PART 2

Feasibility Study

11. Bases of the Survey & Study for FPPIII Project

(1) Experience gained from previous Fish Ports Project

The study, planning and design for FPPIII Project as described hereunder are based on previous experience gained from the study, design, construction and operations of FPPI and FPPII Projects considering the current situation of fisheries development in the Philippines.

Navotas FPC in Metro Manila was constructed with ADB assistance in the 1970s while the Nationwide Fish Ports Package I Project (FPPI) comprising of Iloilo, Sual, Lucena and Camaligan FPC and Zamboanga FPC was constructed in the 1980s. Davao and General Santos FPC under FPPII was constructed in the 1990s. At that time fish hauls were either unloaded onto small pier, adjacent river banks or along sand beaches as there were no berthing facilities and on shore facilities such as market hall and other associated facilities to cater to fish landings and handlings even for Navotas. Trading of fresh fish was done in stalls along road sides without sewage facilities. Fish handling was then very unsanitary and the surroundings were extremely unhygienic. From 1970 to the mid of 1980s, development in fishing industry was primarily aimed at increasing fish haul landings which resulted to the destructions of mangrove forest for the construction of fish ponds, destruction of coral reefs due to rampant trawl fishing, illegal fishing through the use of dynamite and cyanide and the proliferation of black tiger prawn culture in the 1980s for municipal fisheries. Commercial fishery productions also kept increasing.

Based on the foregoing experience, how to make the best use of FPPIII Project was therefore conceived.

Fish Ports Package I Project (FPP I)

Package I Project was therefore developed to provide fish port facilities which were then not available at that time to enhance sanitation in fish handling operations. These include the construction of appropriate berthing facilities, ice plant and market hall and other associated facilities, to facilitate fish landings to reduce fish spoilage incidences and to preserve the quality of fish catch to maintain their value and palatability. Moreover, for foreign exchange earnings, the installation of freezers, cold storages and associated refrigeration facilities was conceived for the processing of prawns for global markets. During those days, there were no proper guidelines about environmental considerations. Focus was made on volume of fish capture and on how to reduce on construction cost including cost for environmental mitigations measures such as sewage treatment facilities. It was only in the 1980s that environmental concerns began to emerge. However, during the execution of the Project, there was a directive from the incumbent administration to reduce by 2/3 the construction cost of the Project. To cope with the instruction, material specifications had to be downgraded and certain facilities had to be scaled down. Moreover, the abrupt prohibition of asbestos for use as roofing and sidings of building facilities was unexpected and appropriate alternative measures could not be found. These among other problems have resulted to shortage in facilities and increase in maintenance cost of facilities which up to date has been continuing.

Water supply for Iloilo FPC and Lucena FPC was supposed to come from the local water districts but there was a demand increase due to the rising population and as such the project was not provided with sufficient volume of water. In the case of Zamboanga FPC, Camaligan FPC and Sual FPC, the development of deep wells for water supply was included in the scope of works of the Project.

Land acquisition for the existing fish landing site in Pangasinan encountered extreme difficulties and therefore an arrangement was made to locate the fish port in Sual from the technical point of view based on an arrangement with the local government that all fishermen will relocate to Sual. The arrangement however did not materialize because the local government and the fishermen

failed to reach an agreement which resulted to the under utilization of the fish port. On the other hand, the canning plant has attracted many small boats and commercial vessels to use Zamboanga FPC since 2000. Zamboanga FPC is now playing a major role as a fish landing center.

Fish Ports Package II Project (FPP II)

FPPII was therefore planned considering the major issues of concern experienced in the implementation and of operation of FPPI Project based on the following premise.

1) The fish port site should be located in fish production centers.
2) The building facilities including the market hall refrigeration/ice making building are to be constructed of reinforced concrete for durability and as measure against corrosion due to the salty air environment and damages cause by typhoon occurrences to reduce on maintenance cost.
3) For environmental mitigation measures, the fish ports will be provided with waste water treatment facility to handle liquid waste discharges from the market hall and fish processing facilities. Breakwater facility will be provided to ensure harbor calmness for the safe berthing and mooring of small boats and fish vessels.
4) Application of atmospheric condenser instead of evaporative condenser commonly used in developed countries because of the sad experience in FPPI Project regarding the occurrence of scaling of refrigeration pipes caused by the presence of high calcium carbonate from water supply used as cooling water. Removing the scales had post extreme difficulties that required shutting down of operations of the refrigeration facilities.
5) Choice of a candidate site for a fish port should also consider the availability of abundant water supply/source.

For General Santos FPC, Tambler which is 10km away from the traditional fish landing area in the City at Lions Beach was selected as the fish port site, based on the city zone planning to redevelop Lions Beach as a coastal park. With the close coordination of PFDA and the City Government, the transfer of the site to Tambler was conducted without hindrance.

Fish Ports Package III Project (FPP III)

It is essential for Philippine fishery industries to transform the manner of fishing from just mere catching to value adding of fish hauls by proper and hygienic post handling and processing operations. Planning and design of FPPIII Project will be pursued considering the foregoing and the stakeholders' request for a comprehensive improvement to fish port operations, efficiency, sanitation, safety, security and information system, the ultimate objective of which is to generate more income while at the same time preserving precious fish resources. The manner on which this will be undertaken is described hereunder:

1) DPWH was initially the implementing agency for FPPI and II Projects but was later on transferred to DOTC. After the completion of construction works, the fish ports were turned-over to PFDA for operations. Because the implementing agency for design and construction and operation differed there were instances where the objectives of PFDA could have not been reflected. However, for General Santos FPC there was closer coordination with PFDA and DOTC regarding the review of the original master plan for which revisions were made on the system, components, and scale of facilities prior to the start of implementation of the Project.
2) To avoid repetition of the same incidence as stated above, the implementation of FPPIII Project, it is highly desirable for PFDA as the implementing agency and the end user to organized a PMO (Project Management Office), who will be the coordinating window for the planning, design and construction of the Project up to start of operations and maintenance.

3) At an interval of 15 to 20 years, there is a need to renew certain machinery particularly for the refrigeration system and the ice plant due to normal wear and tear depreciation for which the service life of major equipments would have been attained. In anticipation of this development and for continuity and sustainability of operations there is need for DA and PFDA to make representations with relevant agencies to set aside the needed funds generated from the operations of the fish ports to cover the cost for the renewal of depreciated machinery/equipments.
4) Planning and design of structures and equipment will focus on durability and service life to reduce on maintenance cost as a major means of sustaining smooth and long lasting operations. For example, the market hall structure including the roof will be constructed of reinforced concrete for lifetime durability against corrosion and typhoons. The scale and layout plan of the market hall facilities will made considering the flow of trading activities, from fish landing, unloading, trading, sorting, and packing up to transporting. Fish brokers will be provided with uniform offices for orderly trading activities.
5) Increasing usage will help raise the revenues of the regional fish ports and make them more useful to the local, regional and national economy. In order to achieve this, the underutilized facilities of existing regional ports must be used in the processing of other agricultural products such as livestock and poultry. Turning the ports into integrated fisheries-agriculture processing centers will improve their economic viability. As being implemented for the cold storages of Iloilo FPC and Camaligan FPC and the pier of Sual FPC, multipurpose use is recommended for stable income of the Fish ports.
6) The rehabilitation and/or improvement of the Municipal Fish Ports facilities are included in the Project to enhance the development of the fishery industry as mandated by the Charter of PFDA. The municipal fish ports are also conceived as one major source of low value fish supply to the regional ports for processing into added product for global markets. Operations of both ports will be complementary and mutual cooperation-ship is vital for mutual benefits. The regional ports will supply the municipal ports with ice to preserve the quality of fish catch for trading and processing.
7) Some of the port facilities were designed based on conditions at the time of preparations of the plans such as 100 ton capacity vessels for berthing impact and T-14 ton for vehicle load. Fish vessels have recently become much larger and coupled with the multi-purpose use of the facility as for example the mooring of 1000 ton agricultural product carriers and use of bigger mobile cranes for unloading of cargos for Sual, there is a need for a drastic review of the overall plans of all regional fish ports included in FPPIII to cope with the changing events for durability and safety.
8) The provision and rehabilitation of the breakwaters for Iloilo, Lucena, Bislig and some other fish Ports are determined necessary to ensure the required wave calmness of the fish ports for safety of berthing and as place of refuge in times of bad weather conditions The breakwaters for Iloilo FPC and Bislig were also conceived to prevent silt intrusion into the fish ports. These improvements are expected to induce more fish boat operator to use the port that would generate more port revenues.
9) The rehabilitation and improvement of the boat repair including slipway facilities which are essential for the operation of fish ports are major source of port revenues.
10) Solar panel power generation system will be installed for Iloilo FPC to reduce on power rate charge if combined with the excessively high commercial power cost from PECO. In this connection, sales of surplus power could be negotiated with PECO.
11) As mentioned earlier, the atmospheric condenser system, will be adopted for cold storages to reduce on maintenance cost. Likewise, the cold store rooms with appropriate temperature will be compartmentalized for flexibility of use to reduce on cost of operation.
12) Waste water treatment and solid waste collection facilities will be provided for all candidate fish ports as mitigating measures against adverse environmental concerns.
13) The future increase in fish catch particularly for marine fishery appears to be uncertain. As one possible measure to close the gap deficiency between supply and demand is the provision

of HACCP compliant fish processing facilities for value adding of products for global markets that would command much higher cost, for sustainability of operations. The veering of quantity to quality will ultimately reduce the incidences of fish spoilage estimated at 30% of fish catch will in turn compensate the deficiency in fish capture.

14) Deep wells will be developed for Lucena FPC so as to secure sufficient quality and quantity of fresh water supply. The supply of water for Iloilo FPC, from the city water district will be followed up.
15) The administration office for Lucena FPC will be located on top of new market hall for proximity to the trading activities operations as well as to provide sufficient office space at minimal cost, without unnecessarily encroaching other available essential areas of the port premises.
16) Pay public toilets will be provided for the convenience of port users. Part of the revenues to be generated from the fees will be used to maintain the toilet facilities to ensure hygiene and sanitations at all times.
17) CCTV (Closed circuit TV), public address will be provided at major areas of the market hall and vehicle holding areas as major means of controlling activities for safety and security of operations.
18) As part of the experience gained from the implementation of FPPI & FPPII Projects, there is a need to provide technical assistance for capacity building of PFDA staffs in connection with fish port management and marketing promotions for sustainable operations and maintenance of the fish ports.

(2) Objective Fish Ports and Scope of Survey

PART 2 of the study comprise the Feasibility Study conducted through the field Survey from February to April and June 2010. These include the candidate fish port chosen as priority. The major output of the tasked comprise of the following: 1) Review of the Project components including fish demand analysis, and number of fishing vessels at each fish port, 2) Deliberation with PFDA and other government agencies concerned of the Plans for the Regional and Municipal Fish Ports as shown in the tabulation below was made, including the assessment of environmental and social aspects associated with the implementation of the Project, implementation schedule and cost estimate. To ensure an orderly execution of the Project, an assessment of the implementation schedule and organizational structure for operation and management of the fish ports was likewise conducted. Chapter 20 describes the economic studies based on “without and with Project scenarios”. The results for assessment of EIRR and FIRR indicators shows that the Project is both economically and financially viable.

As mentioned earlier, the scope of the Survey includes 6 regional fish ports and 15 municipal fish ports of which 11 are subject for the feasibility study while 10 municipal fish port are for the needs assessment survey.

As for Balatan Municipal Fish Port, the evaluation was made for reference purposes only, considering the high cost of constructing a breakwater which constrained the development of a fish port in the locality, as discussed in Chapter 10 for the determination of the order of priority for development of candidate fish ports.

Table 11.1 hereunder summarizes the scope of survey works conducted.

Table 11.1 Scope of Survey Works

Level of Survey		Regional Fish Port			Municipal Fish Port	Province	Demand Study	Facility Scale Determination	Fish Handling Distribution Survey	Stake-holders Hearing Survey	Hydrographical Survey	Topographical Survey	Soil Investigation	Wave Analysis	Preliminary Design	Cost Estimation	Implementation/ Construction Schedule	Environmental and Social consideration	Project Evaluation	
																			Economic Analysis	Financial Analysis
Feasibility Study (F/S)	1	Iloilo				Iloilo	x	x	x	x	x	x	-	x	x	x	x	EPRMP	x	x
	2	Sual				Pangasinan	x	x	x	x	x	x	-	-	x	x	x	EPRMP	x	x
	3	Lucena				Quezon	x	x	x	x	x	x	-	-	x	x	x	EPRMP	x	x
	4	Camaligan				Camarines Sur	x	x	x	x	x	x	-	-	x	x	x	EPRMP	x	x
	5	Davao				Davao	x	x	x	x	x	x	-	-	x	x	x	EPRMP	x	x
	6	Bislig				Suligao del Sur	x	x	x	x	x	x	x	x	x	x	x	IEER	x	x
				1	Conception	Iloilo	x	x	x	x	x	x	x	x	x	x	x	EPRMP	x	x
				2	Subic	Zambales	x	x	x	x	x	x	-	-	x	x	x	IEER	x	x
				3	Atimonan	Quezon	x	x	x	x	x	x	-	-	x	x	x	EPRMP	x	x
				4	Calabanga	Camarines Sur	x	x	x	x	x	x	-	-	x	x	x	IEER	x	x
				5	Sta. Cruz	Davao del Sur	x	x	x	x	x	x	-	x	x	x	x	IEER	x	x
Need Assessment Survey				6	Dumangas	Iloilo	x	x	x	x	-	-	x	-	x	x	x	IEEC	NA	NA
				7	San Jose	Antique	x	x	x	x	x	x	x	-	x	x	x	IEEC	NA	NA
				8	Dagupan	Pangasinan	x	x	x	x	-	-	-	-	x	x	x	IEEC	NA	NA
				9	Calauag	Quezon	x	x	x	x	x	x	x	-	x	x	x	IEEC	NA	NA
				10	Sta. Elena	Camarines Norte	x	x	x	x	x	x	x	-	x	x	x	IEEC	NA	NA
				11	Pasacao	Camarines Sur	x	x	x	x	-	-	-	-	x	x	x	IEEC	NA	NA
				12	Balatan	Camarines Sur	x	x	x	x	x	x	x	x	x	x	x	IEER	x	x
				13	Oas	Albay	x	x	x	x	-	-	-	-	x	x	x	IEEC	NA	NA
				14	Panabo	Davao del Norte	x	x	x	x	x	x	x	-	x	x	x	IEER	NA	NA
				15	Mati	Davao Oriental	x	x	x	x	-	-	-	-	x	x	x	IEEC	NA	NA

Legend: x : Conducted
- : Applied existing available Data
NA : Not Applicable

EPRMP : Environment Performance Report and management Plan
IEER : Initial Environment Examination Report
IEEC : Initial Environment Examination Checklist

12. Demand and Scale of Fish Port Facilities

12.1 Iloilo Fish Port Complex (IFPC)

12.1.1 Boats Entries and Berthing

Total number of boat entries to IFPC had been decreasing from 1,884 to 952 during 2005 – 2008, but has retrieved to 1,136 in 2009 with the shifting of the landing base of some commercial fishing boats from Cebu to IFPC and the drastic increase of non-fishing boats mainly carrying agro-products (90 boat entries in 2009). It is estimated that the number of boat entries will gradually retrieve to the following levels, with the improvement mooring area calmness and development of agro-fishery processing.

Table 12.1.1 Estimated Boat Entries to IFPC

Type of boats	Current (ave.2005-09)				Future (With Project)				Remarks
	No. of entries			GRT	No. of entries			GRT	
	Per year	Per day (ave.)	Per day (peak)		Per year	Per day (ave.)	Per day (peak)		
Municipal	97	0.27	0.61	2.3	97	0.27	0.61	2.3	Keep the average of 2005-09
Commercial	1,185	3.29	4.85	32.9	1,794	4.98	6.20	35.5	Retrieve to the 2005 level
Non-fishing	27	0.08	0.27	306.2	90	0.25	0.87	306.4	Keep the 2009 level
Total	1,309	3.65	5.25	38.9	1,981	5.50	7.68	33.1	

Based on records, there are 419 commercial fishing boats (10 – 350 GT) that used PPA Iloilo Commercial Port in 2009. These fishing boats will be moving to IFPC provided that the mooring area calmness is improved and that berthing charge is reasonable to entice one-stop unloading & loading practice. The above commercial fishing boats expected to move to IFPC will be accommodated at the existing 300m long commercial berth.

12.1.2 Fish Unloading and Distribution

The fish unloading volume at IFPC is expected to increase from 23,912 MT (average of 2005-09) to 26,821 MT in 2025, with the expansion of aquaculture production (2,749 MT consisting of milkfish: 2,650 MT, tilapia: 84 MT, others: 15 MT). In addition, processors are expected to bring into IFPC some 2,033 MT of raw materials for processing. The distribution channels of unloaded fishes to the Project are as shown below:

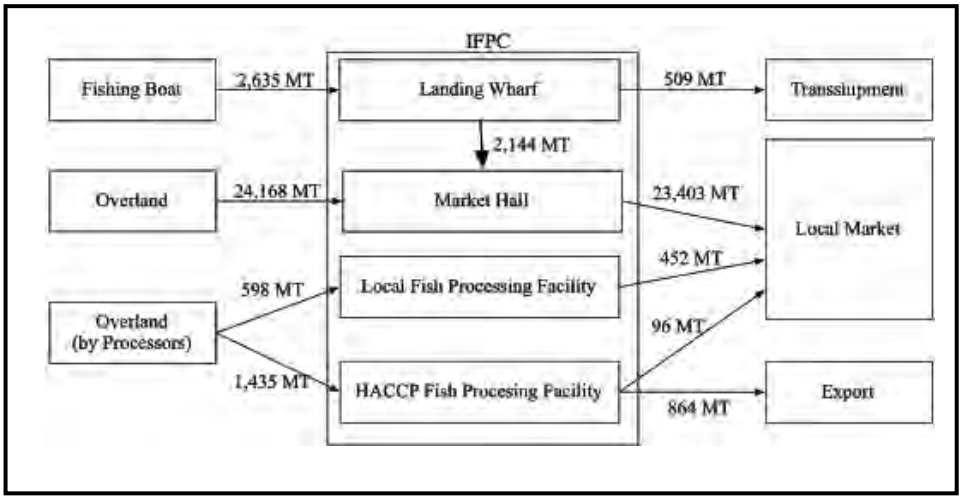


Fig. 12.1.1 Fish Distribution Channel at IFPC (with the Project)

On the other hand, out of the total demand for fish in Iloilo City (about 15,000 MT/year), it is estimated from the fish flow (Fig. 6.1.1) that about 60% will be supplied to IFPC and 40% will be directly distributed to public markets and consumer centers. With the modernization of the wholesale market of IFPC, fish catch directly distributed to public markets would partly be absorbed by IFPC by inducing existing wholesalers from public markets in Iloilo City to relocate to IFPC.

(1) Market Hall

The restricted space of the market hall at IFPC is causing heavy congestion during trading hours. In addition, there is no space for icing/packing of fish after trading, so that packing of traded fish are usually made in the parking area. There is a need to expand the auction space from 50 m^2/bay to 65 m^2/bay in order to mitigate the congestion during trading and to expand the icing/packing area (to 35 m2/bay) to avoid fish handling outside the market hall. Furthermore, the total numbers of bays should be increased from 28 to 31 considering the projected increase in fish handling volume to1.12 times by 2025.

Table 12.1.2 Estimated Space Needed for the Market Hall of IFPC

		Existing (2009)	Projection (2025)
Fish handling volume at market hall (average at peak month)		81.10 MT/day (Trading time: 00:00 - 06:00)	90.83 MT/day (Trading time: 00:00 - 06:00)
Handling volume per m^2		50 kg/m^2 (1 cycle/day)	50 kg/m^2 (1 cycle/day)
Operating rate of each bay		90%	90%
Needed space for auction		1,802 m^2 (81,100kg/50kg/90%)	2,018 m^2 (90,830kg/50kg/90%)
No. of fish brokers		20	23
Estimated area	Auction space	1,400 m^2 (50 m2/bay x 28 bays)	2,015 m^2 (65 m^2/bay x 31 bays)
	Icing/packing space	-	1,085 m^2 (35 m^2/bay x 31 bays)
	Loading & unloading	-	900 m^2
	Total	1,400 m^2	4,000 m^2

Note: Loading & unloading space shows the peripheral area outside the building columns.

12.1.3 Fish and Chicken Processing

(1) Local Fish Processing

Local fish processing will be one among the potential activities in IFPC for the effective use of available space in the Refrigeration Building. The availability of raw materials particularly small pelagic will occupy the largest portion of postharvest loss. It is estimated that about 600 MT of small pelagic (150 MT in Concepcion and 450 MT in San Jose) will be primary cause of over-supply that would generate the drop in market price and that part of catch will be discarded during the peak season. The Project will focus the catering of these low-priced fishes (mainly sardines and eastern little tuna) for processing to 1) frozen fish (whole) for storing to be shipped out when price is improved, and 2) semi-smoked and/or fish burger on pilot-scale, so as to stabilize fresh fish market price as well as to increase the cost by processing to value-added products. Since it is difficult to estimate the available demand for processed products other than frozen fish for the local market for the time being, it is highly recommended that proof test be conducted through technical assistance as the objective of which is to encourage local processors.

The following table shows the estimated production schedule for local fish processing in IFPC, based on available quantity of raw materials and the types of processed products with possibility for expansion at this point in time.

Table 12.1.3 Production Schedule for Local Fish Processing at IFPC

	Volume of fish deemed as over-supply /*1	With T/A for proof test for processing		Without T/A
		Volume of raw materials	Volume of processed products	Volume of raw materials
Concepcion	149 MT/year (0 – 42 MT/month)	For frozen: 282 MT/year (0 – 113 MT/month)	Frozen fish (non-processed): 282 MT/year (0 – 113 MT/month)	For frozen: 360 MT/year (0 – 95 MT/month)
San Jose	449 MT/year (0 – 158 MT/month)	For processing: 316 MT/year (0 – 45 MT/month)	Semi-smoked fish (IQF): 152 MT/year (0 – 22 MT/month)	
Total	598 MT/year (0 – 158 MT/month)		Fish burger (IQF): 19 MT/year (0 – 3 MT/month)	

Note: /*1 Fish unloading volume exceeding monthly average at each month.

For the above local fish processing, the following refrigeration equipments are conceived to be required.

1) Air Blast Freezer

Air blast freezer will be used for individual-quick-freezing (IQF) of the processed products (vacuum-packed, semi-smoked fish &/or fish burgers). The processing will be done from Feb. to Oct. when low-priced raw materials are available. The volume of products to be processed is estimated at 24.3 MT/month (or 1 MT/day) maximum, which will be processed by 2-shift per day operation by one unit of air blast freezer (500kg/6 hours/shift).

2) Contact Freezer

Contact freezer will be used for the freezing raw fish, that is beyond the daily capacity of processing during peak season (Mar. – July). Frozen fish will be stored in cold store rooms from Mar. to Aug. (when price is low) to be shipped out from Sep. to Feb. (when price is high). The volume of raw materials to be frozen is estimated at 113 MT/month (4.5 MT/day) max., to be processed by 5-shift per day operation using one unit of contact freezer (1,000 kg/4 hours/shift).

3) Cold Storage

Cold store compartments will be used for storing both the frozen fish and the frozen processed products. The estimated capacity of the cold storage is based on the holding volume as shown in the table hereunder:

Table 12.1.4 Estimated Cold Storage Holding Volume at IFPC

Type of Products	With T/A for proof test for processing		Without T/A	
	Holding Volume	Required Cold Storages	Holding Volume	Required Cold Storages
For frozen fish	0 – 282 MT (average 173 MT)	30 MT (35 m^2) x 8 rooms	0 – 330 MT (average 189 MT)	30 MT (35 m^2) x 10 rooms
For frozen processed products	0 – 59 MT (average 36 MT)	30 MT (35 m^2) x 2 rooms	-	-

4) Smoking Chamber

From t Table 12.1.3, the maximum volume of semi-smoked fish is estimated at 1 MT/day (22 MT/month). The required capacity of smoking chamber is one unit of 200 kg/cycle (1 hour/shift) under 5-shifts per day operation.

(2) HACCP Fish Processing

Majority of fishery products produced by existing fish processors in Iloilo include milkfish, squid, shrimp, scallop, assorted fishes, but the products are primarily destined to Japan, Hong Kong and

local market. The HACCP fish processing facilities is expected not only to improve the quality of existing fish processed products but also to diversify exporting destinations to U.S.A and E.U. markets. As discussed in Chapter 3.2, there is a growing demand for these products in overseas markets including overseas Filipino workers for milkfish products and the existing 4 fish processors in Iloilo Province (as discussed in Chapter 6.1.2) are willing to move into IFPC should the proposed HACCP fish processing facilities be installed thereat.

The minimum production capacity is estimated at 1 MT/unit/day considering the continuous shipment to clients (at one refrigerated container of 20 MT per month). Based on the needs of the existing fish processors and current market price of products, the table hereunder shows the production schedule by the used of 4 lines of HACCP facilities.

Table 12.1.5 Production Schedule of the Proposed HACCP Fish Processing at IFPC

	Raw material (MT)	Processed products (MT)	Price (PhP/kg)		Existing Fish Processors (potential users)
			Export	Local	
Milkfish	540	360	195	165	IFPA, OFW Dumangas, PIXIE's
Squid	175	140	120	90	E.F.P, UNIFISH
Shrimp	210	140	420	400	E.F.P, UNIFISH
Assorted	390	260	150	120	PIXIE's, E.F.P, UNIFISH
Shellfish	120	60	180	100	E.F.P
Total	1,435	960			

Abbreviation: IFPA: Iloilo Fish Producers Association, E.F.P: Estancia Foods Products, PIXIE's: Our Lady of Hope, Inc.
Note: Projected destination: 90% for export and 10% for local market (Assorted fish: 50% for export and 50% for local)

(3) Chicken/ Meat Processing

There are 2 private chicken dressing plants (Value Rich Farm Enterprise and E & S Foods Products) currently operating in IFPC and another plant (Poultry Rich Dressed Chicken) will be completed in April 2010. These dressing plants however are not provided with freezers and cold storage rooms so that dressed chickens have to be brought out for freezing and storing due to the limited capacity of the existing cold storage room (at 360 m^2) in IFPC. The table below shows the estimated capacity of freezers and cold storage rooms for dressed chicken for IFPC:

Table 12.1.6 Estimated Capacity of Needed Refrigeration Facilities for Chicken Processing at IFPC

		Current demand	Present Capacity of IFPC facilities	Current Shortage in Capacity
Freezer	For chicken	(1.5 MT/day x 2) + (2 MT/day x 1) = 5 MT/day	-	5 MT/day
Cold storage	For chicken	(30 MT/month x 3 months x 2) + (40 MT/month x 3 months x 1) = 300 MT (360 m^2)	300 MT (360 m^2) (40 MT (48 m^2) x 7.5)	260 MT (312 m^2) (40 MT (48 m^2) x 7)
	For meat & others	Current users: 260 MT (312 m^2)		

1) Air Blast Freezer

Air blast freezer will be used for individual-quick-freezing (IQF) of chicken products. Processing will continuously be done throughout the year at 5 MT/day. To avoid competition with existing privately owned enterprises operating outside of IFPC, two units of air blast freezer (500kg/6 hours) will be installed for treating 2 MT of dressed chicken by 2-shift per day operation.

2) Cold Storage

Based on the estimated shortage of cold storage rooms for chicken, meat and other products as indicated on the above Table, 7 units of cold storage (40 MT (48 m^2)/room), same capacity as the existing compartmentalized cold rooms) will be provided.

12.1.4 Ice Production and Distribution

(1) Ice Required for the Municipal Fish Ports Project

As shown in Table 6.1.7 (Chapter 6.1.2), the current shortage of ice for fishery use is estimated at about 80 MT/day for Iloilo Province and 20 MT/day for Antique Province respectively. Most of the ice shortages are due to the demand of municipal fish ports and traditional landing places that are the root causes of fish postharvest loss. There is however sufficient supply of ice in Iloilo City. The need for additional production of ice in IFPC is to cater to the needs of municipal fish ports (Concepcion, Dumangas and San Jose) through appropriate distribution network. The table below shows the estimated volume of ice at 10.1 MT/day average to supply the needs of municipal fish ports project.

Table 12.1.7 Estimated Capacity of Ice for Municipal Fish Ports Project Associated with the Operation of IFPC

Destination	Average fish unloading (MT/month)	Average volume of fish deemed as low quality (MT/month)	Estimated ice shortage (MT/month)		
			Lean month (Dec.)	Average	Peak month (May)
Concepcion	149 – 246 (203)	45 – 103 (70)	45	82	145
Dumangas	580- 1,143 (785)	174 – 594 (270)	50	88	246
San Jose	116 – 383 (225)	33 -225 (94)	33	131	383
Total	919 – 1,677 (1,213)	276 – 828 (434)	147	302	587
Daily ave.	40.4	9.2 – 27.6 (14.5)	4.9	10.1	19.6

Note: Ice shortage is estimated based on the following formula:
(Volume at monthly average in each month x 30%) + (Volume exceeding monthly average for each month x 2)

(2) Ice Required for Local Fish Processing

Based on the volume of raw materials (at 598 MT/year) for local fish processing, those to be processed into semi-smoked or fish burger (316 MT/year) will need ice during processing stage. The required volume of ice is estimated from 0 – 3.6 MT/day (2.1MT/day average) based on icing ratio of 200% of raw fish weight.

(3) Ice for Chicken Dressing Plants

Some 10.8 MT, 10.8 MT and 13.5 MT respectively or a total of.35.1 tons/day of ice is estimated to be required for the three chicken dressing plants operating inside IFPC

Based on the above demands for ice, the capacity of the ice making plant is estimated 50 MT/day. The ice making plant will contribute to reduce the 11% of ice shortage for both Iloilo and Antique Provinces for fisheries use and 100% of demand by chicken dressing plants located inside IFPC.

In addition, 3 units of 5-ton insulated trucks will be required for distribution of ice to the municipal fish ports project, based on the following operation schedule:

Table 12.1.8 Operational Schedule of Insulated Trucks for Ice Distribution from IFPC

Destination	Distance (km)	Ave. ice volume (MT/day)	No. of trucks (5-ton)	Fuel (L/trip)	No. of trips/year	Total fuel (KL/year)
Concepcion	95	3.3	0.7	63	197	12.5
Dumangas	30	3.5	0.7	20	212	4.2
San Jose	85	5.2	1.0	57	315	17.8

Note: Ice requirement during peak month will be covered with increase in operation frequencies.

12.1.5 Boat Repair

The existing lessee of the slipway and boat repair yard in IFPC, namely, "Davao Molasses Hauler, Inc." intends to use the facilities after rehabilitation. Based on the demand from the above lessee, 2 lanes of slipways and a small fabrication workshop will be rehabilitated and upgraded.

12.1.6 Others

For more effective operation of IFPC, control of mooring berth and market hall in particular will further be enhanced through the installation of public address system and security system (CCD camera).

12.2 Sual Fish Port Complex (SFPC)

12.2.1 Boat Entries and Berthing

Both fishing and non-fishing boats currently using the SFPC will continue to use SFPC at the same pace as the present, while all carrier boats (25 boats, 5 GT, 14 m long) used by milkfish cage operators will be invited to SFPC for unloading milkfish and loading fish feed and cage materials, with provision of special berths for e carrier boats, feed storage and cage net mending space.

Table 12.2.1 Estimated Boat Entries to SFPC

Type of boats	Current (ave.2005-09)				Future (With Project)				Remarks
	No. of entries			GRT	No. of entries			GRT	
	Per year	Per day (ave.)	Per day (peak)		Per year	Per day (ave.)	Per day (peak)		
Municipal	-	-	-	-	-	-	-	-	-
Commercial	597	1.66	4.37	17.3	597	1.66	4.37	17.3	Keep average (2005-09)
Non-fishing	79	0.22	0.36	310.6	79	0.22	0.36	310.6	Ditto
Milkfish carrier	-	-	-	-	14,703	49.01	49.01	5.0	All milkfish, feed and cage are unloaded/loaded at SFPC.
Total	677	1.88	4.73	51.7	15,379	50.89	53.74	7.1	

Required numbers of berth

The required numbers of berth are calculated as follows:

(1) Jetty for Milkfish Carrier Boats

The required numbers of berth for milkfish carriers is calculated as follows:

Table 12.2.2 Required Length of Jetty for Milkfish Carriers at SFPC

	Milkfish	Fish feed	Cage materials
Volume to be carried	22,800 MT/year (45 MT/crop/cage x 400 cages x 1.27 crops/year)	45,600 MT/year (22,800 x FCR 2.0)	3,619 times/year (7.1 time/crop x 400cages x 1.27 crops/year)
Carrying capacity per boat	4.8 MT/time (fish) + ice	7.2 MT/time	1 cage net/time
No. of boats entries per day	15.8 (22,800/300days/4.8MT)	21.1 (45,600/300days/7.2MT)	12.1 (3,619 / 300days)
Required No. of berths	1.8 (15.8/9 hrs.)	2.3 (21.1/9 hrs.)	1.3 (12.1/9hrs.)
Total no. of berths	6 (both sides of existing pier will be utilized)		

Note: No. of operating days and hours: 300 days/year and 9hours/day. Average berthing time per boat: 1 hour.

(2) Jetty for Local Fishing Boats and Non-Fishing Boats

The required numbers of berth for local fishing boats is calculated as follows:

Table 12.2.3 Required Berths for Local Fishing Boats and Non-Fish Boat at SFPC

	Average 2008-09 at peak month (Nov.)
No. of boats entries per day	5.73 boats
No. of boats moored at stair landing and pier	5 berths (30 m extension pier is necessary)

For detail calculation of the required berths, refer to Section 13.2.1- Basic port facilities.

12.2.2 Fish Unloading and Distribution

In collaboration with the municipality of Sual, should the terms and conditions for the use of the port facilities in Sual are agreed by and between the Management of SFPC and the cage operators, all milkfish from fish cages would be unloaded at SFPC. With this in consideration, unloading of milkfish in SFPC is projected to gradually increase by 20% per annum over the next 5 years after rehabilitation of SFPC has been completed. The time needed for preparatory works to arrive at a mutual consensus should however, be considered.

It is estimated that fish unloading volume at SFPC will increase from 552 MT (average of 2005-09) to 23,352 MT in 2025, by encouraging the existing milkfish cage operators in Sual to use the SFPC as a fish unloading base (See the Chapter 6.2.1). In addition, about 480 MT of raw materials (skipjack) for local fish processing will be brought into the proposed local fish processing facilities by processors themselves. The distribution channels of unloaded fishes with the Project are shown below:

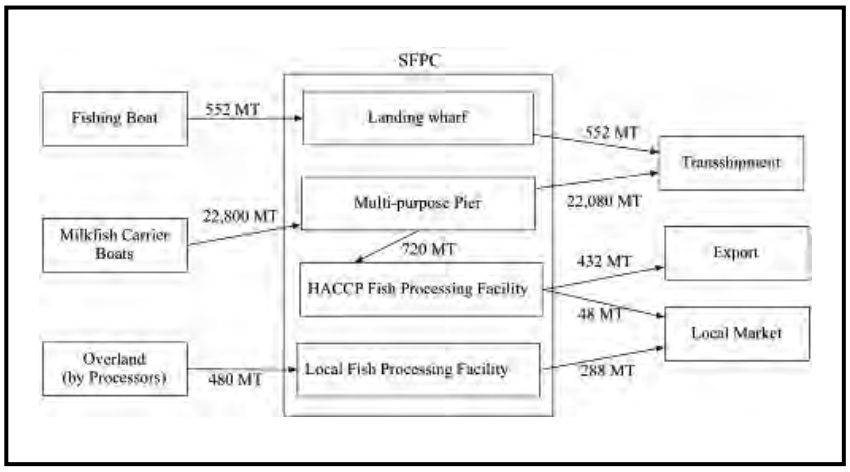


Fig. 12.2.1 Fish Distribution Channel at SFPC (with the Project)

12.2.3 Fish Processing

(1) Local Fish Processing

Local fish processing will be one potential activity in SFPC for effective utilization of the space in the existing Refrigeration Building. Raw materials will be made available from 3 main unloading sites (Subic, Masinloc and Bolinao) along the South China Sea, which is one of the major skipjack fishing grounds in the Philippines. The processed skipjack products will be distributed mainly to northern Luzon (Region II) where fish supply is deficit (estimated deficit at about 41,000 MT per annum in 2025, See Table 6.2.1). SFPC is located in a strategic place for collecting raw materials and distributing to northern Luzon in this manner. Considering the smoked sardines produced in Lucena to be mainly distributed to northern Luzon, there is a possibility that smoked skipjack might also be consumed in this region. To justify the acceptability of smoked skipjack by local people, however, it is highly recommended to conduct proof test through technical assistance to encourage local processors. The following table shows the tentative production schedule for local fish processing in SFPC, based on available raw materials (estimated at about 480 MT per year of skipjack which is about 25% of skipjack unloading in Subic, Masinloc and Bolinao). Considering that this is the first attempt of this kind of processing in the country, it is highly recommended that technical assistance be extended to support PFDA in trial processing and demonstration of smoked skipjack, so as to encourage local processors.

Table 12.2.4 Production Schedule for Local Fish Processing at SFPC

	Volume of raw materials	With T/A for proof test in processing		Without T/A	
		Volume of processed products	Shipping volume	Volume of frozen fish	Shipping volume
Subic	293 MT/year	Semi-smoked fish (IQF): 288 MT/year (24 MT/month)	288 MT/year (12 – 36 MT/month)	360 MT/year (10 – 77 MT/month)	360 MT/year (20 - 60 MT/month)
Masinloc & Bolinao	187 MT/year				
Total	480 MT/year (13.6 – 103.6 MT/month)				

For the above local fish processing, the capacity of the refrigeration equipment is conceived as follows:

1) Air Blast Freezer

Air blast freezer will be used for individual-quick-freezing (IQF) of the processed products (vacuum packed semi-smoked skipjack). The processing will be done throughout the year by using both raw and frozen skipjacks, with continuous production of 24 MT/month (1 MT/day) based on 2-shift operation per day using one unit of air blast freezer (500kg/6 hours/shift).

2) Brine Freezer

Brine freezer will be used for freezing raw materials, when the volume is beyond the daily processing capacity during peak season (Dec. - Apr.). The volume of raw materials to be frozen is max. 63.6 MT/month (3 MT/day), which will be administered by 2-shift operation per day using one unit of contact freezer (2,000 kg/8 hours).

3) Cold Storage

Cold storage rooms will be used for storing both the frozen fish and the frozen processed products. The required capacity of cold storage is estimated based on the holding volume of the store rooms as follows:

Table 12.2.5 Volume to be Stored in the Cold Storage of SFPC

Type of Products	With T/A for proof test in processing		Without T/A	
	Holding Volume	Required Cold Storages	Holding Volume	Required Cold Storages
Frozen raw materials	25 – 109 MT (average 71 MT)	20 MT x 4 rooms	0 – 127 MT (average 71 MT)	20 MT x 6 rooms
Frozen processed products	0 – 48 MT (average 24 MT)	20 MT x 2 rooms	-	-

4) Smoking Chamber

From Table 12.2.4, the volume of semi-smoked fish produced is estimated at 1 MT/day (24 MT/month). The required capacity of smoking chamber is therefore estimated at one unit of 200 kg/cycle (1 hour/shift) under 5-shifts operation per day.

(2) HACCP Fish Processing

As discussed in Chapter 3.2, there is a growing demand for milkfish products in overseas markets particularly by overseas Filipino workers in the Middle East (45.8%), Europe (9.5%), America (9.2%) and others. To export fishery products to these countries, it is required that the products have to be processed in accordance with HACCP standards. Currently there are 2 potential fish processors who are willing to use the proposed HACCP fish processing facilities in Sual, namely, Bolinao Agro-Resources Inc. (current lessee of Refrigeration Building of SFPC) and Sual Fish Cage Operators (11 enterprises). The minimum production capacity is estimated at 1 MT/unit/day considering continuous shipment to the client (one refrigerated container or 20 MT per month). Two units will be required for the above 2 potential fish processors.

12.2.4 Ice Production and Distribution

(1) Ice Required for Milkfish Harvest

At milkfish harvest of 22,800 MT/year, it is estimated that 31.7 MT/day of ice will be required based on ice ratio of 50% of raw fish weight at 360 days per annum operation of the ice plant. Considering the lead time (of approx. 5 years) to induce all fish cage operators to unload harvested milkfish to SFPC, the ice demand would be gradually increase during the first 4 years reaching up to 31.7 MT/day after the 5th operation year.

(2) Ice Required for Local Fish Processing

To maintain freshness of raw materials (2 MT/day) during the processing stage, 4 MT/day of ice will constantly be required based on icing ratio of 200% of raw fish weight.

(3) Ice for Existing Commercial Fishing Boats

Monthly fish unloading volume by existing commercial fishing boats at SFPC varies from 4.4 to 153.9 MT/month (50.5 MT in average). Based on icing ratio to boat (150% of fish catch volume), it is estimated that some 7 – 231 MT/month (75.7 MT in average) of ice would be required. Average ice requirement is approx. 2.5 MT/day.

Table 12.2.6 Estimated Ice Requirement for SFPC (with the Project)

(Unit: MT/day)

	1st year	2nd year	3rd year	4th year	5th year
Ice for harvest of milkfish	6.3	12.7	19.0	25.3	31.7
Ice for local fish processing	4.0	4.0	4.0	4.0	4.0
Ice for commercial fishing boats	2.5	2.5	2.5	2.5	2.5
Total	12.9	19.2	25.5	31.9	38.2
Supply from existing SFPC ice plant	6.5	9.6	13.5	15.0	15.0
Ice plant capacity for expansion	6.4	9.6	12.0	16.9	23.2

Due to the limited space in the existing refrigeration building of SFPC, ice plant will be expanded by 12 MT/ day although the shortage of ice after 5th year is estimated at 23.2 MT/day. The contribution of SFPC's ice plants after expansion is estimated at 71% of the total ice requirement in Sual.

12.2.5 Boat Repair

Due to congestion at the existing boat repair yards (slipways) in Navotas – Metro Manila, there is a possibility for Metro Manila based ship/boats to consider using the boat repair facilities in Sual. Currently and for the foreseeable future to come there will be no steel vessel repair yard in the northern Luzon except for SFPC. In particular, skipjack purse seiners (50 – 150 GT) although limited in number, operating in South China Sea off the coast of Luzon may have to use Sual for the maintenance of their fishing fleet because of proximity. Moreover, due to the heavy congestion of the ship repair facilities in Navotas brought about by the limited space with no room for expansions, it is most likely that the ship repair facilities of Sual would also be accommodating commercial vessels of up to 300 GT capacity. For this to be realized, during the technical assistance, PFDA will be provided with support for the preparation of brochure and if possible for the establishment of a web-site to advertise/market the ship repair facilities of Sual to ship operators particularly those stationed in Metro Manila.

12.2.6 Others

To induce fish cage operators for the maximum utilization of SFPC, the port facilities should include the following:

(1) Fish Feed Storage

Annual volume of fish feed required for milkfish cage culture in Sual is estimated at 45,600 MT/year (22,800 MT x 2.0 (feed conversion ratio)). Based on 100 times/year (2times/week) frequency feed delivery by suppliers, volume of feed to be stored is calculated at 456 MT. Considering that there are 11 fish cage operators in Sual, the required covered shed for the storage of fish feed is estimated at 40 MT x 11 rooms.

(2) Cage-net Washing Area

Each cage-net has to be changed every 3 weeks for maintenance (washing out of clogged materials in net mesh). Total number of net washing is estimated at 3,619 times/year (150 days / 21 days x 1.3 crops/year x 400 cages) or 12 nets/day to be washed and dried.

12.3 Lucena Fish Port Complex (LFPC)

12.3.1 Boats Entries and Berthing

The total number of commercial fish boats entries to LFPC had drastically increased in 2009 due to unloading of Navotas based purse seiners and all other local fishing boats at the fish port. On the other hand, non-fishing boats entries have been decreasing during 2005 - 09 sharply declining in

2006 because of the operation of the new PPA Port in Lucena. Taking into consideration these situations, it is envisioned that entries for both commercial fish boats and non-fishing boats would be maintained at the 2009 level, while the average of the 2005 to 2009 level would be maintained for municipal fishing boats.

Table 12.3.1 Estimated Boat Entries to LFPC

Type of boats	Current (ave.2005-09)				Future (With Project)				Remarks
	No. of entries			GRT	No. of entries			GRT	
	Per year	Per day (ave.)	Per day (peak)		Per year	Per day (ave.)	Per day (peak)		
Municipal	2,068	5.90	11.60	2.3	2,068	5.90	11.60	2.3	Keep average of 2005-09
Commercial	2,434	6.76	10.44	97.5	3,277	9.10	13.60	110.3	Keep 2009 level
Non-fishing	945	2.63	3.81	305.9	37	0.10	0.33	108.2	Keep 2009 level
Total	5,444	15.12	22.32	97.5	5,382	15.10		68.8	

Due to the increase in numbers of commercial fishing boats in 2009, the multi-purpose pier is heavily congested so that waiting time for berthing became taking longer time for fish unloading and preparation (loading of fuel, ice and water). Based on the above numbers of boat entries, the existing pier has to be extended as described below:

Based on the site investigation, 60 percent of Commercial boat and Non-fishing boat are utilizing the multi-purpose pier. In order to accommodate all the above vessels, the pier has to be extended by 25 meters from the existing 114 m long pier to expand the capacity to seven berths.

12.3.2 Fish Unloading and Distribution

It is estimated that the fish unloading volume at IFPC will increase from 23,738 MT (average of 2005-09) to 25,278 MT in 2025, with the expansion of aquaculture production (about 1,540 MT of milkfish and tilapia). The distribution channels of unloaded fishes with the Project are as shown below:

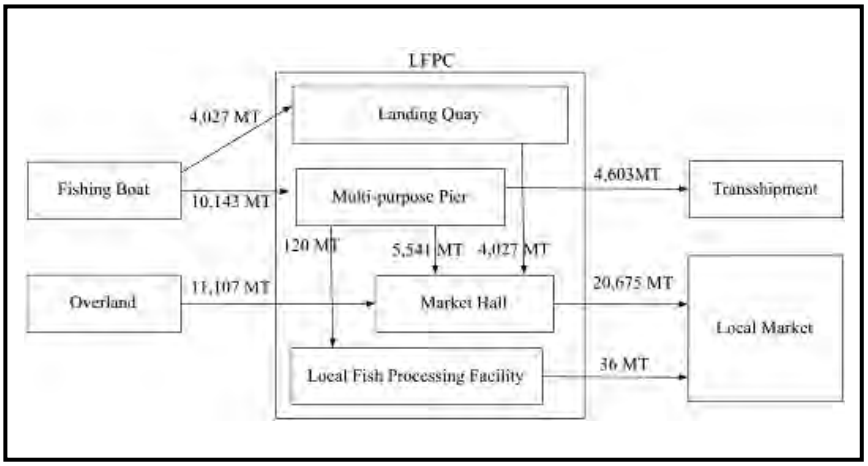


Fig. 12.3.1 Fish Distribution Channel at LFPC (with the Project)

(1) Market Hall

The space of the existing market hall (at 1,914 m^2) is appropriate for trading activity, but there is no space for icing/packing of fish after trading, so that traded fish products are usually packed in the parking area. It is therefore necessary to expand the market hall by adding the icing/packing area (32.5 m^2/bay) to avoid fish handling outside the market hall. Furthermore, the total numbers of bays will be increased from 29 to 31 considering the increase in fish handling volume (106.3%

in 2025) and 2 additional fish brokers requesting LFPC to provide trading space for the present trading activities.

Table 12.3.2 Estimate of Additional Space for Market Hall of LFPC

		Existing (2009)	Projected (2025)
Fish handling volume at market hall (average at peak month)		81.49 MT/day (Trading time: 00:00 - 12:00)	86.38 MT/day (Trading time: 00:00 - 12:00)
Handling volume per m^2		50 kg/m^2 (1 cycle/day)	50 kg/m^2 (1 cycle/day)
Operating rate of each bay		90%	90%
Required area for auction space		1,914 m^2 (81,490kg/50kg/90%)	1,920 m^2 (86,380kg/50kg/90%)
No. of fish brokers		25	27
Designed area	Auction space	1,914 m^2 (66 m^2/bay x 29 bays)	2,015 m^2 (65 m^2/bay x 31 bays)
	Icing/packing space	-	1,008 m^2 (32.5 m^2/bay x 31 bays)
	Loading & unloading	-	906 m^2
	Total	1,914 m^2	3,929 m^2

Note: Loading & unloading space shows the peripheral area outside the building columns.

(2) Retail Market

The retail market will be allocated next to the project market hall to accommodate the existing 50 fish retailers operating in the peripheral area of the existing market hall. The space required for one retailer (unit) is 3 m^2 (1.5 m x 2 m/unit).

12.3.3 Fish Processing

(1) Local Fish Processing

Local fish processing will be one of potential activities in the LFPC for effective utilization of the space in the existing Refrigeration Building. Sardine is the dominant and lowest-priced species unloaded at LFPC and about 5,000 MT are currently smoked or dried in Lucena (outside of LFPC, by procuring raw materials from LFPC and Navotas). The Project will focus on processing sardine to more value-added product such as fish burger on pilot-scale. The following table shows the tentative production schedule for local fish processing at LFPC. It is highly recommended that a proof test will be done through a technical assistance, to justify the acceptability of this new processed product by local consumers to motivate processors to produce more.

Table 12.3.3 Production Schedule for Local Fish Processing at LFPC

Unloading volume of sardine at LFPC (ave. 2008-09)	Monthly Average Surplus Volume	Volume of raw materials	Volume of fish burger (IQF)
4,144 MT/year (155 – 587 MT/month)	600 MT/year (0 – 241 MT/month)	120 MT/year (0 – 48 MT/month)	36 MT/year (0 - 15 MT/month)

Note: Fish processing will be conducted only during peak fishing season from Nov. – May.

For the above fish processing, the following equipments will be used (In case that no proof test for fish processing is made, only 3) chilled storage for storing smoked fish will be used):

1) Air Blast Freezer

Air blast freezer is necessary for individual-quick-freezing (IQF) of processed products (vacuum packed fish burgers). Processing will be done during peak fishing season from Nov. – May. The volume of fish burger to be processed is estimated at 14.48 MT/month (1 MT/day) maximum, to be accomplished in 2-shift operation per day by one unit of air blast freezer (500kg/6 hours/shift).

2) Cold Storage

Cold storage rooms will be used for storing the frozen fish burger. The capacity of the cold storage is estimated based on the holding volume, assuming that all raw materials procured are processed simultaneously.

Table 12.3.4 Estimated Cold Storage Holding Capacity for LFPC

Type of Product	Holding Volume	Estimated Cap. of Cold Store
Frozen fish burger	0 – 17 MT (average 8 MT)	20 MT x 1 room

3) Chilled Storage (Storage for Smoked Fish)

The existing chilled storages (50 MT x 2) are used mainly for storing smoked fish produced by local processors outside of LFPC. These cold storages are, however, of the older model and previously designed with larger refrigeration machinery for other use, thus consuming more electricity when use for storing smoked fish. The existing chilled storages are used by 14 fish processors and the holding volume of smoked fish varied from 42.9 to 132.9 MT (87.9 MT in average) in 2009. In this context, it is better to install new chilled storages (25 MT/room x 4 rooms) to save on operational (power) cost considering the monthly fluctuations of holding volumes and the small storing quantity of the individual fish processor. Operation of the existing chilled storages should therefore be temporarily stopped; to be used as originally designed in the future when there is a need. Continuous maintenance of the facility however is needed to prevent speedy deterioration of the machineries.

12.3.4 Ice Production and Distribution

(1) Ice Required for the Municipal Fish Ports Project

As estimated in Table 6.3.7 of Chapter 6.3.2, the current ice production in Lucena City appears to be sufficient but ice supply for the municipal fish ports Project in Atimonan, Calauag and Sta. Elena will be short by 4.5 MT. Assuming that fishing boats currently unloading at Mercedes (20 out of 35 units) will move to Sta. Elena with the completion of the Project, the average shortage of ice would increase to 16.5 MT/day (mostly for Sta. Elena) but LFPC would be too far and would be uneconomical to supply ice. Therefore, the shortage should be covered by private ice plants in the vicinity of Sta. Elena as shown in the Table below.

Table 12.3.5 Estimated Shortage of Ice in the Project Municipal Fish Ports under LFPC

Municipal fish port	Average fish unloading (MT/month)	Estimated ice requirement (MT/day)			Existing ice plant (MT/day)	Shortage of ice (average)
		Lean month (Feb.)	Average	Peak month (May)		
Atimonan	168 – 411 (271)	11.2	18.0	27.4	25.0	-6.4
Calauag	237 - 582 (383)	15.8	25.6	38.8	25.0	
Sta. Elena	107 – 249 (164)	6.8	10.9	16.6	-	10.9
Sta. Elena (w/Project)	218 – 522 (344)	14.2	22.9	34.8	-	22.9
Total (current)	512 – 1,242 (818)	33.8	54.5	82.8	50.0	4.5
Total (w/Project)	618 – 1,515 (998)	41.2	66.5	121.0	50.0	16.5

Note: Ice requirement (MT) is estimated based on the ratio of ice: fish = 2:1.

(2) Ice Required for Local Fish Processing

To maintain freshness of raw materials (120 MT/year) for local fish processing, about 240 MT/year of ice will be needed during the processing stage, based on icing ratio of 200% of raw fishes weight. The volume of ice required could be supplied from LFPC ice plant (25 MT/day).

Based on the foregoing, there will be expansion of the ice plant for LFPC.

12.3.5 Others

To enhance the operation of LFPC, the port will be provided with public address system and CCD camera for the security system particularly for the control of the berthing areas and market hall.

12.4 Camaligan Fish Port Complex (CFPC)

12.4.1 Boat Entries and Berthing

As stated in Chapter 6.4.1, it would be extremely difficult to summon fishing boats to Camaligan even for the loading of ice supply and fuel because of the higher cost as compared with Naga City and the more convenient conditions for unloading fish catch in Naga public market and in Calabanga even if double handling is being made.

12.4.2 Fish Unloading and Distribution

It has been observed that the brought to CFPC consist of those procured by fish processors delivered overland. The same operation is expected for the future, although the volume is projected to increase from 563 MT (average of 2005-09) to 2,282 MT in 2025, with the establishment of HACCP fish processing facilities. Distribution of unloaded fishes with the Project is illustrated below:

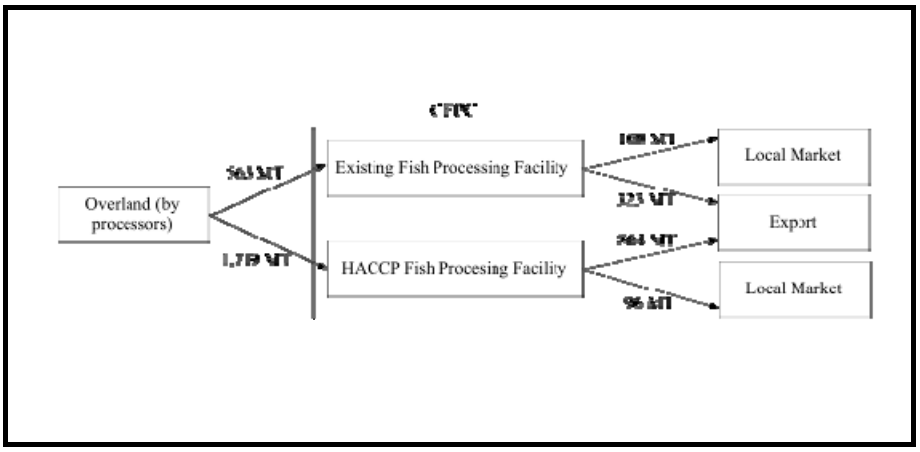


Fig. 12.4.1 Fish Distribution Channel at CFPC (with the Project)

(1) Market Hall

The existing market hall which is being out and was converted into fish processing plant by the lessee (fish processor in CFPC). Due to the absence of fish unloading at CFPC except for raw materials directly procured by fish processors, the market hall is no longer functioning and expected to remain the same in the future.

12.4.3 Fish and Chicken Processing

(1) HACCP Fish Processing

Based on the types and proportions of products presently being processed by existing fish processors, the volume of processed products at CFPC in 2004 (1,538 MT), and the number of fish processors intending to apply for HACCP accreditation (4 processors), the following production schedule has been conceived with the proposed installation of 4 units of HACCP compliant fish processing facilities.

Table 12.4.1 Production Schedule for HACCP Fish Processing of CFPC

	Raw material (MT)	Processed products (MT)	Price (PhP/kg)		Existing Fish Processors (potential users)
			Export	Local	
Giant squid	467	373	450	225	Fresh Catch, Sanvar, T & T
Octopus	287	230	240	120	Fresh Catch, Sanvar
F.W. shrimp	80	48	210	105	Kim Marine, T & T
Cuttlefish	77	61	300	150	Fresh Catch, Sanvar
Crab meat	611	153	500	250	CLC Seafoods
Lobster	65	29	1,200	600	Fresh Catch
Shellfish	132	66	180	90	Fresh Catch
Total	1,719	960			

Note: Projected destination: 90% for export and 10% for local market currently but expected to improve to 75% export and 25% domestic market with the Project.

The destinations of products will be diversified from Japan, Taiwan and Hong Kong at present to U.S. and E.U. markets where the HACCP-accreditation is required. The minimum production capacity is set at 1 MT/unit/day considering the continuous shipment to the customer (one refrigerated container 20 MT per month).

(2) Chicken Processing

1) Air Blast Freezer

At present there are 4 units of contact freezers at CFPC, (2 units @ 400 kg and 1,000 kg per 4 hours) being used for freezing chicken and fishery products. Due to occurrence of voids between the freezing plates and the dressed chickens, the frozen chickens lose shapes which cause uniform freezing quality, resulting to claims from buyers regarding low product value. For improvement, one unit of air blast freezer (500kg/6 hours/shift) will be installed to freeze 1 MT of chicken by 2-shift operation per day. The remaining 2 units of operable contact freezers (one unit of 400 kg and 1,000 kg per 4 hours) will be used for domestic fishery products because of the limited space of the existing Refrigeration Building.

2) Cold Storage

The existing 3 cold storages (48 m^2 (40 MT) x 1 room (partitioned into 2 cubicles) and 21 m^2 (15 MT) x 2 rooms) have been leased to 3 food processors/distributors for the storing of chicken and meat products. The facilities are being fully used including the ante-room of the cold storage for the stacking of products due to space constraints in the cold store rooms. There is request from the existing lessees (MC Enterprises and Jawn Enterprise) for the provision of additional cold storages of 75 – 100 MT but due to space limitation of the Refrigeration Building, cold storages of 60 MT (20MT x 3 rooms) will be installed for the proper storing of chicken & meat products.

12.4.4 Ice Production and Distribution

(1) Ice Required for the Municipal Fish Ports Project

As estimated in Table 6.4.7 (Chapter 6.4.2), the current shortage of ice for fishery use is about 59 MT/day for Camarines Sur Province. Most of the ice shortage is borne by the municipal fish ports and traditional landing places causing the fish post harvest losses. In this context, there is a need for CFPC to produce and supply more ice to the municipal fish ports project in Calabanga, Pasacao, Balatan and Oas through an adequate distribution network. Total volume of ice required for the municipal fish ports project are estimated at 28.4 MT/day at peak fishing season month (13.0 MT/day in average) as shown in the table below.

