterprise Development Authority(SMEDA)

General mangerSmeda- Sindh

5th Floor, Baharia complex II, M.T Khan Road, Karachi.

Tel : 92-21- 111 111 456, Fax: 021-5610572

7. Karachi Fisheries Harbour Authority (KFHA)

Government of Sindh
Managing Director KFHA
Fish Harbour, West Wharf Karachi.
Tel : 21-2314204

8. Korangi Fisheries Harbour Authority

Ministry of Food, Agriculture & Livestock
Government of Pakistan
Managing Director
Kprangi fish Harbour, Chashma Goth, Landhi.
Tel : 21-5016719

9. Pasni Fish Harbour

Director General Pasni Fish Harbour
Pasni, Balochistan
Tel: 0863- 210212

10. Gawadar Fish Harbour

Director General Gawadar Fish Harbour
Gawadar, Balochistan

11. Fisheries Department**Government of NWFP**

Shami Road, Peshawar

12. Fisheries Department

Government of Punjab
2- Sanda Road Lahore
Tel: 42- 7321172

13. Fisheries Department**Government of Sindh**

Block- 50, Pakistan Secretariat,
Saddar, Karachi.
Tel : 21-9203314

14. Fisheries Department**Government of Boalochistan**

Pasni.
Tel: 0863- 210212

List of fishery Related Industry and Associations**15. Fishermen's Co-operative Society (FCS)**

Chairman FCS
Fish Harbour, West Wharf Karachi.
Tel : 21-2310315, 2313139

16. Pakistan Sea Food Industries Association

Chairman
C-6, Fish Harbour, West Wharf Karachi.
Tel : 21- 2313601-2

17. Pakistan Sea Food Industries Association

Chairman
M/s. long Wharf Seafoods (Pvt) Limited
B-3, Fish Harbour, West Wharf Karachi.
Tel : 21-2313010

18. Sindh Trawlers Owners & Fishermen Association

213, Askary Building, Fish Harbour
West Wharf, Karachi.
Tel : 21- 2132644

19. Karachi Fishing Boat and Trawler Owners Group

Mole No. 33, Fish Harbour, West Wharf, Karachi.
Tel: 21-201855, 201259

20. Mole Holder Association

M. Ismail & Company
Fish Harbour, West Wharf Karachi.
Tel : 21- 201776

Fishery Related Research & Educational Institutes**21. National Institute of Oceanography (NIO)**

Director General NIO
ST-47, Block- 1, Clifton, Karachi.
Tel : 21-5860028-30

22. Centre of Excellence in Marine Biology

Director
Department of Botany
University of Karchi
Tel : 21-470572 – 479001

(Some international Fisheries Organizations/Groups)**23. Food & Agriculture Organization (FAO)**

Chief FAO
Viale delle Terme di Caracalla
00100 Rome, Italy
web. site : [www. Fao. Org](http://www.Fao.Org)

24. The Marine Product & Development Authority, India

MPEDA house, Panampilly Avenue, Panampilly Nagar, Cochin.
Tel : 91-484-311979, E-mail: mpeda@vnl.com

25. Infofish

P O Box 10899
50728 Kuala Lumpur, Malaysia
Tel : (603) 2914466 Fax: (603) 2916804
E-mail: infish@tm.net.my

26. East Fish

P O Box 0896, UN Centre, Medtermolen 3, DK-2100 Copenhagen, Denmark
Tel : (45) 35467180

27. Ministry of Agriculture & Cooperatives, Thailand**Department of Fisheries**

Ratchadamnern Nok
Bangkok
Tel: (66-2) 282-4513
Fax: (66-2) 280-1502

28. Department of Fisheries, Malaysia

Wisma Tani, Jalan Sultan
Salahuddin 50028, Kaula Limpur
Tel : 03-298-2011
Fax: 2910305

29. Ministry of Fisheries & Aquatic Resources, Sri Lanka

Maligawatte Secretariat
Colombo 10
Tel : 546183

30. Cabin Plant International A/S

Roesbjergvej 9, DK-5683 Haarby
Tel : 45 63 73 20 20
Fax: 45 63 73 20 00
E-mail: cpi@cabinplant.com

31. China International Fisheries Corp.

31 Minfeng Lane, Xidan, Beijing, China.

Tel: 86-10-66081039, Fax: 86-10-66011021

32. Swede Fishery Group

ICH Trading AB, Vastmannagatan 9, SE-111

24 Stockholm, Sweden
Tel: 46 8 20 81 90 Fax: 46 8 20 81 11
Web site: www.swedefish.org