Table 12.4.2 Estimated Shortage of Ice for the Municipal Fish Ports' Project under CFPC

Destination	Average fish unloading (MT/month)	Average volume of fish deemed as low quality (MT/month)	Estimated Ice shortage (MT/month)		
			Lean month (Feb.)	Average	Peak month (May)
Calabanga	292 – 716 (472)	88 – 386 (177)	88	229	630
Pasacao	110- 161 (138)	33 – 64 (46)	33	53	86
Balatan	187 – 273 (235)	56 – 109 (78)	56	89	147
Oas	41 – 59 (51)	12 – 24 (17)	12	19	32
Total	785 – 1,187 (895)	222 – 455 (319)	230	390	853
Daily ave.			7.7	13.0	28.4

Note: Ice shortage is estimated based on the following formula:
(Volume of monthly average for each month x 30%) + (Volume exceeding monthly average for each month x 2)

To facilitate distribution of ice to the aforesaid municipal ports, 3 units of 5-ton insulated trucks will be provided and to be operated based on the following schedule:

Table 12.4.3 Operation Schedule of Insulated Trucks for Ice Distribution from CFPC

Destination	Distance (km)	Ave. ice volume (MT/day)	No. of trucks (5-ton)	Fuel (L/trip)	No. of trips/year	Total fuel (KL/year)
Calabanga	15	9.1	1.8	10	549	5.5
Pasacao	30	2.1	0.4	20	126	2.5
Balatan	50	3.6	0.7	33	215	7.2
Oas	100	0.8	0.2	67	46	3.1

Note: Ice requirement during peak month will be covered by the increase in operation frequencies.

(2) Ice Required for Procurement of Raw Materials for Fish Processing

There is request for ice for the preservation of raw materials during transport for HACCP fish processing. It is estimated that 50% of ice to the volume of raw materials are required, so that the required ice volume for this purpose will be about 860 MT/year (for 1,719 MT of raw materials) at 2.4 MT/ day.

(3) Ice Required for Agro-industry

There is the existing stable demand for ice at 18 MT/day for agro-industry use.

From the foregoing requirement, the total demand for ice at CFPC is estimated at 33.4 MT/day average. Thus, a 15 MT/day additional ice plant will be provided for CFPC under the Project.

12.4.5 Others

Due to the absence/insufficiency of HACCP compliant processing facilities in southern Luzon in general and the Bicol Region in particular, the provision of these facilities for CFPC is expected to induce several fish processors to locate to CFPC to revitalize its operation for sustainability. The expansion of the capacity of the ice plant for CFPC is intended to support the operation of the municipal ports' project where raw materials will be derived for HACCP processing. As mentioned above, the ice plant will also support the needs of the agro-industry for the stable supply of 18 MT/day of ice. Road conditions to all the municipal ports have greatly improved thus facilitating the supply of raw materials from the municipal ports to be transported overland. Should the operation of CFPC be HACPP accredited, this would significantly improve the marketability of products particularly for export thereby commanding higher cost beneficial to the interest of the fishing industry.

12.5 Davao Fish Port Complex (DFPC)

12.5.1 Boat Entries and Berthing

Although the number of commercial fishing boat entries to DFPC has drastically increased from 299 in 2008 to 840 in 2009 due to the expiry of fishing treaty with the Indonesian Government at the end of 2008, fish unloading volume at DFPC has not significantly increased due to the limited fishery grounds in the Davao Gulf. Foreign fishing boat entries have also decreased in 2009, because the Taiwanese boats had shifted their base of operation to Indonesia. The location of DFPC is such that it could easily be affected by external factors and this is also true in the case of General Santos. For this reason, it is quite difficult to forecast the number of fishing boats entries to DFPC. Thus for the foreseeable future, the number of boats entries to DFPC is assumed to remain at the average level of boat entries from 2005-09.

Table 12.5.1 Estimated Boats Entries to DFPC

Type of boats	Current (ave.2005-09)				Future (With Project)				Remarks
	No. of entries			GRT	No. of entries			GRT	
	Per year	Per day (ave.)	Per day (peak)		Per year	Per day (ave.)	Per day (peak)		
Municipal	1,181	3.28	4.43	5.2	1,181	3.28	4.43	5.2	Average of 2005-09
Commercial	511	1.42	2.72	23.4	511	1.42	2.72	23.4	ditto
Foreign	681	1.89	3.05	53.7	681	1.89	3.05	53.7	ditto
Non-fishing	10	0.03	0.21	206.6	10	0.03	0.21	206.6	ditto
Total	2,382	6.62	8.11	23.8	2,382	6.62	8.11	23.8	

Needs to convert the existing stair landing to vertical quay-wall type of structure:

The existing local commercial fishing boats (ring-netters without out-riggers) has no other option but to unload at the quay-wall of the inner part of the breakwater, while the stair-landing wharf is accommodating local fishing boats with out-riggers. This arrangement is obstructing the landing and transshipment zone of foreign tuna long-line fishing boats which is located between the stair-landing wharf and quay-wall. Fish unloading activities are therefore taking place separately. To improve berthing/landing operations, it is essential to renovate a section of the existing stair-landing wharf to vertical quay-wall for ring-netters to centralize the domestic fish unloading operations.

Base on the market time operation of seven hours, the unloading/preparation time is estimated at five hours multiplied by 2.72 frequency of entries per day, the required number of berth is calculated at 60m to be provided at the north side of the tuna berthing structure.

12.5.2 Fish Unloading and Distribution

For the same reason stated above, fish unloading volume at DFPC will principally remain at the average level of 2005 – 09 (5,251 MT) volume. In addition, about 760 MT of raw materials for fish processing is projected to be brought into DFPC for the HACCP processing facilities as can be seen in the flowchart hereunder.

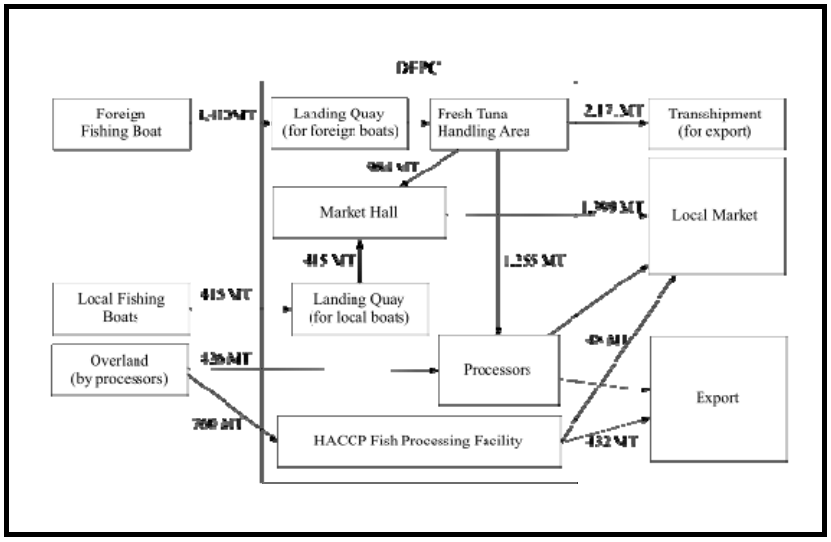


Fig. 12.5.1 Fish Distribution Pattern for DFPC (with the Project)

(1) Market Hall

There is currently no market hall in DFPC because the existing market hall was converted into fresh tuna handling & packing shed by exporters registered with DFPC. While fish volume for handling at the market hall will be quite limited at 5.14 MT/day broken down into 2.41 MT of fish unloaded by local fishing boats and 2.73 MT/day of tuna non sashimi grade. Although non sashimi grade tuna is being directly sold to fish processors and/or local fish dealers at the fresh tuna handling & packing shed based on prior arrangement, the proposed market hall is intended to promote trading activities at DFPC through auctions.

Table 12.5.2 Estimate of Necessary Space for Market Hall of DFPC

		Current (Average 2005-09)	Projected (2025)
Fish handling volume at market hall (daily average at peak month)		2.41 MT/day (Trading time: 08:00 - 15:00)	5.14 MT/day (Trading time: 08:00 - 15:00)
Handling volume per m^2		50 kg/m^2 (1 cycle/day)	50 kg/m^2 (1 cycle/day)
Operating rate of each bay		90%	90%
Required area for auction space		54 m^2 (2,410kg/50kg/90%)	114 m^2 (5,140kg/50kg/90%)
No. of fish brokers		None	2
Designed area	Auction space	-	130 m^2 (65 m^2/bay x 2 bays)
	Icing/packing space	-	65 m^2 (32.5 m^2/bay x 2 bays)
	Loading & unloading	-	120 m^2
	Total	-	315 m^2

Note: Loading & unloading space shows the peripheral area outside the building columns.

12.5.3 Fish Processing

(1) HACCP Fish Processing Facilities

Fishery products produced by existing fish processors at DFPC are mainly frozen tuna (loin, steak and saku) for export to Japan, U.S.A. and E.U. (2 processing plants are HACCP accredited). Other minor processors, although are processing assorted marine fishes, octopus and milkfish. It is expected that the HACCP fish processing facilities will assist these small-medium scale processors in improving the quality of fishery products other than tuna and diversifying the sales outlets to the U.S.A and E.U. markets. As discussed in Chapter 3.2, there is a growing demand for HACCP accredited products in overseas markets.

The minimum production capacity is estimated at 1 MT/unit/day considering the continuous shipment to customers (at one refrigerated container of 20 MT per month). Based on the needs of the existing fish processors and current market price of products, the table hereunder shows production schedule by 4 units of HACCP compliant facilities.

Table 12.5.3 Production Schedule of HACCP Compliant Fish Processing Facilities at DFPC

	Raw material (MT)	Processed products (MT)	Price (PhP/kg)		Existing Fish Processors (potential users)
			Export	Local	
Milkfish	400	240	195	165	Ming Trading, Milkfish Producer
Octopus	120	96	240	180	Ming Trading
Assorted	240	144	150	120	Ming Trading
Total	760	480			

Note: Projected destination: 90% for export and 10% for local market (Assorted fish: 50% for export and 50% for local)

12.5.4 Ice Production and Distribution

As shown in Table 6.5.8 (Chapter 6.5.2), ice supply for fishery use is sufficient for Davao as well as for the municipal fish port areas in the vicinity of DFPC. Considering private sector participation for the development of ice making plants, expanding the existing ice plant capacity of DFPC is considered not necessary.

12.5.5 Others

The development of a fish port in Bislig is anticipated to support the operation of DFPC particularly for the supply of raw materials for HACCP processing, more so that DFPC is located in the 3rd largest consuming center of the country next to Cebu City. Davao is favored with good natural conditions. It is located in a typhoon free zone with readily available abundant water resources. Compared with other sites elsewhere, power is relatively cheap and peace and order is well stabilized. With the proposed installation of HACCP accredited fish processing facilities coupled with the establishment of laboratory facilities to enhance quality of fish processing for added value, DFPC will truly become one of the primary regional fish production center not only for Mindanao but also for the whole country.

12.6 Bislig Fish Port Complex (BFPC)

12.6.1 Boats Entries and Berthing

(1) Skipjack Purse Seiners

Of the 147 sets (50 – 250 GT) of General Santos base purse-seiners (92 sets purse-seiners) (and 55 sets ring netters) of which 70% are fish boats dedicated for catching skipjack and 30% for small pelagic fish species, about 30 sets of purse-seiners are operating in the EEZ waters off Mati in Davao Oriental and the remaining are deployed in the Philippine waters of Celebes Sea. From the proportion of the EEZ between the Pacific Ocean at latitude N 6 – 10 degree and the Celebes Sea, about 2/3 or 52 sets of purse-seiners for skipjack fishing is estimated to shift fishing base from General Santos to Bislig, should a fish port thereat is developed. This issue was also confirmed with the South Cotabato Purse Seiners Association (SOCOPA) which is scouting the rich eastern seaboard fish resources as fishing ground for possible exploitation, it still being under utilize and operationally viable.

The Number of purse seine fishing boats that will shift operation base from General Santos to Bislig are estimated at 52 skipjack purse seiners and 57 fish carriers (See Table 12.6.1). Shifting of base of operation from General Santos to Bislig is assumed to take about 5 years considering the conservative mind of boat operators. By shifting the operation base from General Santos to Bislig, fishing boats will be able to benefit for shorter distance to fishing grounds (See Table 12.6.2). Based on the expected operational pattern of fishing boats, the required number of berths for skipjack purse seiners are calculated as shown in Table 12.6.3.

Table 12.6.1 Estimated Fishing Boats to Shift Base from General Santos to Bislig

Type of Boats	Boats Currently Based at G.S.	Boats Shifting Base to Bislig	Remarks
Skipjack purse seiner (50 - 250 GT)	78	52	Move to Bislig in the same proportion as that of the area of Celebes Sea : Pacific Ocean (N6 - 10) = 1 : 2)
Small pelagics purse seiners (50 – 250 GT)	14	0	Continue to operate in Celebes Sea.
Carrier (80 - 250 GT)	160	57	Will move in same ratio as the purse seiners.
Total	307	109	

Table 12.6.2 Comparison of Operation Patterns of Skipjack Purse Seiners by Fishing Grounds

	Fishing Ground (Landing Base)		
	Pacific Ocean (G.S.)	Celebes Sea (G.S.)	Pacific Ocean (Bislig)
No. of fishing days/trip	4 – 7 days (carrier)	3 – 5 days (carrier)	3 – 5 days (carrier)
Distance to fishing ground	300 miles (36 hours/one way)	200 miles (24 hours/one way)	100 miles (12 hours/one way)

Table 12.6.3 Berths Required for Skipjack Purse Seiners

	Carrier boats	Catcher boats
No. of days per trip	3 – 5 days/trip (6 trips/month)	24 days/trip
No. of boats	57 units	52 units
Operating efficiency	80% (24 days/month)	80% (24 days/month)
No. of boats entries per day	11.40 units/day	1.73 units/day
Required time for fish unloading and preparation	6 hours (3 hours each)	-
Operating hours of BFPC	24 hours	24 hours
No. of berths required for fish unloading and preparation	6 berths (11.4 units / 2 rotations, 6 hrs./rotation)	-
No. of berthing days	6 days/month	6 days/month
No. of berths required for mooring (repos)	11.4 berths (57 units/30 days x 6 days/month)	10.4 berths (1.7 units/day x 6 days)

(2) Tuna Hand-liners

Taking into account that a new public fish market was built and a stair landing wharf is planned to built at the existing fish landing center in Mangagoy, close to the BFPC project site, it is anticipated that the existing municipal fishing boats will not use BFDC from the viewpoint of sales of their catch. On the other hand, it is expected that existing commercial fishing boats (hand-line) would unload fish and load ice, water & bait fish at BFDC if the existing fish brokers move to BFDC, since majority of catch of commercial fishing boats are tuna and skipjack to be shipped to Davao and Butuan because of minor relation with the trading activities of the existing public market. These boats are assumed to be supported by their fishing communities after unloading fish capture.

In addition, 22 medium-scale tuna hand-line fishing boats (same type as the local commercial fishing boats in Bislig) out of 66 units, currently operating with base at General Santos, are also expected to move to Bislig, considering the distance to the fishing ground. The required berths for fish unloading for local commercial fishing boats are calculated as follows:

- Size of boats : 10–34 m long (ave. 22 m), with outriggers
- No. of local boats operated : 35 units (44 units x operating rate 80%)
- No. of boats from General Santos : 18 units (22 units x operating rate 80%)
- No. of days per trip : 15 days/trip + 5 days for preparation
- Average number of boats entries : 2.6 units/day ((35 + 18 units) / 20 days)
- No. of berths required for fish unloading : 3 berths x 20 m/berth (for fish unloading)

12.6.2 Fish Unloading and Distribution

Should the 52 sets of purse-seiners be shifting their fishing base of operation from General Santos to Bislig, about 54% of the skipjack and tuna unloaded at Market Halls No. 2 & 3 of GSFPC (31,419 MT) is expected to be discharged in Bislig, provided that no significant change in fish catch is encountered due to change in fishing grounds from Celebes Sea to Pacific Ocean. Based on the 2009 data from GSFPC, 17,019 MT consisting of 93.7% of skipjack and 6.3% of tuna 6.3% is estimated to be unloaded in Bislig.

It is estimated that the fish unloading volume at BFPC will be 20,345 MT in 2025 including 17,019 MT from skipjack purse-seiners and 1,108 MT from tuna hand-liners which will move from General Santos, as calculated in the Table below:

Table 12.6.4 Estimated Fish Unloading Volume at BFPC

Skipjack purse-seiners (from General Santos)		Hand-liners (Local boats & from General Santos)	
Unloading volume of skipjack & tuna at Mkt #2&3 of GSFPC per year	: 31,419 MT	No. of boat entries per day	: 2.64 units/day
Total No. of catchers for skipjack (purse seine & ring net)	: 96 units	Average fish unloading volume per boat per trip	: 3.5 MT/trip (1–8 MT/trip)
No. of catchers to move to Bislig	: 52 units	Average fish unloading volume per day	: 9.24 MT/day
Percentage of catchers to move to Bislig	: 54%	No. of fishing trips per year	: 18 trips/year
Estimated fish unloading volume at Bislig	: 17,019 MT	Estimated fish unloading volume per year at Bislig	: 3,326 MT

The distribution pattern of fish unloading with the Project are as shown in the flowchart below:

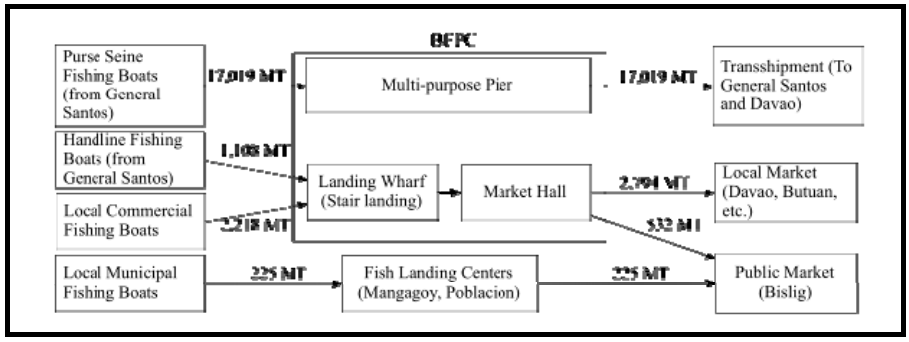


Fig. 12.6.1 Fish Distribution Pattern at BFPC (with the Project)

(1) Market Hall

For handling and trading of fish unloaded by local commercial fishing boats, a market hall will be provided for BFPC. The existing 2 fish brokers will be invited to the market hall for trading activities.

Table 12.6.5 Estimated Space Needed for the Market Hall of BFPC

		Projected (2025)
Fish handling volume at market hall (ave. at peak month)		11.6 MT/day (Trading time: 15:00-17:00)
Handling volume per m^2 (tuna and skipjack)		50 kg/m^2 (1 cycle/day)
Operating rate of each bay		90%
Required area for auction space		258 m^2 (11,600 kg / 50 kg / 90%)
No. of fish brokers		4
Designed area	Auction space	260 m^2 (65 m^2/bay x 4 bays)
	Icing/packing space	130 m^2 (32.5 m^2/bay x 4 bays)
	Loading & unloading	230 m^2
	Total	620 m^2

Note: Loading & unloading space shows the peripheral area outside the building columns.

12.6.3 Ice Production and Distribution

Based on the estimated fish unloading volume to Bislig and time required for completion of shifting from General Santos to Bislig (5 years), the ice required for both fishing boats and transshipment are calculated at about 100 MT (50 MT x 2 units) as shown in the Table below. The ice necessary for public market and municipal fishing boats was not considered due to existing private ice plants in Bislig (with a total capacity of 15 MT/day).

Table 12.6.6 Ice Production Schedule for BFPC

		1st year	2nd year	3rd year	4th year	5th year
Estimated fish unloading volume per year	Purse-seiners	3,404	6,807	10,211	13,615	17,019
	Hand-line	2,420	2,621	2,823	3,025	3,326
	Total	5,824	9,428	13,034	16,640	20,345
Required volume of ice per year	For fishing boats	8,736	14,143	19,551	24,960	30,518
	For transshipment	2,646	4,448	6,251	8,054	9,907
	Total	11,381	18,591	25,802	33,014	40,424
Average volume of ice per day		31.6	51.6	71.7	91.7	112.3
Capacity of ice plant installed		50.0	50.0	100.0	100.0	100.0
Operating ratio of Ice Plant		63.2%	100.0%	71.7%	91.7%	100.0%

Note: Icing ratio 150% of catch volume for fishing boats, 50% of fish volume for transshipment to G.S. and Davao

12.6.4 Boat Repair

The proposed BFPC is the only major fish port to be located along the east coast of Philippines to develop the big fishing ground potentials of the eastern seaboard. As stated elsewhere in Report, the development of the fishing grounds along the eastern seaboard is expected to fill the decreased in marine fish catch brought about by the termination of the fish agreement treaty with Indonesia. Many General Santos base vessels are anticipated to locate to BFPC upon its completion in addition to fishing boats already stationed in Bislig. The influx of fishing vessels to Bislig would therefore necessitate support facilities to induce more fishing operators to use BFPC. This would include in particular the provision of ship repair facilities more so that Bislig is far from ship repair areas such in General Santos and Zamboanga del Sur. The ship repair facilities will be provided with slipway for dry docking to cater for fish boats up to 300 GT.

In General Santos there are 4 shipyards currently operated, of which 3 are providing repair services for medium-scale fishing boats up to 300 GT. Based on the discussion with shipyard owners in General Santos, at least one of shipyards operated in General Santos, with particular intention of SAFI Shipyard Inc., would use the project slipway in Bislig, in accordance with the movement of significant number of fishing boats from General Santos to Bislig.

12.6.5 Others

The rich fishery resources along the eastern seaboard of the country remains the only fishing ground barely tapped for many years. One of major reason is the absence of a fishing base proximate to the fishing grounds. With the development of BFPC, many fish operators intend to relocate in Bislig as their base of operation. As mentioned earlier, BFPC is envisioned to become the primary source of materials for fish processors in DFPC and GSFPC.

12.7 Municipal Fish Ports

The demand and scale of municipal fish ports are determined based on the results of fish landing & marketing survey made in December 2009 by CESD under sub-contract with the JICA Survey Team.

12.7.1 Boat Entries and Fish Unloading

(1) Concepcion

Fish unloading from fishing boats has already centralized to the LGU Fish Port in Concepcion. Numbers of fishing boats will not changed from the current level. Standard size of fishing boats and numbers of entries per day are determined as follows:

Table 12.7.1 Estimated Boat Entries to Concepcion

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Beach seine	15.0	16.7	1.2	1.6	Yes	9.6	9.6
	Ring net	16.4	18.2	1.1	1.2	Yes	0.6	0.6
	Danish seine	22.3		2.6		Yes	0.5	0.5
	Baby trawl	16.6	19.4	1.1	1.3	Yes	8.1	8.1
	Gill net	13.2	14.6	0.7	1.0	Yes	2.3	2.3
	Collect boat	13.1	14.8	1.0	1.2	Yes	5.7	5.7
Municipal		10.9	12.6	0.4	0.7	Yes	130.8	130.8

Fish unloading volume at Concepcion Fish Port will not increase much; from 2,438 MT in 2005to 2,457 MT in 2009 with e limited handling volume of aquaculture products (milkfish, etc.). As same with the current situation, about 92% of fish will come from fishing boats to be mostly distributed within Iloilo Province (mainly to Iloilo City). It is also expected that about 150 MT/year of small pelagic will be collected from Concepcion for local processing at IFPC with the Project.

(2) Dumangas

Due to the scattered existing fish landing sites and water canals connecting fish ponds in Dumangas, it is difficult to centralize the fish unloading to the project site at "Dacutan Wharf". The following table shows the standard size of fishing boats and numbers of entries per day in Dacutan Wharf site.

Table 12.7.2 Estimated Boat Entries to Dumangas

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Gill net/Bag net	14.5	15.0	1.1	1.2	Yes	0.5	0.5
Municipal		8.3	12.0	0.6	0.8	Yes	2.1	2.1

Fish unloading volume will slightly increase from 334 MT in 2009 to 370 MT in 2025, with the expected increase in aquaculture products transported by boat (milkfish and shrimp). Due to the limited unloading volume, about 70% of unloaded fish will be consumed in the municipality, same as the current situation.

(3) San Jose

Considering that the existing 3 fish landing sites (Maybato North, Maybato South and San Angel) are located along the same bay, it is possible to centralize fish unloading site to the existing LGU Fish Port in San Jose, if the port facilities are improved and expanded. The table hereunder summarizes the estimated boat entries and fish unloading volume based on the production of all fishing boats for the above 3 landing sites to be unloaded at the proposed LGU fish port site.

Table 12.7.3 Estimated Boat Entries to San Jose

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Ring net	18.7	22.9	1.6	2.5	Yes	11.9	11.9
	Long line	14.7	22.0	1.1	1.9	Yes	1.1	1.1
Municipal		7.9	14.3	0.7	1.0	Yes	69.7	69.7

Fish unloading volume in 2025 is estimated at 2,703 MT, without any increase from the current level. All fish catch is unloaded from fishing boats, of which about 40% are brought to Iloilo Province. It is also expected that about 450 MT/year of small pelagic will be collected from San Jose for local processing at IFPC with the Project.

(4) Dagupan

In Dagupan, most of the fish unloading is conducted at the existing LGU Fish Port (Magsaysay Fish Wholesale Market), which plays as the fish collecting and distribution center not only for Dagupan City but also for Pangasinan Province. Danish seiners seasonally shift their landing base to Sual from Sep. – Feb. Standard size of fishing boats and number of entries during peak season from Mar. – Aug. is as follows:

Table 12.7.4 Estimated Boat Entries to Dagupan

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Danish seine	20.7	24.7	2.3	3.0	Yes	5.7	5.7
	Trawl	12.0	12.0	3.0	3.0	Yes	9.5	9.5
Municipal		-	-	-	-	Yes	10.9	10.9

Fish unloading volume will increase from 12,630 MT to 15,497 MT from 2009 – 2025, with increase in milkfish production to be delivered mainly to the fish port by overland transport and the remaining by bancas. Ninety-one percent of unloaded fish is brought overland and 60% are shipped out to other provinces (mostly to Northern Luzon).

(5) Subic

Fish landing activities are centralized to the existing LGU Fish Port in Subic. Standard size of fishing boats and number of entries will be kept at the 2009 level as shown in the tabulation below.

Table 12.7.5 Estimated Boat Entries to Subic

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Hand line	11.3	11.5	1.0	1.2	Yes	1.8	1.8
	Ring net	9.1		1.3		Yes	1.0	1.0
	Purse seine	28.4		4.3		No	0.2	0.2
	Danish seine					Yes	0.1	0.1
	Bag net					Yes	2.0	2.0
Municipal		8.4	13.0	0.8	1.2	Yes	73.0	73.0

Fish unloading volume will increase from 7,890 MT to 8,868 MT for the period covering 2009 – 2025, with the increase in aquaculture products (milkfish and tilapia) to be transported overland. Fish hauls are brought into the fish port both by fishing boats (43%) and overland (57%), and about 50% are shipped outside of Zambales Province, mainly to NCR and Region IV-A. With the implementation of the Project, about 300 MT of skipjack are expected to be shipped out to SFPC as raw materials for local processing.

(6) Atimonan

In Atimonan, fish unloading is mainly conducted at the existing LGU Fish Port. Number of fishing boats will not changed from the current level. Standard size of fishing boats and number of entries per day are tabulated hereunder.

Table 12.7.6 Estimated Boat Entries to Atimonan

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Danish seine	22.7	27.0		4.2	Yes	3.0	3.0
	Ring net	21.5	22.5			Yes	5.5	5.5
Municipal		8.6				Yes	9.1	9.1

Fish unloading volume in 2025 is estimated at 3,253 MT, with the increment of only 5 MT (milkfish) from 2009. Fish hauls are brought to the fish port both by fishing boats (56%) and overland (44%), and most of fish products (76%) are delivered outside of Quezon Province after trading in the fish port. Only 3% of fish catch is shipped to LFPC.

(7) Calauag

In Calauag, most of the fish hauls are unloaded and treated at the existing LGU Fish Port. Numbers of fishing boats will not change from the current level. Standard size of fishing boats and numbers of entries per day are shown in the table below:

Table 12.7.7 Estimated Boat Entries to Calauag

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Danish seine	17.1	20.0	2.6	4.0	Yes	Limited	Limited
Municipal		5.9	8.1	0.6	0.8	Yes	21.0	21.0

Fish unloading volume is estimated to increase from 4,600 MT to 4,954 MT for the period 2009 – 2025, with the increment in aquaculture fish (milkfish and tilapia) transported overland. Due to absence of commercial fishing boats, 87% of unloaded fish catch are brought overland, and 69% are distributed within Quezon Province. Very limited volume of fish is delivered to LFPC.

(8) Sta. Elena

Due to the shallow water at San Lorenzo, the current main fish landing site, it is expected that most of local commercial fishing boats will use the project fish port (in Pulong Guit-Guit). In addition, 20 units of commercial fishing boats out of 35 Danish seiners currently based in Mercedes fish port are expected to return to Pulong Guit-Guit after the development of the proposed fish port. The number of fishing boats entries, therefore, will drastically increase as shown below:

Table 12.7.8 Estimated Boat Entries to Sta. Elena

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Danish seine	22.4	26.7		1.6	Yes	1.7	8.9
	Baby trawl	14.1	16.0		1.5	Yes	2.9	2.9
	Trawl	30.6		4.0			0.2	0.2
	Collect boat						2.0	2.0
Municipal		8.6				Yes	18.8	18.8

Accordingly, it is estimated that fish unloading volume will also drastically increase from 1,969 MT (mostly unloaded at San Lorenzo) to 4,308 MT (to be centralized to the project fish port, including 179MT of cultured shrimps) from 2009 to 2025. All fishcatch are brought by fishing

boats and 97% of fishes are shipped out to other provinces particularly to LFPC. Sta. Elena is therefore one of the major fish suppliers to LFPC.

(9) Calabanga

All commercial fishing boats unload fish hauls at Sabang (project fish port) in Calabanga. Considering the excessive fishing operation in San Miguel Bay, the number of fishing boats entries will not change from the current level. Standard size of fishing boats and numbers of entries per day are tabulated hereunder.

Table 12.7.9 Estimated Boat Entries to Calabanga

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Baby trawl	8.1	10.0	0.9	1.3	Yes	35.1	35.1
	Collect boat					Yes	12.0	12.0
Municipal		6.4		0.6		Yes	72.5	72.5

Fish unloading volume will slightly increase from 5,660 MT to 5,773 MT for the period covering 2009 – 2025, with the estimated increment increase in aquaculture shrimps, but 96% for unloaded fish hauls are from capture fishery. Eighty-two per cent of fish productions are shipped out to Manila after processing into salted and/or dried fishes (anchovy, sardine and Acetes sp., locally called “Alamang”).

(10) Pasacao

In Pasacao, fish unloading is mainly conducted at the existing LGU feeder port (project fish port) and the private-owned commercial fishing base (HFH). Standard size of fishing boats and numbers of entries per day at the project fish port are as follows:

Table 12.7.10 Estimated Boat Entries to Pasacao

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Bag net	18.0	20.0	2.5	2.5	Yes	0.1	0.1
	Ring net	12.0	12.0	1.1	1.2	No	0.6	0.6
	Service boat	12.3	12.5	1.0	1.0	Yes	1.4	1.4
	Carrier	13.0	16.0	1.4	2.0	Yes	5.1	5.1
Municipal		7.3	10.5	0.5	0.8	Yes	0.9	0.9

Fish unloading volume in 2025 will be stable at same level of 2009 (1,659 MT). Due to the shortage of fish, 71% of fish hauls are brought overland from outside to adjacent public markets, while 35% of fish hauls are shipped to other areas, primarily to Naga.

(11) Balatan

Main fish landing center for commercial fishing boats is located along the coast between Duran and Poblacion where fish unloading can be centralized to the fish port project. Standard size of fishing boats and numbers of entries per day for the fish port project is shown in the table below:

Table 12.7.11 Estimated Boat Entries to Balatan

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Purse seine	22.9	24.0	3.1		No	3.3	3.3
	Ring net	12.4	15.0	0.9	1.0	No	2.8	2.8
	Danish seine	19.4	19.6	2.1	2.1	No	2.7	2.7
	Drift gill net	10.7	11.0	0.6	1.2	Yes	0.9	0.9
	Service boat	13.3	15.0	0.9	1.0	Yes	6.5	6.5
	Carrier					No	3.1	3.1
Municipal		8.1	14.0	0.9	1.2	Yes	45.4	45.4

Fish unloading volume will increase from 2,815 MT to 3,001 MT for the period covering 2009 and 2025, with increment increase in aquaculture shrimps. Ninety-four per cent of fish hauls are supplied from fishing boats, and 70% are shipped to other provinces (mostly to Manila and Legaspi).

(12) Oas

Commercial fishing boats at 2 landing sites (Cagmanaba and Tapel) will be centralized to the fish port project in Cagmanaba. Standard size of fishing boats and numbers of entries per day at that fish port are tabulated as follows:

Table 12.7.12 Estimated Boat Entries to Oas

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Ring net	12.0	13.0	1.1	2.0	No	2.1	2.1
	Bottom longline	13.0	13.0	0.7	0.7	Yes	4.2	4.2
	Danish seine	15.3	20.0	0.7	0.9	Yes	0.6	0.6
	Bag net					Yes	2.1	2.1
Municipal		7.5	15.0	0.7	1.3	Yes	20.1	20.1

Fish unloading volume in 2025 will not change from the 2009 level (610 MT). There is no fish brought by overland, and 96% of fish hauls are delivered to several towns in Albay Province (85% to Polangui).

(13) Sta. Cruz

Although the existing fish landing places are scattered to 6 sites along the coast of Sta. Cruz, it is expected by that with the establishment of municipal ordinance to centralize fish unloading for the future, all commercial fishing boats will unload fish hauls at the fish port project at the mouth of Tagabuli Bay including milkfish produced by fish cages located therein. The number of milkfish to be supplied by boats will increase from 9.6 to 10.5 per day from 2009 to 2025, with increase in number of fish cage culture from the current 546 to 600 units maximum. Standard size of fishing boats and numbers of entries per day for the fish port project is tabulated hereunder:

Table 12.7.13 Estimated Boat Entries to Sta. Cruz

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Ring net	20.7	24.1	1.7	2.1	Yes	1.8	1.8
	Bag net	13.8	14.6	1.8	1.8	Yes	1.1	1.1
Municipal		4.3	4.9	0.6	0.6	Yes	2.4	2.4
Milkfish collect boat		4.5	6.0	0.5	0.5	Yes	9.6	10.5

Fish unloading volume will increase from 3,004 MT to 3,257 MT from 2009 to 2025, with the increment in numbers of fish cages operating in Tagabuli Bay. All fish hauls are unloaded from boats including milkfish, and 54% are shipped out to other provinces (milkfish for Valencia and Cagayan de Oro in particular) considering the over-supply of milkfish in the vicinity of Davao. It is also expected that a portion of the produced milkfish will be supplied as raw materials to the proposed HACCP fish processing facility in DFPC.

(14) Panabo

Number of milkfish collected by boats will increase from 8.0 to 11.5 from 2009 to 2025, with the increase in number of fish cages from the current 349 to 500 units maximum as projected by BFAR for the fish port project (located in the Mariculture Park in Cagangohan). Standard size of fishing boats and numbers of entries per day at fish port project are tabulated as follows:

Table 12.7.14 Estimated Boat Entries to Panabo

Type of boat	Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
	Mean	Max.	Mean	Max.		2009	2025
Municipal	4.5	6.0	0.5	0.5	Yes	7.3	7.3
Milkfish collect boat	4.5	6.0	0.5	0.5	Yes	8.0	11.5

Accordingly, milkfish unloading volume will increase from 2,272 MT in 2009 to 3,255 MT in 2025, with the increase of fish cages. Sixty-nine percent of unloaded milkfish is distributed to nearby cities such as Tagum, Davao and other Cities (Surigao, Mati, etc.), while the remaining proportion without increment increase in volume is consumed in Panabo City. Same as Sta. Cruz, some of the milkfish products will be supplied as raw materials to the proposed HACCP fish processing facility in DFPC.

(15) Mati

Fish unloading by all commercial fishing boats in Mati will be centralized to the fish port project in Daticor. In addition to the local fishing boats, it is expected that 22 units of tuna hand-liners operating in General Santos will move to Mati with the Project, taking into account the shorter distance to fishing ground. Standard size of fishing boats and numbers of entries per day for the fish port project are tabulated as follows:

Table 12.7.15 Estimated Boat Entries to Mati

Type of boat		Length of boat (m)		Draft (m)		Out-rigger	No. of boat entries per day	
		Mean	Max.	Mean	Max.		2009	2025
Commercial	Hand line	14.0		1.2		Yes	0.9	1.8
	Ring net	14.0	14.0	1.4	1.5	Yes	3.4	3.4
	Carrier					Yes	0.9	0.9
Municipal		5.3		0.5		Yes	10.6	10.6

With the shifting of operation base of tuna hand-liners from General Santos to Mati, fish unloading volume will increase from 600 MT to 1,708 MT from 2009 to 2025. It is estimated that most of the fish surplus (59% of the total) will be distributed to Davao for processing and local consumption, while very limited volume will be delivered to other province based on the present condition.

12.7.2 Scale of Facilities

(1) Landing Facilities

Landing facilities will be provided in addition to the existing facilities or newly constructed at the following municipal fish ports as shown in the table below. Based on estimated fish boat entries, market trading time, unloading time of fish catch and ship size, the required berthing length at each municipal fish port is estimated as shown in the Table below. Landing facilities will not be provided for project sites with existing facilities such as Dumangas, Subic, Atimonan, Calauag, Pasacao and Panabo.

Table 12.7.16 Required Berthing Length at Each Municipal Fish Port

Fish Port	No. of commercial fish boat entries per day	Required No. of berths	Existing berth length (m)	New berth construction (m)
Concepcion	26.8	9	30	90
San Jose	13.0	5	5	60
Dagupan	15.2	5		70
Sta. Elena	14.0	2		45
Calabanga	47.1	6		60
Balatan	12.8	5		105
Sta. Cruz	13.4	2		20
Mati	6.1	2		30

Note: 1) Unloading time is one hour except Calabanga which is 30 minutes.

(2) Market Hall

Market hall will either be rehabilitated or newly constructed for all the municipal fish ports' Project. For the appropriate management and operation of the market halls, each municipality is requested to station at least one staff on full-time basis. Based on the estimated fish handling volume per day at peak month, the needed space of the market halls for each of the municipal fish port is estimated as shown in the Table below.

Table 12.7.17 Estimated Space of the Market Halls for Each Municipal Fish Port

Fish Port	Fish handling volume (MT/day)	Current No. of brokers	Market hall area (m2)					Trading time
			Trading	Packing	Loading	Office	Total	
Concepcion	8.3	15	165	83	41	-	290	5 – 8 am
Dumangas	1.3	8	26	13	6	10	60	Daytime
San Jose	12.8	6	255	128	64	10	460	6 – 9 am
Dagupan	53.6	75	1,072	536	268	20	1,900	24 hours
Subic	28.7	18	574	287	143	20	1,030	2 – 6 am
Atimonan	13.7	13	480	240	120	-	840	4 – 9 am
Calauag	20.9	3	418	209	104	10	750	3 – 10 am
Sta. Elena	18.2	0	363	182	91	10	650	Daytime
Calabanga	21.6	12	324	162	81	10	580	5 am & 1 pm
Pasacao	5.4	3	107	54	27	-	190	Daytime
Balatan	9.1	3	182	91	46	10	330	6 – 9 am
Oas	2.0	0	39	20	10	10	80	Daytime
Sta. Cruz	9.0	3	181	90	45	10	330	Daytime
Panabo	9.0	2	181	90	45	10	330	Daytime
Mati	9.7	4	194	97	48	10	350	Daytime

Note: 1) Fish handling volume (MT/day) shows the estimated volume in 2025 at peak month.
2) The area for trading activities is calculated based on standard practice at 50 kg/m^2 (considering the use of fish containers).
3) The space for icing/packing and loading/unloading are assumed at 50% and 25% of the trading area respectively.
4) Port Management Office (approx. 10m2) will be provided for all the ports except for Concepcion, Atimonan and Pasacao.
5) The market hall space for Atimonan was adjusted based on the existing area of 840m^2 as against the estimated at 490 m^2.
6) Trading in Calabanga takes place twice daily at unloading volume proportion of 3:1, for the estimation of the needed space for the market hall based on 3/4 of the fish handling volume.

(3) Ice Storage

The required ice will be supplied to each municipal fish port from the Regional Fish Port and/or the nearby private ice plants taking into account the technical and managerial capability of the municipality. Ice storage will be installed for fish ports with existing ice retailing and storages. Identifying the local ice retailers for lease of the ice storages prior to the operation of the fish port would be essential for the operation of the port. Based on the estimated fish handling volume per day at peak month, the capacity of the ice storage shed for each municipal fish port is estimated as shown in Table below.

Table 12.7.18 Calculation of Required Capacity of Ice Storage at Each Municipal Fish Port

Fish Port	Fish handling volume in peak month (MT/day)	Existing ice retailers at fish port	Ice selling ratio	Ice to be kept in peak month (MT)	Dimension & no. of ice storages	Remarks
Concepcion	8.3	2	0.0	0.0	-	Use existing ice storage.
Dumangas	1.3	0	1.0	1.3	1.8m x1.8m x 1	Existing ice plant (10 MT).
San Jose	12.8	0	1.0	12.8	3.6m x 3.6m x 1	Existing ice plant (20 MT).
Dagupan	53.6	3	0.0	0.0	-	Use existing ice storage.
Subic	28.7	3	0.0	0.0	-	ditto
Atimonan	13.7	5	0.0	0.0	-	ditto
Calauag	20.9	3	0.0	0.0	-	ditto
Sta. Elena	18.2	0	2.0	36.3	3.6m x 3.6m x 3	Very limited ice supply.
Calabanga	21.6	0	1.0	21.6	3.6m x 3.6m x 2	Existing ice plant (2 MT).
Pasacao	5.4	0	0.0	0.0	-	Use existing ice storage.
Balatan	9.1	0	1.0	9.1	3.6m x 2.7m x 1	Ice supply from Iriga.
Oas	2.0	0	2.0	3.9	2.7m x1.8m x 1	Very limited ice supply.
Sta. Cruz	9.0	0	1.0	9.0	3.6m x 2.7m x 1	For milkfish harvesting.
Panabo	9.0	0	1.0	9.0	3.6m x 2.7m x 1	For milkfish harvesting.
Mati	9.7	0	1.0	9.7	3.6m x 2.7m x 1	Existing ice plant (20 MT).

13. Preliminary Design

13.1 Design Criteria

The preliminary design of the fish port facilities adopted the following criteria:

13.1.1 Code and Standards

The PPA "Design Manual for Port and Harbor Facilities" was utilized for port facilities. Design criteria code and standards for other facilities are shown in the relevant section of the report.

13.1.2 Waves

Wave analysis was made to determine the Design Wave Heights for Bislig, Iloilo and Balatan Fish Ports where new Breakwater will be provided.

Study of Design Waves is made for Sta. Cruz and Concepcion for the design of the causeway, revetment, etc

The flowchart hereunder shows the process and sequence of the study to determine the design wave heights.

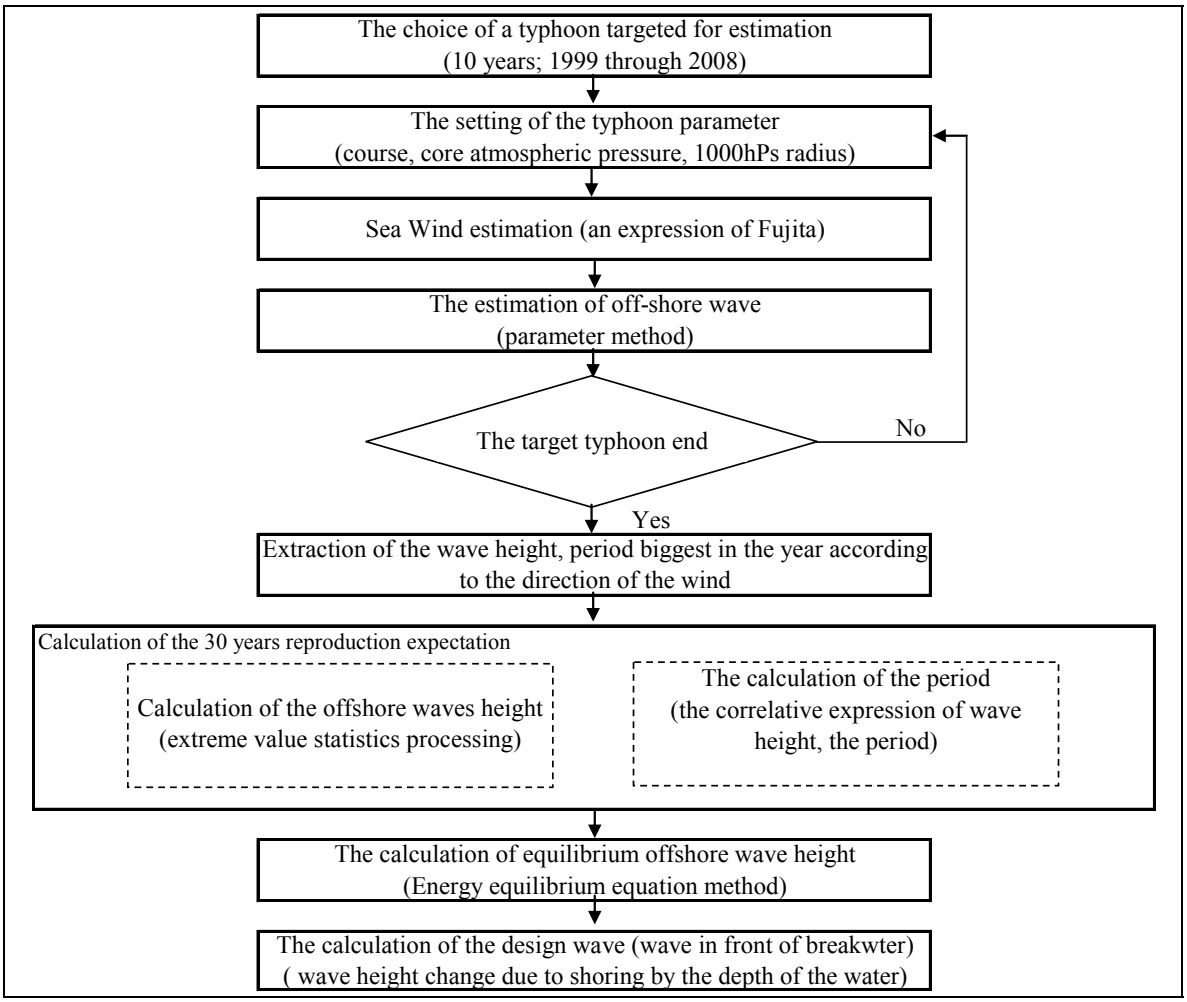


Fig. 13.1.1 Flowchart of Examination of the Design Wave Estimation for All Ports except Sta. Cruz (Estimation from the Typhoon Record)

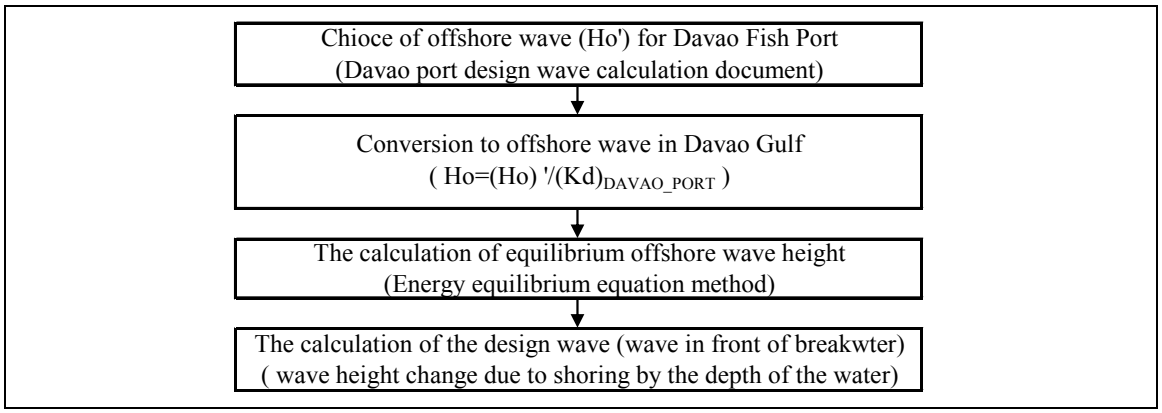


Fig. 13.1.2 Determining the Design Wave Heights for All Ports except Sta. Cruz (Estimation from the previous examination result)

Design Wave Heights based on 30-year return period for all Ports as described above.

Table 13.1.1 Estimated Results of the Design Waves

Fishing Port / Description	Iloilo	Bislig	Balatan	Concepcion	Sta. Cruz
Ho (m)	5.9	7.5	8.1	2.6	3.7
To (sec)	10.5	15.6	9.3	4.8	5.8
Ho' (m)	2.5	2.2	7.7	1.4	2.7
Direction	WSW	NE	WSW	N	ESE
H (m)	3.0	4.0	3.5	1.4	2.2

Source: Survey by JICA Team

Design waves for existing fishing port were set as follows using the data of previous Master Plan Report of FPPP (I) and (II).

Table 13.1.2 Design Waves of Existing Fish Ports

Fishing Port / Description	Lucena	Sual	Davao
Ho (m)	–	3.4	2.9
To (sec)	4.9	5.7	5.8
$H_{1/3}$ (m)	2.8	0.65	2.84
Direction	SSE	NNW	SE

Source: PFDA

13.1.3 Seismic Condition

Seismic coefficient is based on Regional Seismic coefficient, Factor for Subsoil condition and Importance factor of facilities.

The Regional Seismic coefficient for each fish is tabulated hereunder.

Table 13.1.3 Regional Seismic Coefficient for Each Fish Port

Regional seismic coefficient	Location
0.10	Iloilo, San. Jose, Concepcion, Dumangas
0.15	Sual, Lucena, Camaligan, Davao, Bislig, Dagupan, Subic, Atimonan, Calauag, Sta. Elena, Calabanga, Pasacao, Balatan, Oas, Sta. Cruz, Panabo, Mati

Source: Philippine Ports Authority (PPA)

13.1.4 Tide Level

The table below summarizes the tidal datum for regional fish ports based on field survey, actual survey data and the "Tide and Current Table Philippines 2010 published by the Coast and Geodetic Survey Department".

Table 13.1.4 Tide Levels for Regional Fish Ports

Port	HWL	LWL	Notes
Iloilo*1)	+2.25	±0.00	Based on the Tide and Current Tables 2010.
Sual*2)	+1.34	±0.00	Based on Actual Tide observation Records reckoned from the nearest reference point (San Frenando) 2008
Lucena*2)	+1.76	±0.00	Based on Actual Tide observation Records reckoned from the nearest reference point (Batangas) 2009
Camaligan			
Davao*2)	+2.22	±0.00	Based on the Actual Tide observation Records 2003.
Bislig*3)	+1.93	±0.00	Based on the Harmonic Analysis of observed data

*1) : Use Tide prediction based on the "Tide & Current Table 2010" published by NAMRIA.
*2) : Use actual survey data obtained from NAMRIA.
*3) : Result of the harmonic analysis based on the Tide Observation carried out in this Survey

The table below summarizes the tidal datum for municipal fish ports based on field survey, actual survey data and the "Tide and Current Table Philippines 2010 published by the Coast and Geodetic Survey Department/Actual Tide Observations".

Table 13.1.5 Tide Levels for Municipal Fish Ports

Port	HWL	LWL	Remark
Concepcion*3)	2.88	±0.00	Based on the Harmonic Analysis of observed data
Subic*3)	1.29	±0.00	Based on the Harmonic Analysis of observed data
Atimonan*3)	2.09	±0.00	Based on the Harmonic Analysis of observed data
Calabanga*2)	2.02	±0.00	Based on Actual Tide observation Records reckoned from the nearest reference point (Legasipi) 2008
Sta. Cruz*3)	2.10	±0.00	Based on the Harmonic Analysis of observed data
Dumangus*1)	2.26	±0.00	Based on the Tide and Current Tables (Iloilo) 2010.
San Jose*3)	1.98	±0.00	Based on the Harmonic Analysis of observed data
Dagupan*2)	1.22	±0.00	Based on Actual Tide observation Records reckoned from the nearest reference point (San Frenando) 2008
Calauag	2.02	±0.00	Based on Actual Tide observation Records reckoned from the nearest reference point (Legasipi) 2008
Sta. Elena*3)	1.97	±0.00	Based on the Harmonic Analysis of observed data
Balatan*1)	2.15	±0.00	Based on the Tide and Current Tables 2010 (Ref. Cebu)
Pasacao*1)	2.15	±0.00	Based on the Tide and Current Tables 2010 (Ref. Cebu)
Oas*1)	2.15	±0.00	Based on the Tide and Current Tables 2010 (Ref. Cebu)
Panabo*3)	2.11	±0.00	Based on the Harmonic Analysis of observed data
Mati*2)	2.22	±0.00	Based on the Actual Tide observation Records (Davao) 2003.

*1) : Use Tide prediction based on the "Tide & Current Table 2010" published by NAMRIA.
*2) : Use actual survey data obtained from NAMRIA.
*3) : Result of the harmonic analysis based on the Tide Observation carried out in this Survey.

Tide observations were carried out for the following eight (8) Municipal Fish Ports in Bislig, San Jose, Conception, Subic, Atimonan, Sta. Elena, Sta. Cruz and Panabo. Tide observation records were analyzed by Study Team using harmonic analysis to determine each Tidal elevation.

Tide Observation and output of harmonic analysis are summarized in Appendix 8.2.

13.1.5 Bathymetric and Topographic Condition

Bathymetric surveys and topographic surveys were carried out for
Regional fish ports: IFPC, SFPC, LFPC, CFPC, DFPC and BFPC
Municipal fish ports: San Jose, Concepcion, Subic, Atimonan, Calauag, Sta. Elena, Calabanga, Balatan, Sta. Cruz and Panabo

Datum level of Bathymetric and topographic survey is as follows;
Fishing Ports with tide observation : based on temporary bench mark
Fishing Ports without tide observation: based on MLLWL

13.1.6 Soil Investigation

Soil investigations were carried out for the following sites;
Bislig (3), San Jose (1), Conception (1), Subic (1), Balatan (2), Sta. Cruz (1), Panabo (1).

The Subsoil Profiles and Testing results are shown in the Appendix 8.

13.1.7 Natural Conditions for Refrigeration Facilities

1) Ambient temperature : + 35° C
2) Wet bulb temperature : + 28° C
3) Humidity : 70 %
4) Water temperature: + 30° C
5) Electric Source: AC460V x 60 hz x 3phs x 3 lines, AC230V x 60 hz x 3phs/1ph x 3/1 lines

13.2 Preliminary Design

13.2.1 Basic Port Facilities

(1) Berthing/Landing Facilities

1) Particulars of Fishing Vessels

Particulars of fishing vessels was determined based on the data gathered during the site investigations. Table 13.2.1 and Table 13.2.2 show the type, size and number of calls of fishing vessel for the Regional and Municipal fish ports considered for the preparation of the development plan.

Table 13.2.1 Type, Size and Number of Calls of Fishing Vessels for Regional Fish Ports

Fish Port		Projected Fishing Vessels from existing operation				Estimated New Fishing Vessel			Total
IFPC	Type of vessel	Municipal	Commercial	Non-Fish boat					
	Size of vessel	1.0-3.0 GT	3-50 GT	50-2,000 GT					
	No of calls/day	0.61	6.20	0.87					7.68
SFPC	Type of vessel		Commercial		Non-Fish boat	Milk fish carrier			
	Size of vessels		10-40 GT		20-1,000 GT	5 GT			
	No of call/day		4.37		0.36	49.01			53.74
LFPC	Type of vessels	Municipal	Commercial (Slope landing)	Commercial (Pier landing)	Non-Fish boat				
	Size of vessel	2.0 GT	3-50 GT	50-250 GT	50-400 GT				
	No of call/day	11.60	5.44	8.16	0.33				25.53

Fish Port		Projected Fishing Vessels from existing operation				Estimated New Fishing Vessel			Total
DFPC	Type of vessels	Municipal	Commercial	Foreign	Non-Fish boat				
	Size of vessels	3-5 GT	15-30 GT	10-100 GT	50-400 GT				
	No of call/day	4.43	2.72	3.05	0.21				10.41
BFPC	Type of vessels					Fish carrier	Commercial	Catcher	
	Size of vessel					80-250 GT	10-80 GT	50-250 GT	
	No of calls/day					11.40	2.60	10.40	24.40

Table 13.2.2 Type, Size and Number of Calls of Fishing Vessels for Municipal Fish Ports

		Commercial boats	Municipal boats	Total
Concepcion	Length (m)	13.1 to 22.3	10.9	
	No of calls/d	26.8	130.8	157.6
Dumangas	Length (m)	14.5	8.3	
	No of calls/d	1.2	2.6	3.8
San Jose	Length (m)	14.7 to 18.7	7.9	
	No of calls/d	13.0	69.0	82.0
Dagupan	Length (m)	12 to 20.4		
	No of calls/d	15.2	10.9	26.1
Subic	Length (m)	9.1 to 28.4	8.4	
	No of calls/d	5.1	73.0	78.1
Atimonan	Length (m)	21.5 to 22.7	8.6	
	No of calls/d	8.5	9.1	17.6
Calauag	Length (m)	17.1	5.9	
	No of calls/d		21.0	21.0
Sta Elena	Length (m)	14.1 to 30.6		
	No of calls/d	14.0	18.8	32.8
Calabanga	Length (m)	8.1 to 10	6.4	
	No of calls/d	47.1	72.5	119.6
Pasacao	Length (m)	12 to 18	7.3	
	No of calls/d	7.2	0.9	8.1
Balatan	Length (m)	10.7 to 22.9	8.1	
	No of calls/d	19.3	45.4	64.7
Oas	Length (m)	12 to 15.3	7.5	
	No of calls/d	9.0	20.1	29.1
Sta Cruz	Length (m)	13.8 to 20.7	4.3	
	No of calls/d	13.4	2.4	15.8
Panabo	Length (m)	4.5	4.5	
	No of calls/d	11.5	7.3	18.8
Mati	Length (m)	14.0	5.3	
	No of calls/d	6.1	10.6	16.7

Note: Particulars of Commercial boats are attached in the Appendix.

2) Height of Wharf Deck

The height of wharf deck is determined considering the dimensions of the fishing vessels that will call at the wharf and the tidal range at the fish port.

The relationship between tidal range and crown height of wharf deck is presented in Table 13.2.3

Table 13.2.3 Relationship between Tidal Range and Crown Height of Quay Wall

Tidal range (HWL-LWL) (m)	Target fishing vessels (GT)			
	0 to 20	20 to 150	150 to 500	500 or more
0 m to 1.0 m	0.7 m	1.0	1.3	1.5
1.0 to 1.5	0.7	1.0	1.2	1.4
1.5 to 2.0	0.6	0.9	1.1	1.3
2.0 to 2.4	0.6	0.8	1.0	1.2
2.4 to 2.8	0.5	0.7	0.9	1.1
2.8 to 3.0	0.4	0.6	0.8	1.0
3.0 to 3.2	0.3	0.5	0.7	0.9
3.2 to 3.4	0.2	04	0.6	0.8
3.4 to 3.6	0.2	0.3	0.5	0.7
3.6 or more	0.2	0.2	0.4	0.6
Extra value for lay-by Quay	0.0 m	0.0 to 0.5 m	0.5 to 1.0 m	1.0 m

Source: Survey by JICA Team

The height of wharf deck for unloading and preparation quay for each port are given in Table 13.2.4.

Table 13.2.4 Height of Wharf Deck (for New Wharf Only)

		HWL (m)	Tidal range (m)	Elev. allowance (m)	Deck Elev. (m)	Target vessel (GT)
Bislig	Pier	+2.03	2.03	1.0	+3.0	80-250
	Commercial	+2.03	2.03	0.8	+2.8	10-80
	Lay-by	+2.03	2.03	1.5	+3.5	50-250
Concepcion		+2.26	2.26	0.6	+2.9	0-30
San Jose		+2.26	2.26	0.6	+2.9	0-30
Dagupan		+1.22	1.22	0.7	+1.9	0-30
Sta Elena		+2.02	2.02	0.6	+2.6	0-30
Calabanga		+2.02	2.02	0.6	+2.6	0-5
Balatan		+2.15	2.15	0.6	+2.8	0-30
Sta. Cruz		+2.22	2.22	0.6	+2.8	0-30
Mati		+2.22	2.22	0.6	+2.8	0-20

Source: Survey by JICA Team

However, before deciding on the final height of wharf deck, the elevations of the existing structures within and near the port shall be taken into consideration.

3) Berthing Depth

Water depth of the harbor was determined based on the full loaded draft of the fishing vessels plying thereat plus clearance of about 50 cm below the keel. Table 13.2.5 shows the types, size, full draft and berthing depth alongside the wharf.

As shown in Table 13.2.4, several berthing depths were considered for each regional and municipal fish ports.

4) Length of Wharf

Three types of wharf were planned for functional utilization of the facility.

a. Landing Wharf – Where fish hauls are landed
b. Preparation Wharf – For the outfitting of vessels including fuel, ice, water, food supply prior to fishing expedition.
c. Lay-by Wharf – where vessels are moored or berthed alongside for repair, maintenance or standby.

The required length of the wharf was estimated based on the projected number of fishing

vessels to berth alongside, using the following expression.

Required length = N/r x L

Where: L: Length of berth = overall length + allowance
N: Standard number of fishing boats calling at the port per day
r : berthing frequency
r = (Time allowed for landing)/(Fish landing time per boat)

The following expression was used in calculating the length of the Lay-by wharf.
Required length = n x b
Where: n: Number of fishing vessel to moor alongside
b: Required length shared by the vessels

In this case, however, no lay-by wharf was considered for municipal boat in the fish port because the coastal area adjacent to the existing fish port for rehabilitation and improvement is available as lay-by area.

In the final determination of the length of the wharf, the monthly peak calls for each fish port was taken into account in the estimation. The results of the estimated length are shown in Table 13.2.5, for Regional and Municipal fish ports.

Unloading and preparation wharfs for municipal boats for Municipal Fish Ports were not provided because the existing facilities are sufficient considering the small volume of fish haul unloadings and minor preparations.

Table 13.2.5 Required Length and Berthing Depth

Fish Port	Type of wharf	Type of vessels	Objective vessel (GT)	Full loaded draft (m)	Berthing Depth (m)	Add'l wharf for unloading and preparation (m)
Sual	Multi-purpose pier	Commercial, Non fish boat, milk fish carrier	5-1,000 Ave 300	3.3	-4.0	30.0
Lucena	Multi-purpose pier	Commercial, Non fish boat	50-400 Ave 300	3.3	-4.0	25.0
Davao	Commercial	Commercial	15-30	2.0	-2.5	60.0
Bislig	Multi-purpose pier	Carrier boat Purse seiner	50-250 Ave 125	3.3	-4.0	110.0
	Commercial	Hand-line fishing boats	10-80 Ave 20	2.9	-3.5	60.0
	Lay-by	Carrier boat Purse seiner	50-250	2.6 (Light)	-3.5	170.0
Concepcion		Commercial	0-30	1.2	-1.0	90.0
San Jose		Commercial	0-30	1.6	-1.0	60.0
Dagupan		Commercial	0-30	3.0	-3.5	90.0
Sta Elena		Commercial	0-30	1.6	-2.0	45.0
Calabanga		Commercial	0-5	1.1	±0.00	60.0
Balatan		Commercial	0-30	3.1	-3.5	105.0
Sta. Cruz		Commercial	0-30	1.8	-2.0	20.0
Mati		Commercial	0-20	1.4	-2.0	30.0

Source: Survey by JICA Team

5) Width of Apron

Apron is provided for unloading or placing of fish haul, car space, etc. Standard width of apron is determined according to usage of the wharf as follows:

Fish Handling	Width of Apron (m)
Conveying of fish haul to market hall	3.0
Transportation of fish catch by truck	10.0
Preparation	10.0
Lay-by	6.0

Based on the above, the standard apron width considered is 10m for Regional Fish Port and 3 m for Municipal Fish Port but if parking area is available at the seaside for turning of vehicles, road space should be considered.

6) Structural Type of Wharf

The type of wharf was determined based on the comparative structural studies undertaken for Regional Fish Ports, while most appropriate design was recommended considering hydro survey, soil condition, wave condition, etc. for Municipal Fish Ports. Considered types of structure are depending on the soil condition, cost, material availability, construction period, construction procedure and maintenance/operation. Recommended types of structure are shown in Table 13.2.6

Table 13.2.6 Recommended Type of Structures for Each Fish Port

Fish Port	Type of wharf	Depth of wharf (m)	Type of Structure
Sual	Multi-purpose pier	-4.0	Reinforced concrete deck on RC or Steel pipe piles foundation. Concrete deck elevation will be lowered for milk fish boat to facilitate unloading of fish catch, loading fish feeds and fish net.
Lucena	Multi-purpose pier	-4.0	Reinforced concrete deck on RC or Steel pipe piles. 21.9 m wide concrete deck for the expanded area, same as the existing pier for efficiency of operations and ease of vehicular movement.
Davao	Commercial	-2.5	Reinforced concrete deck retained by L-shaped concrete blocks. Existing rock mound revetment will be removed to minimize adverse environmental issues.
Bislig	Multi-purpose pier	-4.0	Reinforced concrete deck on PC or Steel pipe piles.
	Commercial	-3.5	Reinforced concrete stair landing with L-shaped or concrete block toe.
	Lay-by	-3.0	Reinforced concrete stair landing laid onto the armor stone of the breakwater. The Lay-by wharf will be constructed at the inner side of the breakwater to maximize the use of the port basin.
Concepcion		-1.0	Reinforced concrete stair landing facility with concrete block toe. The concrete block will be embedded in the sea bed to attain bearing capacity and sufficient water depth.
San Jose		-1.0	Reinforced concrete stair landing facility supported with concrete block toe. Foundation of the concrete block will be embedded on the sea bed to attain bearing capacity and sufficient water depth.
Dagupan		-3.5	Reinforced concrete stair landing retained by L-shaped concrete block.
Sta Elena		-2.0	Reinforced concrete stair landing with concrete block toe.
Calabanga		±0.00	Reinforced concrete stair landing with concrete block toe. The concrete block will be embedded in sea bed to attain sufficient water depth.
Balatan		-3.5	Reinforced concrete stair landing with L-shaped concrete block toe. The wharf will be sheltered with breakwater against rough wave actions.
Sta. Cruz		-2.0	Reinforced concrete stair landing with concrete block toe. The concrete block will be embedded in sea bed to attain sufficient water depth.
Mati		-2.0	Reinforced concrete stair landing with concrete block toe.

(2) Breakwater

Breakwater will be provided to shelter the port basin and mooring areas from wave actions particularly during stormy conditions and occurrence of monsoon waves or typhoons.

1) Design Wave Height and Predominant Wind Direction

The breakwater to be effective should be laid out perpendicular to the line of approach of the incoming wave or parallel to said wave. Table 13.2.7. Breakwaters provided in Iloilo, Bislig and Balatan where its construction is found necessary to maintain calmness in the fish port was based on the wave and predominant wind direction.

Table 13.2.7 Design Wave Heights

	Ho (m)	To (sec)	Ho' (m)	Direction
Iloilo	5.9	10.5	2.5	WSW
Bislig	7.5	15.6	2.2	NE
Balatan	8.1	9.3	7.7	WSW

Source: Survey by JICA Team

2) Crown Height of Breakwater

The crown height of breakwater was based on the comparative study considering the design tide level, the significant wave height in front of the proposed breakwater, height of wharf and reclamation, and the height of existing structures adjacent to the proposed structures.

Table 13.2.8 Recommended Crown Height of Breakwaters

	Design Tide level (m)	Wave Height (m)	Crown Height Elev. (m)
Iloilo	+ 2.26	3.0	+ 3.8
Bislig	+2.03	4.03	+6.1
Balatan	+2.15	3.53	+5.7

Note : Reference datum: LWL +/- 0.00 m Source: Survey by JICA Team

3) Width of Fish Port Entrance

Width of port entrance is determined by considering the size and number of passing fishing boats. If width of fishing boat is regarded as B, width of port entrance ranges mostly form 6B to 8B considering that the position of the route is from outer sea to outer put and the width applies to double route. Table 13.2.9 shows the estimated width of port entrance for Iloilo, Bislig and Balatan.

Table 13.2.9 Width of Port Entrance

	Type of Vessel	GT(t)	Width of Vessel	Width of Port Entrance (8B)
Iloilo	Commercial (w/outrigger)	80	15	90m
Bislig	Commercial (w/outrigger)	50	13	80m
Balatan	Commercial (w/outrigger)	50	5	40m (Allowance for littoral drift)

4) Weight of Individual Armor Rock at the Breakwater

The weight of the armor rock is determined for stability of the breakwater against wave action using Hudson formula as indicated:

$$Wr = \gamma r \times (Ho')3 / Kd\,(Sr - 1)\,3 \times \cot \alpha$$

where:

Wr : weight of individual armor stone (t), Ho': wave height (m)
Kd : damage coefficient, 3.5 will be adopted for no damage and no overtopping
α : angle of slope of armor rocks
γ r : specific weight of rock (2.6t/cu.m)

Sr : ρ r/ ρ o =2.6/1.03=2.52

Table 13.2.10 shows the estimated results.

Table 13.2.10 Estimated Weight of Armor Stone

	γ r*	Sr	Kd	Cot	Ho (m)	Wr (t)	Remark
Iloilo	2.60	2.52	3.5	2.5	3.0	2.10(3.1)	Stone
Bislig	2.65	2.57	3.5	2.0	2.51	1.54	Stone
	2.30	2.23	8.3	2.0	4.03	5.75(7.36)	Cncrete Block
Balatan	2.65	2.57	3.5	3.0	3.53	2.84	Stone
	2.30	2.23	8.3	1.33	3.53	(9.20)	Cncrete Block

Source: Survey by JICA Team

5) Structure Type of Breakwater

The determination of type of breakwater was based on the comparative studies undertaken. The kind of foundation type was chosen considering soil condition and the different types of breakwaters were compared as to workability, cost, material availability and construction period.

The structural comparison is indicated Appendix 3 and recommended types are shown Fig 13.2.1.

(3) Dredging/Reclamation

1) Dredging

The regional fish ports in IFPC, Bislig, Sta. Cruz, Balatan and Sta. Elena will be dredged to the required depth for safe berthing and smooth maneuvering of fishing vessels.

Table 13.2.11 Dredging Plan

	Dredging Depth (m)	Dredging volume (m^3)	Disposal Area
IFPC	-5.50	150,000	Deep sea
Bislig	-4.00 and -3.50	54,000	Mangagoy and filling material
Sta. Cruz	-2.00	3,100	Reclamation
Balatan	-3.50	30,000	Reclamation
Sta. Elena	-2.00	6,000	Reclamation

Source: Survey by JICA Team

2) Reclamation

The proposed fish ports of CFPC, Calabanga, Sta.Cruz, San. Jose, Dagupan, Calauag, Sta. Elena and Mati.

Table 13.2.12 Reclamation Plan

	Reclamation volume (m^3)	Material Source for reclamation
CFPC	15,000	Quarry
Calabanga	7,000	Quarry
Sta. Cruz	5,000	Dredging
San. Jose	2,000	Quarry
Dagupan	39,000	Quarry
Calauag	5,900	Quarry
Sta. Elena	2,900	Dredging
Mati	2,600	Quarry

Source: Survey by JICA Team

(4) Ship Repair Facilities

Ship repair and slipway are basic facilities in fish ports. The existing ship repair facilities in Iloilo FPC and Sual FPC will be rehabilitated and improved. A new ship repair and slipway facilities will be constructed for Bislig FPC. Oil leakage from fish vessels in the slipway area will be collected by means of oil separator.

1) Iloilo FPC

One of the two slipways for Iloilo IFPC will be rehabilitated. The damaged concrete beams, rails and rock mound for the underwater portion of the slipway underwater will be rehabilitated considering least maintenance cost. Associated mechanical works including the winch, cradle, etc will also be rehabilitated. Positioning bit for ship landing will be provided on the new breakwater. The existing fabrication shop will be demolished and to be replaced with smaller but appropriate size of fabrication shop to house the existing repair machineries. All the steel frame members of the existing fabrication shop will be re-used to minimize on construction cost.

2) Sual FPC

The existing slipway will be rehabilitated for capacity increase of up to 300 GT for bigger size vessels. The existing fabrication shop will be demolished to be replaced with smaller one, same as Iloilo FPC.

3) BFPC

A new 300GT capacity slipway will be constructed for Bislig FPC to cater to commercial fish vessels expected to relocate to Bislig from General Santos.

(5) Others

1) Soil Improvement

Based on the results of the geotechnical investigation, the location of the HACCP buildings for Camaligan FPC will require soil improvement to avoid the occurrence of possible settlement. There are various soil improvement methods such as preloading, sand drain, paper drain, board drain, etc. to increase the bearing capacity of the soil to avoid the incidence of settlement. The selection of a particular soil improvement method will depend on several factors, such as, required improvement, soil conditions, available equipment, local experience and cost. Considering the characteristics of the different methods, combination of vertical drain and preloading method will be adopted. Embankment height, width or drain pile interval will be designed under to attain 90 percent soil consolidation. Typical section of the proposed method of soil improvement is attached in the Appendix.

2) Navigation Aids Consisting

Navigation aids consisting of light beacon will be provided for Iloilo FPC and Lucena FPC for the safe navigation of fish vessels. The International Association of Lighthouse Authorities (IALA) will be adopted for the detailed design of the navigation aids.

13.3 Refrigeration Facilities

13.3.1 Design Criteria for Refrigeration Facilities

The table hereunder summarizes the configuration of the refrigeration facilities for rehabilitation and/or renewal.

Table 13.3.1 Summary of Configuration of the Refrigeration Facilities

Component	Existing condition	System to be introduced	Remarks
Condensing system of Ice making plant	Forced air-type evaporative condenser	Natural air-type evaporative condenser	To reduce electrical cost and for ease of maintenance
Cooling system of cold storage	Ammonia system, for ice making plant	Independent cooling system with Freon	Same as above
Size of cold storage	Large scale cold storage	Compartment type cold storage	To facilitate leasing & operation of facilities
Cooling system of contact freezer	Ammonia system with evaporative condenser	Freon system with air-cooled condenser	Low initial investment & ease of maintenance
Cooling system of ice storage	Ammonia system with evaporative condenser	All-in one type Freon refrigerant cooling unit	To reduce electrical cost &for ease of maintenance
Refrigerant for cooling systems except ice making plant	Ammonia	Freon (R-507)	To facilitate maintenance

R-22 Freon was not previously considered as medium of refrigerant for Iloilo FP due to environmental pollutions associated with Ozone Depletion (OD). Recently, the used of other newly developed refrigerant aside from R-22 have likewise encountered problems associated with Global Warming (GW). Regrettably, however, no refrigerant up to date has been fully developed to fully address problems related to OD and GW. Therefore, R-507 (and/or R-404A) and Ammonia will be adopted as the medium of refrigerant for the refrigeration facilities of the Project. R-507 refrigerant has already been in used by PFDA for the compartment type of cold storages in IFPC for 2 years.

The same manufacturer and model of the compressor of the new ammonia refrigeration system in Sual and Camaligan should be considered taking into account the sharing of common spare parts to avail cheaper cost in procuring by lot parts.

13.3.2 Scope of Works for the Rehabilitation/Renewal of Refrigeration Facilities in Five (5) Regional Fish Ports and New Installation of Ice Making Plant for Bislig Fish Port

(1) Iloilo Fish Port

Scope of Rehabilitation Works

* Demolition and removal of dilapidated ice making plant including air-forced evaporative condenser
* Installation of new ice making plant and ice storage room for Bislig Fish Port
* Modification of the layout plan for the refrigeration facilities including the installation of new fish cold storage and unit freezers for the processing of raw fish
* Modification of the layout plan for cold storage of meat products and installation of new freezing facilities for meat products

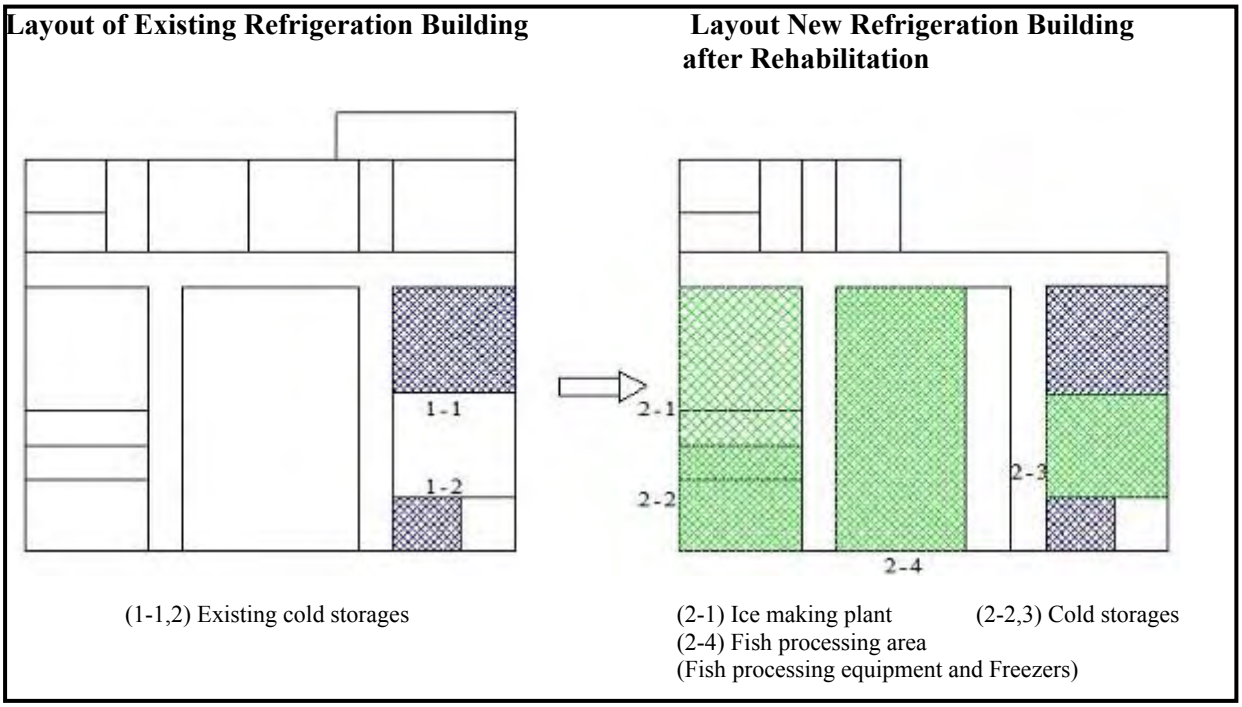


Fig. 13.3.1 Existing Layout and Proposed Design of Refrigeration Facilities (Iloilo)

Table 13.3.2 Concise Specifications of the Refrigeration Facilities after Rehabilitation (Iloilo)

Component	Capacity etc	Cooling capacity and Cooling system	Rehabilitation/New Installation
Ice making plant	50tons/day of 50kg block ice (@ 25tons/day system x 2 sets)	Approx. 420kw, ET-18/CT+40 Ammonia cooling System with herring bone and evaporative condensing system	New installation
Ice storage	About 100 tons capacity cold store room @ design temp. of-5deg. C	4 sets of all-in-one type cooling unit with Freon direct expansion and air-cooled condenser system	Replacement of the ammonia refrigerant system with cooling unit
Freezer (I) for fish (Contact freezer)	2 tons/day capacity @ design freezing temp. of:-20deg.C with 10kg freezing pan(1ton/4hrs x2 /day)	Approx. 31kw, ET-30/CT+45 Direct expansion and dry, contacting system with R 507 Freon refrigerant	Existing ammonia refrigerant system to be replaced with Freon refrigerant system.
Air blast Freezer (II) for fish products	1 ton/day @ design freezing temp. :of -20deg.C with 10kg of freezing pan (0.5ton/6hrs x 2/day)	Approx. 16kw, ET-30/CT+45 Freon(R-507) direct expansion and dry, Air-blasting system	New installation
Air Blast Freezer for meat products	2 ton/day @ design freezing temp. of: -20deg.C with 10kg freezing pan(0.5ton/6hrs x 2 sets x 2/day)	Approx.16kw, ET-30/CT+45 Freon(R-507)direct expansion and dry, air-blast system	New installation 2 sets
Compartment type Cold storage for fish (10 rooms)	Approx. 35m2 each @ .design maintenance temperature of -20deg.C for manual handling	Approx.9kw, ET-30/CT+45 Freon(R-507)direct expansion and dry, hanging evaporator	Rehabilitation will be the division of the large store room into compartments
Compartment type Cold storage for meat (7 rooms)	Approx. 48m2 each Maintenance temp.: -20deg.C Human handling	Approx.11kw,ET-30/CT+45 Freon(R-507)direct expansion and dry, hanging evaporator	Rehabilitation will be the division of the large store room into compartments
Cooling unit for existing cold storage for Meat products (7.5 rooms)	Approx. 48m2 each @design maintenance temp.:of-20deg.C for manual handling	Approx.11kw,ET-30/CT+45 Freon(R-507)direct expansion and dry, hanging evaporator	Rehabilitation will be the preparation of units for future use.

(2) Sual Fish Port

Scope of Rehabilitation Works

* Rehabilitation of ice making plant and ice storage (Expansion)
* Rehabilitation of brine immersion type freezing plant (New installation)
* Rehabilitation of Cold storage and Air-blast freezing system for fish products

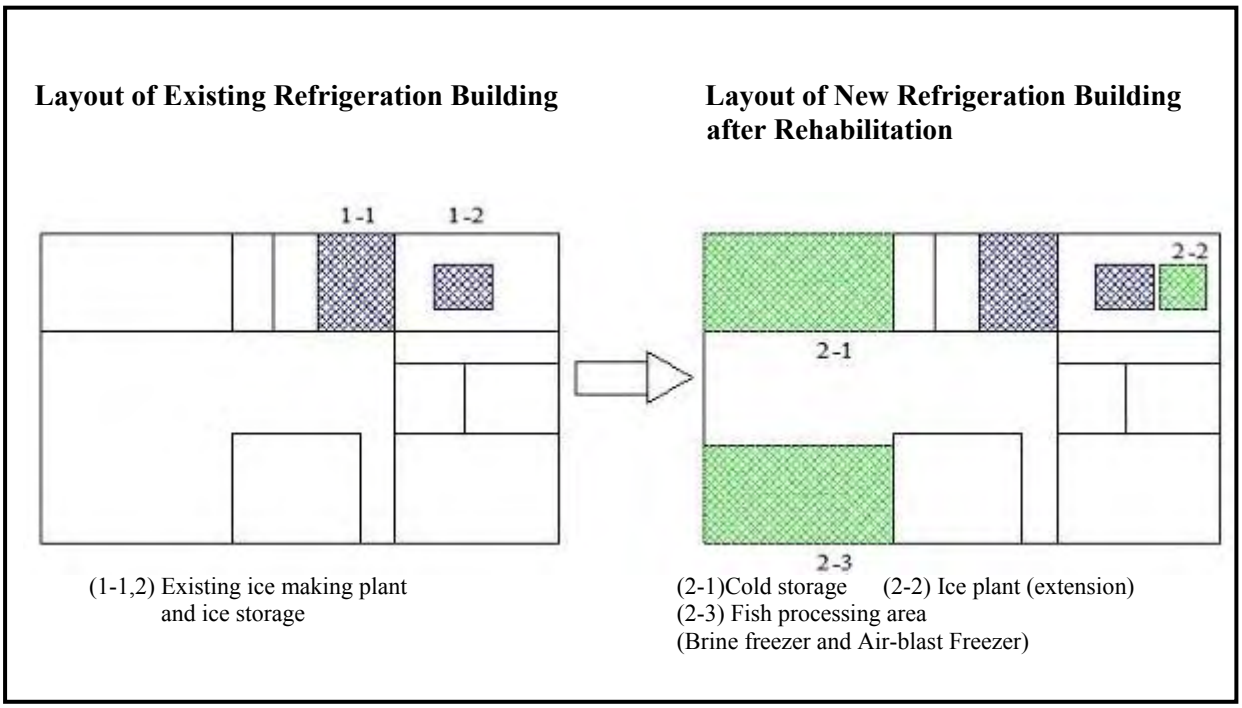


Fig. 13.3.2 Existing Layout and Proposed Design of Refrigeration Facilities (Sual)

Table 13.3.3 Concise Specifications of Refrigeration Facilities after Rehabilitation/New Installation (Sual)

Component	Capacity etc	Cooling capacity and Cooling system	Rehabilitation/ new installation
Ice making plant	12 tons/day, 50kg type block ice	Approx. 100kw, ET-18/CT+40 Ammonia cooling System with herring bone and evaporative condensing system	Rehabilitation (Expansion)
Ice storage	Approx. 50 ton @ design maintenance temperature of-5deg. C	2 sets of all-in-one type cooling unit with Freon direct expansion and air-cooled condenser system	Rehabilitation of refrigerant system from ammonia to Freon.
Freezer (I) for fish (Brine freezer)	4 tons/day @ design freezing temperature of -10deg.C, brine immersion system (2tons/6hrs x 2 t/day)	Approx. 52kw, ET-15/CT+45 Ammonia cooling system Evaporator: Herring bone type Condenser: Evaporative type	New installation Compressor and condenser shall take one of new ice making plant
Freezer (II) for fish (Air-blast freezer)	1 ton/day @ design freezing temperature of-20deg.C with10kg freezing pan (0.5ton/1time x 2 /day)	Approx. 16kw, ET-30/CT+45 Freon(R-507) direct expansion and dry, Air-blast system	New installation
Compartment type Cold storage for fish (6 rooms)	Approx. 25m2 each @ design maintenance temp. of -20deg.C for manual handling	Approx. 7.5kw, ET-30/CT+45 Freon(R-507) direct expansion and dry, hanging evaporator	Rehabilitation

(3) Lucena Fish Port

Scope of Rehabilitation/New Installation

* Rehabilitation of ice storage (New installation and modification of cooling system)
* Rehabilitation of Cold storage and Air-blast freezing system for fish (New installation)

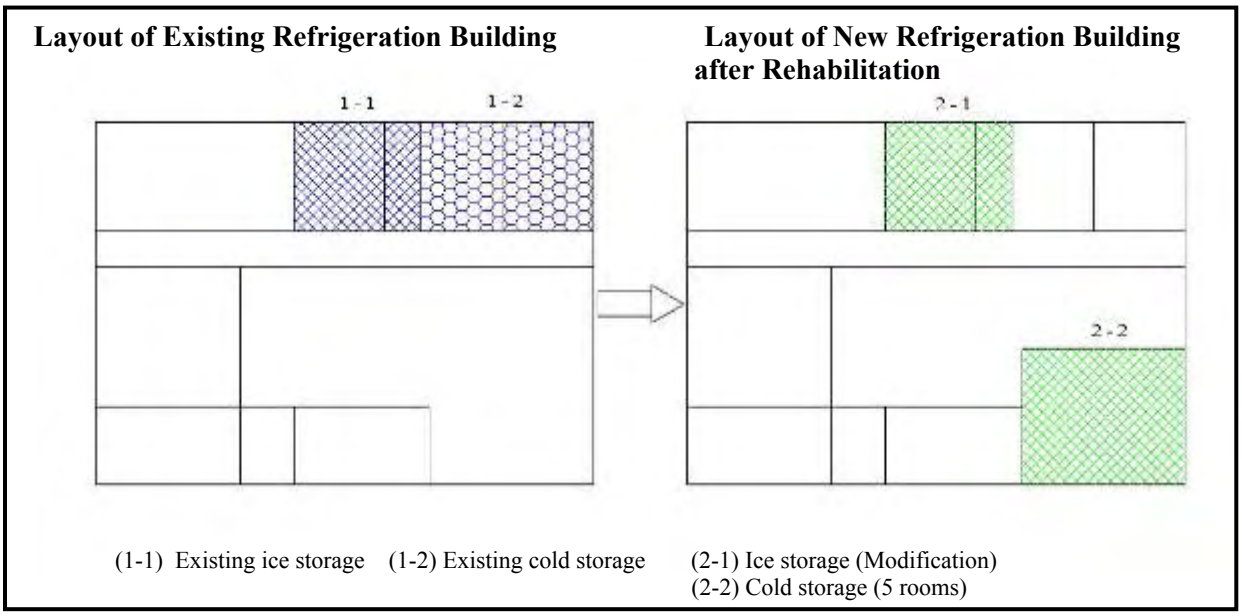


Fig. 13.3.3 Existing Layout and Proposed Design of Refrigeration Facilities (Lucena)

Table 13.3.4 Concise Specifications of Refrigeration Facilities after Rehabilitation (Lucena)

Component	Capacity etc	Cooling capacity and Cooling system	Rehabilitation/ new installation
Ice storage	Approx. 50 ton @ design maintenance temp. of-5deg. C	2 sets of All-in-one type cooling unit with Freon direct expansion and air-cooled condenser system	Rehabilitation Cooling unit will be installed instead of ammonia one
Freezer (II) for fish (Air-blast freezer)	Design freezing temp. of -20deg.C with10kg freezing pan (0.5ton/cycle x 2 /day)	Approx. 16kw, ET-30/CT+45 Freon(R-507) direct expansion and dry, Air-blast system	New installation
Compartment type Cold storage for fish (4 rooms)	Approx. 25m2 each @ designed maintenance temperature of -5deg.C for manual handling	Approx. 8kw, ET-15/CT+45 Freon(R-507) direct expansion and dry, hanging evaporator	New installation Existing cold storage to be demolished and replaced
Compartment type Cold storage for fish	Approx. 20m2 each @ designed maintenance temp. of -20deg.C for manual handling	Approx. 6kw, ET-30/CT+45 Freon(R-507) direct expansion and dry, hanging evaporator	New installation

(4) Camaligan Fish Port

Scope of Rehabilitation

* Demolition of fish processing area for new ice making tank, etc
* Rehabilitation of ice making plant and ice storage (New installation)
* Rehabilitation of ice storage (New installation and modification of cooling system)
* Rehabilitation of cold storage and freezing unit for meat (New installation)

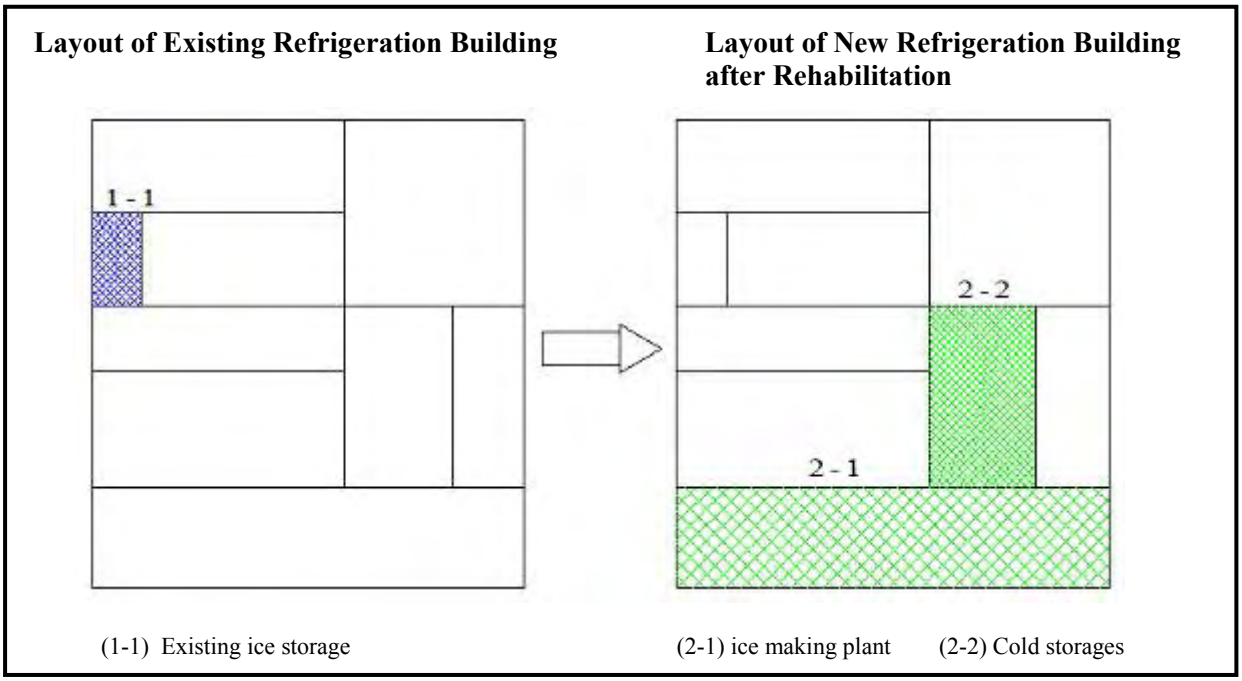


Fig. 13.3.4 Existing Layout and Proposed Design of Refrigeration Facilities (Camaligan)

Table 13.3.5 Concise Specifications of Refrigeration Facilities after Rehabilitation (Camaligan)

Component	Capacity etc	Cooling capacity and Cooling system	Rehabilitation/ new installation
Ice making plant	15tons/day, 50kg type block ice	Approx. 125kw, ET-18/CT+40 Ammonia cooling system with herring bone and evaporative condensing system	Rehabilitation (Expansion)
Ice storage (I) for extended ice making system	Approx. 15 tons @ design temperature of -5deg. C	2 sets of all-in-one type cooling unit with Freon direct expansion system and air-cooled condenser	New installation
Ice storage (II)	Approx. 10tons @ design temperature of -5deg. C	1 set of all-in-one type cooling unit with Freon direct expansion and air-cooled condenser system	Replacement of existing ammonia refrigerant system with Freon cooling system.
Freezer for meat (Air-blast freezer)	Design freezing temp. of -20deg.C using chicken cage (0.5ton/cycle x 2 /day)	Approx. 16kw, ET-30/CT+45 Freon(R-507) direct expansion and dry, Air-blast system	New installation
Compartment type Cold storage for meat (3 rooms)	Approx. 20m2 each @ design maintenance temp. of -20deg.C for manual handling	Approx. 5kw, ET-30/CT+45 Freon(R-507) direct expansion and dry, hanging evaporator	Rehabilitation

(5) Davao Fish Port

Scope of Rehabilitation

* Rehabilitation ice storage (New installation and modification of cooling system)

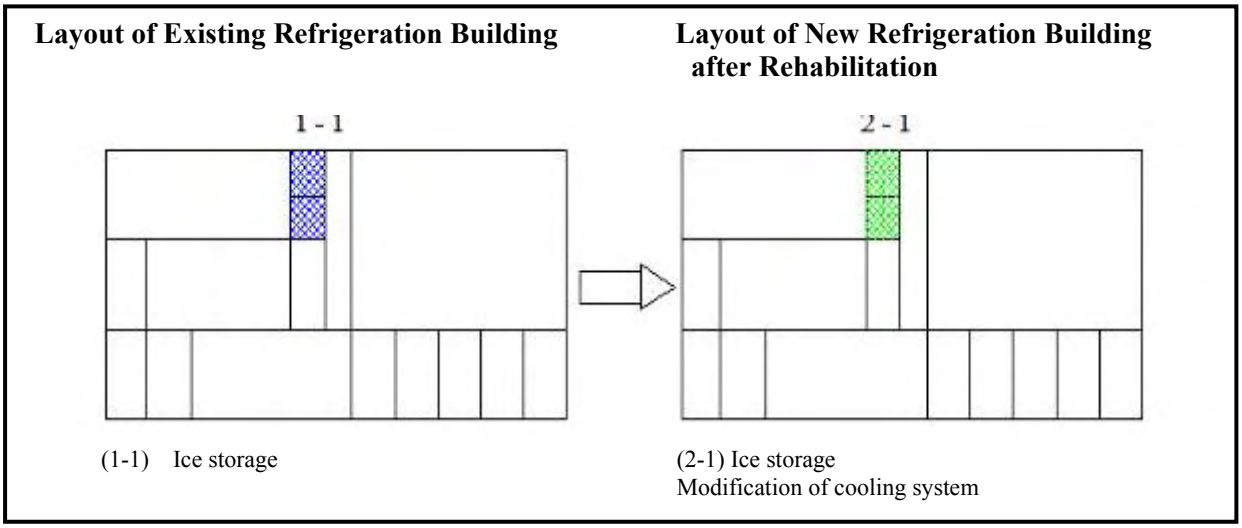


Fig. 13.3.5 Existing Layout and Proposed Design of Refrigeration Facilities (Davao)

Table 13.3.6 Concise Specifications of Refrigeration Facilities after Rehabilitation (Davao)

Component	Capacity etc	Cooling capacity and Cooling system	Rehabilitation/ new installation
Ice storage	Approx. 30 ton capacity @ design temperature of -5deg. C	2 sets of all-in-one type cooling unit with Freon direct expansion system and air-cooled condenser	New installation

(6) Bislig Regional Fish Port

Scope of new ice making plant and cold storage are shown in the following table.

Table 13.3.7 Components of the New Ice Making Plant and Cold Storage for Bislig Fish Port

Component	Capacity etc	Cooling capacity and Cooling system	Rehabilitation/ new installation
Ice making plant	100tons/day, (50tons/day x2 sets of 50kg type block ice)	Approx. 420kw, ET-18/CT+40 of Ammonia cooling with herring bone and evaporative condensing system	New installation
Ice storage	Approx. 150 ton Aimed temperature: -5deg. C	8 sets of all-in-one type cooling unit with Freon direct expansion and air-cooled condenser system	New installation

(7) HACCP Compliant Refrigeration System

The table hereunder shows the standard type of HACCP compliant fish processing facilities to be provided for Iloilo FP, Sual FP, Camaligan Fish Port and Davao Fish Port. The system of refrigeration however, will be subject to modification based on the results of dialogues with potential fish processors of their plan of operations.

Each of the regional fish ports mentioned above will be provided with the following number of HACCP compliant fish processing facilities.

Iloilo FP : 4 sets
Sual FP : 2 sets
Camaligan FP : 4 sets
Davao FP : 2 sets

Table 13.3.8 Brief Specifications of HACCP Compliant Refrigeration System

Item	Particulars	Cooling capacity and Cooling system	Others
Freezer for meat (Air-blast freezer)	0.5ton/cycle x 2 /day @ design freezing temperature of -20deg.C	Approx.16kw,ET-30/CT+45 Freon(R-507) direct expansion and dry, and air-cooled condenser Air-blast system	Freezing trolley and Freezing pan shall be made of SUS. Freezing unit shall be the split type air cooled condenser
Ice making unit and ice storage	2 tons/day of flake ice making facility with ice storing capacity of 4 tons	Approx.14kw, ET-25/CT+45 Freon(R-507) direct expansion and dry, and air-cooled condenser Water treatment	Icing drum shall be made of SUS and/or Aluminum alloy. Inner surface of storage shall be SUS. Cooling unit shall be the split type air-cooled condenser
Cold storage	Approx. 20m2 each @ design maintenance temp. of -20deg.C	Approx. 5kw, ET-30/CT+45 Freon(R-507)direct expansion and dry type	Cooling unit shall be the split type air-cooled condenser

Freezing pans and trolleys, and surface of flake icing drum shall be made of stainless steel (SUS304). Inner surface of storages and ice storages shall be made of stainless steel (SUS304). Inner surface of freezing unit shall be provided with appropriate protection against corrosion.

13.4 HACCP Compliant Fish Processing Facilities

HACCP compliant facilities to be complimented with laboratory facilities for quality improvement of fishery products are proposed as part of the scope of works of the Project. The Existing fish ports' facilities were designed mainly as landing facilities for fishing vessels and for this reason; they were not provided with facilities for food processing. The project is will be for small and medium size fish processing companies that lack the needed funding to install HACCP compliant facilities. During the F/S stage, the selection of potential processors could not be pursued unless the facilities are already available for bidding. For this reason, the establishment of one type of standard model HACCP compliant facilities with wide ranging compatibilities for a variety of different users and needs was conceived.

Moreover, the chemical and microbiological laboratories were planned to be built as part of the fish port to improve the quality of export for processed product to U.S. and E.U. The HACCP compliant facilities proposed for this project were therefore envisioned as one standard type for the regions.

The table below shows the number of HACCP processing facilities and laboratories proposed to be provided for each regional fish port. The bases used in determining the scale are described in Chapter 12.

Table 13.4.1 HACCP Compliant Facilities and Laboratories Proposed to be Provided for Each Regional Fish Port

Facility	Description	Regional Fish Ports					
		IFPC	SFPC	LFPC	CFPC	DFPC	BFPC
Processing facilities	HACCP accreditable	4 units	2 units	-	4 units	2 units	-
Laboratory for Inspections	Chemical & Microbiology	1 unit			1 unit	1 unit	-

Note: The standard equipments for each laboratory are as listed in Appendix 9.

13.4.1 Criteria for Determining the Type of HACCP Compliant Processing Facilities

The Major fish species for export to U.S. and E.U. produced by existing fish processors in the Philippines are milkfish, squid, shrimp, scallop, assorted fishes. As discussed in Chapter 3.2, there is a growing demand for these products in overseas markets.

The minimum production capacity of the proposed HACCP compliant facilities is 1 MT/unit/day considering the continuous of processed fish through refrigerated container at 20 MT per month. Considering the needs of existing fish processors and current market price of the products, the tabulation below shows the estimated production schedule of 2 to 4 lines of HACCP processing facilities, as shown in Table 13.4.1 above.

The building to house the HACCP processing facility is estimated as follows:

1)	Office space	(13.5m^2 x 3 sets) : Office space for the manager and director.
2)	Staff room	(25.2 m^2): Locker room and space for workers
3)	Anteroom	(27 m^2): Arrival and checking areas for raw-materials
4)	Raw-materials	(54 m^2): Receiving area for raw-materials
5)	Fish cutting area	(40 m^2): Preparation and cutting area for raw materials
6)	Cold processing room	(76 m^2): Processing area
7)	Hot processing room	(31.5 m^2): Hot processing area (smoke, boil)
8)	Finishing area	(78 m^2): Packing area
9)	Lavatories	(9.6 m^2): Toilet for workers
10)	Walk-in Closet	(15 m^2): Walk-in space for workers
11)	Corridor	(71 m^2): connection walkway and observation space
Estimated Total Area.		430-500 m^2

13.4.2 Design Criteria for Inspection Laboratory

Quality inspection of the product will be undertaken in the laboratory. Laboratory examination will be split into 3 categories as shown in the box below, for biological examination, chemical analysis and toxicological test.

Categories of Fisheries product testing

Biological
- Parasite examination, Molecular Diagnosis (PCR)
- Red tide/HAB Monitoring

Chemical
- Physicochemical Analysis, Water Analysis
- Environmental pond soil analysis, Antibiotic Residue Screening Heavy metals

Microbial & Toxicological
- Microbiological analysis

All the categories of laboratory examinations are essential for securing food safety. However, in order to reduce on cost only the minimum laboratory facilities to certify product assurance quality will be provided. This will involve the provision of laboratory facilities inside the fish port, is to focus on the physicochemical and microbiological analysis in accordance with HACCP Guidelines for fisheries processing products. If laboratory facilities are not provided, most of the processed fish products from the fish ports will be subjected to risk of spoilage/deterioration because of the long waiting time and time consuming laboratory inspections if conducted in other laboratories outside the fish ports. Therefore the installation of appropriate laboratory facilities is essential for immediate with HACCP requirements to enhance the competitive advantage of the Filipino producers in overseas markets. Bacteria will drastically multiply in number as time increase that will subject products to spoilage. Physicochemical and Microbiological analyses will include the following examinations:

Physiochemical analysis such as those listed hereunder:

Ash, Moisture, Protein, Crud fat, Salt, Boric acid, Histamine, Formalin, Trimethyl, amine-Nitrogen, Total Volaticle Base-Nitroggen, Free Fatty Acid, Thiobarbituric Acid

Microbiological analysis including the following:

Standard plate count/ Aerobic plate count, Yeast/Molds count, Coli form count, Faecal Coli form, *Staphylococcus aureaus, Salmonella, Shigella, E.Coli*, Anaerobic Bacteria

The physio-chemical analysis rooms to be provided with three rooms as follows:

1) Preparation room (5.4 m^2) : Samples' preparation consisting of draft chamber),
2) Washing room (6.0m^2) : Cleaning and drying of laboratory equipments/devices),
3) Micro-analyze room (33.5m^2) : For High Performance Liquid Chromatograph, Centrifuge machine.

Microbiological analysis rooms to be provided with six rooms as follows:

1) Ante-room (9.0 m^2) : changing of clothes and cleaning area),
2) Microscope room (10.5 m^2) : For determining the shape/type of bacteria to be isolated using two types of microscopes),
3) Sterilization room (9.3 m^2) : For sterilizing of broth and decontamination of strains.),
4) Microbiology room (35.7 m^2) : For incubating and determining of bacteria.),
5) Washing room (3.5 m^2) : For washing and drying of equipments/devices.,
6) Inoculation room (2.6 m^2) : To be provided with clean bench for UV sterilization and inoculation.)

It is noted that the Project will be provided with minimum laboratory facilities with essential equipments/devices indispensible for speedy laboratory analysis to secure HACCP compliance. As described above, the laboratory will be provided with chemical and analytical equipments, as listed in the Appendix 9.

13.4.3 Iloilo Fish Port Complex (IFPC)

(1) HACCP Compliant Processing Facilities

As mentioned earlier, IFPC will be provided with four processing facilities as listed in Section 13.3.1.

(2) Quality Inspection of Fishery Products

As described in Chapter 6.1.3, IFPC is currently not provided with laboratory facilities for the inspection and processing of fisheries products for HACCP accreditation. Four lines (units) of fish processing facilities and laboratory facilities are proposed to be installed for IFPC to comply with HACCP requirements. The inspection facilities will be installed on the first floors of the processing facilities and will cater to two types of tests for appropriate and speedy examinations of fish products in accordance with HACCP regulations. This will involve Physicochemical and Microbiological analyses, to be conducted by use of different testing equipments in different rooms. For the minimum required space to facilitate laboratory activities are shown below from function, safety and health reliability.

13.4.4 Sual Fish Port Complex (SFPC)

(1) HACCP Compliant Processing Facilities

SFPC will be provided with 2 lines of processing facilities as described previously in Section 13.3.1.

(2) Quality Inspection of Fishery Products

SFPC will not be provided with laboratory facilities because the BFAR laboratory facilities in Metro Manila which is quite proximate to Sual is available for the test and examinations of raw materials/processed products.

13.4.5 Lucena Fish Port Complex (LFPC)

LFPC will not be provided with processing facilities and inspection laboratory because almost all the fresh fish catch are destined to Metro Manila except for a few which are being smoked in Dalahican.

13.4.6 Camaligan Fish Port Complex (CFPC)

(1) HACCP Compliant Facilities

As shown in Section 13.3.1, CFPC will be provided with four processing facilities.

(2) Quality Inspection of Fishery Products

As described in Chapter 6.4.3, laboratory facilities for test of fishery products are not available in the Bicol Area. in particular. It is noted that several fish processing companies are operating in CFPC, and for this reason four lines of HACCP compliant fish processing facilities are planned for CFPC. One HACCP compliant inspection laboratory will be established on the first floor of the processing facilities. Similar to the other regional ports, the laboratory will cater to Physicochemical and Microbiological analyses by use of different testing equipments in different rooms. For the minimum required spaces for laboratory activities are as shown below from function, safety and health reliability.

13.4.7 Davao Fish Port Complex (DFPC)

(1) HACCP Compliant Fish Processing Facilities

As mentioned in Section 13.3.1, DFPC will be provided with two trains of processing facilities.

(2) Quality Inspection of Fishery Products

As described in chapter 6.5.3, one inspection laboratory facility of BFAR is located in the center of Davao city but the limited manpower and equipments are insufficient to meet the requirements of DFPC to satisfy HACCP Guidelines. Several processors have been discovered to be interested in fish processing. Therefore, for speedy and efficient inspection, DFPC will be provided with HACCP compliant laboratory facilities in accordance with HACCP requirements. The facility will be installed on the first floor of one of the processing facilities. Similar to the other laboratory facilities to be provided for the other regional ports, the inspection laboratory will be used for Physicochemical and Microbiological analyses, by use of different testing equipments in different rooms. To facilitate accurate and efficient testing activities, the minimum required spaces for the laboratory are shown below from function, safety, and health reliability.

13.4.8 Bislig Fish Port Complex (BFPC)

BFPC is envisioned as the base of operation for the fishing activities along the eastern seaboard of Mindanao in support to the operations of DFPC and GSFPC. For this reason, BFPC will not be provided with processing facilities and inspection laboratory but instead with ice plant to cater the fishing expeditions of ring netters and purse seiners expected to relocate from General Santos to Bislig upon the construction of the fish port.

13.5 Building Works

13.5.1 Design Criteria

In order to ensure safety, the following established Codes, Standards and References have

been adopted as guidelines for the Basic Design of Building facilities.

(1) Building and Safety Code

- The National Building Code of the Philippines
- P.D. 1185, The Fire Code of the Philippines and Regulations
- National Structural Code for Buildings
- Uniform Building Code (UBC 1977)
- National Plumbing Code of the Philippines
- Sanitation Code of the Philippines.
- Administrative Order N0. 35, DENR
- Philippine Electrical Code
- National Fire Protection Administration
- Fire Code of the Philippines
- Mechanical Engineering Code of the Philippines
- American Society of Heating , Refrigeration and Air-Conditioning Engineers, Inc. (ASHRAE)

(2) Code for Handicapped

- The Law to enhance Mobility of Disabled Persons (BP 344)
- American Disability Act (ADA) Guidelines

13.5.2 Design Concept

The overall design concept applied for all building facilities for all chosen regional and municipal ports are described as follows;

a. Appropriate for the purpose and function.
b. Must be flexible to cope with changes in operation and usage
c. Friendly to the environment, does not emit pollution, use of power saving materials and ease of usage; and,
d. Economy in cost of construction, maintenance and operation.

13.5.3 Building Structures

The Table 13.5.1 and 13.5.2 show the various types of building structures with the required floor areas to facilitate operation of the port facilities.

Table 13.5.1 Summary of Building Structures (Regional Fish Port)

Item No.	Fish Port	Market Hall (m^2)	Retail Market (m^2)	Fish Processing Facilities (HACCP) (m^2)	Admin. Bldg. (m^2)	Ref. Bldg (m^2)	Fab. Bldg (m^2)	Toilet (m^2)
1	IFPC	3,875	-	4 units-536/ unit	-	4,500	800	-
2	SFPC	-		2 units-536/unit	-	-	800	-
3	LFPC	3955.5	489	-	780 (2^{nd} floor of market hall)	-	-	2 units-35/unit
4	CFPC	-	-	4 units-536/unit	-	-	-	-
5	DFPC	342	-	2 units-536/unit	-	-	-	-
6	BFPC	462	-	-	700	-	800	-

Source: Survey by JICA Team

Table 13.5.2 Summary of Building Structures (Municipal Fish Port)

Item No.	Fish Port	Market Hall(m^2)	Retail Market(m^2)	Temp. Market (m^2)	Admin. Bldg. (m^2)	Ice Storage Bldg (m^2)
1	Concepcion	392	-	196		-
2	Dumangas	72	-	-	12	1unit-8
3	San Jose	392	-	-	12	2units-15
4	Dagupan	2266	-	-	180	-
5	Subic	1032	150	-		-
6	Atimonan	882	-	314.4		-
7	Calauag	742	-	-	12	-
8	Sta. Elena	342	-	-	12	2units-16
9	Calabanga	567	-	-	12	2units-22
10	Pasacao	207	-	-		
11	Balatan	342	-	-	12	1unit-16
12	Oas	72	-	-	12	1unit-15
13	Sta.Cruz	322	-	-	12	1unit-16
14	Panabo	342	-	-	12	1unit-16
15	Mati	252	-	-	12	1unit-16

Source: Survey by JICA Team

13.5.4 Administration Building: (Regional Fishing Ports)

The administration buildings will be developed to provide sufficient space to facilitate functional requirements. The building will be provided with main, communal, circulatory and ancillary system. The total space requirement of the facility was calculated based on Occupancy Load and estimated number of Personnel. Table 13.5.3 hereunder summarizes the general requirements for occupancy load.

Table 13.5.3 General Requirement (Occupancy Load)

	Use	m^2/Person
1.	Office Head (Single Occupancy)	9.0 -9.3m/2/ person (4.65m^2 office space, 4.65m^2 circulatory/ancillary areas.)
2.	Multiple Occupancy Load(common area)	7.0 m/2 (max.) 5.0 m^2 (min.)
3.	Conference Room	1.20 m^2/person (max.)
4.	Lobby	0.60 m^2/person

Source: The National Building Code of the Philippines

(1) Function

The building will house the staffs of Regional FPC, including, PMO, Administrative and Finance Services Division, Harbor and Market Operations Division, Port Maintenance and Refrigeration Division as well as the support zones necessary for the discharge of daily responsibilities in operating the port complex and in implement the policies and procedures of PFDA.

(2) Design Concept of Bislig FPC

Based on the foregoing concept, the building will be rectangular shaped @ 27 meters long x 12 meters wide, two (2) stories. The roof of the entry stoop will be designed to carry dead and live loads. This area will be designed as view deck, and for flag raising ceremonies. The roof will be reinforced concrete for lifetime durability which could be utilized as a multi-purpose space or could be expanded in the future as additional floor.

The building will be provided with one main entrance and two service side entrances. Ramps will provided on both sides of the main entrance to facilitate safe entrance and exit of disabled persons. The corridor will be located in the middle of the building to ensure adequate air circulations. The main stair and toilet facilities will be located within the lobby

area for convenience and accessibility of users. The structure will composed of RC roof deck on RC concrete beams and columns with footings. The estimated building space is attached as Appendix 3.

(3) Design Concept of Lucena FPC

Table 13.5.1 shows the building particulars of the Lucena FPC administration building structure @ 52 meters long x 15 meters wide, to be located on top of the market hall. The floor slab of the administration office will be designed to accommodate all the staffs of PFDA to manage and operate Lucena FPC. The main entrance to the administration office will be located at one side of the market hall to be provided with ramps for the use of disabled persons. Covered hallways will be provided on both land and sea sides of the building. A multi-purpose space will be provided . The building structure will comprise of RC roof deck on RC beams, columns and footings. The estimated office space is attached as Appendix 3.

(4) Fire Prevention System

- Fire Hose to be housed in a cabinet with standpipe will be provided at strategic locations.
- Portable Fire extinguishers will be provided in strategic locations.

(5) Ventilation and Air Conditioning

Provisions for split type air conditioning units shall be provided on all single occupancy and communal office areas.

13.5.5 Administration Building (Municipal Fishing Ports)

As reflected in Table 13.2.4.1 shows the particulars of the administration buildings to be provided for most of the municipal fish ports. The 4m width x 3m long one storey administration building to be located within the port complex will house the staffs of the local government units (LGUs) to manage and operate the fish port. Amenities including toilet and kitchenette will be provided. The structure will comprise of RC roof deck on RC beams, columns and footings.

(1) Function

The administration building will house the administrative staffs of the LGUs to manage and operate the fish ports efficiently.

13.5.6 Regional and Municipal Fish Ports Market Halls

(1) Design Concept

Table 13.5.1 and 13.5.2 show all the estimated floor areas of both the regional and municipal fish ports market halls. The floor of all market halls will be elevated by 0.90 meters from finished ground to be provided with platforms with ramps and stairs at designated areas for the handling of fish hauls. The market hall will be provided with space for auction and packing area for iced fish. The auction area will be located at the seaside portion of the market hall while the packing area for iced fish will be located at the landside portion. Unloading and loading area of fish products will be located outside the auction and packing area for iced fish to implement one-way traffic fish flow, to avoid chaotic congestion. Floor spaces will be provided with fish broker's offices, toilet facilities and cashier's booths. Fixed louvers as sunscreen to be constructed of galvanized aluminum modified polymer materials will be provided along the side of the market hall. The structure will comprise of RC roof deck on RC beams, columns and footings for durability against corrosion and typhoons (except for Sta. Cruz in Davao for which typhoon does not occur) to

minimize on maintenance cost. The port will be provided with drainage system and waste water treatment facility in compliance with DENR regulations and JICA Guidelines to enhance sanitation and hygiene more so that the fish port are catering to highly perishable fish commodities. Brokers' cashier booths space will be provided but the provision of facilities will be borne by the brokers.

13.5.7 Fish Processing Building (HACCP)

(1) Function

Fish processing buildings to accommodate 4 trains each of HACCP compliant fish processing facilities will be provided for Iloilo FPC and Camaligan FPC while Davao FPC and Sual FPC will be provided with fish processing buildings to house 2 trains each of HACCP compliant fish processing facilities. These buildings will be used primarily for adding value in processing of fish and frozen fish to meet international standards based on HACCP requirements.

(2) Design Concept

The building structure will elevated from finished ground by 0.90 meters and having a dimension of 34.5 meters long and 16 meters wide, 2 floors. A covered corridor will be provided at the outermost end of the building .The stairs and toilet facilities will also be located within this area. Fixed window panels will be provided for the observation of the processing rooms by guests. The processing room will be located at the ground floor while the laboratory and flake ice stacker will be located on the second floor. The building structure will consists of RC roof deck on RC beams, columns and footings. Fire fighting facilities will be same as the Administration building.

(3) Ventilation and Air Conditioning

All office rooms will be provided with split type of air conditioning units. The processing area and the laboratories will also be provided with commercial split type air conditioning units, 20 TR, ducted with ceiling mounted diffusers

13.5.8 Fabrication Building

Iloilo, Sual and Bislig Fish Port Complexes will be provided with fabrication building for ship repair. The existing fabrication facility for Iloilo and Sual FPC will be renovated and the size to be reduced to facilitate operation. A new fabrication shop will be provided for Bislig FPC. The column grids/ traveling crane grids will be maintained except for all the existing machine foundations which will be demolished and to be reconstructed based on the revised plan. Salvaged structural steel materials will be properly stacked at designated areas will be reused to the extent practicable. The revised building size for IFPC and SFPC is 40 meters long by 20 meters wide or a total of 800 m2. Floor spaces for amenities such toilet and locker facilities as well as office and tool room were considered.

13.5.9 Retail Market

(1) Function

This particular building structure will cater as wet market for unloaded fish. This facility will be used for retail trading business of sellers and buyers.

Lucena FPC and Subic Municipal fish port will be provided each with retail market.

(2) Design Concept

a) Lucena FPC Retail Market

The building is 25 meters long and 15 meters wide or a total of 375 m2. This building which will be aligned with the market hall will house 60 vendor stalls for. The vending and buying areas will be separated to avoid congestion. The structure will consists of RC roof deck on RC beams, columns and footings. Fire fighting facilities will be the same as the Administration building.

b) Subic Retail Market

The building structure is 30 meters long and 5 meters wide (from the inside column). Twenty (20) individual glazed stalls of 1.0 meter by 1.5 meter each will be provided at the mid of the retail market building, to separate vendors from wholesale buyers to avoid congestions. The stalls will provided with storage under the stand. The stalls will be constructed of steel roof framing on 6" diameter steel columns with concrete pedestals.

13.5.10 Temporary Market Hall

A temporary market hall to be constructed of light materials will be provided so as not to obstruct the ongoing trading activities during the demolition and renovation of the existing market hall. This temporary facility will be aligned along the perimeter of the new market hall to be constructed ahead of schedule considering the lead time to complete the construction of the new facility.

13.5.11 Iloilo FPC Refrigeration Building

The existing refrigeration building's roof framing is composed of 4 modules that are interconnected. For the revised plan, the existing roof framing will be modified by eliminating the two modules at the center of the building. The 2 modules located at each end will not be affected. The central modules have a total area of 4320 m2 to be demolished under the revised design for the provision of RC roof deck on RC beams, columns and footings. This area will accommodate the new fish processing building, and space for driveways of delivery trucks. The processing building is 25 meters wide by 34 meters long or a total area of 850 m2. Solar panels will be installed onto the top of the new roof deck. The existing architectural, structural columns, beams and roof framing housing the existing ice making room and ice storages (at the end modules) will be maintained. The entire roofing will be replaced with GA. Aluminum roofing sheets, coated with modified polymer and provided with single faced aluminum insulation material. The internal elements will be revised accordingly based on the revisions. All salvaged steel structures will be cleaned and repainted with epoxy paint. Excess structural steel materials will be inventoried and stacked at designated areas.

A new reinforced concrete structure facility, 45m long x 18.8m wide or a total floor area of 846 sq.m. will be constructed to house the generator, electrical and machine rooms and office area. Four (4) atmospheric type condensers will be installed outdoor. Fire fighting facilities will follow those provided for the Administration Building

Ventilation and Air Conditioning

All office areas will be provided with split type air conditioning units while the processing area will be provided with commercial split type of air conditioning units, 20 TR, ducted with ceiling mounted diffusers.

13.5.12 Ice Storage Buildings (Municipal Ports)

Nine (9) out of the 15 municipal fish port sites will be provided with ice storage and ice

crushing machines. Size and requirement varies from site to site. The other Six (6) municipal fish ports are provided with ice storages and retailing outlets.

13.5.13 Amenity Block

Amenities including 2 units of toll toilet facilities for public use to be located away from the market hall for sanitation will be provided for Lucena FPC. Revenues generated by use of the toilets will be used to maintain the facilities.

Function

The toilet building will be 5.0 meters x 7.0 meters to be equally divided for the use of both sexes. The male toilet will contain 3 water closet cubicles, urinals and lavatories. While the female toilet will contain 4 water closet cubicles and lavatories. A janitor's closet with slop sink will be provided between the male and female toilets. The layout of the toilets and lavatories will be back to back to reduce on space. A reinforced concrete septic vault will be provided for every amenity block for domestic wastewater discharge.

13.5.14 Exterior and Interior Outline Specifications

The exterior and interior material schedule for the Regional and Municipal Fish Port Building Structures will be selected based on the following considerations:

1) Compatibility with the environment
2) Performance
3) Durability
4) Cost & ease of maintenance

The proposed finish schedule is shown in Appendix.3.

13.6 Backup Area

(1) Road and Parking Area

The following established Codes, Standards and References will be adopted as guidelines for the basic design and construction of Roads and Pavements:

a) AASHO Guide for the Design of Rigid and Flexible Pavements
b) AASHTO Specifications, Test Protocols and Guidelines
c) American Concrete Institute (ACI) Committee Reports, Standard Practices, and Commentaries

Three kinds of pavement structure, i.e., asphalt, concrete and concrete blocks (interlocking concrete block) will be adopted. Based on construction cost and maintenance, concrete pavement is recommended for road, loading/unloading, apron and parking area.

Roads/Loading/Unloading/Apron Area	Public Parking Area
PCCP 230mm w/ 6mm wire (fc'=24MPa)	PCCP 200mm w/ 6mm wire (fc'=24MPa)
Base Course 150mm (CBR>80)	Base Course 150mm (CBR>80)
Sub Base Course 150mm (CBR>20)	Sub Base Course 150mm (CBR>20)

(2) Drainage

Storm drainage system will be designed based 5-year return period rainfall intensity in accordance with rational formulas as shown hereunder:

Qy = 0.278*Cy*T*Ac
where,

Qy : the peak flow rate/discharge
Cy : the runoff coefficient
T : the average rainfall intensity
Ac : the catchment area

therefore:

A = Qy / V

Where,

A: the sectional area of the drainage
V: the average velocity of flow estimated using Manning Equation

All tests will be in strict conformity with ASTM C-76. Reinforced Concrete Culvert Pipes will be used for main drainage lines to be located at the side of the road or under the sidewalk. For surface run-off, L-shaped curb and gutter with openings will be provided at appropriate locations on each side of the road. These openings will terminate directly to manholes/catch basins. Around the buildings, culvert pipes, or in some cases U-ditch, will be constructed between manholes/catch basins to be linked to a main drain.

(3) Fence and Landscape

Fence will be provided, or rehabilitated to secure the fish ports from unwarranted intrusions. Fence will be constructed of CHB wall or combination of CHB and cyclone wires to be provided with barbed wires on top.

Landscape (Green/Plants) will be considered taking into account minimum maintenance. Whenever possible, existing trees will be preserved and maintained. However, when deemed necessary, trees will be transferred to other location that will not interfere with the Works.

(4) Fish Processing Facilities

Fish Processing Facilities will be provided for Iloilo FPC, Sual FPC, Camaligan FPC and Davao FPC. Except for Camaligan FPC, all fish processing facilities will be constructed on stabilized reclaimed areas. The fish processing facilities area for Camaligan FPC will be newly filled by 1.5 meter thick average fills. The subsoil condition about 5 meters below existing ground surface however is poor. To avoid future settlement, soil improvement by paper drain method will have pursued to hasten consolidation so that construction could be pursued immediately thereafter.

(5) Fuel Depot

An area close to the multi-purpose pier will provided for as fuel depot t for fishing vessels and carriers. All facilities needed for the operation of the fuel depot will be provided by the private sector on contract basis with PFDA.

13.7 Utilities

13.7.1 Electric Power/Solar System

(1) Design Condition

Listed hereunder are the design codes and standards:

- Philippine Electric Code (PEC)
- National Electrical Code (NEC)
- National Fire Protection Administration (NFPA)

- American Society for Testing and Materials (ASTEM)
- American National Standards Institute (ANSI)
- Institute of Electronics and Electrical Engineers (IEEE)
- International Electro-technical Commission (IEC)
- Philippine Standards (PS)

(2) Present Power Supply Condition of Regional Fish Ports

Present power supply condition of regional fish ports are as follows;

Table 13.7.1 Present Condition of Power Supply for Regional Fish Ports

Fish Port	Power Used (kwh)	Power Provider	Main Transformer
Iloilo	1,199,200	PECO	2,500 KVA
Sual	35,074	CENPELCO	2,000 KVA
Lucena	971,637	MERALCO	1,500 KVA
Camaligan	472,286	CASURECO	1,000 KVA
Davao	1,169,465	DAVAO LIGHT	750 KVA
Bislig	---------	SURSECO 1	----------

Source: Survey by JICA Team

Table 13.7.2 Present Condition of Generator Sets for Regional Fish Ports

Fish Port	Specifications	Present Condition			Remarks
		NO.1	NO.2	NO.3	
Iloilo	3- 750 KVA, 460V, 3Ø	Damaged- Alternator winding Burnt	Good Condition, Battery to be replaced	Alternator to be replaced	Needs Daily Maintenance
Sual	2- 1000 KVA, 230V, 3Ø	Damaged		--------	Privately owned generator
Lucena	2- 750 KVA, 460V, 3Ø	OK, but 2000 AT, Main Beaker Needs Spare unit. Too old.		--------	Needs Daily Maintenance
Camaligan	2- 500 KVA, 460V, 3Ø	DG # 1. Still Operating. Freq. Meter is set to 64 Hz.	DG # 2. No voltage output. To be replaced	--------	Needs Daily Maintenance
Davao	1- 350 KVA, 230V, 3Ø	Good Condition	--------	--------	Needs Daily Maintenance

Source: Survey by JICA Team

Issues to be considered related to existing power supply are as follows;

Table 13.7.3 Issues to be Considered Related to Power Supply of Regional Fish Ports

Fish Ports	Location/ Equipment	Issues
Iloilo	Ice Plant Panel MCC-1,MCC-2,	Some components such as indicating lamps and other internal parts like control transformers and fuses were transferred to other panel.
Sual		Not Found
Lucena	Power Center No.2	Dismantled and abandoned.
	LVSG NO. 1	Manual transfer switches, Main Breakers, 2000 ampere ratinsgs. Defective
Camaligan	Generator Room	Underground low voltage cable supplying the Main distribution board is deteriorating and emitting smoke during rainy season.
Davao	LPP-EX2	Present capacity is now small due to increase in internal connection
Bislig		Not available

Source: Survey by JICA Team

(3) Present Power Supply of Municipal Fish Ports

Present conditions of Municipal Fish Ports are as follows:

- Concepcion: Market hall ceiling lights and street lights are mostly dilapidated .Replaced with waterproof type lighting fixtures suitable for port operations.

- San Jose: All electrical lights and panel boards are deteriorated and not operational. Replace waterproof type lighting fixtures and electrical equipment appropriate for port operations.
- Calabanga: No existing structures

For the remaining municipal ports such as Dumangas, Dagupan, Subic, Atimonan ,Calauag, Sta. Elena, Pasacao, Balatan, Oas, Sta. Cruz, Panabo and Mati: No issues of major concern.

(4) Future Demands

The table hereunder summarizes the estimated future demands for Electrical Power for the Fish Ports.

1) Regional Fish Ports

Table 13.7.4 Future Demand of Electrical Power for Regional Ports

Port	Present energy consumption (kwh/year)	Future Demand of Energy consumption (Kwh/year)					Total (kwh/year)
		Refrigeration machineries	Buildings				
			Market Hall	Adm. Building	HACCP facilities	Fabrication Shop	
Iloilo	1,308,218	3,683,563	35,040		720,000	7,300	5,754,121
Sual	35,074	1,107,143			360,000	7,300	1,509,517
Lucena	971,637	192,632	40,880	56,784			1,261,933
Camaligan	499,881	1,121,065			720,000		2,340,946
Davao	1,403,358	336,208	3,212		360,000		2,102,778
Bislig	0	1,669,262	4,380	50,960		7,300	1,731,902

Note* Energy consumption for Building shows Room Lighting and Air conditioner. Source: Survey by JICA Team

2) Municipal Fish Ports

Future demands of electrical power for Municipal ports are as follows:

Table 13.7.5 Future Demand of Electrical Power for Municipal Ports

Municipal Fish Port	Future Demand of Energy consumption		Total (kwh/ Year)	Municipal Fish Port	Future Demand of Energy consumption		Total (kwh/ Year)
	Market Hall	Administration Building			Market Hall	Administration Building	
Concepcion	3,796	292	4,088	Calabanga	5,256	292	5,548
Dumangas	876	292	1,168	Pasacao	2,044	292	2,336
San Jose	3,796	292	4,088	Balatan	3,212	292	3,504
Dagupan	20,732	1,752	22,484	Oas	876	292	1,168
Subic	10,804	292	11,096	Sta.Cruz	3,212	292	3,504
Atimonan	8,176	292	8,468	Panabo	3,212	292	3,504
Calauag	7,008	292	7,300	Mati	2,336	292	2,628
Sta. Elena	3,212	292	3,504				

Source: Survey by JICA Team

(5) Solar Power Generation

An examination of the PV system was carried out to find ways and means of reducing the unit cost of power consumption of the fishing ports for sustainability of operations. The total demand is estimated based on current consumption plus future requirements. The table hereunder summarizes the estimated demand of power supply for each regional fish port.

Table 13.7.6 Estimation of Electric Power Consumption for Each Fish Ports

Fish port	The present consumption (KWh/ year)	The consumption with additional machineries (KWh/ year)		Total (KWh/ year)
		Refrigeration machineries	Building facilities	
Iloilo	1,308,218.2	3,683,563	762,340	5,754,121
Sual	35,074.0	1,107,143	367,300	1,509,517
Lucena	971,637.0	192,632	97,664	1,261,933
Camaligan	499,881.3	1,121,065	720,000	2,340,946
Davao	1,403,358.0	336,208	363,212	2,102,778
Bislig	0.0	1,669,262	62,640	1,731,902

Source: Survey by JICA Team

The table hereunder shows the summary of estimated power generation for each regional fish ports.

Table 13.7.7 Solar Power Generation for Each Regional Fish Ports

Fishing Port	Area of Solar Panel (m^2)	Efficiency of Power generation by Panel (kw/ m^2)	Size of System (kw)	Design factor for actual Power generation Volume	Volume of Solar Power (kwh/Year)
Iloilo	6,600.0	0.15	990.0	0.7	1,232,708
Sual	580.0	0.15	87.0	0.7	93,762
Lucena	2,000.0	0.15	300.0	0.7	323,316
Camaligan	1,150.0	0.15	172.5	0.7	185,907
Davao	2,300.0	0.15	345.0	0.7	429,580
Bislig	1,690.0	0.15	253.5	0.7	315,648

Source: Survey by JICA Team

For example, relation between major demand of electric power in IFPC refrigeration buildings and average Solar Power generation is as follows. Capacity of the Solar Power generation is 990 x 0.7=693kW. Taking into account the various kinds of electricity demand such as office use and so on, it would be adequate to introduce the 693kW capacity system.

Table 13.7.8 Electric Power Demand Estimation for IFPC

Facilities		Demand per unit (KW/unit)	No of unit	Peak Power demand (KW)	Efficiency	Daily operation time (hr)	Operation days per year (day)	Rate of operation (%)	Annual power demand (KWh /year)	Average Power demand (KW)
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
Ice Making		142.5	2	285	0.8	19.2	365	100.00	1,597,824	228.0
Ice Storage		1.1	4	4.4	0.7	18	365	100.00	20,236	3.1
Contact Freezer	Fish (material)	30	1	30	0.9	8	240	59.20	30,689	16.0
Air Blast Freezer	Fish (products)	19	1	19	0.9	12	240	72.10	35,508	12.3
Air Blast Freezer	Meat	19	2	38	0.9	12	240	100.00	98,496	34.2
- 20 degrees Cold Storage	Fish	11	10	110	0.7	18	365	100.00	505,890	77.0
- 20 degrees Cold Storage	Meat	11	7	77	0.7	18	365	100.00	354,123	53.9
- 20 degrees Cold Storage	Existing	11	7	77	0.7	18	365	100.00	354,123	53.9
- 20 degrees Cold Storage	Existing	7.5	1	7.5	0.7	18	365	100.00	34,493	5.3
Air Blast freezer	HACCP	19	4	76	0.9	12	365	100.00	299,592	68.4
- 20 degrees Cold Storage	HACCP	4.5	4	18	0.7	18	365	100.00	82,782	12.6
Ice Making (Flake Ice)	HACCP	11	4	44	0.7	24	365	100.00	269,808	30.8
Ice Storage (Flake Ice)	HACCP									
Total				785.9					3,683,563	595.4
							Note:	(i) = (c)x (d) x (g) (for reference)		

Source: Survey by JICA Team

Contribution of the solar power supply to the total electricity bill for each ports are as follows;

Table 13.7.9 Contribution of Solar Power to Total Electric Demand

Fishing Port	Total bill of electricity (Million Pesos)	Equivalent bill of Solar power generation (Million Pesos)	Contribution rate (%)
Iloilo	65.02	13.93	21.4%
Sual	11.02	0.68	6.2%
Lucena	9.02	2.31	25.6%
Camaligan	18.72	2.02	10.8%
Davao	9.46	2.34	24.7%
Bislig	8.19	1.54	18.8%

Source: Survey by JICA Team

Three cases of unit cost per KW calculation were considered for initial construction cost as shown below.

Case 1 Construction costs 730,000 yen /Kw (365,000 PHP/KW)
Case 2 Construction costs 500,000 yen /Kw (250,000 PHP/KW)
Case 3 Construction costs 200,000 yen /Kw (100,000 PHP/KW)
(Where conversion rate is set to 2yen/PHP)

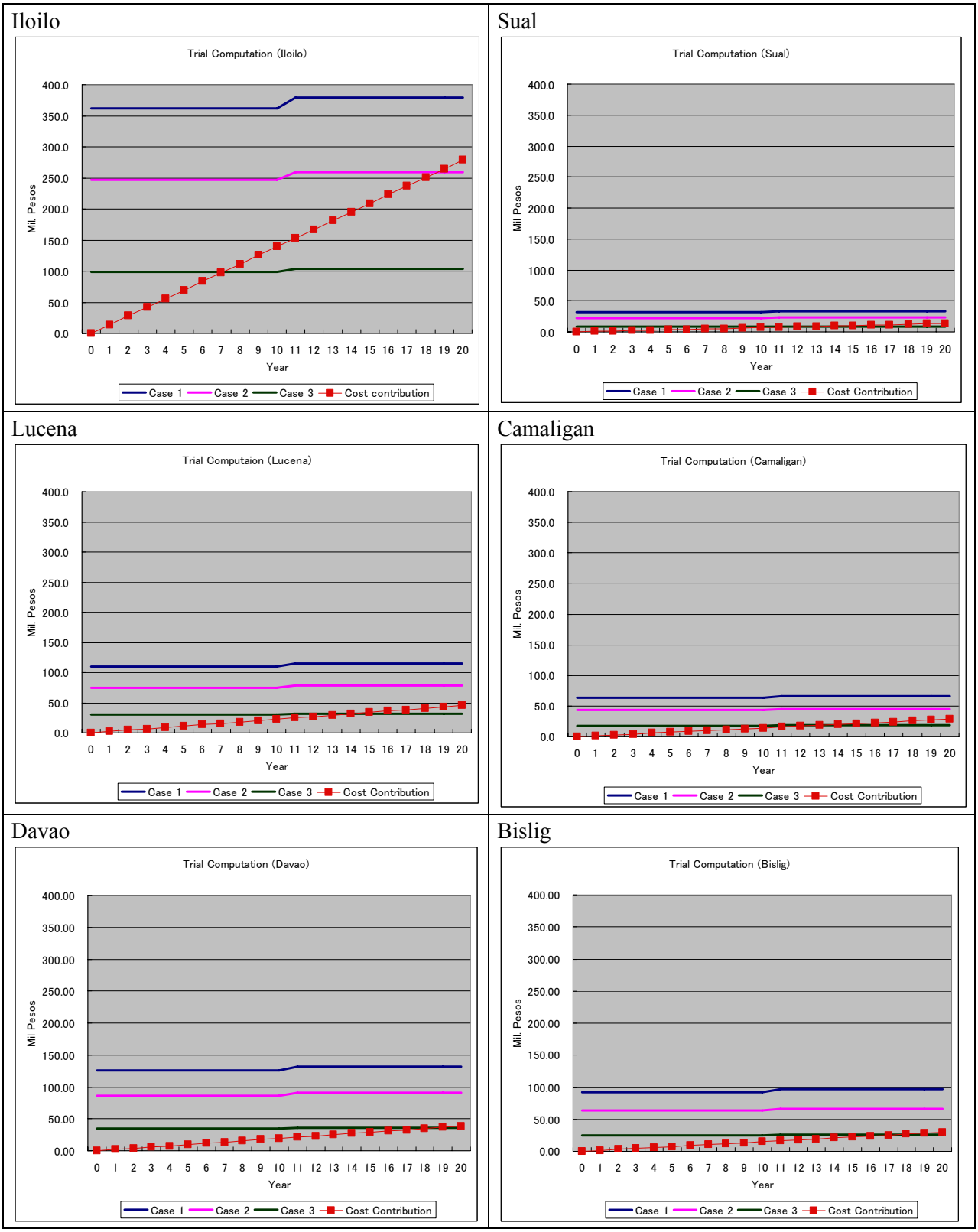


Fig. 13.7.1 Case Study of Solar Power System (Source: Survey by JICA Team)

Iloilo fishing port is a consumer of large electrical power. Among the regional fish ports, the use of solar power for Iloilo appears to be the most effective as shown in the table below. Therefore, solar power system shall be provided IFPC only.

The table hereunder shows the estimated reduction of CO_2 emissions with the use of photovoltaic power generation.

Table 13.7.10 Environmental Contribution Value

Fish port	Quantity of annual generation (KWh)	Quantity of oil reduction (kl)	Quantity of CO_2 reduction (t)	Quantity of CO_2 reduction Forest conversion area (ha)
Iloilo	1,232,708	279.82	387.69	108.56
Sual	93,762	21.28	29.49	8.26
Lucena	341,774	77.58	107.49	30.10
Camaligan	185,907	42.20	58.47	16.37
Davao	429,580	97.51	135.10	37.83
Bislig	315,648	71.65	99.27	27.80
Total		590.06	817.50	228.91

Source: Survey by JICA Team

(4) Water Supply

The demand for water volume was determined based on the proposed improvement and expansion of fish ports' facilities including ice making, fish processing facilities, market hall, etc considering the existing freshwater supply condition. Development of for additional water supply system shall comply with the Philippine National Standard for Drinking Water (PNSDW).

1) Existing Water Supply Condition

Based on the results of the surveys, the table hereunder summarizes the existing water supply conditions for the Regional fish ports.

Table 13.7.11 Present Water Supply Conditions

	Water District (m^3)	Deep well (m^3)	Total (m^3)	Elevated tank (m^3)	Underground reservoir (m^3)	Water treatment	Water cost (php/m^3)
IFPC	100		100	80	600		57
SFPC	56		56	50	300	Chlorination	
LFPC	35		35	100	300		46
CFPC		163 (capa 976)	163	50	300	Chlorination	
DFPC		86 (capa 26)	86		600		
BFPC							59.2

Following are the issues of major concern:

IFPC
- Water volume from Metro Iloilo Water District (MIWD) is insufficient. There is a need to purchase water from private haulers
- MIWD assured in their letter of (Fig 13.7.1) that all possible means are being considered to address the existing situation on water supply to IFPC considering future need.
- Rehabilitation of existing pipe leakages

SFPC
- Existing deep well need to be rehabilitated
- Dilapidated overhead tank and underground reservoir will have to be rehabilitated
- Rehabilitation of existing pipe leakages

LFPC
- Water volume from Quezon Metropolitan Water District (QMWD) is insufficient. There is a need to purchase water from private haulers
- There is a request for additional allocation from QMWD. Accordingly, if the request for a loan for the expansion program is approved within this year, the water supply increase

will be realized by 2014
- Development of new deep wells in the vicinity of the fish port complex is an alternate option to produce fresh water
- Rehabilitation of existing pipe leakages
- Repair of the leakages of the elevated water tank and distribution pipes

CFPC
- One of the two deep well pumps is below the rated capacity. Nevertheless, some 720 m^3/d of water is still available

DFPC
- There is a need the pumps and controls for well No. 1 and 3. The pump and control facilities for deep well no.2 is still in good condition

BFPC
- Bislig City Water District (BCWD) has 3 different water sources: spring, river and deep wells. Based on 2008 records, BCWD produced 5,995 cubic meters of fresh water per day
- BCWD has also plans for the construction of a new well at rated output of 6,160 cubic meters per day. BCWD can provide the water requirements of Bislig FPC

Municipal Fish Ports
- Existing water supply can provide the requirements of Subic, San Jose, Pasacao
- Tapping of water is the existing fish ports for Conception (but the volume is not sufficient), Dagupan, Atimonan, Calauag, Calabanga, Balatan, Sta Cruz
- Existing water supply pipes is far from the location of the fish ports for Dumangas, Sta Elena, Oas, Panabo, Mati

2) New Water Demand Including Existing Consumption

The estimated water demand is based on the rehabilitation and improvement schemes of the existing port facilities in addition to the existing consumption as tabulated below;

Table 13.7.12 Water Demand of Each Fish Port

	Total Water Demand					Existing consume	**Total**
	Market hall	Ref. Bldg	HACCP	Toilet, etc	Sub-Total		
IFPC	58.9	140.7	64.8	13.3	277.7	100.0	377.7
SFPC	0.0	63.4	32.4	0.0	95.8	56.0	151.8
LFPC	53.2	49.8	0.0	12.5	115.5	35.0	150.5
CFPC	0.0	54.0	64.8	0.0	118.8	163.0	281.8
DFPC	4.7	54.0	32.4	2.4	93.5	86.0	179.5
BFPC	5.7	90.0	0.0	2.0	97.7		97.7
Concepcion	5.6	0.0	0.0	0.9	6.5		6.5
Dumangas	1.0	0.0	0.0	0.6	1.6		1.6
San Jose	7.0	0.0	0.0	0.6	7.6		7.6
Dagupan	36.2	0.0	0.0	4.5	40.7		40.7
Subic	16.9	0.0	0.0	1.1	18.0		18.0
Atimonan	11.2	0.0	0.0	0.8	12.0		12.0
Calauag	12.2	0.0	0.0	0.6	12.8		12.8
Sta. Elena	5.5	0.0	0.0	0.6	6.1		6.1
Calabanga	11.0	0.0	0.0	0.7	11.7		11.7
Pasacao	3.3	0.0	0.0	0.6	3.9		3.9
Balatan	5.5	0.0	0.0	0.6	6.1		6.1
Oas	1.2	0.0	0.0	0.6	1.8		1.8
Sta. Cruz	5.3	0.0	0.0	0.6	5.9		5.9
Panabo	5.4	0.0	0.0	0.6	6.0		6.0
Mati	4.0	0.0	0.0	0.6	4.6		4.6

- The proposed schematic diagrams considering the existing facilities are shown in Appendix 10.

  System A-1: Iloilo, Sual, Lucena, Camaligan and Bislig
  System A-2: Davao
  System A-3: Concepcion, San Jose, Dagupan, Subic, Atimonan, Calauag, Calabanga and Balatan
  System A-4: Dumangas, Calauag, Calabanga, Oas, Panabo, Sta. Cruz and Mati
- Installation of clarifiers should be provided for HACCP water supply
- New deep well should be provided or rehabilitated for Sual, Lucena, Davao, Concepcion (Shallow well)
- Existing water pipelines should be rehabilitated for Iloilo, Sual, Lucena

(5) Waste Water Treatment

Wastewater discharge from the market halls, fish processing facilities (HACCP and Local) and retail market of both the regional and municipal fish ports will be treated to meet the standard effluent set by the Department of Environmental & Natural Resources (DENR).

1) Codes and Standards to be Applied

- Uniform Plumbing Code (UPC), 1991 Edition
- National Plumbing Code of the Philippines (NPCP)
- Sanitation Code of the Philippines (Presidential Decree No. 856)
- National Building Code of the Philippines (Presidential Decree No. 1096)
- DENR Administrative Order No. 35, Series of 1990
- Philippines Clean Water Act of 2004 (Republic Act 9275)

2) Condition of Existing Wastewater Treatment Facility

The 60 cu.m. per day capacity of the existing wastewater treatment facility (WWTF) for Davao FPC is sufficient only for the operation of the existing fish processing facilities. The WWTF is being operated in accordance with the standard effluent specified by DENR-Davao. Additional WWTF is needed to cater to the rehabilitation and improvement of facilities for Davao FPC.

The WWTF for Iloilo FPC which was constructed in 1995 is no longer in use because it has heavily deteriorated. The facilities can be rehabilitated to cater for wastewater treatment for the new market hall and fish processing facilities to minimize on construction cost.

The detailed descriptions of the existing WWTF are shown in the Appendix 7.7.

3) Design Volume of Wastewater Treatment for the Regional and Municipal Fish Ports

The estimated discharged volume from the market hall and fish processing facilities were calculated based on the trading/treated volume of fish products and the floor area of the market halls. The BOD content of wastewater discharge is assumed at 2,700 mg/l.

Table 13.7.13 Estimated Waste Water Discharge

	Estimated Total Waste Water Discharge				**Design Volume**
	Market hall	Ref. Bldg	HACCP	Total	
Iloilo FPC	58.9	50.7	64.8	174.4	**180**
Sual FPC	0.0	18.4	32.4	50.8	**65**
Lucena FPC	53.2	4.8	0.0	58.0	**65**
Camaligan FPC	0.0	0.0	64.8	64.8	**65**
Davao FPC	4.7	0.0	32.4	37.1	**40**
Bislig FPC	5.7	0.0	0.0	5.7	**7**
Concepcion	5.6	0.0	0.0	5.6	**5**
Dumangas	1.0	0.0	0.0	1.0	**1**
San Jose	7.0	0.0	0.0	7.0	**8**
Dagupan	36.2	0.0	0.0	36.2	**37**
Subic	16.9	0.0	0.0	16.9	**17**
Atimonan	11.2	0.0	0.0	11.2	**8**
Calauag	12.2	0.0	0.0	12.2	**13**
Sta. Elena	5.5	0.0	0.0	5.5	**6**
Calabanga	11.0	0.0	0.0	11.0	**12**
Pasacao	3.3	0.0	0.0	3.3	**5**
Balatan	5.5	0.0	0.0	5.5	**6**
Oas	1.2	0.0	0.0	1.2	**2**
Sta. Cruz	5.3	0.0	0.0	5.3	**6**
Panabo	5.4	0.0	0.0	5.4	**6**
Mati	4.0	0.0	0.0	4.0	**4**

(6) Sewerage

Sewerage system will be planned based on the water supply volume and sewage from various buildings. For sewage from toilet, the effluent will be conveyed through concrete or vinyl pipe to a septic tank. The catch basin outlet should be provided with filter to trap solids before sewage is discharged into the sea.

Table 13.7.14 Design Volume of Septic Tank

Fish Port	Administration Bld.	Fabrication shop	MH	HACCP	Total	Design
Iloilo		1.125	11.625	15	27.75	30
Sual		1.125		7.5	8.63	10
Lucena	4.875		11.625		16.50	20
Camaligan				15	15.00	15
Davao			1.125	7.5	8.63	9
Bislig	4.125	1.125	0.75		6.00	6
Concepcion			3.375		3.38	4
Dumangas	0.375		1.8		2.18	3
San Jose	0.375		1.35		1.73	2
Dagupan	1.875		16.875		18.75	19
Subic			4.05		4.05	5
Atimonan			2.925		2.93	3
Calauag	0.375		0.675		1.05	2
Sta. Elena	0.375		0		0.38	1
Calabanga	0.375		2.7		3.08	4
Pasacao			0.675		0.68	1
Balatan	0.375		0.675		1.05	2
Oas	0.375		0		0.38	1
Sta. Cruz	0.375		0.675		1.05	2
Panabo	0.375		0.45		0.83	1
Mati	0.375		0.9		1.28	2

Detailed calculation for design volume of the septic tank and the drawing of typical sections are attached in Appendix 7.

(7) Closed Circuit Television (CCTV) System

CCTV System is an integral part of the security system for fish port operations. CCTV System enhances port security through the monitoring of strategic areas of the fish port.

The objective of the system is to maintain a safe and secure environment by monitoring areas in and around the fish port premises.
The system will composed of Pan Tilt Zoom (PTZ) and Fixed Internet Protocol (IP) Cameras, Wireless LAN Access Points and Stations, communication System, Display and Control Computers, Network Disk Recorder, Optical Video Recorder and Network Monitoring System.

(8) Public Address and Communication

Public address and communication facilities will be provided together with CCTV System to integrate the total monitoring, communication, control and managing system.

The equipment for the public address and communication will be installed at the control center in the administration building.

(9) Solid Waste Treatment

In compliance with DENR regulations and recycling of materials, solid waste from all the fish ports will be collected to be stored temporarily in the Solid Waste Storage inside fish port premises.

Floor of Solid Waste Storages will be elevated by 0.90 meters from finished ground to be provided with loading and unloading platforms. The building will be provided with sorting and storage rooms for paper, bottle & glass, plastic, metals and wood, etc. The building will be provided with concrete louver blocks for ventilation and skylight roofing sheets for natural lighting. The solid waste storage structure will consists of RC roof deck on RC concrete beams, columns and footings for durability and economy.

13.8 Fish Port Layout

(1) IFPC

Commercial fish vessels operators are willing to use Iloilo FPC as base of operations provided that wave conditions inside the port basin and mooring areas are improved with the construction of the east breakwater to shelter the port from wave actions particularly those occurring during the northeast/southeast monsoon seasons.

The construction of the east breakwater will shelter the port and is expected to induce more customers to use the port facilities not only as unloading of fish catch but also for fishing trips preparation such as ice loading, refueling, loading of fish net and foods supplies .

Three alternative plans as discussed hereafter were considered for the installation of a breakwater to protect Iloilo FPC from severe wave actions coming from the southwest direction.

Plan A
As shown on the drawings, the new east breakwater will start from the outside corner of the slipway towards the south bending to the west to shelter the port basin considering an entrance/exit opening of 250 m. The breakwater is 600 m long.
The installation of a breakwater thereat will protect the port basin from the southeast/northeast

waves and intrusion of littoral drift from the west. Construction cost will be reduced due to the shallow water depth. The port should be provided with anti-pollution measures because the basin is enclosed with breakwaters.

Plan B

Island type of breakwater (350m) is provided at the opposite side of west breakwater to protect the quay wall and slope landing except the slipway.

While the port basin is basically protected from northeast waves, diffracted waves will enter the port basin from both side. Intrusion of littoral drifts from the west into the basin could not also be avoided. This plan is more economical than Plan A because of the shorter length. Pollution control in the basin would be easier because of the two entrances thereby water to circulate in the basin.

Plan C

Extension of the existing breakwater to shelter the port from southwest monsoon waves together with the construction of a shorter east breakwater to protect the basin from southeast waves.

In this case the approach channel of the fishing vessel from the west will become narrow of the Oton Bank in front of the west breakwater. Littoral drifts from the west direction will be trapped inside the port because of the extended the west breakwater thereby generating adverse impact to the environment associated with oceanography such as current, seabed configuration, accretion/erosion, coastal changes, among others.

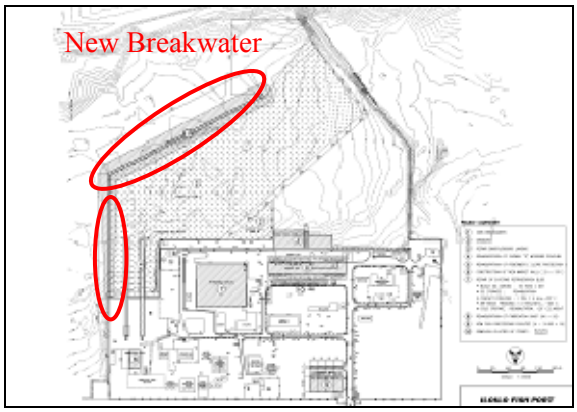


Fig. 13.8.1 Plan A

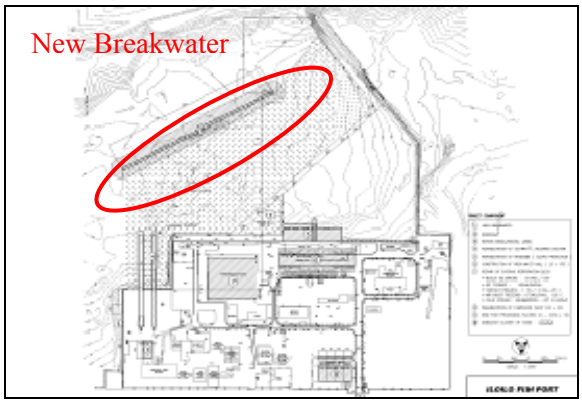


Fig. 13.8.2 Plan B

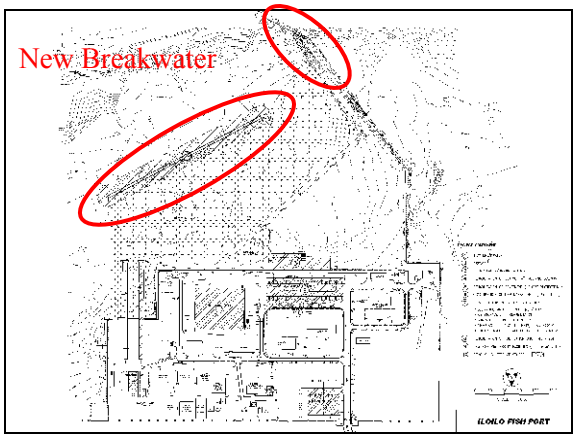


Fig. 13.8.3 Plan C

Among the Plans, Plan C disadvantageous as compared with Plans A and B. As such, the detail calmness study was made for A and B. Based on the results of the study, Plan A is recommended not only from the viewpoint of calmness but also from the point of view of prevention of silt intrusion/deposits into the port meriting for the averting of expensive yearly maintenance cost.

Plan A alternative will improve availability from 88% to 95% for the commercial berth. The table hereunder summarizes the comparison of benefits to be derived with the east breakwater scenario and without the east breakwater scenario.

Table 13.8.1 Wave Direction and Height

	Wave Direction	Wave Height	
		Without East BW	With East BW
Jan	ESE	Hmax=1.0x1.33= 1.3m > 0.4m	Hmax=1.0x0.16= 0.2m < 0.4m
Feb			
Mar			
Apr			
May	SSE	Hmax= 2.0x0.89= 1.8m > 0.4m $H_{1/20}$= 1.0x0.89= 0.9m > 0.4m	Hmax= 2.0x0.34= 0.7m > 0.4m $H_{1/20}$= 1.0x0.34= 0.3m < 0.4m
Jun			
Jul			
Aug			
Sep			
Oct			
Nov	ESE	Hmax=1.0x1.33= 1.3m > 0.4m	Hmax=1.0x0.16= 0.2m < 0.4m
Dec			

Source: Survey by JICA Team

In order to retain the further calmness of Port basin, additional wave calmness analysis applying time-dependent mild slope equation for random waves were carried out for the layout with inner Breakwater.

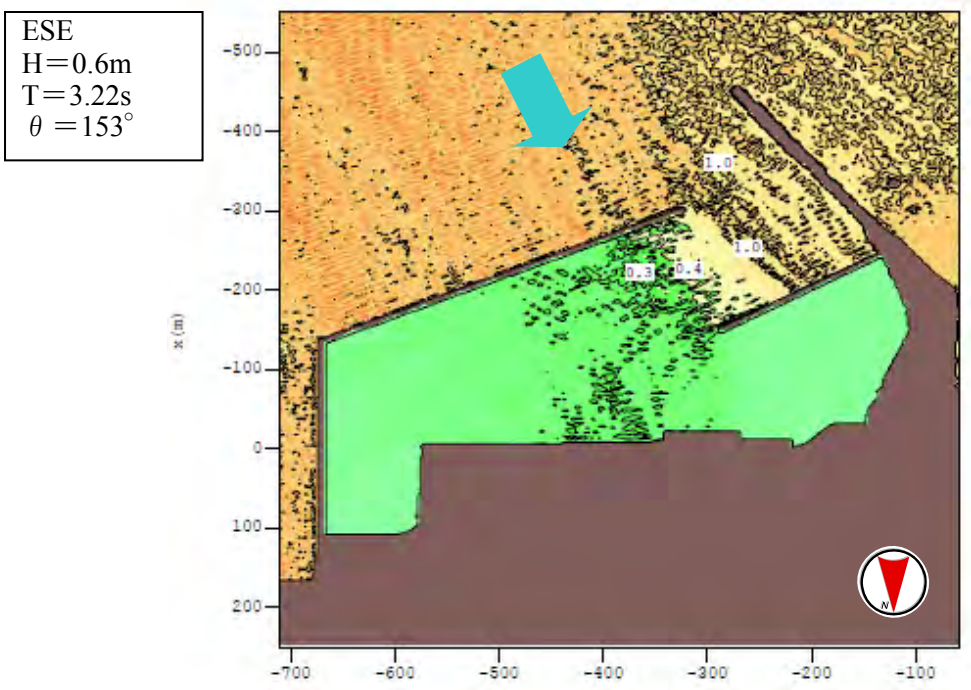


Fig. 13.8.4　Result of Calmness Analysis (for Annual Maximum Wave ESE)

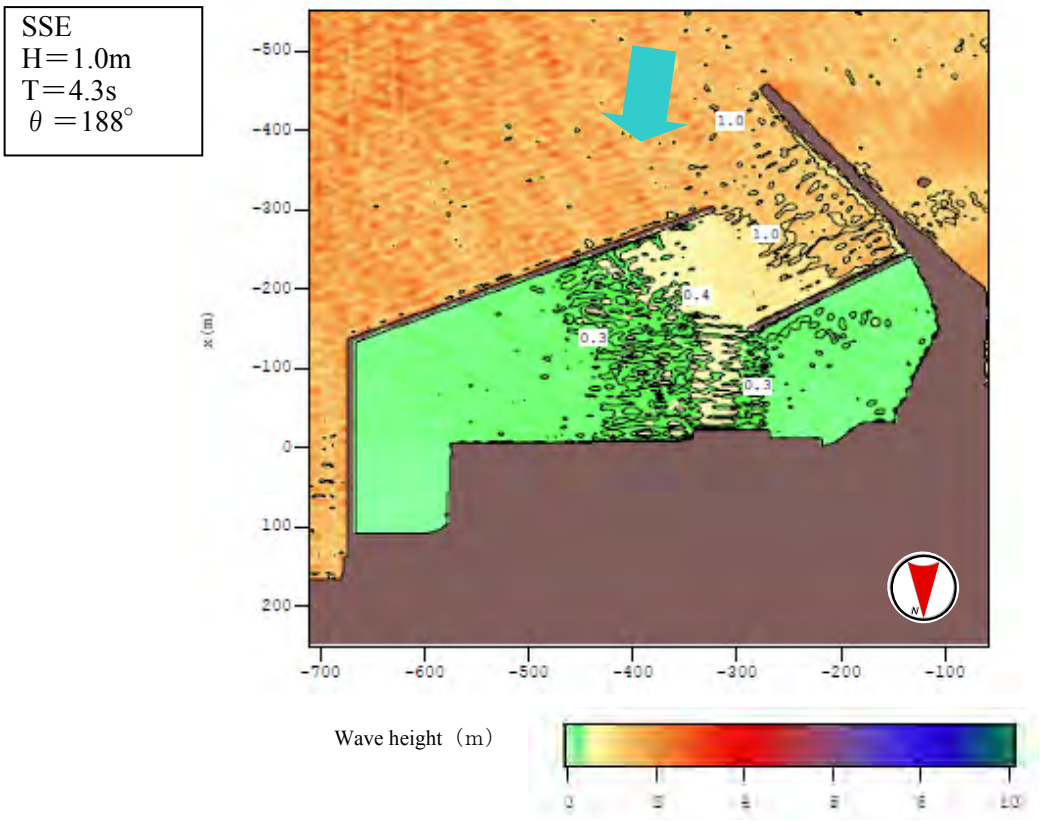


Fig. 13.8.5　Result of Calmness Analysis (for Annual Maximum Wave SSE)

When Inner Breakwater installed, calmness of Port basin becomes considerably good for fishing boat to berth and operation. It would be recommended to add inner breakwater in future.

(2) LFPC

Due to the increase in trading volume of fish catch and intensification of fish spoilage, the existing market hall will have to be reconstructed to avoid further damages. The new market hall will have an area of 4,000 m2 which is 50% larger than the existing facility at 1,900 m2. The space available for the expansion is at the waterfront area but is quite limited. For this reason, the new administration building will be constructed on top of the new market hall. The existing administration building will be demolished and the area will be used for the expansion of the market hall, construction of retail market and vehicle holding area.

(3) BFPC

Bislig FPC is a new development to cater for the rich fishing grounds along the eastern seaboard. Bislig Bay faces the Pacific Ocean where intrusion of big wave actions into the cove are prevalent to ensure the safe operations of the fish port particularly for small boats. There is therefore a need to provide a breakwater to shelter the fish port from wave actions all year round so it could be use not only as place of unloading of fish capture but also as a place of refuge in times of severe wave conditions. coming from Bay mouse to proposed Fish Port area is big enough for the small fishing boats. In order for fishing boats to operate safely, it is needed to prepare the Breakwater.

As stated in Chapter 2, the declining catch in commercial fisheries is exacerbated by another limitation besides overfishing in traditional fishing areas. This is the inability of the local commercial fishing fleet to fish in far-flung, deep sea areas within the Exclusive Economic Zone (EEZ) which are under-fished by Filipinos but actively poached on by foreigners. The construction of a regional fish port in Bislig, Surigao del Sur as base of operation of commercial fish vessels to tap the rich fishing grounds of the eastern seaboard because of its proximity is therefore expected to augment marine fish production which as stated earlier has consistently been declining over the years.

As part of the major port facilities for Bislig FPC to induce fisher folks to locate in Bislig, the port will be provided with Pier, Slipway, landing facility, Lay-by wharf, Breakwater and ice plant, a basic facility badly needed for postharvest handling operations. In order to attain the required depth to allow the safe passage of fishing boats particularly commercial fishing vessels, there is also a need to dredge and deepen the channel and basin areas. The existing RoRo PPA Pier adjacent to the proposed site has been abandoned. Initially the use of the PPA was considered to reduce on cost. However, as shown on the layout plan, the pier is not provided with adequate backup space badly needed for the development of support facilities including ice making plant, market hall among other associated facilities to spur fishing activities and trade. Moreover, the 2 alternatives of mathematical model wave studies applying time-dependent mild slope equation for random waves based on a 30-year return period that were conducted as can be seen hereunder, clearly shows that wave refractions from the tip of the proposed breakwater for both cases still would adversely affect wave calmness at the PPA pier while the proposed location for the construction of a pier and fish landing facilities are adequately sheltered. Considering the rich fishing grounds of the eastern seaboard, the potential of Bislig FPC as base of operation of fishing vessels because of its proximity is bright. For this reason, wide backup space is needed to induce fish canning factories as well as private fish processors to locate to Bislig.

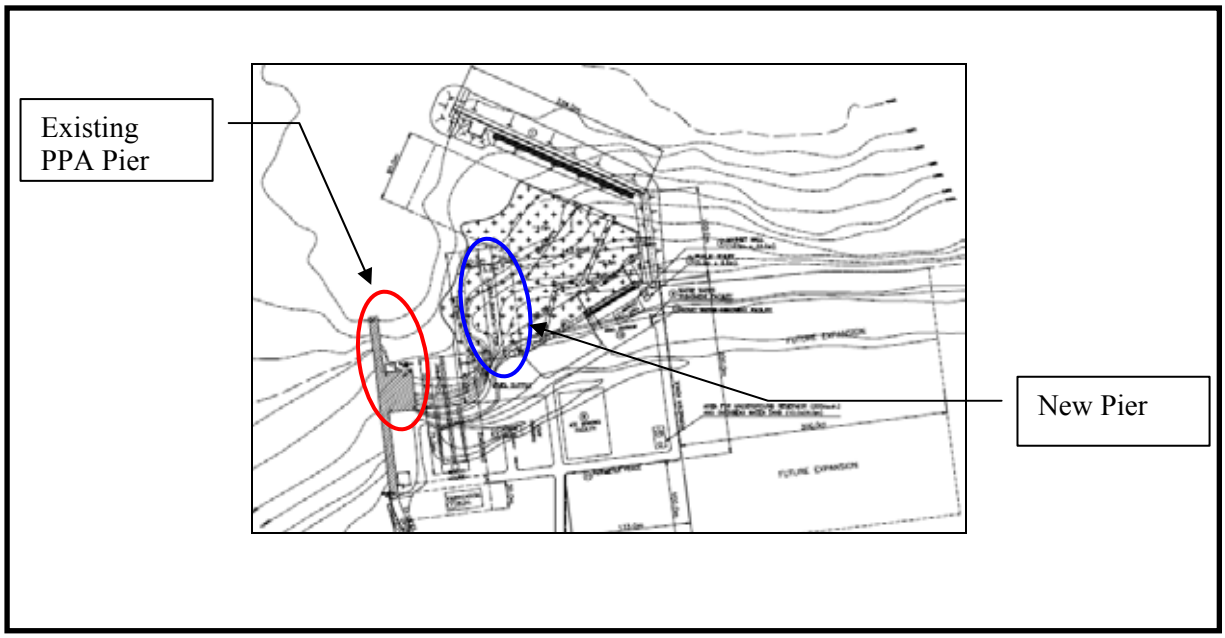


Fig. 13.8.6 Plan of Bislig Fish Port

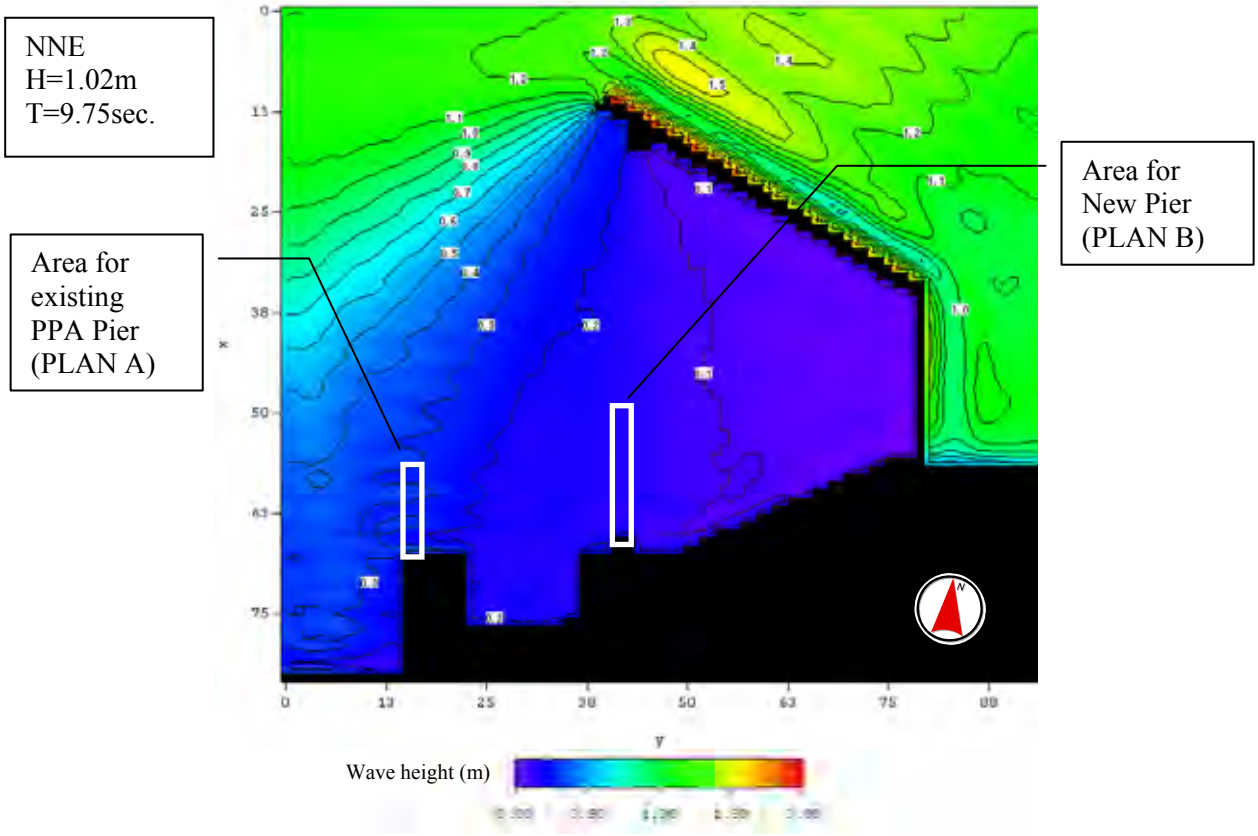


Fig. 13.8.7 Result of Calmness Analysis (for Annual Maximum Wave)

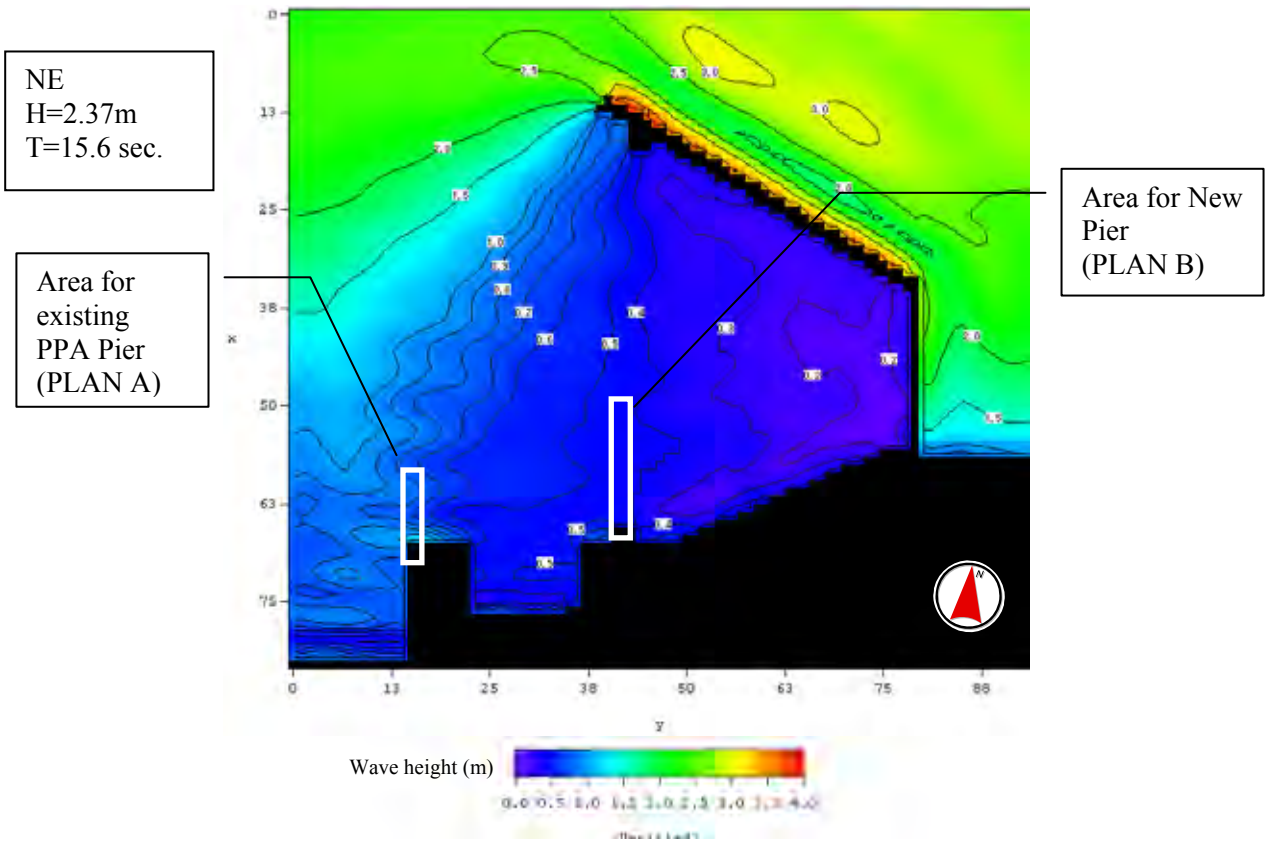


Fig. 13.8.8 Result of Calmness Analysis (for Return Period 30 Years Wave)

Plan A

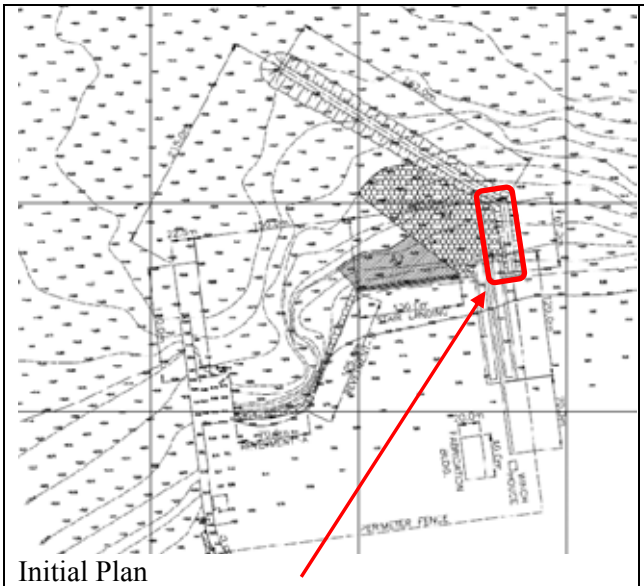
Should the use of the PPA Pier be considered, the structure has to be widened to 9m and the length extended to 70m to ensure safe berthing and mooring. However, in order to achieved the desired wave calmness along the berthing areas for the safe operations of fishing boats/vessels, the breakwater has to be elongated which would adversely affect the financial viability of the Project.

Plan B

Assuming that PPA will not be used and a pier will be constructed in a new location as shown on the layout plan, the facility will be well sheltered from wave actions and the desired calmness to attain 100% berth availability year round can be secured.

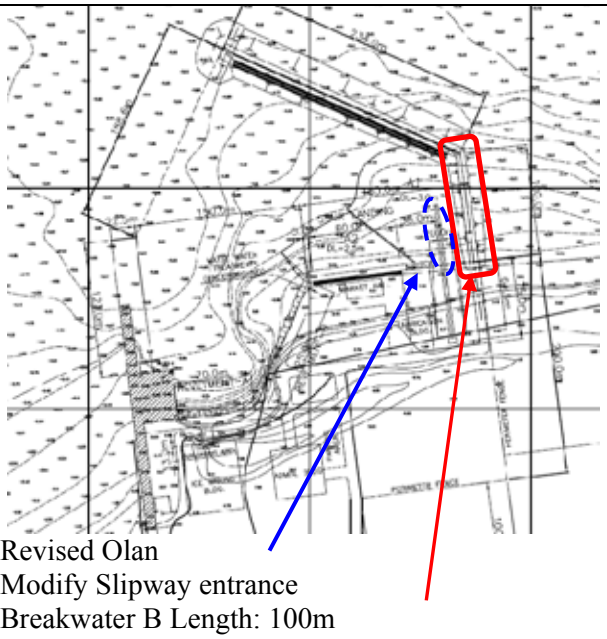
Based on the foregoing comparisons, Plan B is preferable over Plan A, considering the high construction cost of the Breakwater and that the backup area for Plan A is inadequate.

In addition to the above layout plan, preliminary layout plans as shown hereunder were prepared.



Initial Plan
Breakwater B Length: 50m

Alternative Plan
Provide Lay-by wharf behind Breakwater A



Revised Olan
Modify Slipway entrance
Breakwater B Length: 100m

Final Plan showing
Location of New Pier, Slipway, Dredging areas, etc

(4) Balatan

The primary consideration for Balatan Fish Port is the adverse wave attacks from the Sibuyan sea. During the survey, it was reported that fish boats could not moor alongside the existing causeway for 3 months to unload their fish hauls because of rough waves. For this reason, the construction of a breakwater to shelter the port not only from wave intrusion but also from littoral drifts to avoid expensive maintenance dredging cost was conceived.

Plan A

Plan A utilizes the existing Causeway to be extended as a breakwater as shown in the layout plans to shelter the port from wave attacks and deposits of littoral drifts. The port basin is well sheltered meriting for favorable calmness, ensuring safety of fish unloading operations and as place of refuge in times of rough sea conditions.

Plan B

Plan B is same as Plan A, except that an unloading of the fish catch, preparation and lay-by quay wall will be constructed behind the breakwater to shelter the berthing facility from wave intrusions to ensure safe fish unloading operations of fish hauls at all times. Sand drift was conservatively considered than Plan-A due to the existing river located at the right side of the port as primary source of silt/sand discharge into the sea. For this reason, the contour line is parallel based on the result of Bathymetric survey to determine the alignment of the breakwater. It is considered that the positioning of the breakwater will in no way affect the siltation mechanism that would adversely affect the port. Because the length of the breakwater for Plan B is longer than Plan A, construction of Plan B would be cheaper and economical.

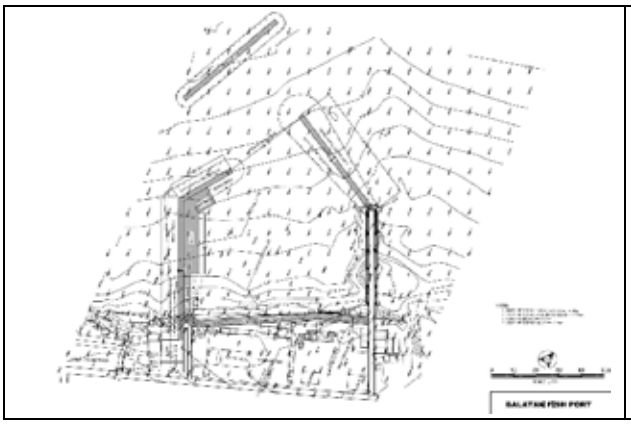


Fig. 13.8.9 Plan-A

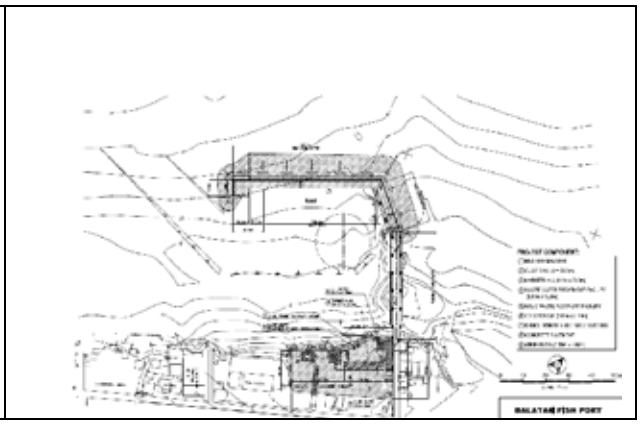


Fig. 13.8.10 Plan-B

14. Environmental and Social Considerations

The Environment Impact Assessment (EIA) process for the identified fish ports involved the predicting and evaluating the likely impacts of the project (including cumulative impacts) on the environment during construction, commissioning, and operation abandonment. It also includes designing appropriate preventive, mitigating and enhancement measures addressing these consequences to protect the environment and the community's welfare. (DENR-EMB DAO 2003-30) As required, this was done by Regional DENR-EMB Offices were the identified ports were located. The Environment and Social Consideration Team with the Survey Team presented and discussed with the DENR-EMB Regional Officials the proposed project and design. Based on the presentation and discussion with reference to the DAO-2003-30, the DENR-EMB Officials recommended what type of Environment Impact Assessment was to be done.

For the EIA Environment Performance Report and Management Plan (EPRMP) considered is the Project Description; the description of the existing project and the proposed expansion or changes; and the Environment Management Plan (EMP) and the Environment Monitoring Plan (EMoP) on the most significant impacts and measures.

For the EIA Initial Environment Examination Report (IEER) Brief Project Description Summary of Baseline Characterization Summary Impact Assessment, Environmental Management and Monitoring Plan Summary of Environmental Monitoring Plan.

For the EIA Initial Environment Examination Checklist (IEEC) Project Description; description of the existing project vis-à-vis the proposed expansion or changes summary of the EMP and EMoP on the most significant impacts and key measures.

In conclusion, the PFDA EIA study generally revealed that the Fish Port Project has minimal negative impacts on the Natural Environment, instead a high positive Socio-economic impact will occur, enhancing the regional and municipal fishing industry. This will consequently improve the socio-economic environment of the region and particularly the living conditions of the fisher folks in the municipalities. However, due diligence should be practiced by the Philippine Fish Port Authority in coordination with the Local Governments for the sustainability of structural (Operations and Maintenance of port structures) and particularly the non-structural measures (Information, Education and Communication, and stakeholders participation) in concurrence with the laws and regulations of the Government interagency that have stakes in its operation. Thus, the strengthening of institutional support and capability building becomes an imperative element to further the sustainability of the regional fish ports.

A. ENVIRONMENT PERFORMANCE REPORT AND MANAGEMENT PLAN (EPRMP) The documentation of the actual cumulative environmental impacts and effectiveness of current measures for single projects that already operating but without an ECC. (DENR-EMB DAO 2003-30)

1. Iloilo City, Iloilo

Iloilo Fish Port Complex (IFPC) was constructed in 1982-1985 as a regional fish port. Major facilities in IFPC include the breakwater, landing quay, slipway, refrigeration building, market hall, municipal market shed, cold storage administration building, water supply system, carpentry shop and foundry shop, RO water treatment plant.

Brief description of the existing project vis-à-vis the proposed expansion or changes		**Significant Impacts:**	**Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures**
Existing Facility	Modifications/Construction	● Disruption of port operations during construction ● Silt mobilization/transport ● Increase water turbidity ● Increased traffic inside port ● Increase danger to life/safety during heavy construction work ● Increased wastewater and solid waste generation ● Increase GHG emissions ● Release of NH3/FREON refrigerant to atmosphere ● Generation of old/obsolete refrigeration Equipment and materials ● Employment generation	**EMP:** ● Schedule construction activities (land-based and marine-based works) with least disturbance of operations ● Use of silt curtain during dredging; Use cutter-suction dredger ● Assign Port Traffic & Safety officer to manage land and sea traffic in harbor ● Strict implementation and observance of govt regulations for construction safety and sanitation ● Operation of WWTP for sewage and processing wastewater ● Operation of MRF, solid waste segregation and coordinate with LGU for regular solid waste collection ● Regular coordination with LGU for traffic ● Recover NH3/FREON and store/dispose strictly following DENR-approved methods/guidelines; Recondition/retrofit decommissioned equipment/re-use materials; Use of non-CFC refrigerant 404A and 507 ● Maximum use solar power & conservation of electric energy **Monitoring Plan:** ● Assign PCO during construction and operation ● Submit quarterly SMR; Weekly monitoring of MRF; Comprehensive energy audit annually ● Monitoring employment stats -monthly during construction and operation ● Conduct scheduled and surprise inspection for compliance with safety/sanitary rules and compliance with construction specs ● Inventory of recovered refrigerant and decommissioned refrigeration equipment/materials
Breakwater	Additional 350m rock-mound type		
Water Basin	Dredging 150 million cu.m		
Sloped Landing	Convert to stair type (Partly)		
Slipway & Mooring Dolphin	Repair and rehabilitation		
Road Parking	Rehabilitation		
Revetment	Rehabilitation 200-m long		
Market hall	Reconstruct		
Refr. Bldg.	Rehabilitation of roof		
Refr. Machineries	Repair/replace contact & blast freezers Rehabilitation of ice storage Add ice making		
Fabrication shop	Scale down size		
Fish Processing Facility	Additional 4 units HACCP facility		
Others	Install solar power generator		
	Waste Water Treatment Plant		
	Water supply		
	MRF for solid waste		

2. Sual, Pangasinan

Sual Fish Port Complex (SFPC)-constructed from 1982-1990; started operations in 1992. Major port facilities: slipway, winch machine, market hall, multi-purpose pier, banca landing, refrigeration building, cold storage, ice making facilities, fabrication shop, carpentry shop and winch house.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures
Existing Facility	Modifications/Construction	● Disruption of port operations during construction ● Pollution of seawater ● Solid waste generation ● Generation of construction debris ● Increase GHG emission ● Employment generation	**EMP:** ● Schedule construction activities with least disturbance of operations ● Provide WWTP for sewage and processing wastewater ● Provide MRF, solid waste segregation and coordinate with LGU for regular solid waste collection ● Conserve electric energy; Use non-CFC refrigerant for ice making/HACCP facility **Monitoring Plan:** ● Assign PCO during construction and operation; Weekly monitor MRF Operation ● Submit quarterly SMR; Comprehensive energy audit annually ● Monitoring employment stats -monthly during construction and operation
MP Pier	Renovate of existing pier & 30m extension		
Revetment	Repair		
Perimeter Fence	Change to CHB fence		
Slipway 1 unit	Rehab 1 and add 1 unit		
Pavement	Overlay all pavements		
Refr. Bldg	Replace 2,400 sqm roofing		
Refr. Machineries	Expand ice making to 12tpd Rehab. ice storage Add brine/blast freezer Rehab Cold storage		
Fabrication shop	Demolish/Rehab Fab. Bldg.		
Fndry/Carpty shop	Demolish		
Others	Install HACCP Facility		
	Waste Water Treatment Plant		
	MRF for Solid Waste		
	Deep well		
	Food storage		

3. Dalahican,Lucena City

Lucena Fish Port Complex already exists before 1982. It was issued a Certificate of Non-Coverage by the EMB-Region 4 CALABARZON. It is considered as the fish landing center in the province and it provides post-harvest infrastructure support to the fishing industry in the area.

The Philippine Government and the JICA plans to rehabilitate and expand the existing fishing port to better serve the fishing industry and improve the livelihood of local residents.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures
Existing Facility	Modifications/Construction	● Disruption of port operations during construction ● Increased wastewater and solid waste generation ● Increase road traffic inside port ● Increased water turbidity ● Increased danger to life and safety during construction ● Employment generation ● Increase GHG generation ● Release of NH3-refrigerant to atmosphere	**EMP:** ● Schedule construction activities with least disturbance of operations ● Assign Port Traffic & Safety officer to manage land and sea traffic in harbor ● Strict implementation and observance of govt regulations for construction safety and sanitation ● Operation of WWTP for sewage and processing wastewater ● Operation of MRF, solid waste segregation and coordinate with LGU for regular solid waste collection ● Regular coordination with LGU for traffic ● Conservation of electricity and use of non-CFC refrigerant 404-A and 507 for new contact freezers and air blast C.S ● Recover NH3 and store/dispose strictly following DENR-approved methods/guidelines ● Assign PCO during construction and operation **Monitoring Plan:** ● Submit quarterly SMR; Weekly monitoring of MRF; Comprehensive energy audit annually ● Monitoring employment stats -monthly during construction and operation ● Conduct scheduled and surprise inspection for compliance with safety/sanitary rules and compliance with construction specs ● Inventory of recovered refrigerant and decommissioned refrigeration equipment/materials
Multi-purpose Pier	Expansion of existing pier by 35m Repair of fender system		
Banca Landing Quay			
Slipway			
Breakwater	Rehab of damaged breakwater		
Administration Bldg.	Demolish of existing Admin building New building on new Market Hall		
Warehouse			
Market Hall	Reconst/expansion of market hall (3,023 m^2) New Retail Market		
Roads/Parking Areas	Rehab of roads/yards and parking area		
Refr Building	Rehab of building roofing (2,300 m^2)		
Refr Machineries	Install cold storage (4 rooms) Install new cold storage Install 1 T/day air blast freezer		
Foundry Shop			
Fabrication Shop			
Water Supply	Construction of new deep well Installation of new water reservoir Repair of elevated water tank		
Sea Water Pump House			
Carpentry Shop			
Generator (2 sets)			
Others	Waste Water Treatment Plant MRF for solid waste		

4.Camaligan Camarines Sur

The Camaligan Fish Port Complex (CFPC) is the 4th major fish port project that was completed by the Government under the Nationwide Fishing Port Package I. The port has been operational since October 1991. The complex is located at the banks of the Bicol River in Barangay Dugcal, Camarines Sur. It is strategically located about 1.5 km from the Poblacion and about 4 km from Naga City. The complex is within 1.6 hectares of reclaimed area. The main operations carried out in the port complex are loading and unloading, processing of marine products, and storage.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures
Existing Facility	Modifications/Construction	• Disruption of port operations during construction • Increased wastewater and solid waste generation • Increased danger to life and safety during construction • Employment generation • Increase GHG generation • Release of NH3 & FREON refrigerant	**EMP:** • Schedule construction activities with least disturbance of operations • Assign Port Traffic & Safety officer to manage land and sea traffic in harbor • Strict implementation and observance of govt regulations for construction safety and sanitation • Operate WWTP for sewage and fish processing wastewater • Operate MRF, solid waste segregation and coordinate with LGU for regular solid waste collection • Conserve electrical energy consumption • Recover NH3/FREON and store/dispose strictly following DENR-approved methods/guidelines; New ice making and cold storage system will use non-CFC refrigerant 404A and 507 **Monitoring Plan:** • Assign PCO during construction and operation • Submit quarterly SMR; Weekly monitoring of MRF; Comprehensive energy audit annually • Monitoring employment stats -monthly during construction and operation • Conduct scheduled and surprise inspection for compliance with safety/sanitary rules and compliance with construction specs • Inventory of recovered NH3/FREON refrigerant and decommissioned refrigeration equipment/materials
Wharf			
Market Hall			
Administration Building			
Land Area	Additional land fill		
Revetment	New revetment for additional land fill		
Perimeter Fence	Demolish and newly construction		
Fish Processing Facility	Add 4 units HACCP		
Refr Building			
Refr Machineries	Add block ice making system (15 tons/day)		
	Independent cooling system for ice making		
	Add ice making system		
	Add air-blast freezing system (1 T/d)		
	Piping lines modification		
Others	Waste Water Treatment Plant		
	MRF for solid waste		

5. Davao City, Davao del Sur

The project involves rehabilitation of existing Davao Fish Port Complex (DFPC). It was constructed on June 1993 to July 1995; it started operations in May 1995 when local commercial fishing vessel started unloading their catch and do fish trading activities at the landing site. Foreign transshipment operations took place on July 1995 when foreign fishing vessel unloaded, processed and packed its fish cargo at DFPC and eventually exported their products to market abroad. The major port facilities are berthing and landing quays; market hall with stalls/bays at 100 sq.m per stall/bay to be utilized as processing area; block ice and cold storage facilities; water and power supply systems; fuel depot facilities; refrigerated vans and hauling equipment; office space and guarded parking areas.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures
Existing Facility	Modifications/Construction	● Disruption of port operations during construction ● Increase water turbidity ● Increased traffic inside port ● Increase danger to life and safety due to heavy construction work ● Increased wastewater and solid waste generation ● Additional GHG emissions ● Employment generation	**EMP:** ● Schedule construction activities with least disturbance of operations ● Assign port traffic & safety officer to manage land and sea traffic in harbor ● Strict implementation and observance of govt regulations for construction safety and sanitation ● Provide WWTP for sewage and process wastewater ● Provision of MRF; solid waste segregation and coordinate with LGU for regular solid waste collection ● Regular coordination with LGU for land traffic ● Conserve electric energy use; Use of non-CFC refrigerant 404-A and 507 for additional ice making & cold storage system **Monitoring Plan**: ● Submit quarterly SMR ● Weekly monitoring of MRF; Comprehensive energy audit annually ● Monitoring employment stats -monthly during construction and operation ● Conduct scheduled and surprise inspection for compliance with safety/sanitary rules and compliance with construction specs
Landing Quay	Extension of landing facility		
Breakwater			
Revetment	Convert to Quay wall 60m		
Pavement			
Landscaping	Modify road and parking yard for fish processing area		
Admin bldg			
Market Hall	Additional market hall		
Refr. Bldg			
Refr. Machineries	Add ice making Add cold storage (air blast freezing)		
Water Supply	Deep well		
Waste water Treatment	Expansion of Waste Water Treatment Plant		
Others	MRF for solid wastes Add 4 units HACCP		

6. Concepcion, Iloilo

Construction of the Concepcion Municipal Fish Port was done from June 1998 to April 1999. Existing facilities include a 10-m long causeway, stair landing for fishing boats, revetment, market hall and the local service utility companies provide ice storage facilities Water and power supply.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures
Existing Facility	Modifications/Construction	● Increased risk to safety and health during construction ● Disruption of port and other operations during construction ● Increase wastewater and solid waste pollution of seawater ● Increase in boat landings due to improved port facilities; Employment generation	**EMP:** ● Strict implementation of government rules on construction manpower safety and sanitation ● Schedule construction activities with least disturbance of operations ● New WWTP will treat sewage and wastewater from fish market area; Daily collection of solid wastes by LGU solid waste mgmt office ● LGU's PCO will be assigned to monitor compliance to sanitary regulations **Monitoring Plan:** ● PCO will submit quarterly SMR report on environmental management in port premises ● Daily monitoring of wastewater and solid waste generation ● Monthly monitoring of employment statistics & port revenues to assess socio-economic impacts during construction and operation
Rock Causeway	Extension (120m)		
Landing Facility	Construct 50m stair		
Market Hall	Reconstruction		
Others	Waste Water Treatment Plant MRF for solid waste Water connection		

7. Zone IV, Atimonan, Quezon

Atimonan Municipal Fish Port is an existing port covered by an Environmental Compliance Certificate (ECC) issued by the EMB-Region 4-CALABARZON on 28 October 2004. The Philippine Government and the JICA plans to rehabilitate some components of the fish port to better serve the fishing industry and improve the livelihood of local residents.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures
Existing Facility	Modifications/Construction	● Increased solid and wastewater pollution of seawater ● Increased risk to safety and health during construction ● Disruption of port operations during construction ● Increase in employment generation and in boat calls due to improved port facilities	**EMP:** ● Strict implementation of government regulations on construction safety and sanitation ● Schedule construction activities with minimum disturbance of operations ● Operation of WWTP will treat sewage and wastewater from market area; Daily collection and disposal of solid wastes by LGU solid waste mgmt office. **Monitoring Plan**: ● Quarterly monitoring via SMR of wastewater quality and solid waste management ● Daily monitoring of wastewater and solid waste generation ● Monthly monitoring of employment stats and port income to assess socio-economic impacts during construction and operation
Fish Landing	Repair of Stair Landing		
Revetment	Repair		
Market Hall	Reconstruction		
Brokers' Offices			
Admin Building			
Parking Area			
Others	Waste Water Treatment Plant MRF for solid waste		

B. INITIAL ENVIRONMENT EXAMINATION REPORT (IEER) The study of the significant impacts of a project on the environment. It includes and Environmental Management Plan. (DENR-EMB DAO 2003-30)

8.Subic, Zambales

Subic Municipal Fish Port is situated on reclaimed land. Facilities: boat landing facility, fish market and ice storage. SMFP located on 7-ha reclamation (volcanic ash) adjacent to Tamayoc River and Subic Bay. Young mangrove stands are present in Tamayoc R. There are 18 food stalls lessees in the port operating 12/24 hours.

Brief description of the existing project vis-à-vis the proposed expansion or changes		**Significant Impacts:**	**Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures**
Existing Facilities	Modifications/Construction	● Disruption of port operations during construction ● Increased wastewater & solid waste generation ● Increased risk to safety and health during construction ● Increase in LGU revenue collection ● Incremental employment generation	**EMP:** ● Strictly Implement construction work safety and sanitary practices ● Operate WWTP for water quality mgmt ● Proper waste segregation at port premises; Daily solid waste collection by LGU environmental mgmt office ● PCO of LGU to be assigned to monitor solid waste and wastewater management **Monitoring Plan**: ● Quarterly monitoring via SMR report on wastewater quality and solid waste management ● Socio-economic impacts through monthly monitoring employment stats will be done during construction and operation
Market hall	Demolish & construction of Market hall Add retail market		
Pavement	Rehab of pavement		
Access road	Paving of access road		
Water supply	New water connection		
Others	Waste Water Treatment Plant MRF for solid waste		

9.Bislig City Surigao del Sur

The newly constructed RORO port in Brgy Tabon, Bislig was left idle after construction for about a year now due to shallow depth at the jetty site. The site was seen to be best for fish port development. The existing facilities present are landing quay, slipway, administration building, lightings, water supply system, and sewer system.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures
Existing Facility	Modifications/Construction	**Significant Impacts:** ● Increase seawater turbidity and increase sedimentation due to silt mobilization/transport ● Generation of construction debris ● Increase in GHG emissions ● Heightened danger to life and safety due to heavy construction work ● Increased wastewater and solid waste generation ● Increased fishing boat calls and fish landings ● Generation of new LGU revenue collections and employment opportunities	**EMP:** ● Use of silt curtain and cutter/suction dredger during dredging phase ● Strict implementation and observance of construction safety and sanitation regulations ● Operate WWTP for treatment of wastewater and sewage; Provide MRF with regular solid waste collection/disposal by LGU Environment Mgmt Office ● Assignment/designation of PCO for Bislig Fish Port Management Office ● Coordinate with LGU for daily solid waste disposal ● Conservation of electric energy **Monitoring Plan**: ● PCO to submit quarterly SMR for Port's wastewater quality and solid waste management ● Comprehensive energy audit annually ● Daily monitoring of wastewater and solid waste generation ● Monthly monitoring of employment stats & port revenues
PPA Ferry Terminal with • Pier • RORO ramp • Office • Land area with Pavement • Lighting system			
Others	Pier		
	Breakwater		
	Dredging		
	Landing facility		
	Slipway		
	Revetment		
	Access Road		
	Landscaping		
	Fence		
	Market hall		
	Ice making plant		
	Ice Storage		
	Administration building		
	Slipway & Fabrication shop		
	Water supply system		
	Power supply connection		
	Waste Water Treatment Plant		
	MRF for solid waste		
	Fuel supply system		

10.Sta. Cruz Davao del Sur

The proposed Sta. Cruz fish port is located in Bogy. Bato wherein an existing 280-meter causeway is available, which was purposefully built by PNOC just too easily transport its geothermal equipment to the southern part of Mindanao. Other than the existing causeway and access road, no other facility is present.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures
Existing Facility	Modifications/Construction	● Major disruption of access to and operation of port during construction ● Increased seawater turbidity and increase siltation due to silt mobilization and transport during dredging and reclamation ● Increase risk to health and safety during construction ● Increased solid waste generation and wastewater discharges ● More efficient fishing boat cargo loading and unloading during operations ● Increase in LGU revenue and employment generation	**EMP:** ● Use of silt curtain and cutter-suction type dredger ● Provide temporary alternate fishing boat landing facility during construction ● Strict implementation and observance of rules on construction safety and sanitation ● Solid waste segregation and regular collection of garbage during operation ● Operation of WWTP and new water supply system ● PCO of LGU to be assigned to monitor solid waste and wastewater management **Monitoring Plans:** ● Quarterly monitoring via SMR report by PCO on wastewater quality and solid waste management ● Daily monitoring of solid waste and wastewater generation ● Monthly monitoring of revenue collection and employment stats will be done during construction and operation
Causeway	Rehab/improve causeway		
Access road	Rehab/Pave of access road		
Water basin	Dredging		
Others	Stair Landing		
	Reclamation (895 sqm)		
	Revetment		
	Ice storage		
	Market hall		
	Administration Bldg.		
	Waste Water Treatment Plant		
	MRF for solid waste		
	Water supply system		
	Power supply system		

11.Sabang, Calabanga ,Camarines Sur

The proposed Calabanga Municipal Fish Port will serve the coastal barangays of the Municipality of Calabanga. It is situated on the southern section of Calabanga, facing the San Miguel Bay. Half of the existing natural breakwater is heavily damaged. Most of the fishing activities are municipal in scale with an annual fish unloading volume of about 5,660MT comprising largely of anchovy and sardines.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures
Existing Facility	Modifications/Construction	● Disruption of port operation during construction ● Increase risk to health and safety during construction ● Increased solid waste generation and wastewater discharges ● More efficient unloading and loading of fishing boats during operations. ● Increase in LGU revenue and employment generation	**EMP:** ● Schedule construction activities with least disturbance to port operations ● Strict implementation of government regulations on construction safety and sanitation ● Operation of WWTP will treat sewage and wastewater from market area ● Operation of MRF and daily collection of segregated solid wastes by LGU's solid waste mgmt office **Monitoring Plan**: ● Monitoring via quarterly SMR report by PCO on wastewater quality and solid waste management ● Daily monitoring of solid waste and wastewater generation ● Monthly monitoring of revenue collection and employment stats will be done during construction and operation
Breakwater	Rehab of damaged portion		
Others	Reclamation		
	Revetment		
	Stair Landing		
	Ice storage		
	Market hall (500 m^2)		
	Waste Water Treatment Plant		
	MRF for solid waste		
	Water supply connection		
	Power supply connection		

12. Panabo City, Davao del Norte

The existing fish landing shed in Brgy. Cagangohan, Panabo City is proposed to be fishport center of Panabo due to its proximity to Panabo Mariculture Park wherein large number of fish cage/fish pen operators operates within twenty kilometers of the coast. Existing facilities include small market hall that serve as the Bagsakan Center, landing stairs, ice storage, water supply system, MRF, and storage vans for fish feeds.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures
Existing Facility	Modifications/construction	● Increased risk to safety and health during construction ● Disruption of operations during construction ● Increased wastewater and solid waste pollution of seawater ● Increase in boat calls due to improved facilities ● Increase LGU revenue and employment opportunity	**EMP**: ● Strict implementation/observance of government regulations on construction safety and sanitation ● Schedule construction activities with least disturbance of operations ● Operation of WWTP will treat sewage and wastewater from market area ● Daily collection and disposal of solid wastes by LGU solid waste mgmt office **Monitoring Plan**: ● Quarterly monitoring via SMR of wastewater quality and solid waste management ● Daily monitoring of wastewater and solid waste generation ● Monthly monitoring of employment stats and port revenue collections to assess socio-economic impacts of Panabo fish port
Market hall	New market hall		
Stair landing			
Water supply	Add new water supply		
Power supply			
Access road			
Ice storage	Add new ice storage		
Toilet facilities			
Others	Waste Water Treatment Plant		
	MRF for solid waste		
	Administration bldg.		

13. Balatan, Camarines Sur

The proposed Balatan Municipal Fish Port is located in Bgy Sarimag along Ragay Gulf. Fishing activities in Balatan is characterized with numerous fishing boats, both commercial and municipal in scale. The annual fish production is estimated at 2,815 MT. Balatan Municipal Port has existing causeway and damaged revetments. It is no longer operational but being used by fisherman for their fish landing activities.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key mitigation measures
Existing Facility	Construction/Modifications	● Silt mobilization/transport ● Increase water turbidity ● Increased risk to safety and health during construction ● Disruption of buy-and-sell operations near site during construction ● Increased wastewater and solid waste pollution of seawater ● Increase in boat calls and fish landings due to improved facilities ● Increase in LGU income and local employment	**EMP:** ● Use of silt curtain and cutter/suction dredger during dredging phase ● Strict implementation and observance of rules on construction safety and sanitation ● Solid waste segregation and daily collection of garbage during operation ● Operation of WWTP and new water supply system ● Designate PCO/Environment Officer of LGU to monitor solid waste and wastewater management ● Designate temporary area for displaced informal buy and sell shops currently operating and if possible, allocate leasable area for these stakeholders in final port plan **Monitoring Plans:** ● Quarterly monitoring via SMR report by PCO on wastewater quality and solid waste management in Balatan fish port ● Daily monitoring of solid waste and wastewater generation ● Monthly monitoring of revenue collection and employment stats will be done during construction and operation
Causeway	Repair of stair landing (60 m)		
Others	Breakwater (193m)		
	Quay wall (105m)		
	Dredging		
	Administration bldg.		
	Ice storage		
	Market hall		
	Waste Water Treatment Plant		
	MRF for solid waste		
	Water supply connection		
	Power supply connection		
	Pavement		

C. INITIAL ENVIRONMENT EXAMINATION CHECK LIST (IEEC) Simplified checklist version of an IEE report to be filled up by a proponent to identify and assess a projects impact and mitigation to address such impacts. (DENR-EMB DAO 2003-30)

14. Mati City,Davao Oriental

For Mati City, the proposed fish port is planned to be located at former harbor area of DATICOR compound. The site was abandoned by the company and remains idle for some time. No remaining structure is present at proposed site except for post debris of old pier.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key measures
Existing Facility	Construction/Modifications	● Generation of construction debris ● Increased risk to safety and health during construction ● Wastewater and solid waste pollution of seawater during operation ● Generation of additional LGU income, more fish landings and employment opportunity	**EMP:** ● Coordinate with LGU's for collection and disposal of construction debris (vegetation and recovered timber/wood) ● Strict implementation and observance of construction safety and sanitation rules ● Operate WWTP to treat organic waste discharges from fish market area and sewage system ● Proper solid waste segregation and regular collection/disposal during construction & operation ● Assign LGU's PCO or Environmental Officer to the Port **Monitoring Plan:** ● Quarterly monitoring via SMR by PCO on wastewater quality and solid waste management in fish port ● Daily monitoring of solid waste and wastewater generation during operation ● Monthly monitoring of revenue collection and employment stats will be done during construction and operation
None	Land fill Revetment Stair landing Administration building Ice storage Market hall Waste Water Treatment Plant MRF for solid waste Water supply system Pavement		

15.Dagupan, Pangasinan

The existing fish port serves as the fish landing and marketing center of Pangasinan. At new site, no facilities exist except for crude landing facility. Project scope: reclamation, revetment, stair landing, market hall, WWTP, H2O supply, and pavement.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key measures
Existing Facility	Construction/Modification	● Siltation from reclamation ● Increased wastewater and solid waste generation ● Increased risk to safety and health during construction ● Constriction of navigation lane ● Increased fishing boat landings, LGU revenue collection and employment	**EMP** ● Construct bulkhead/retaining wall prior to filling reclamation area ● Consultation with affected fish pen & boat operators and LGU intervention; Construct bulkhead/retaining wall before earhtfill on reclamation ● Install navigation aids and boat traffic control system ● Implementation/observance of construction safety and sanitation during construction ● Operation of WWT facility ● Proper solid waste segregation and collection during constrn & operation ● Assignment of LGU PCO/Envi. Officer to monitor solid and wastewater discharges **Monitoring Plan**: ● Quarterly marine water quality and solid waste monitoring via SMR ● Monitoring of monthly revenue collection and employment statistics during construction/operation ● Daily monitoring of solid waste and wastewater generation during operation
None	Reclamation Revetment Stair landing Market hall Administration building Waste Water Treatment Plant MRF for solid waste Water supply connection Pavement		

16.San Jose Buenavista, Antique

The existing San Jose port functions as an offshore fish landing facility for the supply of large pelagic in Panay Island. Existing facilities: Causeway, revetment; Ice storage; Fish market; Fish landing; power and water supply;

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key measures
Existing Facility	Modification/Construction	● Disruption of port operations during construction ● Siltation due to earth filling activities ● Increase risk to health and safety ● Increased wastewater and solid waste generation ● Increase fishing boat landings, LGU revenue collection and employment	**EMP:** ● Use of soil barrier to block escape of sediment during earth filling ● Strict implementation and observance of rules on work safety and sanitation ● Waste segregation and regular collection of solid waste during construction & operation ● Operation of WWT facility ● Assignment of LGU's PCO/Environmental Officer to port **Monitoring Plan:** ● Quarterly monitoring of solid waste marine water quality management via SMR ● Daily monitoring of wastewater and solid waste generation ● Daily monitoring of earth filling activities during construction ● Monitoring of monthly port revenue generation and employment statistics
Causeway	Extension – 120m		
Fish landing	Extension -60m		
Land area	Add land fill		
Revetment	Extension – 60m		
Fish market	Reconstruction of market hall		
Power &water supply	Upgrading		
Others	Administration building		
	Ice storage		
	Waste Water Treatment Plant		
	MRF for solid waste		

17.Dumangas, Iloilo

Aquaculture fishery is more predominant than marine fishery in Damages. There are eight fish landing sites in Dumangas, with four as main landing sites and two are used for milkfish unloading. The stair-type boat landing facility is the only facility at the proposed site in Barangay Dacutan.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key measures
Existing Facility	Modification/Construction	● Increase in solid waste and wastewater generation ● Increase risk to health and safety ● Increase in employment and revenue collection of LGU ● Increase fishing boat landings	**EMP** ● Sustained solid waste collection/disposal and operation of WWT facility ● Waste segregation and regular collection of solid waste during construction & operation ● Assign LGU's PCO/Environmental Officer to the port ● Implementation and observance of government regulation on worker's safety and sanitation **Monitoring Plan:** ● Quarterly monitoring river water quality and solid waste mgmt via SMR ● Daily monitoring of solid waste and wastewater generation ● Monitoring of monthly port revenues and employment statistics
Stair landing			
Others	Cold storage		
	Market hall		
	Administration building		
	Waste Water Treatment Plant		
	MRF for solid waste		
	Water supply connection		
	Power supply connection		

18.Calauag,Quezon

Calauag Municipal Fish Port is an existing port but mainly use for fish trading.The Philippine Government and the JICA plans to rehabilitate some components of the fish port to better serve the fishing industry and improve the livelihood of local residents.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key measures
Existing Facility	Modification/Construction	● Siltation due to reclamation ● Disruption of port/market operations ● Increase risk to health and safety ● Increased solid waste generation and waste water discharges ● Increase, fishing boat landings, employment and LGU revenue collection	**EMP:** ● Construct bulkhead/retaining wall prior to filling reclamation area ● Schedule construction activities with minimum disruption of operations ● Waste segregation and regular collection of solid waste during construction and operation ● Strictly implementation and observance of government rules on construction, safety and sanitation ● Operate wastewater treatment facility ● Assignment of LGU's PCO/Environmental Officer to port office **Monitoring Plans:** ● Quarterly monitoring of solid waste & marine water quality management via SMR ● Daily monitoring of wastewater and solid waste generation ● Daily monitoring of earth filling works during reclamation activities ● Monitoring of monthly port revenue generation and employment statistics
Causeway (120 m)			
Fish gear warehouse			
Ice storage & store			
Trading area			
Office building			
Others	Reclamation (2,700 m^2)		
	Revetment		
	Pavement		
	Market hall		
	Extension of drainage		
	Waste Water Treatment Plant		
	MRF for solid waste		
	Water supply connection		

19, Sta. Elena, Camarines Norte

The proposed Sta. Elena Municipal Fish Port in Pulong Guit Guit is mainly used by small-scale boats and is not a developed fishing port facility. Sta. Elena has the sixth highest number of coastal barangays and in terms of production, the municipality ranks second in the province with a total production posted at about 3,684.96 metric tons. Thus, developing a new port will greatly benefit the fisherman in the area.

rief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key measures
Existing Facility	Modification/Construction	● Silt mobilization/transport ● Increase water turbidity ● Increased risk to health and safety ● Solid waste and wastewater generation ● Generation of employment and additional LGU income ● Increase fishing boat landings	**EMP:** ● Use of silt curtain and cutter/suction dredger during dredging phase ● Implementation and strict observance of govt rules on construction safety and sanitation ● Waste segregation and regular collection of solid waste during construction & operation ● Assignment of LGU's PCO/Envi Officer to port office ● Operation of WWT Facility **Monitoring Plan:** ● Quarterly monitoring of solid waste & marine water quality management via SMR ● Daily monitoring of wastewater and solid waste generation in port premises ● Monitoring of monthly revenue generation and employment statistics of port
Causeway	Rehab/Extn of Causeway (33m)		
Revetment	Rehab. of Revetment (40 m)		
Stair Landing	Add Stair landing (20 m)		
Water Basin	Dredging		
Others	Pavement		
	Market hall		
	Ice storage		
	Waste Water Treatment Plant		
	MRF for Solid Waste		
	Water Supply connection		
	Access road		

20.Pasacao, Camarines Sur

The Pasacao Municipal Fish Port is an LGU-operated feeder port in Camarines Sur which is situated along the south coast facing Ragay Gulf. The port was completed in 2004 and is being used not only as a fish port but also as a passenger/cargo terminal. The port is adjacent to the municipal public market. The port has a reported annual fish unloading volume of 1,659 MT, with majority coming from the commercial fishery exclusive of the catch from purse-seine fishing.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key measures
Existing Facility	Construction/ Improvement	● Increase risk to health and safety ● Increase in solid waste and wastewater generation ● Increase in employment and LGU revenue collections ● Increase fishing boat landings	**EMP:** ● Implementation and strict observance of govt rules on construction safety and sanitation ● Waste segregation and regular collection of solid waste during construction & operation ● Assignment of LGU's PCO/Envi Officer to port office ● Operation of WWT Facility **Monitoring Plan:** ● Quarterly monitoring of solid waste & marine water quality management via SMR ● Daily monitoring of wastewater and solid waste generation in port premises ● Monitoring of monthly revenue generation and employment statistics of port
Pier			
Admin Bldg.			
Others	Market hall		
	Waste Water Treatment Plant		
	MRF for solid waste		
	Water supply connection		
	Power supply connection		

21. Oas, Albay

The proposed Oas Municipal Fish Port will benefit a number of commercial fishing boats comprising of ring-net and Danish seine. It was reported that the estimated annual fish catch in Oas is 610 MT. Oas has five (5) coastal barangays, namely Cagmanaba, Badian, Tapel, Nagas and Maramba. The proposed port will be located in Barangay Cagmanaba.

Brief description of the existing project vis-à-vis the proposed expansion or changes		Significant Impacts:	Brief summary of the EMP and EMoP on the most significant impacts and key measures
Existing Facility	Construction/ Improvement	● Risk to health and safety during construction ● Generation of employment and LGU revenues ● Solid wastes and wastewater generation ● Increase fishing boat landings	**EMP:** ● Strict implementation/observance of government rules on construction safety and sanitation ● Waste segregation and regular collection of solid waste during construction & operation ● Assignment of LGU's PCO/Environmental Officer to port office ● Operation of WWT Facility **Monitoring Plan:** ● Quarterly monitoring of solid waste & marine water quality management via SMR ● Daily monitoring of wastewater and solid waste generation in port premises ● Monitoring of monthly revenue generation and employment statistics of port
None	Market hall		
	Waste Water Treatment Plant		
	MRF for solid waste		
	Water supply connection		

15. Construction and Procurement Plan

The Construction and Procurement Plans were prepared based on the following premise:

(1) Natural conditions for each site, situation of procurement activities, construction capacity of local contractors and environmental concerns.

(2) Construction schedule was considered so as not to impede ongoing port operations and trading activities.

(3) For the construction and expansion of the Market hall, the new expansion will first be constructed followed by the construction of the main structure so that it could be turned over to the users. Finally the remaining old market hall will be rehabilitated.

(4) The Market hall will be rehabilitated in sequence by section, so as not to impede the ongoing fish trading activities. Should the capacity of the existing market be insufficient to meet the foregoing construction method, then a temporary market hall will be constructed to maintain the trading activities. When construction is completed, the temporary market hall will be demolished.

(5) For the expansion of the jetty or causeway, the method of construction will be such that fish landing will not be hampered by provision of barricade to clearly show the demarcation of activities. Likewise, working time on daily basis will be discussed to settle issues of concern among the affected activities prior to start of work.

(6) The conditions of access road from the national road to the site will one of the main issues to be resolved for the smooth implementation of construction works.

(7) Land reclamation will be undertaken in compliance with EMB requirements and other pertinent domestic regulations. The construction methodology will include silt dispersal prevention techniques considering current speed and direction for each location to be dredged.

(8) Marine civil works construction schedule will consider the impacts of meteorological conditions particularly the wet season and occurrence of typhoons for construction of marine and civil works. The use of floating equipments for marine works construction will need highly skilled operators and laborers so that the cost will be relatively higher than on land construction. Consequently, from the quality and cost control viewpoint, the methodology for construction works should be such that less marine works will be involved. The construction schedule considered the occurrences of typhoons, monsoon and rainy seasons.

(9) The cost of the solar panel to supplement the commercial power supply system for Iloilo FPC is based on the current unit cost per square of solar panel in Japan.

(10) The use of locally available construction materials to the extent possible was considered in the preparation of the estimated cost of the Project.

(11) The procurement method to be prepared for International Competitive Bidding (ICB) will follow the JICA procurement guidelines. The revised Implementing Rules and Regulations (IRR) of R.A. 9184 will be applied provided that there is no conflict with the JICA procurement guidelines.

15.1 Contract Package

Construction of the Project was conceived to be split into 3 separate contract packages considering the locations of the candidate fish ports, mobilization of equipment and plants by the contractor, deployment of staffs and laborers, supervision of works among other associated criteria to facilitate construction and supervision works. Normally, rehabilitation will entail more work than new construction because of the need to demolish existing structures to accommodate the required repairs and new construction without impeding ongoing operations. Moreover, the sites which are scattered will be more difficult to implement than a project in one location considering the cost of mobilization of staffs, laborers, equipment and plants and personnel for construction supervision. The project which consists of 11 fish ports mainly for rehabilitation are scattered nationwide so that problems associated with mobilization, supply of construction materials and construction supervision would have to be considered to facilitate implementation and execution of construction activities. In light of the foregoing, it was conceived to split the contract into 3 packages to facilitate implementation and execution. The primary consideration for determining the scope of each contract package is the proximity of the sites to facilitate supply of materials, equipment, staffs and labor for the construction and supervision.

Procurement of equipment, machineries and devices will be pursued in one package to be split into 3 sub-packages as follows: 1) Ice making Plant and Refrigeration Facilities including cold storages, 2) Solar Power Generation System, 3) Laboratory Equipment/Devices and others. For the rehabilitation of existing ice making plant and refrigeration facilities, the spare parts for replacement equipment will be outsourced from the same manufacturer that installed the existing refrigeration facilities. Table 15.1 hereunder shows the extent of each contract package.

Table 15.1.1 Contract Packaging

Packages	Contract Period		Regional Port	Municipal Port
	Period	Award Complete		
Package 1 (ILOILO)	36 Months	1st Quarter, 2014 4th, Quarter, 2016	ILOILO	CONCEPCION
Package 2 (SUAL, LUCENA and CAMALIGAN)	33 Months	1st Quarter, 2014 4th, Quarter, 2016	SUAL , LUCENA and CAMALIGAN	ATIMONAN, SUBIC CALABANGA
Package 3 (DAVAO & BISLIG)	30 Months	2nd Quarter, 2014 4th, Quarter, 2016	DAVAO BISLIG	STA. CRUZ
Package 4 (Equipment Supply) *1	36 Months	1st Quarter, 2014 4th, Quarter, 2016	ALL 6 REGIONAL PORTS	

Note *1: Procurement of equipment and devices will be split into 3 categories: 1) Ice making Plant and Cold Storage, Refrigeration Facilities, 2) Solar Power Generation System, 3) Laboratory Equipment/Devices among others.

Contractors/Supplier will be selected through the international competitive bidding in accordance with the “Guidelines for Procurement (March 2009)” of JICA and the “Republic Act No. 9184 (R.A. 9184)”. Selection of the Consultants will be through the short list method in accordance with the “Guideline for the Employment of Consultants” of JICA and “Republic Act No. 9184 (R.A. 9184)”.

16. Project Cost

This Chapter describes the estimated project costs split into foreign portion to be financed by JICA and local potion to be borne by the government of the Philippines (GOP).

The cost of materials for each project site was based on the result of the surveys, "Wholesale Price Index of materials for the National Capital Region (NCR 1990-2009)" issued by the National Statistics Office of the Industry & Trade Statistics Department, and past projects of PFDA and PPA. The Publications of the Association of Carriers and Equipment Lessors (ACEL) Inc. rates were adopted as reference for equipment rentals. "Wage Order No. NCR-14" issued by the Regional Tripartite Wages and Productivity Board of the Department of Labor and Employment was adopted for labor rates.

The unit cost for rubble and armor stones is varying because of the low demand and the cost depends on volume, quarry source and transportation to construction site. For the construction of the east breakwater for ILOILO FPC, stone materials are assumed to be procured from Guimaras Island. For the rehabilitation of the existing breakwater for LUCENA FPC, the unit cost used by PPA for the construction of the commercial port which is adjacent to PFDA fish Port was adopted. The PPA Project was completed in 2008. For the construction of the new breakwater for BISLIG FPC, the unit cost is based on the previous breakwater construction project of PPA which was completed in 2005.

Estimation for work efficiency and man hour are based on past experience of the nationwide fish ports project (package I and II) and other JBIC assisted projects.

The project cost estimation was considered Administration cost, engineering cost, physical contingency, price escalation, tax, Interest during construction, commitment charge and land acquisition.

Table 16.1, 2 and 3 hereunder show the list of unit cost for key materials, labor and equipment.

Table 16.1 List of Unit Cost for Key Materials

No.	Item	Specification	Unit	Unit Price (PHP)	Remarks
1	Reinforced Bar	Grade 40 D13	t	41,350	
2	Reinforced Bar	Grade 60 D25	t	42,000	
3	H-shaped Steel	300x300x10x15	t	70,300	
4	Cement	Portland Cement	bag	266	40kg/ bag
5	Fine Aggregate		m3	1,205	
6	Course Aggregate	40mm	m3	1,764	
7	Ready Mix Conc.	21N (3,000PSI)	m3	3,910	
8	Plywood	12mm	m2	250	
9	Asphalt Concrete	Bituminous Concrete	t	6,037	Hot Laid
10	Fuel	Diesel	L	36	
11	Armor Stone	1,000 - 2,000kg	m3	1,100	without Transportation Cost
12	Rubble Stone	50 - 200kg	m3	910	without Transportation Cost
13	Back Fill Material	Fine Sand	m3	350	
14	PSC Pile	400 x 400 mm	lm.	3,200	Factory made
15	Steel Pipe Pile	Spiral DIA. 600mm,	t	61,000	ASTM A252, Gr-2

Note: All prices mentioned above are including VAT 12%.
No. 11 and No. 12 are calculated based on the several past construction experiences of PFDA and PPA.
No. 14 and 15 are based on the past experience of PPA.

Table 16.2 List of Unit Cost for Key Labors

No.	Item	Specification	Unit	Unit Price (PHP)	Remarks
1	Supervisor		day	500	
2	Normal Labor		day	400	
3	Steel Man	Skilled	day	450	
4	Steel Man	Normal	day	420	
5	Operator	Heavy Equipment	day	470	
6	Carpenter	Skilled	day	450	
7	Carpenter	Normal	day	420	
8	Welder	Skilled	day	450	
9	Welder	Normal	day	420	

Reference: Wage Order No. NCR-14
Note: All prices mentioned above are including Cost of Living Allowance (COLAs)

Table 16.3 List of Unit Cost for Key Equipment

No.	Item	Specification	Unit	Unit Price (PHP)	Remarks
1	Bull Dozer	D8R	Hour	7,649	Additional Ripper: Add 20% of Rate
2	Excavator (0.9 m3)		Hour	3,026	Additional Breaker: Add 35% of Rate
3	Wheel Roader	80Hp 1.3m3	Hour	1,219	
4	Dump truck (10t)		Hour	1,102	
5	Diesel Hammer	M35 with Flying Leader	Hour	1,418	50t crane is required.
6	Crawler Crane 50t	Standard boom 36m	Hour	2,245	
7	Crawler Crane 100t	Standard boom 40m	Hour	4,873	Additional Orange Peel: Add 20% of Rate
8	Generator 150	200KVA	Month	64,381	
9	600t Barge	Flat Barge	Month	64,493	
10	Crane barge 60t	with 650 t flat barge	Month	630,916	Non-propelled.
11	Tug	500Hp	Hour	1,951	
12	Dredger	Cutter Suction 5,000m3	Month	7,867,574	
13	Road Grader		Hour	1,898	
14	Road Roller	12t	Hour	2,280	
15	Asphalt Finisher	Max. Paving Width: 4.7m	Hour	2,748	
16	Concrete Mixing Truck	6.5m3	Hour	1,475	
17	Concrete Mixer	Tilting, 0.3m3 per min.	Month	27,599	

Reference: Association of Carriers and Equipment Lessors Inc. (ACEL), Latest version (Edition 24).
Note: All prices mentioned above are including the cost for general maintenance, fuel, operator and VAT 12%.

16.1 Summary of Project Costs for the Object Sites of Feasibility Study

Table 16.1.1 below show the estimated initial Project cost at Php 5.374 billion for the selected 11 fish ports comprising of 6 regional fish ports and 5 municipal fish ports,

Table 16.1.1 Project Cost

	Cost Item	Amount (PHP Million)	Share (%)
1	Project Costs	5,374	100
2	Foreign Portion (financed by JICA)	4,568	85
3	Local Portion (financed by GOP) *1	806	15

Note *1: The government of the Philippines (GOP) is burdened the commitment charge (PHP32 million) added to the above amount. Therefore defrayment of GOP is PHP 838Million.

The assumptions of the cost estimation are hereunder;

(1) Prices are as of April 2010
(2) Exchange rate: US$1.00 = ¥90.52 = PHP 46.312
(3) 12% VAT was included into the estimated direct cost.
(4) Price escalation of 1.8% was considered for the foreign portion and 7.1% annually for the local potion.

(5) Physical contingency @ 8% was considered the total estimated cost including price escalation.
(6) As for the cost of Consulting Cost, Price escalation and physical contingency are included in the base cost.

The Summary of project cost is shown in the following table.

Table 16.1.2 Summary of Project Cost (Regional and Municipal Fish Ports)

UNIT: 1,000 PHP

Project Component	(A) Total of Base Cost (including VAT)	(B) Price Escalation (Local) 7.1% per year	(C) Price Escalation (Foreign) 1.8% per year	(D) Cost Considered Price Escalation (D) = (A)+(B)+(C)	(E) Contingency 8% (E) = (D) x Conti.(%)	(F) Total Cost (F) = (D) + (E)
1, Cost for Construction works and Equipment Supply						
1) Package 1 (Iloilo)	600,387	36,434	46,970	683,790	54,703	738,493
2) Package 2 (Sual, Lucena and Camaligan)	805,926	47,512	61,517	914,955	73,196	988,151
3) Package 3 (Davao and Bislig)	770,520	47,799	61,501	879,820	70,386	950,206
4) Package 4 (Equipment Supply)	1,662,482	68,383	139,770	1,870,635	149,651	2,020,286
Sub-Total 1	3,839,314	200,128	309,758	4,349,200	347,936	4,697,136
2, Consulting Cost						
1) Detail Design	198,310	0	0	198,310	0	198,310
2) Construction Management	396,570	0	0	396,570	0	396,570
Sub-Total 2	594,880	0	0	594,880	0	594,880
3, Sub-Total 3 (=Sub-Total 1 + 2)	4,434,194	200,128	309,758	4,944,080	347,936	5,292,016
4, Others						
1) PFDA Administration Cost (PMO)	24,499	0	0	0	0	24,499
2) Fish Port Management (T/ A)	37,050	0	0	0	0	37,050
3) Land Accruement Expense (Bislig)	20,000	0	0	0	0	20,000
Sub-Total 4	81,549	0	0	0	0	81,549
5, Total						
Total Cost (=Sub-Total 3 +4)	4,515,743	200,128	309,758	4,944,080	347,936	**5,373,565**

Note 1: Total Local Cost will be 838 (million PHP) includes Loan Commitment Charge.
Note 2: Loan Commitment Charge
= Total Cost x 0.85 x 0.1% x 7 years = 31,972 (1,000 PHP)
Note 3: 1US$=JPY90.520=PHP46. 312
Note 4: Abbreviation
PMO: Project Management Office
T/ A: Technical Assistance
Note 5: Breakdown of the cost for PFDA administration Cost (PMO) is shown in the table 18.2.2.

Currency Portion	(1,000 PHP)	JPY Equivalent (1,000 JPY)
Japanese Yen Loan (85% of Total Cost)	**4,567,530**	**8,927,553**
Local Portion (15% of Total Cost)	**806,035**	-
Total	**5,373,565**	-

The project cost in the case of regional fish ports only is shown in the Appendix 21, Volume 2.

Disbursement schedule considered price escalation is shown in the following;

Table 16.1.3 Calculation of Disbursement

Unit: 1,000 PHP

		Base Cost (2010)			2,012			2,013		
		Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
1	Base Cost of Package 1	90,058	510,329	600,387	0	0	0	0	0	0
	Price Escalation	0	0	0	0	0	0	0	0	0
2	Base Cost of Package 2	120,889	685,037	805,926	0	0	0	0	0	0
	Price Escalation	0	0	0	0	0	0	0	0	0
3	Base Cost of Package 3	115,578	654,942	770,520	0	0	0	0	0	0
	Price Escalation	0	0	0	0	0	0	0	0	0
4	Base Cost of Package 4	166,248	1,496,234	1,662,482	0	0	0	0	0	0
	Price Escalation	0	0	0	0	0	0	0	0	0
	SUB-TOTAL (=1+2+3+4)	492,773	3,346,541	3,839,314	0	0	0	0	0	0
5	Consulting Cost for Detailed Design	69,409	128,902	198,310	34,704	64,451	99,155	34,704	64,451	99,155
6	Consulting Cost for Construction Management	138,800	257,771	396,570	0	0	0	0	0	0
	GRAND TOTAL (SUB-TOTAL + 5+6)	700,981	3,733,213	4,434,194	34,704	64,451	99,155	34,704	64,451	99,155

Unit: 1,000 PHP

2014			2015			2016			TOTAL		
Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
34,271	194,200	228,470	27,894	158,064	185,958	27,894	158,064	185,958	90,058	510,329	600,387
10,819	14,364	25,184	11,412	14,747	26,159	14,203	17,858	32,060	36,434	46,970	83,403
41,908	237,479	279,387	59,300	336,034	395,335	19,681	111,523	131,204	120,889	685,037	805,926
13,231	17,566	30,796	24,261	31,352	55,612	10,021	12,600	22,620	47,512	61,517	109,029
32,723	185,429	218,152	47,161	267,243	314,404	35,695	202,270	237,964	115,578	654,942	770,520
10,331	13,716	24,046	19,294	24,933	44,228	18,174	22,852	41,027	47,799	61,501	109,301
55,416	498,745	554,161	55,416	498,745	554,161	55,416	498,745	554,161	249,372	1,413,109	1,662,482
17,495	36,891	54,386	22,672	46,532	69,204	28,216	56,347	84,563	68,383	139,770	208,153
216,193	1,198,390	1,414,583	267,409	1,377,651	1,645,060	209,299	1,080,259	1,289,557	776,025	3,573,175	4,349,200
0	0	0	0	0	0	0	0	0	69,409	128,902	198,310
46,267	85,924	132,190	46,267	85,924	132,190	46,267	85,924	132,190	138,800	257,771	396,570
262,460	1,284,313	1,546,773	313,676	1,463,575	1,777,250	255,565	1,166,182	1,421,747	984,233	3,959,847	**4,944,080**

Summary of base cost categorized into 4 packages is shown in the following;

Table 16.1.4 Summary of Base Cost

Unit: 1,000 PHP

Package	Regional Fish Port	Municipal Fish Port	(1) Cost of Construction for Each Site	(2) Total of Base Cost for Each Package	(3) Cost of Equipment for Each Site	(4) Total of Bare Cost for Each Site
1	ILOILO		557,874	600,387	803,916	1,361,791
		CONCEPCION	42,512		0	42,512
2	SUAL		274,999	805,926	186,219	461,218
		SUBIC	36,724		0	36,724
	LUCENA		268,099		47,438	315,537
		ATIMONAN	25,852		0	25,852
	CAMALIGAN		147,688		219,252	366,940
		CALABANGA	52,565		0	52,565
3	DAVAO		75,815	770,520	88,741	164,556
	BISLIG		639,283		316,915	956,198
		STA. CRUZ	55,423		0	55,423
	TOTAL		2,176,832	2,176,832	1,662,482	3,839,314

Note1: Base Cost = Bare Cost + VAT 12%

Annual fund plan of each package is shown in the following table. Breakdown of base cost for each fish port is shown after the table.

Table 16.1.5 Annual Fund Plan of Each Package

Annual Fund Plan of the Project

Unit: 1,000 PHP

Package	Regional Fish Port	Municipal Fish Port	Items	Base Cost (2010)			2012			2013			2014			2015			2016			Total		
				Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
1	Iloilo		Base Cost (Construction Works)	74,715	423,387	498,102	0	0	0	0	0	0	24,905	141,129	166,034	24,905	141,129	166,034	24,905	141,129	166,034	74,715	423,387	498,102
			VAT (12%)	8,966	50,806	59,772	0	0	0	0	0	0	2,989	16,935	19,924	2,989	16,935	19,924	2,989	16,935	19,924	8,966	50,806	59,772
			Sub-total 1	83,681	474,193	557,874	0	0	0	0	0	0	27,894	158,064	185,958	27,894	158,064	185,958	27,894	158,064	185,958	83,681	474,193	557,874
		Concepcion	Base Cost (Construction Works)	5,694	32,264	37,957	0	0	0	0	0	0	5,694	32,264	37,957	0	0	0	0	0	0	5,694	32,264	37,957
			VAT (12%)	683	3,872	4,555	0	0	0	0	0	0	683	3,872	4,555	0	0	0	0	0	0	683	3,872	4,555
			Sub-total 2	6,377	36,135	42,512	0	0	0	0	0	0	6,377	36,135	42,512	0	0	0	0	0	0	6,377	36,135	42,512
			Sub-total 3 (=1+2)	90,058	510,329	600,387	0	0	0	0	0	0	34,271	194,200	228,470	27,894	158,064	185,958	27,894	158,064	185,958	90,058	510,329	600,387
			Price Escalation	0	0	0	0	0	0	0	0	0	10,819	14,364	25,184	11,412	14,747	26,159	14,203	17,858	32,060	36,434	46,970	83,403
			Sub-total 4	90,058	510,329	600,387	0	0	0	0	0	0	45,090	208,564	253,654	39,306	172,812	212,117	42,096	175,922	218,019	126,492	557,298	683,790
			Physical Contingency (8%)	0	0	0	0	0	0	0	0	0	3,044	17,248	20,292	2,545	14,424	16,969	2,616	14,825	17,441	8,205	46,498	54,703
			Consulting Cost for Detailed Design	10,854	20,157	31,011	5,427	10,079	15,506	5,427	10,079	15,506	0	0	0	0	0	0	0	0	0	10,854	20,157	31,011
			Consulting Cost for Construction Management	21,705	40,310	62,015	0	0	0	0	0	0	7,235	13,437	20,672	7,235	13,437	20,672	7,235	13,437	20,672	21,705	40,310	62,015
			PFDA Administration Cost (PMO)	5,544	0	5,544	0	0	0	0	0	0	1,848	0	1,848	1,848	0	1,848	1,848	0	1,848	5,544	0	5,544
			Fish Port Management (T/A)	1,852	10,497	12,350	0	0	0	0	0	0	617	3,499	4,117	617	3,499	4,117	617	3,499	4,117	1,852	10,497	12,350
			Land Accruement Expense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total	130,014	581,293	711,307	5,427	10,079	15,506	5,427	10,079	15,506	57,834	242,749	300,583	51,552	204,171	255,723	54,413	207,683	262,096	**174,653**	**674,761**	**849,414**
2	Sual		Base Cost (Construction Works)	36,830	208,705	245,535	0	0	0	0	0	0	16,113	91,308	107,421	18,415	104,352	122,767	2,302	13,044	15,346	36,830	208,705	245,535
			VAT (12%)	4,420	25,045	29,464	0	0	0	0	0	0	1,934	10,957	12,891	2,210	12,522	14,732	276	1,565	1,842	4,420	25,045	29,464
			Sub-total 1	41,250	233,749	274,999	0	0	0	0	0	0	18,047	102,265	120,312	20,625	116,875	137,499	2,578	14,609	17,187	41,250	233,749	274,999
		Subic	Base Cost (Construction Works)	4,918	27,871	32,789	0	0	0	0	0	0	4,304	24,387	28,690	615	3,484	4,099	0	0	0	4,918	27,871	32,789
			VAT (12%)	590	3,344	3,935	0	0	0	0	0	0	516	2,926	3,443	74	418	492	0	0	0	590	3,344	3,935
			Sub-total 2	5,509	31,215	36,724	0	0	0	0	0	0	4,820	27,313	32,133	689	3,902	4,590	0	0	0	5,509	31,215	36,724
	Lucena		Base Cost (Construction Works)	35,906	203,468	239,374	0	0	0	0	0	0	8,977	50,867	59,844	17,953	101,734	119,687	8,977	50,867	59,844	35,906	203,468	239,374
			VAT (12%)	4,309	24,416	28,725	0	0	0	0	0	0	1,077	6,104	7,181	2,154	12,208	14,362	1,077	6,104	7,181	4,309	24,416	28,725
			Sub-total 3	40,215	227,884	268,099	0	0	0	0	0	0	10,054	56,971	67,025	20,107	113,942	134,049	10,054	56,971	67,025	40,215	227,884	268,099
		Atimonan	Base Cost (Construction Works)	3,462	19,620	23,082	0	0	0	0	0	0	1,731	9,810	11,541	1,731	9,810	11,541	0	0	0	3,462	19,620	23,082
			VAT (12%)	415	2,354	2,770	0	0	0	0	0	0	208	1,177	1,385	208	1,177	1,385	0	0	0	415	2,354	2,770
			Sub-total 4	3,878	21,974	25,852	0	0	0	0	0	0	1,939	10,987	12,926	1,939	10,987	12,926	0	0	0	3,878	21,974	25,852
	Camaligan		Base Cost (Construction Works)	19,780	112,085	131,864	0	0	0	0	0	0	6,294	35,663	41,957	7,193	40,758	47,951	6,294	35,663	41,957	19,780	112,085	131,864
			VAT (12%)	2,374	13,450	15,824	0	0	0	0	0	0	755	4,280	5,035	863	4,891	5,754	755	4,280	5,035	2,374	13,450	15,824
			Sub-total 5	22,153	125,535	147,688	0	0	0	0	0	0	7,049	39,943	46,992	8,056	45,649	53,705	7,049	39,943	46,992	22,153	125,535	147,688
		Calabanga	Base Cost (Construction Works)	7,040	39,893	46,933	0	0	0	0	0	0	0	0	0	7,040	39,893	46,933	0	0	0	7,040	39,893	46,933
			VAT (12%)	845	4,787	5,632	0	0	0	0	0	0	0	0	0	845	4,787	5,632	0	0	0	845	4,787	5,632
			Sub-total 6	7,885	44,680	52,565	0	0	0	0	0	0	0	0	0	7,885	44,680	52,565	0	0	0	7,885	44,680	52,565
			Sub-total 7 (=1+2+3+4+5+6)	120,889	685,037	805,926	0	0	0	0	0	0	41,908	237,479	279,387	59,300	336,034	395,335	19,681	111,523	131,204	120,889	685,037	805,926
			Price Escalation	0	0	0	0	0	0	0	0	0	13,231	17,566	30,796	24,261	31,352	55,612	10,021	12,600	22,620	47,512	61,517	109,029
			Sub-total 8	120,889	685,037	805,926	0	0	0	0	0	0	55,139	255,045	310,184	83,561	367,386	450,947	29,701	124,123	153,824	168,401	746,554	914,955
			Physical Contingency (8%)	0	0	0	0	0	0	0	0	0	3,722	21,092	24,815	5,411	30,664	36,076	1,846	10,460	12,306	10,979	62,217	73,196
			Consulting Cost for Detailed Design	14,570	27,058	41,628	7,285	13,529	20,814	7,285	13,529	20,814	0	0	0	0	0	0	0	0	0	14,570	27,058	41,628
			Consulting Cost for Construction Management	29,136	54,110	83,246	0	0	0	0	0	0	9,712	18,037	27,749	9,712	18,037	27,749	9,712	18,037	27,749	29,136	54,110	83,246
			PFDA Administration Cost (PMO)	8,014	0	8,014	0	0	0	0	0	0	2,671	0	2,671	2,671	0	2,671	2,671	0	2,671	8,014	0	8,014
			Fish Port Management (T/A)	1,852	10,497	12,350	0	0	0	0	0	0	617	3,499	4,117	617	3,499	4,117	617	3,499	4,117	1,852	10,497	12,350
			Land Accruement Expense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total	174,461	776,702	951,164	7,285	13,529	20,814	7,285	13,529	20,814	71,862	297,673	369,535	101,973	419,586	521,559	44,548	156,119	200,667	**232,953**	**900,436**	**1,133,389**
3	Davao		Base Cost (Construction Works)	10,154	57,538	67,692	0	0	0	0	0	0	3,173	17,981	21,154	5,077	28,769	33,846	1,904	10,788	12,692	10,154	57,538	67,692
			VAT (12%)	1,218	6,905	8,123	0	0	0	0	0	0	381	2,158	2,538	609	3,452	4,061	228	1,295	1,523	1,218	6,905	8,123
			Sub-total 1	11,372	64,442	75,815	0	0	0	0	0	0	3,554	20,138	23,692	5,686	32,221	37,907	2,132	12,083	14,215	11,372	64,442	75,815
	Bislig		Base Cost (Construction Works)	85,618	485,170	570,788	0	0	0	0	0	0	21,405	121,292	142,697	34,247	194,068	228,315	29,966	169,809	199,776	85,618	485,170	570,788
			VAT (12%)	10,274	58,220	68,495	0	0	0	0	0	0	2,569	14,555	17,124	4,110	23,288	27,398	3,596	20,377	23,973	10,274	58,220	68,495
			Sub-total 2	95,892	543,390	639,283	0	0	0	0	0	0	23,973	135,848	159,821	38,357	217,356	255,713	33,562	190,187	223,749	95,892	543,390	639,283
		Sta. Cruz	Base Cost (Construction Works)	7,423	42,062	49,484	0	0	0	0	0	0	4,639	26,289	30,928	2,783	15,773	18,557	0	0	0	7,423	42,062	49,484
			VAT (12%)	891	5,047	5,938	0	0	0	0	0	0	557	3,155	3,711	334	1,893	2,227	0	0	0	891	5,047	5,938
			Sub-total 3	8,313	47,109	55,423	0	0	0	0	0	0	5,196	29,443	34,639	3,118	17,666	20,783	0	0	0	8,313	47,109	55,423
			Sub-total 4 (=1+2+3)	115,578	654,942	770,520	0	0	0	0	0	0	32,723	185,429	218,152	47,161	267,243	314,404	35,695	202,270	237,964	115,578	654,942	770,520
			Price Escalation	0	0	0	0	0	0	0	0	0	10,331	13,716	24,046	19,294	24,933	44,228	18,174	22,852	41,027	47,799	61,501	109,301
			Sub-total 5	115,578	654,942	770,520	0	0	0	0	0	0	43,053	199,145	242,198	66,455	292,177	358,632	53,869	225,122	278,991	163,377	716,443	879,820
			Physical Contingency (8%)	0	0	0	0	0	0	0	0	0	2,906	16,469	19,376	4,304	24,387	28,691	3,348	18,971	22,319	10,558	59,828	70,386
			Consulting Cost for Detailed Design	13,930	25,870	39,799	6,965	12,935	19,900	6,965	12,935	19,900	0	0	0	0	0	0	0	0	0	13,930	25,870	39,799
			Consulting Cost for Construction Management	27,856	51,732	79,588	0	0	0	0	0	0	9,285	17,244	26,529	9,285	17,244	26,529	9,285	17,244	26,529	27,856	51,732	79,588
			PFDA Administration Cost (PMO)	6,612	0	6,612	0	0	0	0	0	0	2,204	0	2,204	2,204	0	2,204	2,204	0	2,204	6,612	0	6,612
			Fish Port Management (T/A)	1,852	10,497	12,350	0	0	0	0	0	0	617	3,499	4,117	617	3,499	4,117	617	3,499	4,117	1,852	10,497	12,350
			Land Accruement Expense	20,000	0	20,000	0	0	0	20,000	0	20,000	0	0	0	0	0	0	0	0	0	20,000	0	20,000
			Total	185,828	743,041	928,870	6,965	12,935	19,900	26,965	12,935	39,900	58,067	236,358	294,424	82,865	337,307	420,172	69,324	264,836	334,160	**244,186**	**864,370**	**1,108,556**

Table 16.1.5 Annual Fund Plan of Each Package (Continued)

Unit: 1,000 PHP

Package	Sub-Package	Regional Fish Port	Items	Base Cost (2010)			2012			2013			2014			2015			2016			Total		
				Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
4	1. Ice Making & Refrigeration Facilities	Iloilo	Base Cost	28,687	258,179	286,866	0	0	0	0	0	0	9,562	86,060	95,622	9,562	86,060	95,622	9,562	86,060	95,622	28,687	258,179	286,866
			VAT (12%)	3,442	30,981	34,424	0	0	0	0	0	0	1,147	10,327	11,475	1,147	10,327	11,475	1,147	10,327	11,475	3,442	30,981	34,424
			Sub-total 1	32,129	289,161	321,290	0	0	0	0	0	0	10,710	96,387	107,097	10,710	96,387	107,097	10,710	96,387	107,097	32,129	289,161	321,290
		Sual	Base Cost	13,728	123,552	137,280	0	0	0	0	0	0	4,576	41,184	45,760	4,576	41,184	45,760	4,576	41,184	45,760	13,728	123,552	137,280
			VAT (12%)	1,647	14,826	16,474	0	0	0	0	0	0	549	4,942	5,491	549	4,942	5,491	549	4,942	5,491	1,647	14,826	16,474
			Sub-total 2	15,375	138,378	153,753	0	0	0	0	0	0	5,125	46,126	51,251	5,125	46,126	51,251	5,125	46,126	51,251	15,375	138,378	153,753
		Lucena	Base Cost	3,708	33,369	37,076	0	0	0	0	0	0	1,236	11,123	12,359	1,236	11,123	12,359	1,236	11,123	12,359	3,708	33,369	37,076
			VAT (12%)	445	4,004	4,449	0	0	0	0	0	0	148	1,335	1,483	148	1,335	1,483	148	1,335	1,483	445	4,004	4,449
			Sub-total 3	4,153	37,373	41,525	0	0	0	0	0	0	1,384	12,458	13,842	1,384	12,458	13,842	1,384	12,458	13,842	4,153	37,373	41,525
		Camaligan	Base Cost	16,376	147,383	163,759	0	0	0	0	0	0	5,459	49,128	54,586	5,459	49,128	54,586	5,459	49,128	54,586	16,376	147,383	163,759
			VAT (12%)	1,965	17,686	19,651	0	0	0	0	0	0	655	5,895	6,550	655	5,895	6,550	655	5,895	6,550	1,965	17,686	19,651
			Sub-total 4	18,341	165,069	183,410	0	0	0	0	0	0	6,114	55,023	61,137	6,114	55,023	61,137	6,114	55,023	61,137	18,341	165,069	183,410
		Davao	Base Cost	5,673	51,053	56,726	0	0	0	0	0	0	1,891	17,018	18,909	1,891	17,018	18,909	1,891	17,018	18,909	5,673	51,053	56,726
			VAT (12%)	681	6,126	6,807	0	0	0	0	0	0	227	2,042	2,269	227	2,042	2,269	227	2,042	2,269	681	6,126	6,807
			Sub-total 5	6,353	57,179	63,533	0	0	0	0	0	0	2,118	19,060	21,178	2,118	19,060	21,178	2,118	19,060	21,178	6,353	57,179	63,533
		Bislig	Base Cost	27,333	245,994	273,327	0	0	0	0	0	0	9,111	81,998	91,109	9,111	81,998	91,109	9,111	81,998	91,109	27,333	245,994	273,327
			VAT (12%)	3,280	29,519	32,799	0	0	0	0	0	0	1,093	9,840	10,933	1,093	9,840	10,933	1,093	9,840	10,933	3,280	29,519	32,799
			Sub-total 6	30,613	275,513	306,126	0	0	0	0	0	0	10,204	91,838	102,042	10,204	91,838	102,042	10,204	91,838	102,042	30,613	275,513	306,126
			Sub-total 7 (=1+2+3+4+5+6)	106,964	962,673	1,069,637	0	0	0	0	0	0	35,655	320,891	356,546	35,655	320,891	356,546	35,655	320,891	356,546	106,964	962,673	1,069,637
	2. Solar Power System	Iloilo	Base Cost (Solar Power System without Batte	37,750	339,750	377,500	0	0	0	0	0	0	12,583	113,250	125,833	12,583	113,250	125,833	12,583	113,250	125,833	37,750	339,750	377,500
			VAT (12%)	4,530	40,770	45,300	0	0	0	0	0	0	1,510	13,590	15,100	1,510	13,590	15,100	1,510	13,590	15,100	4,530	40,770	45,300
			Sub-total 8	42,280	380,520	422,800	0	0	0	0	0	0	14,093	126,840	140,933	14,093	126,840	140,933	14,093	126,840	140,933	42,280	380,520	422,800
	3. Other Equipment	Iloilo	Base Cost	5,342	48,075	53,417	0	0	0	0	0	0	1,781	16,025	17,806	1,781	16,025	17,806	1,781	16,025	17,806	5,342	48,075	53,417
			VAT (12%)	641	5,769	6,410	0	0	0	0	0	0	214	1,923	2,137	214	1,923	2,137	214	1,923	2,137	641	5,769	6,410
			Sub-total 9	5,983	53,844	59,827	0	0	0	0	0	0	1,994	17,948	19,942	1,994	17,948	19,942	1,994	17,948	19,942	5,983	53,844	59,827
		Sual	Base Cost	2,899	26,088	28,987	0	0	0	0	0	0	966	8,696	9,662	966	8,696	9,662	966	8,696	9,662	2,899	26,088	28,987
			VAT (12%)	348	3,131	3,478	0	0	0	0	0	0	116	1,044	1,159	116	1,044	1,159	116	1,044	1,159	348	3,131	3,478
			Sub-total 10	3,247	29,219	32,466	0	0	0	0	0	0	1,082	9,740	10,822	1,082	9,740	10,822	1,082	9,740	10,822	3,247	29,219	32,466
		Lucena	Base Cost	528	4,752	5,280	0	0	0	0	0	0	176	1,584	1,760	176	1,584	1,760	176	1,584	1,760	528	4,752	5,280
			VAT (12%)	63	570	634	0	0	0	0	0	0	21	190	211	21	190	211	21	190	211	63	570	634
			Sub-total 11	591	5,322	5,913	0	0	0	0	0	0	197	1,774	1,971	197	1,774	1,971	197	1,774	1,971	591	5,322	5,913
		Camaligan	Base Cost	3,200	28,802	32,002	0	0	0	0	0	0	1,067	9,601	10,667	1,067	9,601	10,667	1,067	9,601	10,667	3,200	28,802	32,002
			VAT (12%)	384	3,456	3,840	0	0	0	0	0	0	128	1,152	1,280	128	1,152	1,280	128	1,152	1,280	384	3,456	3,840
			Sub-total 12	3,584	32,258	35,842	0	0	0	0	0	0	1,195	10,753	11,947	1,195	10,753	11,947	1,195	10,753	11,947	3,584	32,258	35,842
		Davao	Base Cost	2,251	20,257	22,508	0	0	0	0	0	0	750	6,752	7,503	750	6,752	7,503	750	6,752	7,503	2,251	20,257	22,508
			VAT (12%)	270	2,431	2,701	0	0	0	0	0	0	90	810	900	90	810	900	90	810	900	270	2,431	2,701
			Sub-total 13	2,521	22,688	25,209	0	0	0	0	0	0	840	7,563	8,403	840	7,563	8,403	840	7,563	8,403	2,521	22,688	25,209
		Bislig	Base Cost	963	8,670	9,633	0	0	0	0	0	0	321	2,890	3,211	321	2,890	3,211	321	2,890	3,211	963	8,670	9,633
			VAT (12%)	116	1,040	1,156	0	0	0	0	0	0	39	347	385	39	347	385	39	347	385	116	1,040	1,156
			Sub-total 14	1,079	9,710	10,789	0	0	0	0	0	0	360	3,237	3,596	360	3,237	3,596	360	3,237	3,596	1,079	9,710	10,789
			Sub-total 15 (=9+10+11+12+13+14)	17,005	153,041	170,045	0	0	0	0	0	0	5,668	51,014	56,682	5,668	51,014	56,682	5,668	51,014	56,682	17,005	153,041	170,045
	Total of Sub-package 1, 2 and 3		Subtotal 16 (=7+8+15	166,248	1,496,234	1,662,482	0	0	0	0	0	0	55,416	498,745	554,161	55,416	498,745	554,161	55,416	498,745	554,161	166,248	1,496,234	1,662,482
			Price Escalation	0	0	0	0	0	0	0	0	0	17,495	36,891	54,386	22,672	46,532	69,204	28,216	56,347	84,563	68,383	139,770	208,153
			Sub-total 17	166,248	1,496,234	1,662,482	0	0	0	0	0	0	72,911	535,635	608,546	78,088	545,277	623,365	83,632	555,092	638,724	234,631	1,636,004	1,870,635
			Physical Contingency (8%)	0	0	0	0	0	0	0	0	0	7,303	41,381	48,684	7,480	42,389	49,869	7,665	43,433	51,098	22,448	127,203	149,651
			Consulting Cost for Detailed Design	30,055	55,816	85,871	15,027	27,908	42,936	15,027	27,908	42,936	0	0	0	0	0	0	0	0	0	30,055	55,816	85,871
			Consulting Cost for Construction Management	60,102	111,619	171,721	0	0	0	0	0	0	20,034	37,206	57,240	20,034	37,206	57,240	20,034	37,206	57,240	60,102	111,619	171,721
			PFDA Administration Cost (PMO)	4,328	0	4,328	0	0	0	0	0	0	1,443	0	1,443	1,443	0	1,443	1,443	0	1,443	4,328	0	4,328
			Fish Port Management (T/A)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Land Accruement Expense	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total	260,734	1,663,668	1,924,402	15,027	27,908	42,936	15,027	27,908	42,936	101,690	614,223	715,913	107,045	624,872	731,917	112,774	635,731	748,505	**351,564**	**1,930,642**	**2,282,206**

Unit: 1,000 PHP

Total of all Packages	Base Cost (2010)			2012			2013			2014			2015			2016			Total		
	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total	Local	Foreign	Total
Amount per year	-	-	-	34,704	64,451	99,155	54,704	64,451	119,155	289,453	1,391,002	1,680,455	343,435	1,585,936	1,929,371	281,059	1,264,369	1,545,428	**1,003,356**	**4,370,209**	**5,373,565**
Accumulated Amount	751,037	3,764,705	4,515,743	34,704	64,451	99,155	89,409	128,902	218,310	378,862	1,519,904	1,898,765	722,297	3,105,840	3,828,137	**1,003,356**	**4,370,209**	**5,373,565**	-	-	-

Note:

*Loan Commitment Charge = Total Cost x 0.85 x 0.1% x 7 years = 31,972 (1,000 PHP) and The Government of the Philippines (GOP) is burdened the amount.
*Exchange Rate: 1US$=JPY90.520=PHP 46.312

Currency Potion	(1,000 PHP)	JPY Equivalent (1,000JPY)
Japanese Yen Loan (85% of Total Amount)	4,567,530	8,927,553
Local Potion (15 % of Total Amount)	806,035	
TOTAL	5,373,565	

Table 16.1.6 Breakdown of Base Cost for Iloilo Fish Port

Unit: 1,000 PHP

Description of Work Items	Unit	Quantity	Unit Price	Amount
1. Construction Works				
1.1 General Expenses	L.S.	1	8,679.0	8,679.0
1.2 Civil Works				
1) Stare Landing	lm	10	49.6	496.0
2) Slope Protection (Repairing)	lm	210	37.1	7,780.5
3) Breakwater (additional)	lm	600	367.7	220,630.4
4) Harbor Dredging (including Soil Disposal)	m3	150,000	0.162	24,313.8
5) Navigation Aids	L.S.	1	2,492.1	2,492.1
6) Repairing of Slipway	L.S.	1	6,933.0	6,933.0
7) Concrete Pavement & Others	L.S.	1	21,632.4	21,632.4
Sub-Total of Civil Works:				284,278.2
1.3 Building Works				
1) Market Hall	m2	3,875	16.3	63,162.5
2) Fish Processing (HACCP) x 4 and Laboratory	m2	2,484	18.1	44,960.4
3) Ref. Building (Repairing)	L.S.	1	34,374.2	34,374.2
4) Ship Repairing Shop (Repairing)	m2	800	13.0	10,400.0
5) Waste Water Treatment	L.S.	1	10,096.1	10,096.1
6) Others	L.S.	1	6,080.8	6,080.8
Sub-Total of Building Works:				169,074.0
1.4 Miscellaneous	L.S.	1	3,865.1	3,865.1
1.5 Installation of Equipment	L.S.	1	32,205.9	32,205.9
Total of Construction Works:				498,102.2
VAT 12%				59,772.3
Total of Construction Works including VAT:				557,874.5
2. Equipment				
2-1 Ice Making, Storage and Refrigeration facilities				
1 Repairing of Existing Ice Making Machine & Storag	unit	1	108,260.4	108,260.4
2 Refrigeration and Quick Freezer	unit	1	94,768.7	94,768.7
3 Ice Making & Refrigeration (HACCP)	unit	4	23,517.9	94,071.6
Sub-Total of 2-1:				297,100.7
2-2 Solar Power				
1 Solar Panel Power (without Battery)	Kw	1,000	377.5	377,500.0
2-3 Other Equipment				
1 Equipment for Ship Repairing Shop	unit	1	5,112.9	5,112.9
2 Equipment for Local Fish Processing	L.S.	1	12,458.0	12,458.0
3 Equipment for HACCP	L.S.	1	4,029.2	4,029.2
4 Equipment for Market Hall	L.S.	1	3,843.9	3,843.9
5 Vehicles	L.S.	1	9,030.9	9,030.9
6 Equipment for Laboratory	L.S.	1	18,941.7	18,941.7
Sub-Total of 2-3:				53,416.6
Total of Equipment Supply:				728,017.3
VAT 12%				87,362.1
Total of Equipment including VAT:				815,379.4
3, Total Cost of ILOILO FISH PORT Including VAT (3 = 1 + 2):				1,373,253.8

Table 16.1.7 Breakdown of Base Cost for Sual Fish Port

Unit: 1,000 PHP

Description of Work Items	Unit	Quantity	Unit Price	Amount
1. Construction Works				
1.1 General Expenses	L.S.	1	3,533.3	3,533.3
1.2 Civil Works				
1) Milk Fish Jetty	lm	70	696.6	48,762.0
2) Pier Extension	lm	30	2,036.4	61,092.0
3) Fence	L.S.	1	955.8	955.8
4) Slipway Extension	m2	3,000	7.5	22,500.0
5) Revetment (Repairing)	lm	30	60.3	1,809.0
6) Asphalt Pavement (including Drainage Repairing	L.S.	1	10,573.1	10,573.1
7) Navigation Aids	L.S.	1	945.7	945.7
8) Demolishing Existing Blds. and Others	L.S.	1	2,914.1	2,914.1
Sub-Total of Civil Works:				149,551.7
1.3 Building Works				
1) Fish Processing (HACCP)	m2	1,104	18.1	19,982.4
2) Ref. Building (Repairing)	L.S.	1	8,205.6	8,205.6
3) Ship Repairing Shop	m2	800	12.6	10,080.0
4) Waste Water Treatment	L.S.	1	10,096.1	10,096.1
5) Warehouse for Fish Feed	m2	300	12.6	3,780.0
6) Winch house	m2	100	7.0	700.0
7) Toilet	m2	50	21.4	1,070.0
8) New Water Supply System including Deep well	L.S.	1	9,844.6	9,844.6
9) Others	L.S.	1	1,576.2	1,576.2
Sub-Total of Building Works:				65,334.9
1.4 Miscellaneous	L.S.	1	1,667.3	1,667.3
1.5 Installation of Equipment	L.S.	1	25,447.6	25,447.6
Total Construction Works:				245,534.8
VAT 12%				29,464.2
Total of Construction Works including VAT:				274,999.0
2. Equipment				
2-1 Ice Making, Storage and Refrigeration facilities				
1 Repairing of Existing Ice Making Machine & Storage	L.S.	1	46,599.8	46,599.8
2 Refrigeration and Quick Freezer	L.S.	1	43,273.7	43,273.7
3 Ice Making & Refrigeration (HACCP)	unit	2	23,703.1	47,406.2
Sub-Total of 2-1:				137,279.7
2-2 Other Equipment				
1 Equipment for Ship Repairing Shop	unit	1	5,136.3	5,136.3
2 Winch	unit	2	5,140.7	10,281.4
3 Equipment for Local Fish Processing	L.S.	1	11,531.7	11,531.7
4 Equipment for HACCP	L.S.	1	2,037.8	2,037.8
Sub-Total of 2-2:				28,987.2
Total of Equipment Supply:				166,266.9
VAT 12%				19,952.0
Total of Equipment including VAT:				186,218.9
3, Total Cost of SUAL FISH PORT Including VAT (3 = 1 + 2):				461,217.9

Table 16.1.8 Breakdown of Base Cost for Lucena Fish Port

Unit: 1,000 PHP

Description of Work Items	Unit	Quantity	Unit Price	Amount
1. Construction Works				
1.1 General Expenses	L.S.	1	4,387.0	4,387.0
1.2 Civil Works				
1) Repairing of Breakwater	lm	150	613.7	92,055.0
2) Pier Extension	lm	25	1,296.3	32,407.5
3) Repairing Fenders	No.	22	207.5	4,565.0
4) External Works and Others	L.S.	1	2,863.3	2,863.3
Sub-Total of Civil Works:				131,890.8
1.3 Building Works				
1) Ref. Building (Repairing)	L.S.	1	8,422.8	8,422.8
2) Market Hall	m2	3,023	17.2	51,995.6
3) Waste Water Treatment	L.S.	1	10,096.1	10,096.1
4) Retail Market	m2	500	12.6	6,300.0
5) Administration Office	m2	360	22.3	8,028.0
6) Toilet	m2	50	21.4	1,070.0
7) Water Supply System	L.S.	1	8,249.6	8,249.6
8) Others	L.S.	1	3,100.2	3,100.2
Sub-Total of Building Works:				97,262.3
1.4 Miscellaneous	L.S.	1	2,362.0	2,362.0
1.5 Installation of Equipment	L.S.	1	3,471.9	3,471.9
Total Construction Works:				239,374.0
VAT 12%				28,724.9
Total of Construction Works including VAT:				268,098.9
2. Equipment				
2-1 Ice Making, Storage and Refrigeration facilities				
1 Repairing of Existing Ice Making Machine & Storage	L.S.	1	9,235.1	9,235.1
2 Refrigeration and Quick Freezer	L.S.	1	27,841.1	27,841.1
Sub-Total of 2-1:				37,076.2
2-2 Other Equipment				
1 Equipment for Local Fish Processing	L.S.	1	1,435.7	1,435.7
2 Equipment for Market Hall	L.S.	1	3,843.9	3,843.9
Sub-Total of 2-2:				5,279.6
Total of Equipment Supply:				42,355.8
VAT 12%				5,082.7
Total of Equipment including VAT:				47,438.5
3, Total Cost of LUCENA FISH PORT Including VAT (3 = 1 + 2):				315,537.4

Table 16.1.9 Breakdown of Base Cost for Camaligan Fish Port

Unit: 1,000 PHP

Description of Work Items	Unit	Quantity	Unit Price	Amount
1. Construction Works				
1.1 General Expenses	L.S.	1	4,334.4	4,334.4
1.2 Civil Works				
1) Land Rehabilitation	m3	15,000	0.47	7,050.0
2) Soil Improvement	m2	5,000	4.2	20,850.0
3) Slope Protection	lm	100	61.2	6,120.0
4) Perimeter Fence	lm	900	7.5	6,750.0
5) External Works & Others	L.S.	1	2,479.1	2,479.1
Sub-Total of Civil Works:				43,249.1
1.3 Building Works				
1) Fish Processing (HACCP) x 4 and Laboratory	m2	2,484	18.1	44,960.4
2) Ref. Building (Repairing)	L.S.	1	3,376.2	3,376.2
3) Waste Water Treatment	L.S.	1	10,096.1	10,096.1
4) Demolishing of Existing Bld. and Others	L.S.	1	1,296.8	1,296.8
Sub-Total of Building Works:				59,729.5
1.4 Miscellaneous	L.S.	1	1,111.5	1,111.5
1.5 Installation of Equipment	L.S.	1	23,439.9	23,439.9
Total Construction Works:				131,864.4
VAT 12%				15,823.7
Total of Construction Works including VAT:				147,688.1
2. Equipment				
2-1 Ice Making, Storage and Refrigeration facilities				
1 Ice Making Machine & Storage	L.S.	1	46,803.9	46,803.9
2 Blast Freezer and Refrigeration	L.S.	1	21,586.5	21,586.5
3 Ice Making & Refrigeration (HACCP)	unit	4	23,842.1	95,368.4
Sub-Total of 2-1:				163,758.8
2-2 Other Equipment				
1 Equipment for HACCP	L.S.	1	4,029.2	4,029.2
2 Equipment for Market Hall	L.S.	1	9,030.9	9,030.9
3 Equipment for Laboratory	L.S.	1	18,941.7	18,941.7
Sub-Total of 2-2:				32,001.8
Total of Equipment Supply:				195,760.6
VAT 12%				23,491.3
Total of Equipment including VAT:				219,251.9
3, Total Cost of CAMALIGAN FISH PORT Including VAT (3 = 1 + 2):				366,940.0

Table 16.1.10 Breakdown of Base Cost for Davao Fish Port

Unit: PHP

Description of Work Items	Unit	Quantity	Unit Price	Amount
1. Construction Works				
1.1 General Expenses	L.S.	1	1,982.9	1,982.9
1.2 Civil Works				
1) Quay for Ring-net Boats	lm	60	175.6	10,536.0
2) External Works & Others	L.S.	1	1,185.6	1,185.6
Sub-Total of Civil Works:				11,721.6
1.3 Building Works				
1) Fish Processing (HACCP) x 2 and Laboratory	L.S.	1,380	18.1	24,978.0
2) Market Hall	m2	315	17.2	5,418.0
3) Waste Water Treatment	L.S.	1	10,096.1	10,096.1
4) Deep Well	L.S.	1	1,646.4	1,646.4
5) Garbage Collection Area and Others	L.S.	1	1,278.4	1,278.4
Sub-Total of Building Works:				43,416.9
1.4 Miscellaneous	L.S.	1	602.1	602.1
1.5 Installation of Equipment	L.S.	1	9,968.1	9,968.1
Total Construction Works:				67,691.6
VAT 12%				8,123.0
Total of Construction Works including VAT:				75,814.6
2. Equipment				
2-1 Ice Making, Storage and Refrigeration facilities				
1 Repairing of Existing Ice Making Machine	L.S.	1	6,465.3	6,465.3
2 Ice Making & Refrigeration (HACCP)	unit	2	25,130.1	50,260.2
Sub-Total of 2-1:				56,725.5
2-2 Other Equipment				
1 Equipment for HACCP	unit	1	2,037.8	2,037.8
2 Equipment for Market Hall	unit	1	1,528.3	1,528.3
3 Equipment for Laboratory	unit	1	18,941.7	18,941.7
Sub-Total of 2-2:				22,507.8
Total of Equipment Supply:				79,233.3
VAT 12%				9,508.0
Total of Equipment including VAT:				88,741.3
3, Total Cost of DAVAO FISH PORT Including VAT (3 = 1 + 2):				164,555.9

Table 16.1.11 Breakdown of Base Cost for Bislig Fish Port

Unit: 1,000 PHP

Description of Work Items	Unit	Quantity	Unit Price	Amount
1. Construction Works				
1.1 General Expenses	L.S.	1	8,826.0	8,826.0
1.2 Civil Works				
1) Breakwater	lm	334	568.8	189,979.2
2) Revetment with Stair Landing	lm	260	111.7	29,042.0
3) Dreadging (-4.0m)	m3	54,000	0.17	9,180.0
4) Pavement (Access Road and Parking Area)	m2	10,000	2.0	20,000.0
5) Multi Purpose Pier	m2	1,860	74.6	138,756.0
6) Slipway	m2	3,900	7.9	30,810.0
7) Navigation Aid	L.S.	1	2,292.5	2,292.5
8) Perimeter Fence and Others	L.S.	1	8,423.7	8,423.7
Sub-Total of Civil Works:				428,483.4
1.3 Building Works				
1) Administration Building and Toilet	m2	431	22.3	9,611.3
2) Ice Making Building	m2	3,600	11.6	41,760.0
3) Market Hall	m2	360	17.2	6,192.0
4) Fablication Bilding	m2	800	12.6	10,080.0
5) Water Supply System including Reservoir	L.S.	1	8,336.2	8,336.2
6) Fuel Oil Supply System	L.S.	1	1,009.7	1,009.7
7) Electric Power Supply System	L.S.	1	22,182.1	22,182.1
8) Waste Water Treatment System	L.S.	1	8,856.8	8,856.8
9) Others	L.S.	1	3,010.3	3,010.3
Sub-Total of Building Works:				111,038.4
1.4 Miscellaneous	L.S.	1	5,112.9	5,112.9
1.5 Installation of Equipment	L.S.	1	17,327.4	17,327.4
Total Construction Works:				570,788.1
VAT 12%				68,494.6
Total of Construction Works including VAT:				639,282.7
2. Equipment				
2-1 Ice Making, Storage and Refrigeration facilities				
1 Ice Making Machine and Storage	unit	1	273,326.8	273,326.8
2-2 Other Equipment				
1 Equipment for Fablication Shop	unit	1	5,094.4	5,094.4
2 Equipment for Market Hall	L.S.	1	1,528.3	1,528.3
3 Vehicles	L.S.	1	3,010.3	3,010.3
Sub-Total of 2-2:				9,633.0
Total of Equipment Supply:				282,959.8
VAT 12%				33,955.2
Total of Equipment including VAT:				316,915.0
3, Total Cost of BISLIG FISH PORT Including VAT (3 = 1 +2):				956,197.6

Table 16.1.12 Breakdown of Base Cost for Conception Fish Port

Unit: 1,000 PHP

	Description of Work Items		Unit	Quantity	Unit Price	Amount
Construction Works						
1,	General Expenses		L.S.	1	3,448.5	3,448.5
2,	Construction Works					
	1)	Extension of Existing Jetty	lm	120	195.9	23,508.0
	2)	Market Hall	m2	330	18.6	6,138.0
	3)	Waste Water Treatment	m3/day	5	241.3	1,206.5
	4)	External Works	L.S.	1	1,367.6	1,367.6
	5)	Utilities	L.S.	1	2,288.8	2,288.8
	Sub-Total of Work Items:					34,508.9
3, Total Cost of CONCEPTION FISH PORT (1+2):						37,957.4
4, VAT (12%)						4,554.9
5, Total Cost of CONCEPTION FISH PORT Including VAT (5=3+4):						42,512.3

Table 16.1.13 Breakdown of Base Cost for Subic Fish Port

Unit: 1,000 PHP

	Description of Work Items		Unit	Quantity	Unit Price	Amount
Construction Works						
1,	General Expenses		L.S.	1	2,921.8	2,921.8
2,	Construction Works					
	1)	Reconstruction of Market Hall	m2	1,000	18.6	18,600.0
	2)	Retail Shop	m2	165	13.5	2,227.5
	3)	Waste Water Treatment	m3/day	20	242.3	4,846.0
	4)	External Works	L.S.	1	2,386.0	2,386.0
	5)	Utilities	L.S.	1	1,807.6	1,807.6
	Sub-Total of Construction Works:					29,867.1
3, Total Cost of SUBIC FISH PORT (1+2):						32,788.9
4, VAT (12%)						3,934.7
5, Total Cost of SUBIC FISH PORT Including VAT (5=3+4):						36,723.6

Table 16.1.14 Breakdown of Base Cost for Atimonan Fish Port

Unit: 1,000 PHP

	Description of Work Items		Unit	Quantity	Unit Price	Amount
Construction Works						
1,	General Expenses		L.S.	1	2,083.1	2,083.1
2,	Construction Works					
	1)	Demolishing and Reconstruction of Market Hall (814m2) including	m2	1	15,823.0	15,823.0
	2)	Waste Water Treatment	m3/day	10	242.3	2,423.0
	3)	External Works	L.S.	1	1,692.3	1,692.3
	4)	Utilities	L.S.	1	1,060.6	1,060.6
	Sub-Total of Construction Works:					20,998.9
3, Total Cost of ATIMONAN FISH PORT (1+2):						23,082.0
4, VAT (12%)						2,769.8
5, Total Cost of ATIMONAN FISH PORT Including VAT (5=3+4):						25,851.8

Table 16.1.15 Breakdown of Base Cost for Calabanga Fish Port

Unit: 1,000 PHP

	Description of Work Items	Unit	Quantity	Unit Price	Amount
Construction Works					
1,	General Expenses	L.S.	1	3,681.8	3,681.8
2,	Construction Works				
1)	Land Adjustment	m3	7,000	0.47	3,290.0
2)	Revetment (including Stair Landing)	lm	125	122.8	15,350.0
3)	Stair Landing (Sea side, including	lm	20	134.8	2,696.0
4)	Market Hall and Administration Bld.	m2	510	18.6	9,486.0
5)	Ice Storage x 2	m2	32	20.0	640.0
6)	Waste Water Treatment	m3	20	242.7	4,854.0
7)	External Works	m2	2,250	2.4	5,400.0
8)	Utilities	L.S.	1	1,534.8	1,534.8
	Sub-Total of Construction Works:				43,250.8
3, Total Cost of CALABANGA FISH PORT (1+2):					46,932.6
4, VAT (12%)					5,631.9
5, Total Cost of CALABANGA FISH PORT Including VAT (5=3+4):					52,564.5

Table 16.1.16 Breakdown of Base Cost for Sta. Cruz Fish Port

Unit: 1,000 PHP

	Description of Work Items	Unit	Quantity	Unit Price	Amount
Construction Works					
1,	General Expenses	L.S.	1	4,443.5	4,443.5
2,	Construction Works				
1)	Revetment	lm	80	24.6	1,968.0
2)	Rehabilitation of Existing Causeway	lm	254	102.4	26,009.6
3)	Land Reclamation and Dredging	m3	8,100	0.47	3,807.0
4)	Stair Landing	lm	20	61.2	1,224.0
5)	Market Hall and Administration Bld.	m2	265	18.6	4,929.0
6)	Ice Storage	m2	4	20.0	80.0
7)	Waste Water Treatment	m3	5	251.1	1,255.5
8)	Access Road and External Work	L.S.	1	3,591.1	3,591.1
9)	Utilities	L.S.	1	2,176.7	2,176.7
	Sub-Total of Construction Works:				45,040.9
3, Total Cost of STA. CRUZ FISH PORT (1+2):					49,484.4
4, VAT (12%)					5,938.1
5, Total Cost of STA. CRUZ FISH PORT Including VAT (5 = 3 + 4):					55,422.5

16.2 Summary of Project Costs for the Municipal Fish Ports of Needs Assessment Survey

Based on the project estimation for the object municipal ports of Needs Assessment Survey comprised 10 fish ports, the total of initial cost will be amounted to PHP 532 Million.

Note *1: This amount includes VAT 12% but excludes Price escalation, contingency, Consulting cost, Supervision cost by PMO, Fish port Management cost (Technical Cooperation) and Commitment charge.

Table 16.2.1 Summary of Base Costs for the Municipal Ports

Unit: 1,000 PHP

	Municipal Fish Ports	(A) Cost of Construction/ Equipment	(B) VAT 12%	(C) Cost Including VAT
1	SAN JOSE	43,436.8	5,212.4	48,649.2
2	DUMANGAS	4,161.3	499.4	4,660.7
3	DAGUPAN	117,070.7	14,048.5	131,119.2
4	CALAUAG	39,861.2	4,783.3	44,644.5
5	STA. ELENA	68,401.9	8,208.2	76,610.1
6	PASACAO	11,743.9	1,409.3	13,153.2
7	OAS	5,366.6	644.0	6,010.6
8	PANABO	12,678.6	1,521.4	14,200.0
9	MATI	12,137.7	1,456.5	13,594.2
10	BALATAN	160,267.7	19,232.1	179,499.8
	TOTAL	475,126.4	57,015.2	532,141.5

Initial cost of each site is shown hereunder;

Table 16.2.2 Breakdown of Base Cost for San Jose Fish Port

Unit: 1,000 PHP

		Description of Work Items	Unit	Quantity	Unit Price	Amount
Construction Works						
1,		General Expenses	L.S.	1	3,982.9	3,982.9
2,		Construction Works				
	1)	Extension of Causeway and Stair Landing	lm	120	200.1	24,012.0
	2)	Port Yard Extension	m3	2,000	0.46	920.0
	3)	Market Hall and Administration Bld.	m2	310	18.4	5,704.0
	4)	Revetment	lm	60	25.1	1,506.0
	5)	Ice Storage	m2	8	20.1	160.8
	6)	Waste Water Treatment	m3/day	10	241.8	2,418.0
	7)	External Works	L.S.	1	2,834.3	2,834.3
	8)	Utilities	L.S.	1	1,898.8	1,898.8
		Sub-Total of Construction Works:				39,453.9
3, Total Cost of SAN JOSE FISH PORT (1+2):						43,436.8
4, VAT (12%)						5,212.4
5, Total Cost of SAN JOSE FISH PORT Including VAT:						48,649.2

Table 16.2.3 Breakdown of Base Cost for Dumangas Fish Port

Unit: 1,000 PHP

		Description of Work Items	Unit	Quantity	Unit Price	Amount
Construction Works						
1,		General Expenses	L.S.	1	694.7	694.7
2,		Construction Works				
	1)	Stair Landing	Nos.	5	41.7	208.5
	2)	Market Hall and Administration Bld.	m2	85	18.4	1,564.0
	3)	Ice Storage	m2	4	20.1	80.4
	4)	Waste Water Treatment	m3/day	2	241.8	483.6
	5)	External Works	L.S.	1	666.9	666.9
	6)	Utilities	L.S.	1	463.2	463.2
		Sub-Total of Construction Works:				3,466.6
3, Total Cost of DUMANGAS FISH PORT (1+2):						4,161.3
4, VAT (12%)						499.4
5, Total Cost of DUMANGAS FISH PORT Including VAT:						4,660.7

Table 16.2.4 Breakdown of Base Cost for Dagupan Fish Port

Unit: 1,000 PHP

		Description of Work Items	Unit	Quantity	Unit Price	Amount
Construction Works						
1,		General Expenses	L.S.	1	10,643.0	10,643.0
2,		Construction Works				
	1)	Port Yard Reclamation	m3	39,600	0.46	18,216.0
	2)	Market Hall and Administration Bld.	m2	2,200	16.7	36,740.0
	3)	Revetment and Stair Landing	lm	315	50.1	15,781.5
	4)	Waste Water Treatment	m3/day	40	241.8	9,672.0
	5)	External Works	L.S.	1	20,923.8	20,923.8
	6)	Utilities	L.S.	1	5,094.4	5,094.4
		Sub-Total of Construction Works:				106,427.7
3, Total Cost of DAGUPAN FISH PORT (1+2):						117,070.7
4, VAT (12%):						14,048.5
5, Total Cost of DAGUPAN FISH PORT Including VAT:						131,119.2

Table 16.2.5 Breakdown of Base Cost for Calauag Fish Port

Unit: 1,000 PHP

		Description of Work Items	Unit	Quantity	Unit Price	Amount
Construction Works						
1,		General Expenses	L.S.	1	3,624.0	3,624.0
2,		Construction Works				
	1)	Raclamation	m3	5,940	0.46	2,732.4
	2)	Revetment	lm	140	50.0	7,002.8
	3)	Market Hall and Administration Bld.	m2	790	18.3	14,488.6
	4)	Waste Water Treatment	m3/day	20	241.8	4,835.0
	5)	External Works (including drainage extension)	L.S.	1	5,418.5	5,418.5
	6)	Utilities	L.S.	1	1,759.9	1,759.9
		Sub-Total of Construction Works:				36,237.2
3, Total Cost of CALAUAG FISH PORT (1+2):						39,861.2
4, VAT (12%):						4,783.3
5, Total Cost of CALAUAG FISH PORT Including VAT:						44,644.5

Table 16.2.6 Breakdown of Base Cost for Sta. Elena Fish Port

Unit: 1,000 PHP

		Description of Work Items	Unit	Quantity	Unit Price	Amount
Construction Works						
1,		General Expenses	L.S.	1	6,219.0	6,219.0
2,		Construction Works				
	1)	Rehabilitation and Extension of Causeway (including Fish Landing Facility)	lm	80	398.3	31,864.0
	2)	Rehabilitation of Fish Port Land	m3	2,400	2.8	6,720.0
	3)	Dredging	m3	6,000	0.28	1,680.0
	4)	Market Hall and Administration Bld.	m2	310	21.4	6,634.0
	5)	Stair Landing	lm	40	55.6	2,224.0
	6)	Ice Storage	m2	12	23.2	278.4
	7)	Waste Water Treatment	m3/day	10	277.9	2,779.0
	8)	External Works	L.S.	1	7,039.5	7,039.5
	9)	Utilities	L.S.	1	2,964.0	2,964.0
		Sub-Total of Construction Works:				62,182.9
3, Total Cost of STA. ELENA FISH PORT (1+2):						68,401.9
4, VAT (12%)						8,208.2
5, Total Cost of STA. ELENA FISH PORT Including Contingency:						76,610.1

Table 16.2.7 Breakdown of Base Cost for Pasacao Fish Port

Unit: 1,000 PHP

		Description of Work Items	Unit	Quantity	Unit Price	Amount
Construction Works						
1,		General Expenses	L.S.	1	1,343.1	1,343.1
2,		Construction Works				
	1)	Market Hall and Administration Bld.	m2	240	20.4	4,896.0
	2)	Ice Storage	lm	8	22.3	178.4
	3)	Waste Water Treatment	m3/day	5	268.7	1,343.5
	4)	External Works	L.S.	1	3,473.4	3,473.4
	5)	Utilities	L.S.	1	509.5	509.5
		Sub-Total of Construction Works:				10,400.8
3, Total Cost of PASACAO FISH PORT (1+2):						11,743.9
4, VAT (12%)						1,409.3
5, Total Cost of PASACAO FISH PORT Including Contingency:						13,153.2

Table 16.2.8 Breakdown of Base Cost for Oas Fish Port

Unit: 1,000 PHP

		Description of Work Items	Unit	Quantity	Unit Price	Amount
Construction Works						
1,		General Expenses	L.S.	1	694.7	694.7
2,		Construction Works				
	1)	Market Hall and Administration Bld.	m2	85	20.4	1,734.0
	2)	Ice Storage	m2	4	22.3	89.2
	3)	Waste Water Treatment	m3/day	5	268.7	1,343.5
	4)	External Works	L.S.	1	926.3	926.3
	5)	Utilities	L.S.	1	578.9	578.9
		Sub-Total of Construction Works:				4,671.9
3, Total Cost of OAS FISH PORT (1+2):						5,366.6
4, VAT (12%)						644.0
5, Total Cost of OAS FISH PORT Including Contingency:						6,010.6

Table 16.2.9 Breakdown of Base Cost for Panabo Fish Port

Unit: 1,000 PHP

		Description of Work Items	Unit	Quantity	Unit Price	Amount
Construction Works						
1,		General Expenses	L.S.	1	1,157.8	1,157.8
2,		Construction Works				
	1)	Market Hall and Administration Bld.	m3	290	20.4	5,916.0
	2)	Waste Water Treatment	m3/day	10	268.7	2,687.0
	3)	External Works	L.S.	1	2,362.0	2,362.0
	4)	Utilities	L.S.	1	555.8	555.8
		Sub-Total of Construction Works:				11,520.8
3, Total Cost of PANABO FISH PORT (1+2):						12,678.6
4, VAT (12%)						1,521.4
5, Total Cost of PANABO FISH PORT Including Contingency:						14,200.0

Table 16.2.10 Breakdown of Base Cost for Mati Fish Port

Unit: 1,000 PHP

		Description of Work Items	Unit	Quantity	Unit Price	Amount
Construction Works						
1,		General Expenses	L.S.	1	1,104.0	1,104.0
2,		Construction Works				
	1)	Land Leveling	L.S.	1	1,343.1	1,343.1
	2)	Stair Landing	lm	30	55.6	1,668.0
	3)	Market Hall and Administration Bld.	m2	170	20.4	3,468.0
	4)	Ice Storage	m2	9	22.3	200.7
	5)	Waste Water Treatment	m3/day	5	268.7	1,343.5
	6)	External Works	L.S.	1	1,991.5	1,991.5
	7)	Utilities	L.S.	1	1,018.9	1,018.9
		Sub-Total of Construction Works:				11,033.7
3, Total Cost of MATI FISH PORT (1+2):						12,137.7
4, VAT (12%)						1,456.5
5, Total Cost of MATI FISH PORT Including Contingency:						13,594.2

Table 16.2.11 Breakdown of Base Cost for Balatan Fish Port

Unit: 1,000 PHP

		Description of Work Items	Unit	Quantity	Unit Price	Amount
Construction Works						
1,		General Expenses	L.S.	1	14,569.0	14,569.0
2,		Construction Works				
	1)	Breakwater (New Construction)	lm	150	602.1	90,315.0
	2)	Dredging	m3	30,000	0.30	9,000.0
	3)	Landing Facility for Commercial Boat	lm	100	199.2	19,920.0
	4)	Market Hall	m2	350	20.4	7,140.0
	5)	Ice Storage x 2	m2	24	22.3	535.2
	6)	Waste Water Treatment	m3	20	134.4	2,688.0
	7)	Asphalt Pavement including Rainwater Drainages	m2	4,000	2.3	9,200.0
	8)	Utilities	L.S.	1	6,900.5	6,900.5
		Sub-Total of Construction Works:				145,698.7
3, Total Cost of BALATAN FISH PORT (1+2):						160,267.7
4, VAT (12%)						19,232.1
5, Total Cost of BALATAN FISH PORT Including Contingency:						179,499.8

16.3 Cost for Consulting Service and Technical Assistance

Cost for consulting service and technical assistance are shown in the following table.

Table 16.3.1 Cost for Consulting Service and Technical Assistance

	Item	Contents	Cost (1,000 PHP)	Remarks
1. Consulting Service				
1)	Detail Design	Detail Design for the Project (Implementation Period: 12 months, Expatriate Engineer: 93M/M, Local Engineer: 100M/M)	198,310	Detail Design including; ▪ Review of F/S ▪ Confirmation of Indicators for Project Outputs ▪ Natural Condition Survey ▪ Preparation of PQ and Tender for contractors
2)	Construction Management	Construction Management for the Project (Implementation Period: 36months, Expatriate Engineer: 209.5M/M, Local Engineer: 337M/M)	396,570	Construction Management including; ▪ Assistance of tender for contractors ▪ Inspection for difect liability period
		Sub-total	594,880	
2. Fish Port Management		Advisory Service for Fish Port Management (Expatriate Engineer: 24M/M)	37,050	Details are described in 18.4 Technical Assistance

Note: Details of the above table is described in Appendix16 of volume 2, Final Report.
Abbreviation: M/M: Man Months

17. Implementation Schedule

17.1 General

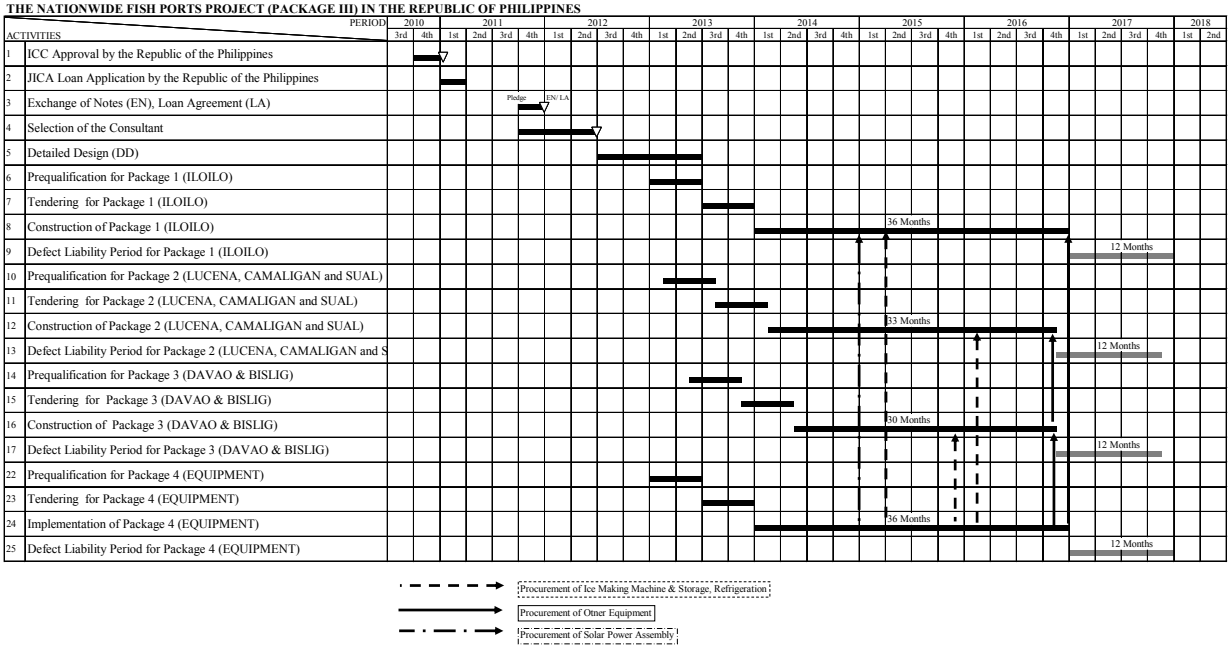
This chapter describes the Implementation schedule showing the sequence of process to be undertaken from ICC approval to the termination of the defects liability period of completed works. The schedule of ICC approval until the completion of the detailed design was determined based on the understanding from a series of discussions with JICA, DA and PFDA.

The tabulation below shows the Construction period for each contract package.

		Construction/ Supply	Defect Liability Period
Package 1 (ILOILO)	:	36 months	12 Months
Package 2 (LUCENA, CAMALIGAN and SUAL)	:	33 months	12 Months
Package 3 (DAVAO and BISLIG)	:	30 months	12 Months
Package 4 (Equipment Supply)	:	25.5 Months	12 Months

The defects liability period for each contract package is 12 months. The defects liability period for Package 4 (Equipment) will cover the whole construction period to ensure compliance with the Specifications/Contract.

Table 17.1.1 Implementation Schedule



17.2 Construction Schedule of Regional Fish Ports

Construction schedule of regional ports are shown hereunder. Critical pass is indicated as dashed line.

Table 17.2.1 Construction Schedule of Iloilo Fish Port

WORK ITEM		1st Year												2nd Year												3rd Year											
	WORK PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	Preparation/ Mobilization																																				
2	Stare Landing																																				
3	Slope Protection (Repairing)																																				
4	Breakwater (additional)																																				
5	Harbor Dredging (including Soil Disposal)																																				
6	Navigation Aids																																				
7	Repairing of Slipway																																				
8	Market Hall																																				
9	Fish Processing (HACCP) x 4 and Laboratory																																				
10	Ref. Building (Repairing)																																				
11	Ship Repairing Shop (Repairing)																																				
12	Waste Water Treatment																																				
14	Repairing of Existing Ice Making Machine & Storage																																				
15	Refrigeration and Quick Freezer																																				
16	Ice Making & Refrigeration (HACCP)																																				
17	Equipment for Ship Repairing Shop																																				
18	Solar Panel Power (without Battery)																																				
19	Equipment for Fish Processing, HACCP and Laboratory																																				
20	Demobilization/ Final Clean Up																																				

Table 17.2.2 Construction Schedule of Sual Fish Port

WORK ITEM		1st Year												2nd Year											
	WORK PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Preparation/ Mobilization																								
2	Milk Fish Jetty																								
3	Pier Extension																								
4	Slipway Extension																								
5	Revetment (Repairing)																								
6	Pavement (including Drainage Repairing)																								
7	Navigation Aids																								
8	Fish Processing (HACCP)																								
9	Ref. Building (Repairing)																								
10	Ship Repairing Shop																								
11	Waste Water Treatment																								
12	Warehouse for Fish Feed																								
13	Winch house																								
14	Repairing of Existing Ice Making Machine & Storage																								
15	Refrigeration and Quick Freezer																								
16	Ice Making & Refrigeration (HACCP)																								
17	Equipment for Ship Repairing Shop																								
18	Winch																								
19	Equipment for Fish Processing, HACCP and Laboratory																								
20	Demobilization/ Final Clean Up																								

Table 17.2.3 Construction Schedule of Lucena Fish Port

WORK ITEM		1st Year												2nd Year											
	WORK PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Preparation/ Mobilization																								
2	Repairing of Breakwater																								
3	Pier Extension																								
4	Repairing Fenders																								
5	Ref. Building (Repairing)																								
6	Market Hall and Administration Office																								
7	Waste Water Treatment																								
8	Retail Market																								
9	New Water Supply System including Reservoir																								
10	Repairing of Existing Ice Making Machine & Storage																								
11	Refrigeration and Quick Freezer																								
12	Equipment for Local Fish Prospecting and Market Hall																								
13	Demobilization/ Final Clean Up																								

Note: — — — Critical Pass

Table 17.2.4 Construction Schedule of Camaligan Fish Port

WORK ITEM		1st Year												2nd Year												3rd Year											
	WORK PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	Preparation/ Mobilization																																				
2	Land Rehabilitation																																				
3	Slope Protection																																				
4	Perimeter Fence																																				
5	Fish Processing (HACCP) x 4 and Laboratory																																				
7	Ref. Building (Repairing)																																				
8	Waste Water Treatment																																				
9	Ice Making Machine & Storage																																				
9	Blast Freezer and Refrigeration																																				
10	Ice Making & Refrigeration (HACCP)																																				
12	Equipment for HACCP, Laboratory and Market Hall																																				
13	Demobilization/ Final Clean Up																																				

Table 17.2.5 Construction Schedule of Davao Fish Port

WORK ITEM		1st Year												2nd Year											
	WORK PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Preparation/ Mobilization																								
2	Quay for Ring-net Boats																								
3	Fish Processing (HACCP) x 2 and Laboratory																								
4	Market Hall																								
5	Waste Water Treatment																								
6	Deep Well																								
7	Repairing of Existing Ice Making Machine																								
8	Ice Making & Refrigeration (HACCP)																								
9	Equipment for HACCP, Laboratory and Market Hall																								
10	Demobilization/ Final Clean Up																								

Table 17.2.6 Construction Schedule of Bislig Fish Port

WORK ITEM		1st Year												2nd Year												3rd Year											
	WORK PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	Preparation/ Mobilization																																				
2	Breakwater																																				
3	Revetment with Stair Landing																																				
4	Dreadging (-4.0m)																																				
5	Pavement (Access Road and Parking Area)																																				
6	Multi Purpose Pier																																				
7	Slipway																																				
8	Navigation Aid																																				
9	Administration Building																																				
10	Ice Making Building																																				
11	Market Hall																																				
12	Fablication Bilding																																				
13	Water Supply System (Reservoir and Deep Well)																																				
14	Fuel Oil Supply System																																				
15	Electric Power Supply System																																				
16	Waste Water Treatment																																				
17	Ice Making Machine and Storage																																				
18	Equipment for Fish Processing and Market Hall																																				
19	Demobilization/ Final Clean Up																																				

Note: — — — Critical Pass

17.3 Construction Schedule of Selected Municipal Fish Ports

Construction schedule of selected municipal fish ports are shown hereunder. Critical pass is indicated as dashed line.

Table 17.3.1 Construction Schedule of Conception Fish Port

WORK ITEM		1st Year											
	WORK PERIOD	1	2	3	4	5	6	7	8	9	10	11	12
1	Preparation/ Mobilization												
2	Extension of Existing Jetty												
3	Market Hall												
4	Waste Water Treatment												
5	External Works												
6	Demobilization/ Final Clean Up												

Note: — — — Critical Pass

Table 17.3.2 Construction Schedule of Subic Fish Port

WORK ITEM		WORK PERIOD	1st Year											
			1	2	3	4	5	6	7	8	9	10	11	12
1	Preparation/ Mobilization													
2	Reconstruction of Market Hall													
3	Retail Shop													
4	Waste Water Treatment													
5	External Works													
6	Demobilization/ Final Clean Up													

Table 17.3.3 Construction Schedule of Atimonan Fish Port

WORK ITEM		WORK PERIOD	1st Year											
			1	2	3	4	5	6	7	8	9	10	11	12
1	Preparation/ Mobilization													
2	Demolishing and Reconstruction of Market Hall (814m2) including Temporary Works		Temp. Works				Parmanent Market Hall						Demolishing of Temp. Works	
3	Waste Water Treatment													
4	External Works and Repairing of Stair													
5	Demobilization/ Final Clean Up													

Table 17.3.4 Construction Schedule of Calabanga Fish Port

WORK ITEM		WORK PERIOD	1st Year											
			1	2	3	4	5	6	7	8	9	10	11	12
1	Preparation/ Mobilization													
2	Land Adjustment													
3	Revetment (including Stair Landing)													
4	Stair Landing (Sea side, including Parapet)													
5	Market Hall and Administration Bld.													
6	Ice Storage x 2													
7	Waste Water Treatment													
8	External Works													
9	Demobilization/ Final Clean Up													

Table 17.3.5 Construction Schedule of Sta. Cruz Fish Port

WORK ITEM		WORK PERIOD	1st Year											
			1	2	3	4	5	6	7	8	9	10	11	12
1	Preparation/ Mobilization													
2	Revetment													
3	Rehabilitation of Existing Causeway													
4	Land Reclamation and Dredging													
5	Stair Landing													
6	Market Hall and Administration Bld.													
7	Ice Storage													
8	Waste Water Treatment													
9	Access Road and External Work													
10	Demobilization/ Final Clean Up													

Note: — — — Critical Pass

17.4 Construction Schedule of Object Municipal Fish Ports for the Needs Assessment Survey

Construction schedule of object municipal fish ports for the Needs Assessment Survey are shown hereunder. Critical pass is indicated as dashed line.

Table 17.4.1 Construction Schedule of San Jose

WORK ITEM \ WORK PERIOD		1st Year											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Preparation/ Mobilization												
2	Extension of Causeway and Stair Landing												
3	Port Yard Extension												
4	Market Hall and Administration Bld.												
5	Revetment												
6	Ice Storage												
7	Waste Water Treatment												
8	External Works												
9	Utilities												
10	Demobilization/ Final Clean Up												

Table 17.4.2 Construction Schedule of Dumangas

WORK ITEM \ WORK PERIOD		1st Year											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Preparation/ Mobilization												
2	Stair Landing												
3	Market Hall and Administration Bld.												
4	Ice Storage												
5	Waste Water Treatment												
6	External Works												
7	Utilities												
8	Demobilization/ Final Clean Up												

Table 17.4.3 Construction Schedule of Dagupan

WORK ITEM \ WORK PERIOD		1st Year												2nd Year					
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Preparation/ Mobilization																		
2	Port Yard Reclamation																		
3	Market Hall and Administration Bld.																		
4	Revetment and Stair Landing																		
5	Waste Water Treatment																		
6	External Works																		
7	Utilities																		
8	Demobilization/ Final Clean Up																		

Note: — — — Critical Pass

Table 17.4.4 Construction Schedule of Calauag

WORK ITEM		WORK PERIOD	1st Year											
			1	2	3	4	5	6	7	8	9	10	11	12
1	Preparation/ Mobilization													
2	Raclamation													
3	Revetment													
4	Market Hall and Administration Bld.													
5	Waste Water Treatment													
6	External Works (including drainage extension)													
7	Utilities													
8	Demobilization/ Final Clean Up													

Table 17.4.5 Construction Schedule of Sta. Elena

WORK ITEM		WORK PERIOD	1st Year												2nd Year											
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Preparation/ Mobilization																									
2	Rehabilitation and Extension of Causeway (including Fish Landing Facility)																									
3	Rehabilitation of Fish Port Land																									
4	Dredging		1st Dredging															2nd Dredging (Finishing)								
5	Market Hall and Administration Bld.																									
6	Stair Landing																									
7	Ice Storage																									
8	Waste Water Treatment																									
9	External Works																									
10	Utilities																									
11	Demobilization/ Final Clean Up																									

Table 17.4.6 Construction Schedule of Pasacao

WORK ITEM		WORK PERIOD	1st Year											
			1	2	3	4	5	6	7	8	9	10	11	12
1	Preparation/ Mobilization													
2	Market Hall and Administration Bld.													
3	Ice Storage													
4	Waste Water Treatment													
5	External Works													
6	Utilities													
7	Demobilization/ Final Clean Up													

Table 17.4.7 Construction Schedule of Oas

WORK ITEM		WORK PERIOD	1st Year											
			1	2	3	4	5	6	7	8	9	10	11	12
1	Preparation/ Mobilization													
2	Market Hall and Administration Bld.													
3	Ice Storage													
4	Waste Water Treatment													
5	External Works													
6	Utilities													
7	Demobilization/ Final Clean Up													

Note: — — — Critical Pass

Table 17.4.8 Construction Schedule of Panabo

	WORK ITEM \ WORK PERIOD	1st Year											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Preparation/ Mobilization												
2	Market Hall and Administration Bld.												
3	Waste Water Treatment												
4	External Works												
5	Utilities												
6	Demobilization/ Final Clean Up												

Table 17.4.9 Construction Schedule of Mati

	WORK ITEM \ WORK PERIOD	1st Year											
		1	2	3	4	5	6	7	8	9	10	11	12
1	Preparation/ Mobilization												
2	Land Leveling												
3	Stair Landing												
4	Market Hall and Administration Bld.												
5	Ice Storage												
6	Waste Water Treatment												
7	External Works												
8	Utilities												
9	Demobilization/ Final Clean Up												

Table 17.4.10 Construction Schedule of Balatan

	WORK ITEM \ WORK PERIOD	1st Year												2nd Year											
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Preparation/ Mobilization																								
2	Breakwater (New Construction)		Construction of wave-dissipating blocks and Concrete Blocks																						
3	Dredging			1st Dredging																			2nd Dredging (Finishing)			
4	Landing Facility for Commercial Boat																								
5	Market Hall																								
6	Ice Storage x 2																								
7	Waste Water Treatment																								
8	Asphalt Pavement including Rainwater Drainages																								
9	Utilities																								
10	Demobilization/ Final Clean Up																								

Note: — — — Critical Pass

18. Project Implementation and Operation & Maintenance Structure

18.1 General

a) In the earlier Fishing Port Project, Packages I and II, DPWH or DOTC were in charge of planning, designing and construction supervision, and thereafter PFDA took over the facilities and have become the agency in charge of the operation, maintenance and management. Repercussions of the arrangement were difficulties in reflecting preferences and opinions on the O&M aspects to the facility planning and designs.

b) It is anticipated that the present Project implementation will avoid the same situation, since both DA, the executing agency and PFDA, the implementing agency, have dealt with the initial planning in this Study, and PFDA shall be responsible for overall implementation from the succeeding detailed design/engineering, bidding, civil works and equipment procurement, to the eventual operation and management. It is expected that the efficient operation and management of the facilities by PFDA will be realized by incorporating those preferences and desires into the planning/design considerations.

c) As explained in Chapter 7, there are a number of the government entities involving in the fishery development in the Philippines with a variety of responsibilities, functions, establishments and resources of each typically demonstrated in Table 7.2.1. Considering complexity in the governmental organization in this respect, there has been an initiative to create a leading government agency in charge of aquaculture and fishery resources, which in fact has been proposed to convert the incumbent BFAR into the department, i.e., Department of Aquaculture and Fisheries Resources, separately from DA. A draft bill of this Act was prepared, wherein delineated is PFDA to be an attached agency of the proposed department without altering its authority and functions in the fish port operation/management.

d) Upon the Project implementation by Japanese ODA Loan proceeds, the Loan Agreement will be concluded between JICA and GOP through the Department of Finance (DOF) as the guarantor of the loan with DA as the implementation agency and PFDA as the executing agency.

e) The loan disbursement procedure generally adopted in the Philippines is the “transfer procedure”, where loan disbursement shall be coursed through a non-resident foreign currency account of the Borrower in Japan. The actual disbursement flow in this case is schematically shown in Fig. 18.1.1. (Note that the detailed process inside PFDA/DA presented is subject to change in accordance with internal guidelines of PFDA/DA.)

f) In the operation phase of the Project, the annual fund requirement shall be appropriated by GOP through the General Appropriations Act in the DA’s annual budget program. Considering the level of financial viability of the Project discussed in Chapter 19, the debt (loan) repayment will be budgeted by GOP national accounts through DOF separately from the DA’s budget. A schematic financing flow is shown in Fig. 18.1.2.

g) Subject to further discussions between JICA and DA(PDF), the loan proceeds to the municipal fish ports would be either the same arrangement as the above, or coursed through the Municipal Development Fund Office (MDFO) to each LGU. In the first scheme, the facilities of the municipal fish ports will be constructed and/or procured in the project implementation by DA/PDF.

h) Following the E/N (exchange of notes) and L/A (loan agreement) for the Project finance by JICA loan proceeds, procedural steps over the project cycles among the relevant agencies are schematically shown Fig. 18.1.3 for each essential process in the Project implementation.

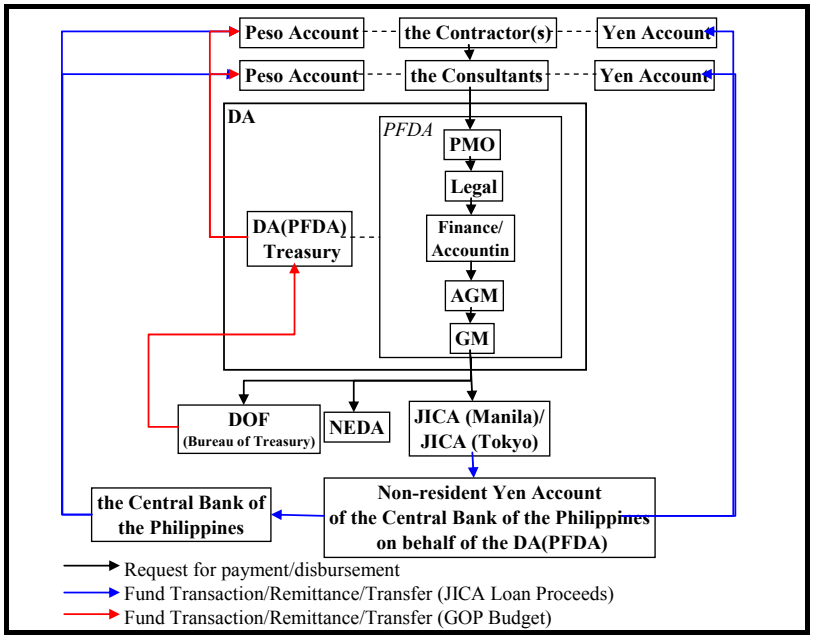


Fig. 18.1.1 Disbursement Flow

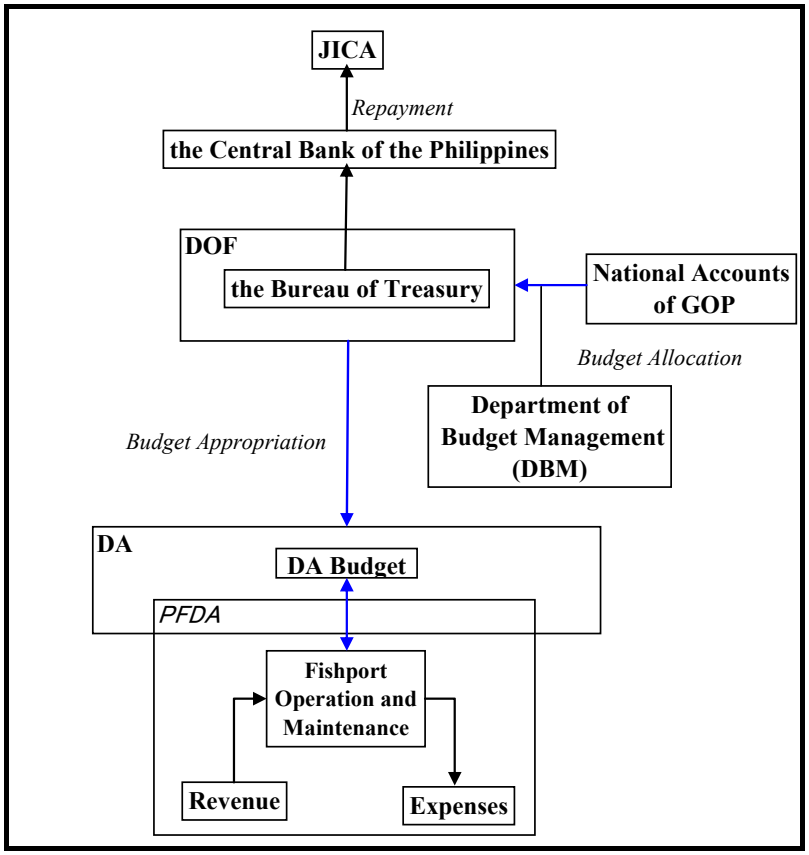


Fig. 18.1.2 Financing Repayment Flow

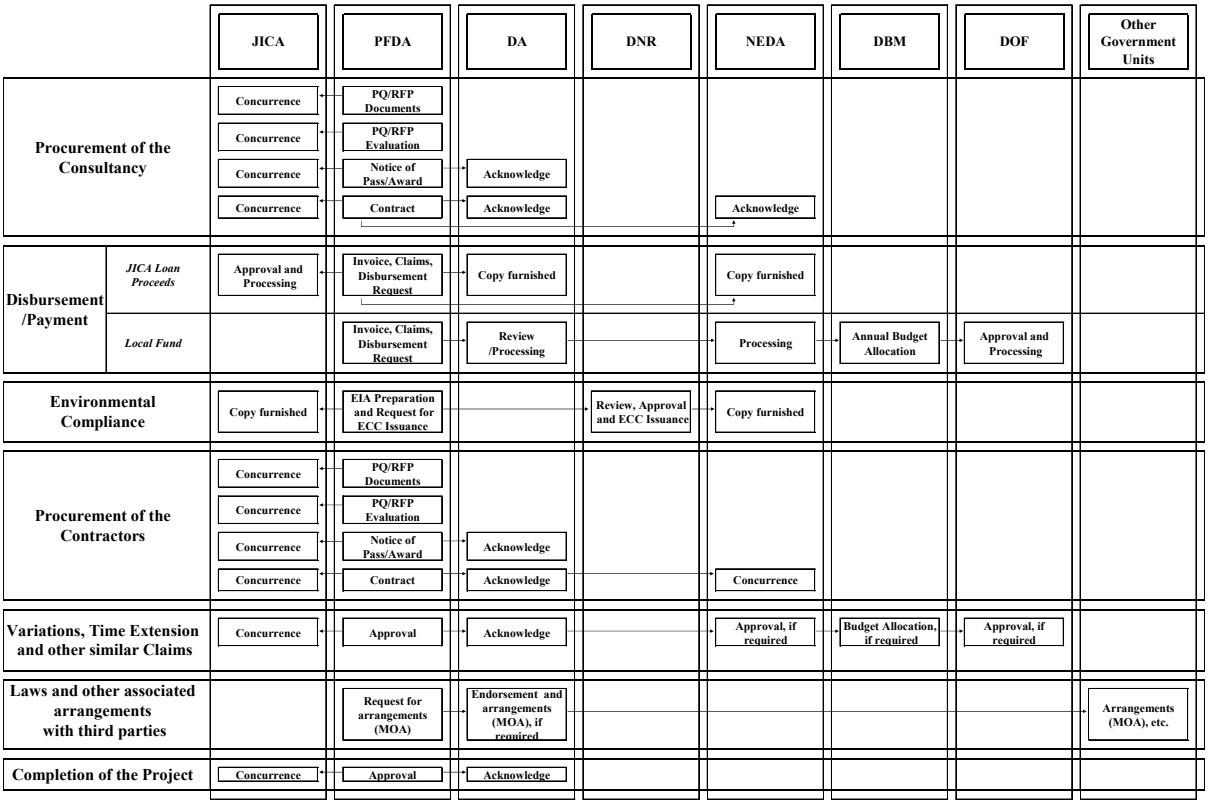


Fig. 18.1.3 Procedural Steps Over the Project Cycles among the Relevant Agencies

18.2 Project Implementation Structure

a) To date, PFDA have exercised design and construction supervision of the municipal ports in the Philippines within its jurisdiction and authority defined in the Agricultural Fishery Modernization Act (AFMA) with the allocated annual budget of GOP. The present Project implementation is expected to be successfully completed within the capacity of PFDA proven in the said experience in collaboration with the existing Fish Port Office of the regional ports.

b) The proposed development of the municipal ports selected in this Study will be implemented by PFDA to its completion of the construction. Thereafter, they will be turned over to/taken over by respective LGUs for operation/maintenance and management.

c) The PFDA has established Regional Fish Port Offices (RFPOs) for the management and operation of each of the Regional Fish Ports (RFP). REPO is headed by a Port Manager to administer the activities of the Fish Port Complex. The organizational structure of the PMOs follows the same pattern of organizing the PMO into 1 to 3 Divisions namely, Administration and Finance, Marketing & Harbor Operations and Engineering, as shown in the organization charts in the Appendix, depending on the size of the RFP. The Administration and Finance Division is in charge of the finances associated with revenues and expenditures, Marketing and Harbor Operation is tasked for marketing promotion, use of the port facilities and sales of ice and, the Engineering Division is designated for maintenance of the port facilities.

d) Table 18.2.1 below summaries number of staff in each office of PFDA.

Table 18.2.1 Number of Staff in Each Office of PFDA

Office	Central Office	Iloilo FPC	Sual FPC	Lucena FPC	Camaligan FPC	Davao FPC
No. of Employees	160	63	8	52	26	41

e) Based on the income and expenditures statement of PFDA, payment for salaries and wages occupies more than half of the expenditures of the Authority. The PFDA is aware of the situation and the authority is exerting all efforts to slim down the size of the organization through rationalization and standardization of government employees as mandated by the national government. Optimizing the organization to achieve the higher efficiency and productive outcomes will be a continuing effort of PFDA for operation and management of the regional fish ports. This aspect will be further discussed in the next sub-section for the operation and maintenance structure.

f) Notwithstanding the above, PFDA will be the implementing agency to oversee the successful execution of the Project. To undertake this task, PFDA will be required to organize a Project Management Office (PMO) and will be deploying counterpart personnel to assist in implementing the Project. The Organizational Structure of the PMO is shown in Fig. 18.2.1 hereafter. The estimated cost relative to PMO including field inspections of PFDA officials is shown in Table.18.2.2.

g) Consulting services for the project implementation: A brief time schedule, cost of consulting services and relevant TOR are shown in Tables 17.1.1 and 16.1.2 respectively. Relevant TOR are also shown in Appendix 16.

h) The requirement of the PMO creation/operations is transient in its nature to cover the implementation period of the Project and is to de dissolved once the facilities become operational.

i) It is also to be noted the cost required for the PMO organization shall be budgeted by DA/PFDA as the administration cost for the Project implementation and shall not be eligible for JICA loan proceeds. The similar arrangement by MDFO/LGUs will be required, in case the implementation of the municipal fish ports will be separately proceeded from the project implementation by DA/PFDA.

Table 18.2.2 Estimated Cost for Field Inspections

ITEM	EXPENDITURES	CENTRAL OFFICE	PACKAGE 1	PACKAGE 2	PACKAGE 3	TOTAL (PHP)
A	PERSONAL SERVICES	6,104,799.98	3,417,066.00	6,042,500.00	4,504,943.97	Php20,069,309.95
B	TRAVELLING EXPENSES	456,000.00	883,272.00	727,212.00	862,848.00	Php2,929,332.00
C	EXPENSES (5% OF TOTAL)					1,500,000.00
	TOTAL (PHP)	**6,560,799.98**	**4,300,338.00**	**6,769,712.00**	**5,367,791.97**	**PHP 24,498,641.95**

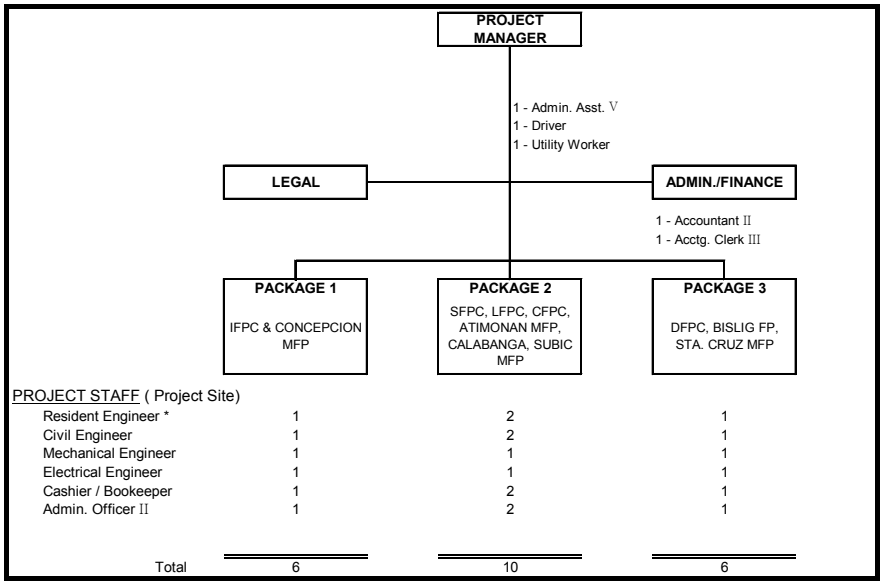


Fig. 18.2.1 PMO Organization Structure in PFDA

18.3 Operation and Maintenance Structure

a) Based on the past operation practice of PFDA in the major regional fish port complexes, such as NFPC, GSFPC, ZFPC, O&M capacity of PFDA with regards to the present development is considered sufficient with appropriate and necessary improvement for sustainability of the Project, particularly in respect of the improvement in the financial status of PFDA.

In general, the capacity of PFDA with regards to the O&M phase of the Project is considered sufficient for sustainable operations of the project fish ports and successful accomplishment of the intended Project objectives for the following reasons:

- In principle, almost all of the civil work facilities included in the Project scope are planed and to be designed free of maintenance over its servicing period;
- Most of the equipment included in the Project scope, such as refrigerator, freezer, ice making plant and other utility, is the same as in the earlier packages of the Fish Port Project, i.e., packages 1 and 2, and its operation and maintenance is likewise the same procedure as have been exercised by the present PFDA organization/staff to date;
- Whereas the past O&M of the above equipment has encountered occasional break-down without timely supply of the essential spare parts, improvement in the effective O&M measures are suggested and explained later in this Study, including appropriate outsourcing option and deregulation/relaxation of the procurement procedure as per the present PFDA guidelines;
-

Other than the above equipment, the solar power system newly introduced in the Project scope can be operated with ease and is basically free of maintenance except for its essential spare part requirements.

b) For Bislig Fish Port newly to be developed in this proposed Project, PFDA will be establishing a Port Management Office following similar organizational structure as those for the other regional fish ports to be slightly modified and adjusted to tailor the management and operation requirements of Bislig FPC.

c) In line with the national government direction, PFDA in particular of its Regional Fish Ports have been exercising rationalization of the organization. Further, it is to be recalled that the salary of the PFDA staff has been in fact a significant component in the expenses of the cash flow.

d) As a part of the effort, PFDA management decreased their staff by 26 from 726 to 700 in 2009. Likewise, in Camaligan FPC, the Administrative and Finance Services Division and Port Operations Services Division will eventually be abolished once the incumbent division chiefs of both units vacate their positions and thereafter the positions of the Camaligan Fish Port will be straight-listed.

e) To date, PFDA has exercised its direct hands-on involvement in O&M of some income generating facilities, such as refrigeration, ice making and marketing, on the three (3) shifts basis as required. Under the circumstances, significant reduction in the man-power resources is not readily possible without unnecessarily jeopardizing these activities and most importantly without creating havoc to those depending on the fish port as the only means of their operation revenues.

As seen in the financial assessment of the Project later demonstrated in this Study, the Project implementation in respect of the regional fish ports is to be financially viable over the Project period of 30 years. (It is to be noted that the financial analysis considers ample costs in O&M in the cash flow.) The past financial status of PFDA also reveals that the financial cash-flow in the regional fish port operations has been self-sustainable. Hence, anticipated risks in the O&M phase of the present Project will be as follows;

i) any substantial changes in the fish port operations on the end of the Philippine government policy, such as complete privatization in the operations, etc.,
ii) difficulties in achieving increase in the fish unit price as anticipated in this Study due to any drastic external environment, such as substantial downturn of the fish catch, crash in the fish market, etc., or any essential inflation in the operation costs,
iii) other than the external environment, difficulties in achieving higher value added business climate in the fish port operations.

With regards to the risk item i) above identified, repayment liability of the possible JICA loan proceeds for this Project implementation shall be committed by the GOP through DOF, i.e., from the national account, whereas any effort to mitigate the excessive burden thereon and securing source of the repayment should be sought for in respect of possible privatization options, wherein debt liability should be appropriately built in the arrangement for its transfer.

For the risk in item ii) above, we understand such situation would be essentially a basic bottleneck in the Philippine economic hierarchy and is to be considered beyond the issue in this Study.

With regards to the risk in item iii), possible causes thereof might be any political motivations, conflict of interests by third parties already vested or in place. For this type of risk exposure, notwithstanding of the bottom-line, PFDA shall exercise the efforts in clearing the technical hurdles to achieve high value added fish port operations as outlined in this Study, such as those suggested in the possible TA implementations.

f) While technical PFDA staff have the capability to maintain the port facilities with minimum orientation, effective outsourcing and privatization strategies will need to be considered for successful project accomplishment in the O&M phase. Some of the key considerations in setting-up the PFDA direction in this respect are described hereunder.

Table 18.3.1 Required Technical Skills for O&M, Nature and Privatization Potential of the Facilities

Facilities		Technical Skill Requirements		Nature of the Facilities		Privatisation
Category	Component	Operation	Maintenance	Common or Specific	Income/Revenue Earning	
Port/Civil Works	Waterfront Structures (Piers, Breakwaters, Revetment, Dredging,	None	Minimum	Common	Minimum	Not Appropriate
Functional Facilities	Market Hall, Buildings, etc.	None	Minimum	Moderately Specific	Minimum	Conditional
	Refrigeration Facilities (including cold storage and ice making plant)	High	High	Moderately Specific	High	Possible
	Processing Facilities (including HACCP provisions)	High	Moderate	Specific	High	Possible
	Ship Repair Shop	High	Moderate	Specific	Moderate	Possible
Utilities	Fuel Supply	Moderate	Moderate	Specific	Moderate	Possible
	Power Supply	Moderate	Moderate	Common	Minimum	Conditional
	Water Supply	Moderate	Moderate	Common	Minimum	Conditional
	Sewerage	Minimum	Minimum	Common	Minimum	Not Appropriate
	Solid Waste Treatment	Minimum	Minimum	Common	Minimum	Not Appropriate
	Solar Power Generation	Minimum	Moderate	Common	Minimum	Not Appropriate

g) In order to efficiently operate and maintain the facilities to be provided by the Project, any of those appropriate for private sector involvement in O&M shall be worth for considering. Adequacy of the Public-Private Partnership approach to the proposed facilities in the Project is summarized in Table 18.3.1. Note that the table has been drawn up by the Study Team based on their initial observation and assessment and shall be subject to further refinement in the successive phase of the Project Implementation.

h) In the above assessment, the Study Team consider the following preliminary key criteria:

- Facilities being public/common in its nature shall be at the hand of PFDA
- Facilities with minimum income/revenue generation could not attract private interests
- Facilities of maintenance free or minimum will not require private sector's involvement

i) In order to achieve successful PPP (Public Private Partnership) approach in O&M of the proposed facilities, some essential considerations shall be incorporated in the respective agreement between PFDA and interested private sectors(s) as listed below:

- Reasonable profit/revenue sharing in between so that healthier operation of the facilities be secured
- Speedy/timely repair and replacement of essential components and spare-parts of the equipment without cumbersome or sometime lengthy government procurement process, which would be particularly important upon the facility break-down
- Facilities of maintenance free or minimum will not require private sector's involvement.
- Appropriate and required risk insurance to be tailored and built-in in each agreement between PFDA and the interested private party (ies)
- Attention to small scale business opportunities, including fisher folks of lower income, without biased monopoly of the larger scale business entities

j) In the Philippines, PPP initiatives have been encouraged by the Government support in providing legal framework since early 90's in the then Ramos administration started with so-called BOT/Omnibus laws. Since then, a series of Presidential Decrees, Administration/Executive Orders have been issued to streamline the respective guidelines. Hence, possible PPP options in O&M of the proposed development should be carefully studied and examined in its strategy, pros/cons, future sustainability in accordance with these definitive guidelines mandated by the national government. It is also pointed out that the relevant mandates provide a room for public/private sectors to effectively share the business opportunities arising from infrastructure developments, wherein both the entities would contribute to the successful O&M by putting respective equity on a possible creation of JV set-up comprising public/private, which has been generally adopted in case of a larger scale concession arrangement. In order to secure, transparency in such an agreement conclusion, there are legal provisions either entering into competitive bidding or accepting an unsolicited proposal from the private sector(s) followed by so-called "Swiss Challenge" strategy.

k) Irrespective to the above possible PPP strategies, to ensure the sustained operation of the regional fish ports, some necessary changes have to be made with respect to current charges and fees which are outdated or unreasonably low to accumulate revenues to sufficiently cover operation and maintenance cost. The changes coupled with the incremental revenues and expenses that are expected to result from the improvement/rehabilitation and construction of various income generating port facilities will in turn enhance operational performance that would spur revenue-generating capacity. As PFDA has been exposed to tax imposition by the bureau of internal revenues (BIR) as an revenue gaining government body (corporate), essentially minimum taxation shall be also imposed and collected on any tariffs, levies, duties, charges, etc. on users of the fish ports that are filed as part of the PFDA revenues by BIR.

l) Based on the foregoing discussions, the improvement of the utilization of existing regional and municipal fish ports should be an immediate objective of the Project. Increasing usage will help raise the revenues of the fishing ports and make them more useful to the local, regional and national economy. In order to achieve this, the underutilized facilities of existing regional ports must be used in the processing of other agricultural products such as livestock and poultry. Turning the ports into integrated fisheries-agriculture processing centres will improve their

economic viability. At present, the PFDA have in fact leased some of the underutilized facilities in regional ports to the private sector. These leases cover agricultural processing activities to be done on a short-term basis initially to accommodate a possible increase in fish landings over the medium or long-term.

m) In the operation phase of the municipal fish ports, revenues from the operations shall be collected by each LGU for expenses of the maintenance of the facilities. Subject to agreement between PFDA and LGUs, in a form of memorandum of agreement (MOA), 10% of the operating revenue from the facilities provided in this Project shall be appropriated to PFDA's levy to source the budget for supervisory/monitoring activities of their staff in charge of O&M in the municipal fish ports.

n) If the LGUs are involved in PPP approaches, it is important to clarify the relation of the municipal fish ports with the regional fish ports and to confirm the plan of operations of the municipality regarding the responsibility of management, operation and maintenance of the municipal port facilities. The need to determine of who will manage and maintain the port facilities should be made because of the incidences of many previous failures. Hence, the capability of the concerned municipality to manage and maintain the facility particularly for the ice making plant, if any, should be thoroughly determined.

o) For municipal fish ports, many ice making plants operated by the LGUs are no longer functioning due to insufficiency or absence or lack of maintenance works. The primary cause appears to be the lack of maintenance expertise and the ability to do business. For this reason, there is a need to confirm the financial capacity and technical capability of the LGUs for the selection of municipal fish ports to be rehabilitated and improved. Nevertheless, all rehabilitations and improvement for municipal fish ports will entail primarily of civil and marine works including berthing and fish landing facilities, backup space, and market hall among other associated utility and building facilities. The municipal fish ports will not be provided with refrigeration facilities including ice plant except for waste water treatment facility (to address environmental concerns in compliance with DENR/JICA requirements) but the system would not require complicated operations and maintenance work because it will consist of simple aeration system such as the uncomplicated electrical wirings and installation of stainless steel pump. Moreover, for lifetime durability or in order to avoid or reduce maintenance of the structures to a minimum, all the facilities such as the market hall including the roof will be constructed of RC (reinforced concrete) as measures against corrosion and typhoons. Similarly, all marine structures will be constructed of heavy duty materials such as RC with sufficient coverings as anti-corrosion measures, large armor stones for stability during occurrences of severe wave actions among other improvements to reduce on maintenance work and cost.

p) When the management, operation and maintenance plan has been resolved, a comprehensive marketing/promotion research should be carried out. For this to be started with, forecast studies must be conducted to establish the component and scale of the port facilities with emphasis to be given for the maintenance of municipal port facilities slated for possible rehabilitation and improvement under this Project as promulgated by the Philippine Government, through the following surveys:

- Survey of demand for export markets should be hinged on the preference of main importing countries for frozen processed fish goods,
- The volume of frozen processed milkfish products for shipment overseas should be estimated based on the number and trend of Filipinos residing and working abroad,
- Survey of market price of tuna finished goods and transition of export volume for export to USA, EU and Japan,
- Survey of market price and transition of other finished fish goods for export to Japan, South Korea, Taiwan, and China.

q) Standardization and Sharing of Information: Accurate data gathering of fish landing and boat registry is indispensable for the management of fish capture. Gathering of fish landing statistics at the municipality level needs to be enhanced, more so that many landing sites which are not registered are scattered nationwide. Fish boats are not properly registered with BFAR and many fish boats are listed as municipal instead of commercial. As such the size of the boat/vessel, capacity of the hold, destinations are not accurately recorded and organized. For this reason, the estimate of fish catch by sampling survey may not reflect the actual volume of fish landings. As such, there is a need to enhance and standardize the method of gathering and organizing statistics for accuracy and reliability of records as the data are useful for information sharing particularly for market price sharing and selection, expansion of trading activities and generation of more users, to spur business activities of the fish ports.

r) The sustainability of operation for the regional fish ports will largely depend on the installation of HACCP accredited fish processing facilities in specific regional fish ports for value adding of processed fish as mandated by major importing countries including the EU, USA and Japan. The installation of the facilities will enhance the competitive advantage of Philippine export processed fish products meriting for higher cost.

s) The establishment of HACCP facilities and the technical assistance in their operation and management will ensure that these are operated efficiently and effectively and that the products processed through these facilities meet international standards. This will ensure the marketability and acceptance of fish processed products in the international market and subsequently sustaining the operation of these facilities. Moreover, these facilities, if properly operated and managed, will contribute substantial economic benefits to generate considerable foreign-exchange earnings.

t) The current rental rate for port facilities offered to potential users for all fish ports nationwide is based on the notion that it is for public service so that charges should be as minimal as possible. For proper maintenance of the facilities however, there is a need for the fish ports to generate sufficient revenues for sustainability of operations particularly for the maintenance of structures and equipment including the breakwaters, piers, building facilities, refrigeration facilities, waste water treatment and associated facilities. For this reason, there is a need to improve the income generation of the fish port operations, by measures identified in this Study, such as wastage minimization, value-added processing by HACCIP compliance, etc. The succeeding section describes outline of the Technical Assistance (TA) programs to achieve these requirements.

u) In order to enhance the capability of PFDA staffs, the provision of technical assistance is vital for the capacity building of PFDA employees to enhance their administrative capability for port operations particularly for effective, efficient and hygienic processing of fish products for value adding and HACCP accreditation, marketing promotions and trading of processed fish products to global markets to enhance the competitive advantage of PFDA with other fish producing countries.

18.4 Technical Assistance

18.4.1 Background

Technical assistance (T/A) aims for the improvement of the operation and management capacity of the regional fish port operated by PFDA in connection with Nationwide FPP III Project. The Nationwide FPP I and II Projects commenced in the early 1980's, for which PFDA has gained many experience in practical operation of fish ports. Based on those experiences, PFDA acquired sufficient knowledge in managing fish port relative to the current fishery industry associated with the fish port program. Should this be achievable, the administration will be able to balance revenues and expenses of regional fish ports to generate incomes. For this reason, the FPP III should focus on simple rehabilitation and improvement of existing facilities that would lead to achieving the objectives of the project. However, based on the results of the field survey, the status of the regional fish ports appears quite difficult. The generation of revenues to yield profits from the current fish port

activities would not be as simple as envisioned to be by rehabilitation and improvement of facilities. Only the Navotas and General Santos are producing sufficient profit from port revenues. Revenues from other regional ports, is relatively low causing PFDA to subsidize the operations from its overall revenues. Improving PFDA's capacity to generate more revenues for stability of operations of the regional fish ports and to cope with global and local market challenges and opportunities require capacity building.

Recently, the fisheries industries are experiencing changes regarding "resource management" particularly on "the effective use of limited resources". In the early 70's, the fisheries industry was focused on developing the means of increasing marine fish capture (MFC), but over the years, FAO instituted drastic measures to reduce MFC to avert over-exploitation of resources and instead to develop and improve aquaculture industry. The 1980's was the turning point for developing the "Aquaculture Industry" for the "Effective utilization of limited resources through processing for the added value. One of the objectives in promoting value adding to processed fish "is, one is to improve the fish price to generate more income for fishermen, and to enhance the effective use of limited marine fish resources. In addition, the economic crisis directly affected the increase in fishing effort for expenses associated with operation such as fuel and supplies. In light of the above, immediate action should be made to improve the facilities t of fish ports to cope with the changes. The functions of the regional fish ports particularly on maintenance and management systems have not improved and no changes have made over the past years. Fish port management system must also be improved from "production mechanisms to "value adding of products" to generate more income for sustainability of operations.

The fisheries industry in the Philippines is facing adverse impacts for growth continuity in fishery regimentation relative to boat regulations, international fishery agreement, etc. With regard to the depleting number of fishing boats calls to unload fish hauls, the regional fish port should be provided with facilities to improve the products by value adding to generate more revenues to compensate the losses in fish productions.

As shown in the recommendations of this Report, measures were suggested to enhance the functional operations of the regional fish port. One is the establishment of food distribution centre, and the other is the installation of HACCP compliant fish processing facility for compliance to international standards, to raise the cost of the commodity and to generate more port revenue. The regional fish ports slated for rehabilitation and improvement will also be provided with fish processing facilities to improve processing techniques for adding value to raise the value of products.

The T/A will comprise the following four components to achieve sustainable utilization and management of the regional fish ports, as recommendation by the JICA Survey Team, subject to the final decision made through discussion between JICA and DA/PFDA.

18.4.2 Objective

The following technical assistance is aimed to improve the sustainable utilization of facilities and equipment, to be provided for the Regional Fish Ports. The T/A is categorized into four schemes as follows:

- Deployment of experts by soft loan
- Deployment of experts by grant aid
- Technical cooperation through the project by grant aid
- JICA training program by grant aid

Based on the study results and after due consultations with PFDA, the table hereunder shows the components of the T/A.

Table 18.4.1 Components of the Technical Assistance

Components	Program Scheme	
1) Fish port management	Deployment of expert	Loan
2) Development of fish processing technology	Deployment of expert	Grant
3) Value Adding of Fisheries products	T/A through the Project	Grant
4) Capacity building of PFDA	JICA training program	Grant

Note：Details of the above components 1) 2) and 3) are shown in Appendix 20 (Table. 20.1, 20.2, 20.3 and 20.4)

(1) Fish Port Management (for 6 Regional Fish Ports and One New Regional Fish Port in Bislig)

For this component, new management system will be instituted based on the F/S report. Setting up of appropriate new pricing system for collection of utilization-fee is essential from financial and economical viewpoints. As pointed out in the F/S report, utilization fee needs to be increased as precondition to attain the objectives of the Project. For the users to accept this proposal, the comprehensive understanding for the use of the new facilities by the private operator will be sought. At the same time, OJT and on site monitoring of all the facilities to understand the management will also be conducted. These activities must be programmed with the schedule of the construction works for coordination to ensure successful implementation.

(2) Development of Fish Processing Technology (for IFPC, SFPC, LFPC)

This component attempts the effective use of the processing space of the existing refrigeration building particularly for some cold storage facilities which not are not being utilized, especially for Iloilo, Sual and Lucena fish ports. However, the leasing out of partitioned areas to private processor had been practiced for Davao and Camaligan FPC. Suitable utilization plans for the use of existing space for processing will be prepared. The lease out of the processing space to the private sectors will be pursued as part of management strategy to improve the regional fish ports. The provision of this component as part of the port facilities is expected to induce the participation of private processors. For Iloilo, Sual and Lucena regions, large volume of small pelagic fish are being caught. However, key informants reported large amount of spoilage due to poor post harvest handling operations coupled with limited sales network.

In view of the foregoing, the small pelagic fish (sardine, small mackerel) and skipjack are the objected catch for the establishment of new products to be processed for the local market.

(3) Quality Improvement of Fisheries Products: (for IFPC, DFPC, CFPC, SFPC)

The two major objectives is “quality preservation of fresh fish” and other is “Value adding of fish products through appropriate processing.

“Quality preservation of fresh fish” will focus on the method of preservation of the freshness of fish hauls brought to the market hall as raw materials for adding value through processing. As one major means of the regional fish ports to generate more revenues, the F/S report highly recommended the imposing of 1% fee to the total transacted cost of the commodities. The application of this system will require the understanding between PFDA and the existing clients the primary objective of which is the improvement of the income of market users by raising fish price through the provision of superior facilities coupled with good service to produce products of internationally accepted quality.

“Value adding of processed fish” would focus on the training of labor/personnel on the appropriate use of the HACCP compliant facilities to cope with internationally accepted standard to raise the competitive advantage of the fishing industry. As previously mentioned, the HACCP processing facilities to be installed are intended to promote the value adding of processed fish products as major source in generating sufficient revenues for sustainability of port operations.

Marketing network of fish products for export and domestic use could be expanded by setting up information centers or web-sites and/or brochures through the Philippine HACCP authorities and monitoring system. This component of the Project will support local fish processor in acquiring HACCP accreditation certificate thorough PFDA and BFAR, for expanding the marketing network of fish processors to increase export volumes. Accordingly, this will enable the fish ports to secure continuous revenues from the HACCP processing facilities.

(4) Capacity Building of PFDA staffs

PFDA staff will be the subject to the training program on fish port management in Japan.

Comprehensive input will be prepared with respect to soft component activities, technical cooperation and deployment of experts in coordination with the counterpart personnel of PFDA and BFAR. The Project log-frame is shown in Table 18.3.1.

18.4.3 Output

The following four components are expected as outputs for the implementation of the technical assistance activities.

Output 1: Adequate use of the regional fish port facilities and equipment
Output 2: Development of fish processing technology that will reduce postharvest loss incidences
Output 3: Maintaining the original value of fish hauls and value adding of processed fisheries products
Output 4: Capacity building of PFDA staff to enhance port management and operations

18.4.4 Activities

The following activities will be implemented to achieve the objectives of output 1.

Activity 1-1: Improvement in port operations and maintenance system
Activity 1-2: Promotion of fish port utilization

The following activities will be implemented to attain the objectives of output 2.

Activity 2-1: Market analysis/promotion
Activity 2-2: Development of new products from underused/surplus fish hauls
Activity 2-3: Expansion and illustrations of processing technology

The following activities will be implemented to accomplish output 3.

Activity 3-1: Improvement in fish handling and trading activities
Activity 3-2: Establishing market price information network system
Activity 3-3: Establishment of quality assurance system
Activity 3-4: Public promotion and demonstration of quality assurance system
Activity 3-5: Review and identifying fish processing procedures
Activity 3-6: Assistance to HACCP system monitoring
Activity 3-7: Implementation of HACCP plans for the fish processing facilities

The following activities will be implemented to realize the objectives of output 4.

Activity 4-1: C/P training in Japan (for the overall management of fish ports, quality assurance and responsibility of operator, fish marketing operation, information

system, and leasing of property).
Activity 4-2: Implementation of action plan

The Flow diagram hereunder summarizes the T/ A activities.

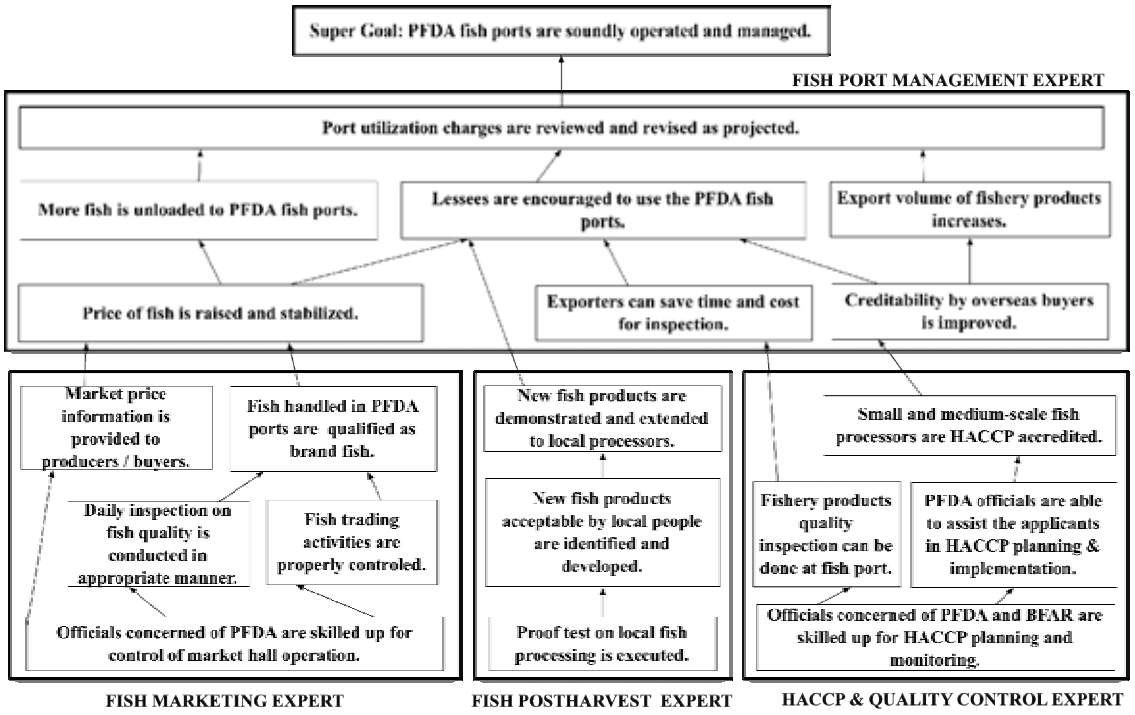


Fig. 18.4.1 Flow Diagram of the Technical Assistance

18.4.5 Input for the Activities

(1) Fish Port Management

[Japanese side]
(Japanese consultant) 24 P/M Fish operation and management expert to be selected by PFDA
[Philippines side] PFDA Fish Port Managers (Counterpart/s)

(2) Development of Fish Processing Technology

[Japanese side]
(Japanese consultant) 20 P/M Fish postharvest technical expert
(Equipment) Trial fish processing machines (US30,000.00)
[Philippines side]
PFDA staff (Counterpart/s)
BFAR/NFRDI staff (Counterpart/s)
Researcher of Postharvest study (1 person)
(Facilities and equipment) Fish port facilities (for processing)
BFAR laboratory
Office space and equipments

(3) Quality Improvement of Fisheries Products

[Japanese side]
(Japanese consultant) 20 P/M Fish marketing expert
20 P/M HACCP/Quality control expert
20 P/M Extension and public awareness expert

(Equipment) transportation vehicle

	Office equipment (PC, Printer, Copy machine)
	Chemical analytical equipments for HACCP (US160,000.00)
	Fish processing machines (US15,000.00)
	Quality assurance equipment (US10,000.00)
[Philippines side]	PFDA staff (Counterpart(s))
	Project manager/Port manager
	Chief of market/Harbors operation
	Officer in charge of Quality assurance
	Officer in charge of Public relations
	BFAR (Counterpart/s)
	Researcher on fish quality inspection laboratory
	Officers in charge of HACCP planning and monitoring
(Facilities and equipment)	Fish port facilities (for processing)
	BFAR laboratory
	Office space and equipments

(4) Capacity Building of PFDA Staffs

[Japanese side]	Provision of Training program
[Philippines side]	selection of PFDA s trainees

18.4.6 Time Schedule of the T/A

Tentatively the schedule for the T/A is shown in Table 18.4.3.

18.4.7 Obligations of the Recipient Country

The Nationwide FPPIII Project is the third phase of development involving rehabilitation and improvement of existing regional and municipal fish ports to enhance the management and operation expertise of PFDA having gained sufficient experience in this field of enterprise. In addition, the T/A to be provided as part of the consultancy services would be essential in achieving the following objectives:

- Establishment of regional fish port management system based on the recommendations in the F/S report
- Preparation of long-term port operation plan
- Marketing development of products including the facilities
- Maintenance and a data collection
- Capacity-building of market retailers
- Collaboration with BFAR, local fish dealers and local fish processors
- Identification of the needs of the fisheries industry

However, prior to the implementation of the T/A activities, the government agencies concerned are requested to organize the market management system and organization of the counterpart staff including the financial structure of the Project. The counterpart personal will be complementing their Japanese staff in all activities. The utmost efforts of all concerned in achieving the objective is highly desirable. Additionally, the participation of organic staff members employed with the Fish Port Project to join the training program are welcome.

Table 18.4.2 Project Log-Frame for Technical Assistance

SUPER GOAL: Fish ports are soundly operated and managed.
PROJECT OBJECTIVES: PFDA's financial status will be improved.

Proposed Scheme	COMPONENT	Implementation SITE	TARGET AGENCY	EXPECTED OUTPUTS	INDICATORS FOR EVALUATION	INPUTS
Individual Expert (Soft-Component of Loan)	**Project Goal: Improvement of Fish Port Operation & Management**					
	A. **Fish Port Management**					**[japanese Side]** **Personnel:** Expert of Fish Port Operation & Management (24 P/M) will be selected by PFDA under contract of consulting services for loan project.
	1. Improvement of port operation and maintenance systems	IFPC, SFPC, LFPC, CFPC, DFPC, BFPC	PFDA	Fish port operation and maintenance system will be established / revised, accepted by stakeholders and implemented (including rules & regulations, port utilization charge/fees, and organization structures).	1) Operational rules and regulations 2) Port charge/fee schedule, 3) Stakeholders workshop report 4) Maintenance schedule 5) Organizational diagram	
	1.1 Organization structures					
	1.2 Fish port operation & management system					
	1.3 Port facility maintenance system					
	2. Assistance in promotion for fish port utilization		PFDA	Project facilities are effectively utilized as projected with increase of number of lessees.	1) Facilities utilization ratio to operation plan 2) Number and scale of fishing boats entries 3) Number of fish procesors (lessees) 4) Fish unloading & handling volume 5) Boat repair record	**[Philippines Side]** **Personnel:** 1. PFDA 1.1 Port Managers (Iloilo, Sual and Lucena) **Facilities & Equipment to be provided:** Office space and office equipment
	2.1 Demonstrate and extend the merits to use the modernized market hall to fish producers and traders	IFPC, LFPC				
	2.2 Encourage fish cage operators to use fish ports	SFPC				
	2.3 Encourage boat operators to use fish ports	BFPC, IFPC				
	2.4 Encourage fish processors to use fish ports	IFPC, SFPC, LFPC, CFPC, DFPC				
Individual Expert (Grant)	**Project goal: Development of Fish Processing Technology**					**[Japanese Side]** **Personnel:** 1. Expert in Fish Postharvest Technology (20 P/M) **Equipments:** 1. Equipment for experimental fish processing (US$30,000)
	B. **Development of Fish Processing Technology**					
	1. Market Analysis	Manila, Iloilo, Northern Luzon	PFDA/NFRDI	The current demand for fish processed products and the taste of local consumers in the target areas will be clarified.	1) Survey report showing current demand for fish processed products and local taste of consumers in the target areas.	**[Philippines Side]** **Personnel:** 1. PFDA 1.1 Port Managers (Iloilo, Sual and Lucena) 1.2 Officers in charge of Marketing 2. NFRDI / BFAR 2.1 Researchers on Postharvest Technology (1 person) **Facilities & Equipment to be** 1. Existing Fish Port Facilities (for processing) 2. Existing BFAR Related Laboratories 3. Office space and office equipment
	1.1 Survey on demand for skipjack products (Northern Luzon)					
	1.2 Survey on demand for processed products of small pelagics (Iloilo and Manila)					
	2. Development of new processed products	BFAR-Region V Fish Processing Lab.and IFPC, LFPC, SFPC	PFDA/BFAR	At least 3 products which are acceptable at local markets, will be developed using small pelagic (sardines, eastern little tuna and round scad) and skipjack.	1) Certificate for product quality and sanitation 2) Label and package developed 3) Standard recipe for processing 4) Record of tasting parties	
	2.1 Experimental fish processing (skipjack, small pelagics)					
	2.2 Testing of products quality and sanitary certification					
	2.3 Promotion and distribution of the product (On market sales)					
	3. Extension & demonstration of processing technology	IFPC, LFPC, IFPC	PFDA/BFAR	Small- and medium-scale fish processors and NGOs of Iloilo, Lucena and Sual are identified and encouraged to tackle on the local fish processing.	1) Record of demonstration 2) Production amount of new processed products	
	3.1 Demonstration of processing methods to private processors					
	3.2 Public awareness					
Yen Loan attached TCP (Grant)	**Project Goal: Improvement of Fish Quality**					**[Japanese Side]** **Personnel:** 1. Fish Marketing Expert (20 P/M) 2. HACCP / Quality Control Expert (20 P/M) 3. Extensinon /Public Awareness (20 P/M) Total: 60 P/M **Equipments:** 1. Transportation vehicle 2. Office equipment (PC, printer, copy machine) 3. Analytical equipments (US $160,000.00) 4. Equipment for quality assurance
	C. **Improvement of Fresh Fish Quality**					
	1. Improvement of fish handling and trading activities	IFPC, LFPC	PFDA	Fish handling and trading activities in the market hall will be properly controlled in accordance with GMP/SSOP.	1) Improved GMP/SSOP 2) ID system of stakeholders 3) Daily fish inspection record	
	1.1 Review and improvement of GMP-SSOP process					
	1.2 Introduction of identification system for market user					
	1.3 On site training on GMP-SSOP for PFDA staffs					
	2. Establishment of Market price information network system	IFPC, LFPC	PFDA	Daily fish market price information network system will be established and accepted by port users.	Digital device for public information system	
	2.1 Establishment of Digital information system (marine GIS)					
	3. Establishment of Quality Assurance System	IFPC, LFPC	PFDA/BFAR	QA system including standards, operation procedure and structure (Fish inspection unit) will be established.	1) Statue of fish inspection unit 2) training record 3) QA system	
	3.1 Establishment of Inspection structure of Quality Assurance					
	~~3.2 Preparation of operational procedure for sensory test of Fresh fish~~					
	4. Public Promotion and demonstration of Quality assurance system	IFPC, LFPC	PFDA	No illegal fish and low quality fish is dealt in the market hall of IFPCand LFPC, and at least 10% of total unloaded fish will be quality-assured with official	1) Quantity & value of assured fish each month 2) Homepage and posters of IFPC and LFPC 3)	**[Philippines Side]** **Personnel:** 1. PFDA 1.1 Project Manager / Port Managers 1.2 Chief of Market & Harbours Operation 1.3 Officers in charge of Quality Assurance 2. BFAR 2.1 Researchers on Fish Quality Inspection Laboratory 2.2 Offficers in charge of HACCP planning & monitoring **Facilities & Equipment to be provided:** 1. Existing BFAR Related Laboratories 2. Office space and office equipment
	D. **Improvement of Processed Fish Quality (HACCP)**					
	1. Review and identification of fish processed procedure	IFPC, DFPC, CFPC, SFPC	PFDA/BFAR	Current GMP/SSOP, HACCP Plan, and the current fish handling in processed facilities will be study, necessary actions to be taken for improvement	1) No. of Processing plan 2) No. of Processor involved in OJT 3) Training records of OJT 4) Records of workshops and seminars	
	2. Assistance in HACCP system monitoring			HACCP monitoring plan and inspection plan will be establish by PFDA /BFAR monitoring team	1) Training records of OJT 2) Records of workshops and seminars 3) No. of inspection data , plan	
	3. Implementation of HACCP Plan for fish processing facilities			Processors will be apply for HACCP Plan, and will be able to maintain HACCP system.	1) Training records of OJT 2) Records of export of products volume	
JICA Training Programme (Grant)	E. **Capacity Building of PFDA staffs**					**[Japanese Side]** 1. Provision of Training Programmes **[Philippines Side]** 1. Selection and dispatchment of Trainees
	1. C/P training in Japan	PFDA	PFDA			
	1.1 Fish Port Management in general			6 port managers will be trained.	Preparation of Action Plan	
	1.2 Fresh Fish Quality Inspection & Control			4 officials (IFPC, LFPC, DFPC, BFPC) will be tained.		
	1.3 Market Price Information Network System (MPINS)			2 officials (IFPC & LFPC) will be trained.		
	1.4 Leasing Business Knowhow			6 officials of business promotion will be trained.		
	2. Implementation of Action Plan			Action plans will be implemented by PFDA.	PFDA Activity Report	

Table 18.4.3 Tentative Schedule of Technical Assistance

TECHNICALASSISTANCE (T/A)

Super Goal: Establishment of Sustainable Fish Port Operation

Proposed SCHEME		COMPONENT	TARGET SITE	IMPREMENT AGENCY	TIME SCHEDULE 2011	2012	2013	2014	2015	2016	2017
Individual Expert (Soft-Component of Loan)		**Project Goal: Improvement of Fish Port Operation**									
	A.	**Fish Port Management**									
		1. Improvement of port operation and maintenace systems	IFPC, SFPC, LFPC, CFPC, DFPC	PFDA						XXXXXXXXX	XXXXXXXXX
		2. Elaboration of rules and regulations of fish port and tariff	BFPC	PFDA						XXX	XX
Individual Expert (Grant)		**Project goal: Development of Fish Processing Technology**									
	B.	**Development of Fish Processing Technology**									
		1. Market Analysis (Northern Luzon, Panay Is., Manila)	IFPC, SFPC	PFDA/NFRDI	XXX						
		2. Development of new fishery products (skipjack, small pelagics, etc.)	IFPC, LFPC, SFPC	PFDA/BFAR	XXX	XX XXX					
		3. Extension & demonstration of processing technology	IFPC, LFPC, SFPC	PFDA/BFAR		XX XXXXXX	XX				
Yen-Loan Attached TCP (Grant)		**Project Goal: Improvement of Fish Quality**									
	C.	**Improvement of Fresh Fish Quality**									
		1. Establishment of Inspection and QA System	IFPC, LFPC	PFDA/BFAR				XXXXXX			
		2. Improvement of GMP-SSOP	IFPC, LFPC	PFDA				XX	XXX		
		3 .Implementation and Promotion of QA System	IFPC, LFPC	PFDA					XXX	XXXXXX	
		4. Establishment of Market information systems	IFPC, LFPC	PFDA						XXX	XXX
	D.	**Improvement of Processed Fish Quality (HACCP)**									
		1. Capacity building of Regional Staffs (BFAR and PFDA)	IFPC, DFPC, CFPC, SFPC	PFDA/BFAR				XXXXXX		XX XX	
		2. Elaboration of HACCP Plan (Guidance to fish processors)	IFPC, DFPC, CFPC, SFPC	PFDA/BFAR				XX XX	XX XX		
		3. Implementation & Monitoring of HACCP Plan	IFPC, DFPC, CFPC, SFPC	PFDA/BFAR						XX XX	XX
JICA Grant	E.	1. Capacity Building of PFDA staffs	Japan	PFDA				XX	XX	XX	XX
YEN-LOAN PROJECT (FISH PORT CONSTRUCTION)					Δ	———	———XXXXXXX	———————	———————	———XXX	———————
					L/A		D/D Tender	Construction		Delivery	O & M

19. Project Evaluation

19.1 Indicators for Project Outputs and Qualitative Effects

19.1.1 Indicators for Project Outputs

Based on the result of the feasibility study, the Project is conceived to achieve the following outputs at the time of 2-year and 10-year of after completion of the Project respectively.

(1) Dissolving of waiting time for mooring of fishing boats

With the improvement and extension of fish landing facilities (jetty, pier and wharf), the waiting time for mooring of fishing boats will be dissolved as follows:

Table 19.1.1 Waiting Time for Mooring of Fishing Boats (Unit: hours/ boat)

Fish Port	Facilities	Boats	Present (2009)	After 2 years	After 10 years
SFPC	Multi-purpose jetty	Milkfish carrier	-	0.0	0.0
LFPC	Multi-purpose pier	Commercial boats	8.8	0.0	0.0
DFPC	Landing wharf for domestic boats	Domestic commercial boats	13.6	0.0	0.0
BFPC	Landing jetty	Commercial boats	-	0.0	0.0
			3.4	0.0	0.0
Concepcion	Stair landing causeway	Commercial boats	20.2	0.1	0.1
Calabanga	Stair landing wharf	Commercial boats	10.4	0.0	0.0
Sta. Cruz	Stair landing wharf	Commercial boats	7.2	0.0	0.0

Means of verification: On-site observation of sample boats

(2) Fish unloading volume at fish ports where fishing boats are newly entering

The volume of fish unloading at fish ports where fishing boats are newly entering will be increased as shown in the following table:

Table 19.1.2 Volume of Fish Unloaded at Fish Ports Increases (Only at Fish Ports Expected to be Accompanied with Newly Entering Fishing Boats) (Unit: MT/year)

Fish Port	Present (Ave.2005-09)	After 2 years	After 10 years
SFPC	552	4,968	22,632
BFPC	2,443	6,023	20,345

Means of verification: PFDA fish port statistics

(3) Average fishing boat entries per day

The number of fishing boat entries to fish ports will be increased as shown in the following table:

Table 19.1.3 Average Number of Boat Entries (Unit: units/day at peak month)

Fish Port	Type of Boat	Present(Ave.2005-09)		After 2 years		After 10 years	
		Number	Ave. GT	Number	Ave. GT	Number	Ave. GT
IFPC	Commercial	3.29	32.9	4.98	35.5	4.98	35.5
SFPC	Milkfish carrier (5 GT)	0.00	0.0	19.60	5.0	49.01	5.0
LFPC	Commercial	6.76	97.5	9.10	110.3	9.10	110.3
BFPC	Hand-liner 3-50GT	1.70	31.0	2.06	31.0	2.60	31.0
	Purse-seiner (catcher and carrier) 50-250GT	-	-	5.25	127.4	13.13	127.4

(Remarks) Increase of fishing boat entries are influenced by plural numbers of factors such as 1) safety of port basin (calmness of mooring area), 2) easiness for fish unloading, 3) market price of fish, 4) distance to fishing grounds, 5) easiness for procurement of fishing requisites (water, ice, food, fishing materials), etc. In this aspect, the interview survey to boat operators should be done at the time of boat entry so as to estimate the boat entries by factors.

Means of verification: PFDA fish port statistics and Interview to boat operators

(4) Volume of ice distributed to the municipal fish ports

With the expansion and new installation of ice making plants, the volume of ice production and distribution to the municipal fish ports will be increased as shown in the following table:

Table 19.1.4 Volume of Ice Distributed to Municipal Fish Ports (Unit: MT/day)

Fish Port	Present (2009)		After 2 years		After 10 years	
	Ice Produced	Ice Distributed	Ice Produced	Ice Distributed	Ice Produced	Ice Distributed
IFPC	0.0	0.0	45.8	10.1	45.8	10.1
SFPC	0.0	0.0	9.6	0.0	12.0	0.0
CFPC	0.0	0.0	13.2	10.2	13.2	10.2
BFPC	0.0	0.0	50.0	0.0	100.0	0.0

Means of verification: PFDA fish port statistics

(5) Export value of fish processed products

With the new installation of the HACCP-applicable fish processing facilities and the extension of technical assistance (for improvement of quality of fish processed products), the export value of fish processed products there from will be increased as shown in the following table:

Table 19.1.5 Export Value of Fish Processed Products at Fish Port (Unit: million PhP / year)

Fish Port	Products	Present (2009)	After 2 years	After 10 years
IFPC	Milkfish	0.0	12.6	63.2
	Squid	0.0	3.0	15.1
	Shrimp	0.0	10.6	52.9
	Assort. marine fish	0.0	4.7	23.4
	Shellfish	0.0	1.9	9.7
SFPC	Milkfish	0.0	16.8	84.2
CFPC	Giant squid	34.9	58.2	151.2
	Octopus	11.5	19.1	49.6
	Freshwater shrimp	2.1	3.5	9.0
	Cuttlefish	3.8	6.3	16.5
	Crab meat	15.9	26.5	68.8
	Lobster	7.3	12.1	31.5
	Shellfish	2.5	4.1	10.7
DFPC	Milkfish	0.0	8.4	42.1
	Octopus	0.0	4.1	20.7
	Assorted marine fish	0.0	2.6	13.0

Means of verification: Record of export of fishery products by each fish processor (Custom Office)

(6) Leasing rate of fish port facilities

Some fish port facilities will be leased out to the private sector at the rates of 100% with technical assistance (for fish port management) as shown below:

Table 19.1.6 Leasing Rate of Fish Port Facilities

Fish Port	Present (2009)				After 2 years				After 10 years			
	FB	PR	CS	SW	FB	PR	CS	SW	FB	PR	CS	SW
IFPC	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
SFPC	-	-	0%	0%	-	100%	100%	100%	0	100%	100%	100%
LFPC	100%	-	100%	-	100%	-	100%	-	100%	-	100%	-
CFPC	-	100%	100%	-	0	100%	100%	-	0	100%	100%	-
DFPC	-	100%	100%	-	100%	100%	100%	-	100%	100%	100%	-
BFPC	-	-	-	-	100%	-	-	100%	100%	-	-	100%
Concepcion	100%	-	-	-	100%	-	-	-	100%	-	-	-
Subic	100%	-	-	-	100%	-	-	-	100%	-	-	-
Atimonan	100%	-	-	-	100%	-	-	-	100%	-	-	-
Calabanga	100%	-	-	-	100%	-	100%	-	100%	-	100%	-
Sta. Cruz	100%	-	-	-	100%	-	100%	-	100%	-	100%	-

FB: Fish Brokers, PR: processors, CS: Cold Storage/Ice Storage, SW: Slipway
Means of verification: List of lessees of fish ports (PFDA and LGU)

(7) Average fish wholesale price at market halls

At the municipal fish ports the deterioration of fresh fish quality is caused due to the shortage of ice and the insufficient water supply and drainage, resulting in the reduction of fish price. With the improvement of market halls and stable supply of ice under the Project, the deterioration of fresh fish quality (reduction of fish price) will be dissolved with at least 5% of recovery of fish price at municipal fish ports (See the table below).

Table 19.1.7 Economic Effects Expected by Improvement of Market Halls and Stable Supply of Ice at Municipal Fish Ports

Municipal Fish Port	Annual fish unloading volume (MT)	Fish exceed monthly average (MT)	Proportion to total fish unloading	Post harvest loss in price (A)	Fish below monthly average (MT)	Proportion to total fish unloading (MT)	Post harvest loss in price (B)	Total loss in price (A+B)
Concepcion	2,438	149	6.1%	1.2%	2,289	93.9%	5.6%	6.9%
Subic	7,890	1,100	13.9%	2.8%	6,790	86.1%	5.2%	8.0%
Atimonan	3,247	353	10.9%	2.2%	2,894	89.1%	5.3%	7.5%
Calabanga	5,660	615	10.9%	2.2%	5,045	89.1%	5.3%	7.5%
Sta. Cruz	2,719	285	10.5%	2.1%	2,434	89.5%	7.5%	7.5%

(Pre-condition) The following assumptions are set forth based on the results of the hearing survey.
(A) 100% of surplus fish exceeding the monthly average volume are caused with 20% price down due to low quality.
(B) 30% of fish below monthly average are caused with 20% price down due to low quality.

As some of fishes unloaded at the municipal fish ports are brought to regional fish ports by overland, 5% of increase in price can be expected as same as municipal fish ports. In addition, in the market halls of regional fish ports, additional 5% of increase in price will be expected with activities for promotion of regional fish brands, execution of fish quality control, and improvement of market operation, with the technical assistance for improvement of fresh fish quality recommended in other chapter.

Table 19.1.8 Average Fish Wholesale Price at Market Halls of Fish Ports (Unit: PhP/kg)

Fish Port	Present (2009)	After 10 Years	
		In case of 5% increase in fish price	In case of 10% increase in fish price (with T/A)
IFPC	75.01	78.76	82.51
LFPC	75.28	79.04	82.81
DFPC	58.75	61.69	64.63
BFPC	78.26	82.17	86.09
Concepcion	44.57	46.80	-
Subic	70.98	74.53	-
Atimonan	79.00	82.95	-
Calabanga	37.44	39.31	-
Sta. Cruz	129.19	135.65	-

(Remarks) The increase in fish price can be expected along with technical assistance for improvement of fresh fish quality, and it takes a long period to show the effects. In this context it is not appropriate to measure this indicator after the 2 year operation.
Means of verification: PFDA fish port statistics (average wholesale price), Book-keeping record of fish brokers (in December)

(Note) Fish prices are affected not only by the effects of the Project, but also by 1) demand and supply of fish, 2) composition of fish species, 3) general price escalation, etc. It is necessary to pay attention on the following matters for measurement of the increase rate of fish price.
Calculate the increase rate of fish price before the Project from the PFDA fish port statistics (or book-keeping record of fish broker).
Make sure that there is no abnormal year with a large difference of fish handling volume.
Make sure that fish species composition is similar to the present (2009). If not, compare prices of specific species (having a large handling volume).

19.1.2 Confirmation of Qualitative Effects

The Project is envisioned to implement various interrelated, complementing, and supporting interventions which, in turn, are expected to contribute to the attainment of the Project's outcome, i.e., *improved operational efficiency of fish ports with subsequent improvement of their earning capacity*. The economic analysis mainly estimated the quantifiable direct benefits (e.g., increased fish landings, improved fish quality, increased revenues, etc.) which, in turn, should be viewed as direct consequences of the Project. However, given the planned interventions under the Project, it is possible to identify some non-quantifiable benefits that may be attributed to each Project component. These are briefly discussed below:

(1) Increased Job Opportunities

During the construction period of the fish port facilities, it is expected that the Project will bring about a significant demand for skilled and unskilled labor required for the implementation of various construction and installation works at each site. It is estimated that over the period of Project implementation/construction, a total of about 3,981 person-years and 46,342 person-years of skilled and unskilled labor, respectively, will be required over the period 2013-2015. Details of the labor requirements by fish port site are presented in Table 19.1.7.

Table 19.1.9 Total Employment Generated During Project Construction

Fish Port	Total Cost		Average Annual Salary		Total Employment Generated	
	Skilled Labor (PhP)	Unskilled Labor (PhP)	Skilled Labor (PhP/Year)	Unskilled Labor[a] (PhP/Year)	Skilled Labor Person-Years	Unskilled Labor Person-Years
A. Regional Fish Ports						
1. Bislig	487,898,189	838,233,786	420,000	79,500	1,162	10,544
2. Camaligan	106,388,975	341,136,983	420,000	69,600	253	4,901
3. Davao	53,288,507	152,650,486	420,000	79,500	127	1,920
4. Iloilo	463,128,834	1,246,445,422	420,000	75,000	1,103	16,619
5. Lucena	220,193,435	292,557,667	420,000	70,800	524	4,132
6. Sual	198,633,905	422,404,556	420,000	72,000	473	5,867
Subtotal					**3,642**	**43,984**
B. Municipal Fish Ports						
1. Calabanga	41,497,182	50,176,558	420,000	79,500	99	631
2. Sta. Cruz	24,740,342	29,330,600	420,000	79,500	59	369
3. Concepcion	23,328,238	27,627,421	420,000	75,000	56	368
4. Atimonan	16,786,872	22,671,287	420,000	70,800	40	320
5. Subic	36,158,098	48,249,631	420,000	72,000	86	670
Subtotal					**339**	**2,359**
Grand Total					**3,981**	**46,342**

[a] Based on average wage rate for the region where the fish port is located.

Aside from the job opportunities generated during construction, the increased operational capacities of each port, together with the establishment of value-adding facilities such as local fish processing, HACCP, and ice making facilities, will likewise increase demand for labor at the regional fish ports. It is expected that an additional demand for labor will require about 1,100 person-years to satisfy the labor requirements for efficiently operating these facilities. At the regional fish ports an increase in the number of fish brokers and buyers and other workers are expected and will require an additional 3,600 person-years in each year of operation over the course of the 30-year Project life. In the municipal fish ports, a greater number of fish brokers and buyers, as well as service workers working in canteens and stores, are expected to operate at the municipal fish ports which will require an additional 2,000 person-years over the same period. In total, the incremental employment generated by the regional and municipal fish ports for their operations is estimated at about 6,700 person-years during each year over 30 years.

(2) Impact on Poverty Reduction

With employment generation expected to increase during Project construction and operation, it is expected that the improvement of the regional and municipal fish port facilities will contribute to the reduction of poverty in the particular site they are operating. However, the extent to which poverty incidence in each of the Project sites will be reduced is difficult to estimate as a substantial portion of the employment opportunities requires semi-skilled workers and the total number of workers expected to be employed is basically a small percentage of the population in each site.

(3) Improved Capacity of Fish Ports as a Place of Refuge

The construction of a breakwater facility in specific fish port sites such as Bislig FPC, Iloilo FPC, and Lucena FPC will improve their capacity to serve as refuge for fishing vessels during inclement weather and therefore prevent these vessels from being damaged by strong waves while they are moored at the ports. The construction of breakwater facilities will also prevent wave damage on port facilities which, in turn, is expected to save the fish ports substantial regular/annual repair and maintenance costs. These facilities will also protect the port basin and mooring areas from adverse wave actions thus ensuring safety of berthing and unloading operations of fish haul at all times. Moreover, the improvement of fish landing facilities, by the provision of sufficient depth for vessels to dock closer to the jetty, will facilitate speedy unloading of fish catch and allow the movement of goods to the market hall in more efficient

time to reduce the incidences of fish spoilage or quality deterioration.

(4) Improved Operational Efficiency of Fish Ports

The improvements of fish port facilities and the proposed technical assistance for improving fish port management are envisaged to result in improved fish port operations and service delivery efficiency which, in turn, are expected to serve port clients (i.e., fisherfolk, buyers/sellers, processors, etc.) on a timely manner. Consequently, this will have a positive impact on strengthening the relationship between port management and its clients and therefore result in better interaction and dialogue for resolving problems/issues which may further improve port operations. This will further have additional positive impact on the port management as it will be able to effectively develop its yearly work and financial plan to ensure that operations are effectively and efficiently carried out every year.

(5) Strengthening of Port Management's Marketing Capacity

Technical assistance will be provided to some fish ports, especially the regional fish ports, in order to strengthen their capacity in marketing their various port facilities and services. This assistance will provide port management the required skills for developing marketing plans and strategies for encouraging new clients to invest as well as retain those clients who are already operating in their respective fish port complex. Therefore, the improvement of each port management's capacity to develop marketing plans and strategies will also ensure the sustainability of each fish port's financial viability.

(6) Improved Cooperation between Fish Port Management and LGUs Concerned

It is expected that greater cooperation in the planning of municipal fish port operations, and their further development will be initiated under the Project. As each of the municipal fish port will be under the jurisdiction of its respective LGU, the incorporation of municipal fish port development plans and budget into the overall LGU development plan and budget will ensure the provision of regular annual O&M to cover the required operational and maintenance expenses. This close planning interaction between the municipal fish ports and their respective LGU will ensure the long-term viability and sustainability of the fish port facilities.

(7) Improved Awareness of People on the Need to Enforce Fisheries Laws and Regulations to Preserve Fisheries Resources

An important qualitative benefit that may be attributed to the Project is the improved awareness of people on the need to enforce fisheries laws and regulations to preserve fisheries resources. As the maximum sustainable yield (MSY) for fisheries in the Philippines has already been breached, there is a critical need to improve the awareness of fishers and all concerned stakeholders within the fishing industry of the need to reduce or eliminate illegal and overfishing activities in order to allow fish recruitment and regeneration in Philippine waters and facilitate the preservation of the country's fisheries resources. Technical assistance to be provided under the Project will facilitate the improvement of people's awareness and will encourage relevant stakeholders operating within the fishing industry to strengthen cooperation in law enforcement and monitoring activities related to the preservation of the country's fishery resources. This will ensure that these resources will be preserved and sustained for future generations to come.

(8) Increased Competitiveness of Exportable Processed Fish Products

The financial viability of some of the regional fish ports largely depends on their ability to serve larger export markets. However, with the recent significant changes in international trade policy, quality and safety criteria have became more rigid and strict compliance to established international standards is required to enhance the competitive advantage of the country's processed fish products. The establishment of HACCP facilities and the technical assistance in their operation and management will ensure that these are operated efficiently and effectively and that the products processed through these facilities meet international standards. This will ensure

the marketability and acceptance of fish processed products in the international market and subsequently the financial viability of these facilities. Moreover, these facilities, if properly operated and managed, will contribute substantial economic benefits and will generate considerable foreign-exchange earnings.

19.2 Financial and Economic Analysis

19.2.1 Introduction to the Analysis

The Project is intended to rehabilitate and improve selected regional and municipal fish ports in order to: (i) improve their earning capacity; (ii) improve sanitary conditions with subsequent improvement of the quality of products transacted within the ports' facilities as well as improve their operational efficiency; (iii) augment the port facilities so that these are able to correspondingly accommodate increasing demand for fish port services; (iv) improve fish port environment; and (v) contribute to job opportunities in the area where each fish port operates.

19.2.2 Major Assumptions Used in the Conduct of the Financial and Economic Analysis

This section discusses the major assumptions applied in the financial and economic analyses of each of fish port selected in order to determine their financial and economic viability. The assumptions were discussed with the relevant staff of each selected fish port, particularly the regional ports, to ascertain whether these are accurate, valid, and may realistically be applied in their operations.

(1) Conditions for Consideration for Sustained Financial Viability of Fish Ports

To ensure the sustained financial viability of the fish ports, some necessary changes have to be made with respect to current charges and fees which are outdated or unreasonably low to accumulate revenues and sufficiently cover operation and maintenance cost. There are therefore some important conditions that need to be considered for future implementation by the respective port management in order ensure the financial viability of each fish port facility. These are the following:

Table 19.2.1 Conditions for Consideration

Fish Port	Conditions for Consideration
1. All regional fish ports	• Market fees and buyer/seller fees should be based on 1% of the value of the volume of fish landed at the fish port with the current charge rates increasing gradually until 2025. ▪ At Bislig FPC about PhP34.50/tub of 40 kg by 2025. ▪ At Davao FPC, from the current charge rate of PhP4.00/tub to about PhP25.85/tub by 2025. ▪ At Iloilo FPC, from the current charge rate of PhP4.50/tub to about PhP33.00/tub by 2025. ▪ At Lucena FPC, from the current charge rate of PhP4.00/tub to about PhP33.10/tub by 2025.
2. Bislig FPC	• Fish unloading fee (current rate) – PhP4.50/kg of 40 kg tub. This current rate was used in the analysis but may be increased during Project implementation as required. • Fish transshipment fee (current rate) – PhP30.00/tub of 40 kg. This current rate was used in the analysis but may be increased during Project implementation as required. • Price of ice (proposed price) – P70.00/block of 50 kg. • Area of raw land rented – target of a potential area of 2 ha and to be rented at the current rate of PhP35.00/sqm/month.
3. Camaligan FPC	• Price of ice (proposed price) – P92.92/block of 50 kg. • Area of raw land rented – target of a potential area of about 2 ha and to be rented at the current rate of PhP30.00/sqm/month.
4. Davao FPC	• Fish unloading fee (current rate) – PhP4.50/kg of 40 kg tub. This current rate was used in the analysis but may be increased during Project implementation as required. • Fish transshipment fee (current rate) – PhP0.50/kg. This current rate was used in the analysis but may be increased during Project implementation as required.
5. Iloilo FPC	• Fish unloading fee (current rate) – PhP4.50/kg of 40 kg tub. This current rate was used in the analysis but may be increased during Project implementation as required. • Fish transshipment fee (current rate) – PhP4.50/tub of 40 kg. This current rate was used in the analysis but may be increased during Project implementation as required.

Fish Port	Conditions for Consideration
	• Price of ice (proposed price) – PhP91.25/block of 50 kg. • Area of raw land rented – target of a potential area of 7 ha and to be rented at the current rate of PhP33.375/sqm/month. This targeted land area is possible with the likely decrease in electricity cost by about 25% due to the installation of the solar panel system. • Electricity charge (proposed rate) – PhP8.48/kwh. With the installation of the solar panel system, electrical charges within the Iloilo FPC should be reduced by at least 25% in order to encourage potential clients to relocate and invest within the port premises.
6. Lucena FPC	• Price of ice (proposed price) – P77/block of 50 kg.
7. Sual FPC	• Fish unloading (proposed rate) – to be increased from the current rate of PhP2.80/tub to P6.00/tub. PhP2.80/tub will be remitted to the municipal office treasury while P3.20/tub will be retained at the Sual FPC as revenue to partly cover some operation and maintenance costs. • Price of ice (propose price) – PhP80.00/block of 50 kg.
8. All municipal fish ports	• Market fees and buyer/seller fees should be based on 1% of the value of the volume of fish landed at the fish port with the current charge rates increasing gradually until 2025. ▪ At Calabanga MFP, about PhP24.00/tub of 40 kg by 2025. ▪ At Sta. Cruz MFP, about PhP32.40/tub by 2025. ▪ At Concepcion MFP, about PhP20.60/tub by 2025. ▪ At Atimonan MFP, about PhP33.20/tub by 2025. ▪ At Subic MFP, about PhP16.50/tub by 2025.

New charge rates are also proposed for the use and lease of various fish port facilities that are to be installed under the Project such as: (i) contact freezers; (ii) blast freezers; (iii) brine tank freezer; (iv) cold storage facilities for fish; (v) cold storage facilities for meat and chicken; (vi) chill storage; (vii) smoking chamber; (viii) vacuum packing machine; and (ix) HACCP fish processing facilities. The current and proposed fish port charges and fees for each regional fish port are presented in Appendix 12, Table 12.1.1 and 12.1.2.

(2) Financial Analysis

The financial analysis was mainly based on incremental revenues and expenses that are expected to result from the improvement/rehabilitation and construction of various port facilities which, in turn, will enhance their operational performance and therefore their revenue-generating capacity. Therefore the financial analysis evaluated the future performance of each port by comparing "with project" and "without project" scenarios to arrive at the incremental revenues and expenses. For this purpose, a financial statement of incremental revenues and expenses was developed for each port analyzed from which incremental income (net of operations expenses, interest expense, and depreciation) was derived to assess the income-earning capacity of each port attributed to port improvement/rehabilitation. This financial statement of incremental revenues and expenses was projected over a period of 30 years which, in turn, served as the basis for creating the projected cash flow statements for each port analyzed. The projected cash flow statements then served as basis for calculating the port-specific financial internal rate of return (FIRR). The financial viability of each fish port was then compared with a weighted average cost of capital (WACC) of 2.2%. The WACC was based on the following interest rates: (i) 1.4% on JICA loan covering construction costs which comprise about 85% of total Project cost; and (ii) 7% on Government of the Philippines (GOP) counterpart funds, based on interest yield of long-term government bonds, which comprise about 15% of total Project cost. As a measure of a particular fish port's financial viability, its calculated FIRR value must be at least or greater than 2.2%.

The major assumptions applied in the financial analysis of each fish port (i.e., regional and municipal) are discussed in detail below:

1) Estimation of Incremental Financial Costs

a) Investment Costs

The total investment costs for each port were based on: (i) the requirements for the services of design and construction consultants; (ii) technical assistance on fish port

management; and (iii) the cost of construction and installation of various types of port facilities, functional facilities, and port utilities that have been identified during the project design as necessary for improving port operations and conditions. Examples of port facilities are stair landing, repair of slope protection, breakwater, harbor dredging, navigational aids, among others. Functional facilities that have been proposed include slipway, market hall, fish processing facilities, refrigeration building and refrigeration machinery, ice making machine, among others. The port utilities proposed include wastewater treatment facility, solar panel system, fuel station, etc. The investment costs used in the financial analysis were generated from the investment cost estimates presented in Chapter 16, Project Cost. The base cost estimates were applied plus a physical contingency of 8%. Price escalation rates for foreign and local costs as well as all taxes (i.e., duties, value-added tax, and withholding tax) were excluded from the analysis.

The investment costs were scheduled according to the implementation schedule proposed in fielding consultants and in carrying out civil works and equipment installation as well as in the implementation of the technical assistance. The disbursement of loan proceeds for each port likewise followed the Project implementation schedule.

In the financial analysis, the fielding of design and construction consultants, conduct of civil works and equipment installation, and implementation of the technical assistance were all assumed to be carried out during the period 2012 – 2017 or from Year 1 – Year 6. All construction works were assumed to be completed by 2016 (Year 5) with port operations commencing by 2017 (Year 6). The technical assistance was assumed to be conducted during 2016 – 2017 (Year 5 – Year 6).

b) Depreciation

Each investment was depreciated over the assumed number of years that it may be in useful operation. Depreciation cost was mainly based on a straight-line estimate (i.e., total value of investment divided by the total number of useful years of the investment). The depreciation cost for each major type of investment is based on the following table.

Table 19.2.2 Basis for Calculating Depreciation Cost

Type of Investment	Useful Life in Years
Port Facilities	50 years
Functional Facilities:	
Buildings	30 years
Equipment	20 years
Utilities	15 years

c) Incremental Operation and Maintenance (O&M) Costs

The assumed operation and maintenance cost of all new investments on port facilities, functional facilities, and utilities was based on a percentage of the total value of each type of investment. This is shown in the following table.

Table 19.2.3 Basis for Estimating O&M Cost

Type of Investment	O&M Cost as % of Total Investment Cost
Port Facilities	0.5% every year
Buildings	0.5% every year
Mechanical Facilities/Equipment	(i) 1% each year from Year 1 – Year 5
	(ii) 2% each year from Year 6 – Year 10
	(iii) 3% each year from Year 11 – Year 30
Port Utilities	(i) 1% each year from Year 1 – Year 5
	(ii) 2% each year from Year 6 – Year 10
	(iii) 3% each year from Year 11 – Year 30

d) Other Incremental Costs

Other incremental costs were likewise estimated and included in the financial analysis which were attributed to the operation of new facilities as well as those facilities which may require expanded operation due to increased port requirements. In other words, these costs are incremental costs, meaning that these would not have been incurred without the new investments under the Project. These incremental costs include additional expenditures on electricity and water as well as on personnel and miscellaneous costs required in the operation of the rehabilitated/improved facilities.

It is worth noting that in Iloilo, expenses in electricity (under "with project" situation) are expected to decrease substantially with the installation of the proposed solar panel system. Current electricity charge in Iloilo is at about PhP11.30/kwh. However, with the operation of the solar panel system, this is expected to be reduced to about PhP8.48/kwh. Incremental electrical costs for the other fish ports were based on the current electricity charges. Electricity charges for each municipal fish port were assumed to be the same as that of the regional fish port in its respective area.

Incremental electricity and water costs incurred in the operation of the local fish processing and HACCP facilities were treated differently in the financial analysis. For example, local fish processing facilities will be rented to private businesses at cost plus a 20% surcharge. This means that the fish port will shoulder all costs of depreciation, electricity, and maintenance will rent the facility based on the value of these costs (e.g., cost/sqm/month) plus a 20% surcharge. The volume of water consumed by the client for fish processing shall be estimated by the port and will be charged to the client at cost plus a surcharge of 13% in the case of Iloilo FPC and 100% in Sual FPC. Lucena is expected not to apply a surcharge on water cost. HACCP facilities will be rented to private businesses as well. All electricity and water costs incurred in the operation of these facilities will be shouldered by the lessee of the HACCP facility. In both cases, since the incremental electricity costs will be shouldered by the lessees of these facilities, electricity costs were not reflected in the projected income and cash flow statements. The incremental electricity costs are presented in Tables 19.2.4.

Table 19.2.4 Summary of Electricity Costs

Fish Port	Charge Rate	Port Electricity Cost (2016) PhP million	Port Electricity Cost (2025 – 2040) PhP million
A. Regional Fish Ports			
1. Bislig	PhP4.73/kwh	4.000	4.000
2. Camaligan	PhP7.70/kwh	3.342	3.342
3. Davao	PhP4.50/kwh	-	-
4. Iloilo	PhP8.48/kwh	32.727	32.727
5. Lucena	PhP7.15/kwh	0.322	0.322
6. Sual[f]	PhP7.30/kwh	4.783	6.483
B. Municipal Fish Ports			
1. Calabanga	PhP7.70/kwh	0.015	0.015
2. Sta. Cruz	PhP4.50/kwh	0.015	0.015
3. Concepcion	PhP7.60/kwh	0.037	0.037
4. Atimonan	PhP7.15/kwh	0.024	0.024
5. Subic	PhP7.30/kwh	0.024	0.024

The following are some explanatory comments on the above-presented table:

- Bislig FPC – incremental electricity costs in Bislig FPC are mainly for ice production.
- Camaligan FPC – incremental electricity costs are for the operation of blast freezer and cold storage facilities for meat and chicken as well as for the ice making facility. The

port is envisioned to shoulder all operating costs (i.e., electricity, depreciation, and maintenance). The facilities will be rented to clients based on the estimated cost (for example per month/sqm) plus a 20% surcharge.

- Davao FPC – incremental electricity costs for Davao FPC are to be shouldered by the lessee of HACCP facilities. HACCP facilities will be leased to private sector clients who, in turn, will shoulder all cost of operation and maintenance.
- Iloilo FPC - electricity charge per kwh under "with project" situation is based on a 25% reduction rate per kwh upon installation of the solar panel system. Current electricity charge by PECO is about PhP11.30/kwh. Incremental electricity costs of Iloilo FPC are expected to be incurred in the operation of the local fish processing facilities such as contact freezer, blast freezer, and cold storage. All cost of operation of the local fish processing facility such as electricity, maintenance, and depreciation are shouldered by the fish port. The facility will be rented to clients based on the estimated cost of operation (for example per month/sqm) plus a 20% surcharge. Additional costs are also expected to be incurred in the operation of the cold storage and blast freezer facilities for meat and chicken as well as ice making facility.
- Lucena FPC – incremental electricity costs will be incurred in the operation of cold storage, chilled storage, and blast freezer units of the local fish processing facility. All cost of operation of the local fish processing facility such as electricity, maintenance, and depreciation will be shouldered by the fish port. The local fish processing facility will be rented to a potential client based on the estimated cost of operation (for example per month/sqm) plus a 20% surcharge.
- Sual FPC – incremental electricity costs will be incurred in the operation of cold storage and blast freezer units of the local fish processing facility. All cost of operation of the local fish processing facility such as electricity, maintenance, and depreciation are shouldered by the fish port. The local fish processing facility will be rented to a potential client based on the estimated cost of operation (for example per month/sqm) plus a 20% surcharge. Additional electricity costs are incurred in the operation of the ice making facility.
- All municipal fish ports – incremental electricity costs incurred by the municipal fish ports are mainly for the overall operation of the major investment facilities such as the market hall.

Expenses on water use were likewise based on current water charge per cubic meter in each of the ports. A summary of the incurred expenses on water is presented in Table 19.2.5.

Table 19.2.5 Summary of Expense on Water

Fish Port	Charge Rate	Expense on Water (2016) PhP million	Expense on Water (2025 – 2040) PhP million
A. Regional Fish Ports[a]			
1. Bislig	PhP37.00/cum	0.670	2.040
2. Camaligan	PhP2.00/cum	0.070	0.070
3. Davao[b]	PhP26.00/cum	-	-
4. Iloilo	PhP67.11/cum	2.060	2.060
5. Lucena[b]	PhP60.40/cum	-	-
6. Sual[b]	-	-	-
B. Municipal Fish Ports			
1. Calabanga	PhP2.00/cum	0.026	0.026
2. Sta. Cruz	PhP26.00/cum	0.026	0.026
3. Concepcion	PhP67.11/cum	0.044	0.044
4. Atimonan	PhP60.40/cum	0.040	0.040
5. Subic	PhP30.00/cum	0.020	0.020

[a] Incremental expense on water is incurred by regional fish ports in the operation of ice making facilities.
[b] Incremental expenses on water for this fish port are shouldered by lessees of local fish processing and HACCP facilities.

A summary of the estimated incremental expenses on personnel and miscellaneous items is presented in Table 19.2.6.

Table 19.2.6 Summary of Personnel and Miscellaneous Expenses

Fish Port	Personnel (2016) PhP million	Personnel (2025 – 2040) PhP million	Miscellaneous (2016) PhP million	Miscellaneous (2025 – 2040) PhP million
A. Regional Fish Ports[a]				
1. Bislig	2.160	2.160	-	-
2. Camaligan[b]	2.880	2.880	1.000	1.000
3. Davao[c]	-	-	-	-
4. Iloilo[d]	3.240	3.240	1.000	1.000
5. Lucena[e]	-	-	-	-
6. Sual[f]	0.841	1.201	-	-
B. Municipal Fish Ports[g]				
1. Calabanga	0.228	0.228	0.004	0.004
2. Sta. Cruz	0.228	0.228	0.004	0.004
3. Concepcion	0.228	0.228	0.008	0.008
4. Atimonan	0.228	0.228	0.006	0.006
5. Subic	0.228	0.228	0.004	0.004

[a] Incremental personnel and miscellaneous expenses incurred by Bislig FPC, Camaligan FPC, Iloilo FPC, and Sual FPC are mainly from the operation of ice plant facilities.
[b] No other incremental expense on personnel at Camaligan FPC was included in the analysis as personnel expense for the operation of HACCP facilities is shouldered by the lessee.
[c] Incremental expense on personnel at Davao FPC for operation of HACCP facilities is shouldered by the lessee of the facilities. Therefore are not included in the analysis.
[d] Incremental expense on personnel at Iloilo FPC for operation of local fish processing and HACCP facilities is shouldered by the lessee of the facilities. Therefore are not included in the analysis.
[e] Incremental expense on personnel at Lucena FPC for operation of local fish processing is shouldered by the lessee of the facilities. Therefore are not included in the analysis.
[f] Incremental expense on personnel at Sual FPC for operation of local fish processing and HACCP facilities is shouldered by the lessee of the facilities. Therefore are not included in the analysis.
[g] Incremental personnel costs incurred by municipal fish ports are mainly for the overall operation of the major investment facilities such as the market hall.

2) Estimation of Incremental Revenues

Port revenues were derived from specific port facilities, which were proposed to be improved/rehabilitated and constructed under the Project. The major functional facilities under the Project are basically value-adding investments such as local fish processing facilities, HACCP facilities, ice making machines, ice storage/cold storage facilities, blast freezers, and improvement/construction of market halls and slipways.

The improvement of port facilities in Bislig FPC, Davao FPC, Iloilo FPC, Lucena FC, and Sual and well as the municipal fish ports is expected to increase vessel port entries and the volume of fish landings each year until 2025. This, in turn, will increase business transactions in their respective market halls which will be improved under the Project. Consequentially, a greater number of fishing vessels is expected to berth at each port for longer periods as well as avail of the port slipway for major repairs. In the regional ports, the increased vessel entries is expected to result in greater revenues from port utility fees as well as revenues from fuel, ice, and water conveyance. Improvements in the port facilities are also expected to encourage larger numbers of vehicular traffic from which the ports, particularly the regional fish ports may generate additional incremental revenues from entrance fees and parking fees. In the financial analysis, taxes such as value-added tax (VAT) and withholding tax were excluded in the analysis.

a) Incremental Revenue from Value-adding Facilities

A substantial amount of revenues are expected to be generated by value-adding facilities

such as: (i) contact freezers; (ii) blast freezers; (iii) brine tank freezer; (iv) cold storage facilities for fish; (v) cold storage facilities for meat and chicken; (vi) chill storage; (vii) smoking chamber; (viii) vacuum packing machine; and (ix) HACCP fish processing facilities. A summary of these facilities for each fish port and the corresponding recommended charges are presented in Appendix 12, Table 12.1.2.

HACCP facilities will be established in Camaligan FPC (4 HACCP units), Davao FPC (2 HACCP units), Iloilo FPC (4 HACCP units), and Sual FPC (2 HACCP units). These facilities will comprise of various types of equipment and facilities such as an ice plant/storage, a blast freezer, cold storage, and processing equipment. The HACCP facilities (inclusive of all the relevant facilities and equipment necessary to operate) will be rented out to a private lessee at a rate which is mutually agreed upon by the specific regional port and the private lessee. The annual rental charge is based on the estimated annual depreciation of all of the HACCP facilities and equipment plus a surcharge. The recommended surcharge for the regional fish ports are as follow: (i) 100%, as in the case of Davao FPC and Iloilo FPC; (ii) 200% as in the case of Sual FPC, and (iii) 300% for Camaligan FPC. These proposed surcharges will need to be presented to potential clients and mutually agreed upon.

Table 19.2.7 Summary of Revenues from HACCP

Fish Port	HACCP Revenue (2016) (PhP million)	HACCP Revenue (2025 – 2040) (PhP million)
Regional Fish Ports		
1. Bislig[a]	-	-
2. Camaligan	25.917	25.917
3. Davao	6.691	6.691
4. Iloilo	14.547	14.547
5. Lucena[a]	-	-
6. Sual	11.237	11.237

[a] No HACCP facilities to be installed.

Aside from the HACCP facilities, other value-adding investments will likewise generate significant revenues for some of the regional fish ports. The establishment of local fish processing facilities in selected regional fish ports is expected to improve the quality of processed fish products as well as generate greater employment opportunities. These local fish processing facilities include relevant facilities/equipment such as contact freezer, blast freezer, cold storage, smoking kiln, and a vacuum packing machine. The local fish processing facilities will be maintained by the port, and will shoulder all related operation and maintenance (O&M) costs including depreciation, maintenance, and electricity. These facilities will be leased to private clients at a rental charge rate which covers O&M costs plus a 20% surcharge. The surcharge is calculated at 20% of the total O&M costs and depreciation.

Aside from the rental of the local fish processing facilities, additional revenues will be generated by the regional fish port from surcharges on electricity and water as well as space rental of the facilities. The total revenues generated by local fish processing facilities are summarized in Table 19.2.8.

Table 19.2.8 Projected Revenues from Local Fish Processing (LFP) Facilities

Regional Fish Port	LFP Revenue (2016) PhP million	LFP Revenue (2025 – 2040) PhP million
1. Bislig[a]	-	-
2. Camaligan[a]	-	-
3. Davao[a]	-	-
4. Iloilo	12.438	12.438
5. Lucena	0.487	0.487
6. Sual	7.734	7.734

[a] No local fish processing facility to be installed.

Cold storage and freezer facilities will likewise be provided in Camaligan FPC and Iloilo FPC to accommodate meat and chicken products. These facilities will be maintained by the port, and will shoulder all related operation and maintenance (O&M) costs including depreciation. These facilities will be leased to private clients at a rental charge rate which covers O&M costs and depreciation plus a 20% surcharge. The surcharge is calculated at 20% of the total O&M costs and depreciation. The total revenues generated by local fish processing facilities are summarized in Table 19.2.9.

Table 19.2.9 Projected Revenues from Freezer and Cold Storage Facilities (For Meat and Chicken)

Fish Port	Freezer and Cold Storage Facilities Revenue (2016) (PhP million)	Freezer and Cold Storage Facilities Revenue (2025 – 2040) (PhP million)
Regional Fish Ports		
1. Bislig[a]	-	-
2. Camaligan	4.197	4.197
3. Davao[a]	-	-
4. Iloilo	25.183	25.183
5. Lucena[a]	-	-
6. Sual[a]	-	-

[a] No freezer and cold storage facilities for meat and chicken to be installed.

b) Incremental Revenue from Fish Landings

Fish landings at each port are assumed to remain at the current charge rate of about PhP4.00 – PhP4.50/tub (or *banyera*) weighing about 40 kg. It is proposed, however, that the fish landing fee at the Sual FPC be increased to PhP6.00/tub from the current rate of PhP2.80/tub. Of the proposed landing fee, PhP2.80/tub will be remitted to the municipal treasury as the LGU's share while the balance of PhP3.20/tub will be retained at the Sual FPC as its revenue to cover part of O&M costs. The volume of fish landings for each fish port was estimated following the projected volume of fish landings under the market study as discussed in Chapter 12 of this report. The projected volume of fish landing, by port, is presented in Table 19.2.10 below.

Table 19.2.10 Projected Volume of Fish Landing by Fish Port

Fish Port	Volume of Fish Landing (Ave. 2005-2009) MT	Volume of Fish Landing (2016) MT	Volume of Fish Landing (2025 – 2040) MT
A. Regional Fish Ports			
1. Bislig[a]	2,443	10,322	20,345
2. Camaligan	563	569	2003
3. Davao[b]	5,251	5,328	6,011
4. Iloilo[c]	23,912	25,350	28,854
5. Lucena[d]	23,738	23,900	25,398
6. Sual[e]	552	18,700	23,832
B. Municipal Fish Ports[f]			
1. Calabanga	5,660	5,697	5,773
2. Sta. Cruz	3,004	3,029	3,257
3. Concepcion	2,438	2,438	2,457
4. Atimonan	3,247	3,247	3,253
5. Subic	10,937	11,047	11,915

[a] In Bislig FPC, fish will mainly be transshipped at a cost of PhP4.50/tub.
[b] In Davao FPC, fish unloaded by fishing vessels are charged a fee of PhP4.00/tub while fish unloaded by overland vehicles are charged a fee of PhP0.43/kg.
[c] In Iloilo FPC, fish unloaded are charged a fee of PhP4.50/tub.
[d] In Lucena FPC, fish unloaded are charged a fee of PhP4.00/tub.
[e] In Sual FPC, it is proposed that fish unloaded be charged a fee of PhP6.00/tub with PhP2.80/tub as share of the LGU and the remaining balance of PhP3.20/tub retained at the Sual FPC as revenue.
[f] Fish unloading fee at all municipal fish ports are assumed at PhP4.50/tub.

c) Incremental Revenue from Market Fees and Buyer/Seller Fees

Fish sold at the fish port market was assumed to be charged a (proposed) rate equivalent to 1% of the volume of fish sold. Although this rate is considerably higher than the average rate currently being charged at the ports (about PhP4.00 – PhP4.50/tub of 40 kg), this is one of the necessary conditions for making the fish ports financially viable.[1] These proposed charge rates were projected to increase incrementally and were expected to peak over a 15-year period from 2011 – 2025. The proposed charge rates for each fish port are presented in the table below.

Table 19.2.11 Proposed Charge Rates for Market Fees and Buyer/Seller Fees

Fish Port	Proposed Average Charge Rate (2025)
A. Regional Fish Ports	
1. Bislig	PhP 34.50/tub
2. Camaligan	No market hall activities.
3. Davao	PhP25.85/tub
4. Iloilo	PhP33.00/tub
5. Lucena	PhP33.12/tub
6. Sual	No market hall activities.
B. Municipal Fish Ports	
1. Calabanga	PhP19.34/tub
2. Sta. Cruz	PhP32.37/tub
3. Concepcion	PhP20.59/tub
4. Atimonan	PhP33.18/tub
5. Subic	PhP16.40/tub

Projected revenues from market fees and buyer/seller fees are presented in Tables 19.2.12 and 19.2.13, respectively.

Table 19.2.12 Projected Revenues from Market Fees

Fish Port	Market Fees (2009) PhP million	Market Fees (2016) PhP million	Market Fees (2025 – 2040) PhP million
A. Regional Fish Ports			
1. Bislig[a]	-	13.698	70.043
2. Camaligan	No marketing of fish.	No marketing of fish.	No marketing of fish.
3. Davao	0.918	2.949	3.257
4. Iloilo	1.401	20.656	23.617
5. Lucena	2.049	14.860	15.785
6. Sual	No marketing of fish.	No marketing of fish.	No marketing of fish.
B. Municipal Fish Ports[a]			
1. Calabanga	-	2.798	2.853
2. Sta. Cruz	-	2.451	2.638
3. Concepcion	-	1.633	1.646
4. Atimonan	-	1.536	1.538
5. Subic	-	0.914	1.083

[a] No landing records for 2009 available.

[1] Currently some municipal fish ports are already charging 1% of the value of fish sales/landed such as Subic Municipal Fish Port and Concepcion Municipal Fish Port.

Table 19.2.13 Projected Revenues from Buyer/Seller Fees

Fish Port	Buyer/Seller Fees (2009) PhP million	Buyer/Seller Fees (2016) PhP million	Buyer/Seller Fees (2025 – 2040) PhP million
A. Regional Fish Ports			
1. Bislig	Fish transshipment.	Fish transshipment.	Fish transshipment.
2. Camaligan	No market facility.	No market facility.	No market facility.
3. Davao	0.490	0.678	0.749
4. Iloilo	0.729	15.492	18.894
5. Lucena	0.016	8.916	12.628
6. Sual	No market facility.	No market facility.	No market facility.
B. Municipal Fish Ports[a]			
1. Calabanga	-	2.280	2.326
2. Sta. Cruz	-	1.973	2.123
3. Concepcion	-	1.551	1.564
4. Atimonan	-	0.614	0.615
5. Subic	-	0.366	0.433

[a] No records for 2009 available.

d) Incremental Revenue from Market Hall Rent

Market hall facilities in Bislig FPC, Davao FPC, Iloilo FPC, and Lucena FPC will be improved/ expanded to accommodate a greater number of clients as well as improve sanitation within the facilities. Rental will be for the market bays and office space and were based on current rental rates at the ports concerned. The rental rates for market bays and office space for each of the regional fish ports are presented in Table 19.2.14.

Table 19.2.14 Total Market and Office Area and Rental Rates

Regional Fish Ports	Market Hall Area Sqm	Bay Rental Rate PhP/month	Total Office Area sqm	Office Rental Rate PhP/sqm/month
1. Bislig	620 (4 bays)	3,136	25	114.95
2. Camaligan	No market hall.		No office rent.	
3. Davao	320 (2 bays)	257	195	159.72
4. Iloilo	4,000 (31 bays)	6,000	387.5	115.00
5. Lucena	3,929 (31 bays)	8,228	387.5	115.00
6. Sual	No market hall.		No office rent.	

e) Incremental Revenue from Ice Sales

Ice making facilities will be installed in Bislig FPC, Camaligan FPC, Iloilo FPC, Lucena FPC, and Sual FPC. These facilities are expected to generate a large amounts of additional revenue as well as contribute to improving/preserving the quality of fish unloaded and transacted within the regional fish port. The distribution of ice to some of the municipal fish ports will likewise contribute to the preservation of fish quality in these ports. The projected revenue from the sale of ice for each regional fish port is presented in Table 19.2.15.

Table 19.2.15 Projected Revenue from Ice Sale

Fish Port	Ice Sale Revenue (2009) PhP million	Ice Sale Revenue (2016) PhP million	Ice Sale Revenue (2025 – 2040) PhP million
Regional Fish Ports			
1. Bislig[a]	-	10.643	37.804
2. Camaligan[b]	-	10.295	10.295
3. Davao[c]	-	-	-
4. Iloilo[d]	-	33.480	33.480
5. Lucena[e]	4.332	8.723	9.267
6. Sual[f]	-	5.425	16.241

[a] Price of ice is at PhP70.00/block of 50 kg.
[b] Price of ice, on the average, is at PhP95.92/block of 50 kg.
[c] No ice making facility to be provided.
[d] Price of ice, on the average, is at PhP93.33/block of 50 kg.
[e] Price of ice is at PhP77.00/block of 50 kg.
[f] Price of ice is at PhP80.00/block of 50 kg.

f) Incremental Revenue from Raw Land Rent

In Bislig FPC, Camaligan FPC, and Iloilo FPC, there will be great potential for generating additional revenues from the rent of unused raw land within the fish port compound. With the upgrading of facilities, market facilities, and overall environmental conditions within these ports, it is expected that private sector clients will be encouraged to relocate and invest within the port complex. In Bislig FPC projected annual revenues from raw land rent are estimated at about PhP8.4 million, mainly from about 2 ha of raw land and rented at about PhP35.00/sqm/month. In Camaligan FPC, annual rental revenues are estimates at about PhP4.8 million, mainly from rent of 2 ha of raw land at about PhP20/sqm/month.

With the installation of the solar panel system at the Iloilo FPC, electricity costs are expected to be reduced by about 25%. Current electricity charge by PECO is about PhP11.30/kwh. Upon the completion of the solar panel system and its full operation, this cost is expected to decrease to about PhP8.48/kwh. This substantial reduction in electricity cost is expected to encourage more potential private sector businesses to relocate into the Iloilo FPC premises and therefore occupy a large portion of the vacant raw land in the port. Of the total 18 ha, about 9-10 ha are still available for commercial use. Of these, a total of about 7 ha are expected to be rented at the current rate of PhP33.375/sqm/month, generating a total of about PhP28.2 million in rental revenues.

g) Incremental Revenue from Port Entry

Information on the type, tonnage, and frequency of vessels entering the ports was difficult to obtain which should have served as basis for projecting revenues from port entry. An alternative approach was therefore applied in the estimation. Revenues from port entry fees were mainly projected using the 2009 port entry revenues of each regional fish port as base. Projection of the port entry revenue was then undertaken following the annual growth rate applied in projecting the port-specific volume of fish landings as estimated in the market demand study of this report. The implication of this approach is that the rate of growth of fish landings and that of port entry of fishing vessels are closely related to some extent. Following this approach, the annual revenue from port entry was projected to increase from the current earnings (2009) of each regional port until 2016, the first year of port operations. This is further projected to increase annually until 2025, based on the assumed annual growth rate, and then assumed to remain at this level over the period 2025 - 2040. The results of the projections are presented in the table below.

Table 19.2.16 Projected Revenue from Port Entry

Fish Port	Port Entry Revenue (2009) PhP million	Port Entry Revenue (2016) PhP million	Port Entry Revenue (2025 – 2040) PhP million
Regional Fish Ports			
1. Bislig	Not applicable.	4.689	4.796
2. Camaligan	Not applicable.	Not applicable.	Not applicable.
3. Davao	3.263	3.542	4.233
4. Iloilo	0.096	1.363	1.558
5. Lucena	0.300	0.350	0.370
6. Sual	0.067	0.205	0.233

Note: This revenue was not estimated or considered for municipal fish ports.

No port entry revenues were estimated for Bislig FPC as this port was basically treated as a new fish port. Estimates of port entry revenue for Bislig FPC were derived from the market study (Chapter 12) regarding projections of the number of expected fishing vessels transferring from General Santos FPC to Bislig FPC once the Bislig FPC facilities are completed.

h) Incremental Revenue from Berthing Fees

Improvements in port facilities of Iloilo FPC, Lucena FPC, Lucena FPC, and Sual FPC are expected to encourage longer berthing periods by fishing vessels with subsequent greater availment of other port facilities and services, i.e., port utilities and slipway/repair facilities as well as require increased services for fuel, water, and ice conveyance.

Incremental revenues from berthing fees were mainly projected using 2009 revenue from berthing fees of each regional fish port as base for projection. Projection of revenues from berthing fees was undertaken following the annual growth rate used in projecting the port-specific port entry revenues over the period 2016 - 2025. The annual revenue from berthing fees was projected to increase significantly from the current earnings (2009) of each regional port until 2016, the first year of port operations. This was further projected to increase annually until 2025 and then assumed to remain at this level over the period 2025 - 2040. The results of the projections are presented in the table below.

Table 19.2.17 Projected Revenue from Berthing Fees

Fish Port	Revenue from Berthing Fees (2009) PhP million	Revenue from Berthing Fees (2016) PhP million	Revenue from Berthing Fees (2025 – 2040) PhP million
Regional Fish Ports			
1. Bislig	0.037	0.634	0.648
2. Camaligan	Not applicable.	Not applicable.	Not applicable.
3. Davao	0.096	1.453	1.737
4. Iloilo	0.302	1.488	1.701
5. Lucena	0.566	0.570	0.605
6. Sual	0.281	0.570	0.646

Note: This revenue was not estimated or considered for municipal fish ports.

i) Revenues from Fuel, Water, and Ice Conveyance

Revenues from fuel, water, and ice conveyance were likewise projected using each port's 2009 earnings from this income source as base. The revenues were then projected following the annual growth rate used in projecting the port-specific port entry revenue over the period 2016 – 2025. The projected increase in revenues from fuel, water, and ice conveyance fees is based on the assumption that as greater number of vessels enter the fish port, availment of fuel, water, and ice conveyance services will correspondingly

increase at the same rate. The annual revenues of each port from fuel, water, and ice conveyance fees were projected to increase significantly from their 2009 level until 2016, the first year of port operations. These were further projected to increase annually until 2025, following the assume port-specific annual growth rate, and then further assumed to remain at this level over the period 2025 - 2040. The results of the projections are presented in the Tables 19.2.18 - 19.2.20 below.

Table 19.2.18 Projected Revenues from Fuel Conveyance

Fish Port	Revenue from Fuel Conveyance (2009) PhP million	Revenue from Fuel Conveyance (2016) PhP million	Revenue from Fuel Conveyance (2025 – 2040) PhP million
Regional Fish Ports			
1. Bislig	0.401	5.730	5.860
2. Camaligan	Not applicable.	Not applicable.	Not applicable.
3. Davao	0.263	0.533	0.596
4. Iloilo	0.043	0.433	0.495
5. Lucena	0.356	0.359	0.381
6. Sual	0.055	0.562	0.637

Note: This revenue was not estimated or considered for municipal fish ports.

Table 19.2.19 Projected Revenues from Water Conveyance

Fish Port	Revenue from Water Conveyance (2009) PhP million	Revenue from Water Conveyance (2016) PhP million	Revenue from Water Conveyance (2025 – 2040) PhP million
Regional Fish Ports			
1. Bislig	-	0.501	0.513
2. Camaligan	Not applicable.	Not applicable.	Not applicable.
3. Davao	-	0.050	0.057
4. Iloilo	0.028	0.282	0.323
5. Lucena	0.193	0.194	0.206
6. Sual	0.010	0.103	0.117

Note: This revenue was not estimated or considered for municipal fish ports.

Table 19.2.20 Projected Revenues from Ice Conveyance

Fish Port	Revenue from Ice Conveyance (2009) PhP million	Revenue from Ice Conveyance (2016) PhP million	Revenue from Ice Conveyance (2025 – 2040) PhP million
Regional Fish Ports			
1. Bislig	-	0.760	2.030
2. Camaligan	Not applicable.	Not applicable.	Not applicable.
3. Davao	0.049	0.099	0.110
4. Iloilo	0.270	2.740	3.133
5. Lucena	1.605	1.616	1.717
6. Sual	0.066	0.333	0.377

Note: This revenue was not estimated or considered for municipal fish ports.

j) Incremental Revenues from Port Utility Fees

Revenues from port utility fees in 2009 were also used as base in projecting revenues from this income source and were assumed to increase following the annual growth rate used in projecting the port-specific port entry revenue over the period 2016 – 2025. It is likewise assumed that revenues from port utility fees will increase as greater number of vessels enter the fish port resulting in an increase in the availment port utility services following the same annual growth rate. The projected annual revenues of each fish port from port utility fees are presented in the Table 19.2.21 below.

Table 19.2.21 Projected Revenues from Port Utility Fees

Fish Port	Revenue from Port Utility Fees (2009) PhP million	Revenue from Port Utility Fees (2016) PhP million	Revenue from Port Utility Fees (2025 – 2040) PhP million
Regional Fish Ports			
1. Bislig	Not included.	Not included.	Not included.
2. Camaligan	Not applicable.	Not applicable.	Not applicable.
3. Davao	3.228	3.298	3.935
4. Iloilo	11.249	18.269	20.889
5. Lucena	1.762	3.547	3.768
6. Sual	0.295	2.993	3.392

Note: This revenue was not estimated or considered for municipal fish ports.

k) Incremental Revenue from Slipway Usage

Revenues from slipway usage were estimated based on comparison of earnings of fish ports relative to their size and capacity and also on the expected demand for slipway usage upon completion of this facility at each fish port. For example, at Sual FPC, it is expected that earnings from slipway usage will be significantly large as Sual will have the only slipway facility in Northern Luzon, along the coast of La Union to Ilocos. Also the construction a breakwater and the repair of the slipway at the Iloilo FPC, and the construction of an additional slipway facility, is expected to increase revenues from ship slipway usage. In Bislig, significant revenues from slipway usage are expected to be generated from the transfer of about 160 fishing vessels from General Santos FPC to the newly constructed Bislig FPC. The projected revenues from slipway usage for the different regional ports are presented in Table 19.2.22 below.

Table 19.2.22 Projected Revenues from Slipway Usage

Fish Port	Revenue from Slipway Usage (2009) PhP million	Revenue from Slipway Usage (2016) PhP million	Revenue from Slipway Usage (2025 – 2040) PhP million
Regional Fish Ports			
1. Bislig	-	3.266	4.083
2. Camaligan	No slipway constructed.	No slipway constructed.	No slipway constructed.
3. Davao	No slipway constructed.	No slipway constructed.	No slipway constructed.
4. Iloilo	1.644	5.262	6.577
5. Lucena	No slipway constructed.	No slipway constructed.	No slipway constructed.
6. Sual	0.180	6.046	7.558

Note: This revenue was not estimated or considered for municipal fish ports.

l) Incremental Revenues from Service Income

It is expected that with the improvement of facilities and provision of value-adding facilities and services, as well as greater volume of fish transacted in most of the fish ports, vehicular traffic within the ports will correspondingly increase. This, in turn, is expected to increase revenues from vehicular entrance and parking fees. The projected revenue from these fees is presented in Tables 19.2.23 - 19.2.24.

Table 19.2.23 Projected Revenues from Entrance Fees

Fish Port	Revenue from Entrance Fees (2009) PhP million	Revenue from entrance Fees (2016) PhP million	Revenue from entrance Fees (2025 – 2040) PhP million
A. Regional Fish Ports			
1. Bislig	-	0.112	0.115
2. Camaligan	Not applicable.	Not applicable.	Not applicable.
3. Davao	0.079	0.127	0.142
4. Iloilo	0.520	3.085	3.527
5. Lucena	0.673	0.678	0.720
6. Sual	0.049	0.167	0.189
B. Municipal Fish Ports			
1. Calabanga	-	Not applicable.	Not applicable.
2. Sta. Cruz	-	Not applicable.	Not applicable.
3. Concepcion	-	0.174	0.218
4. Atimonan	-	0.228	0.285
5. Subic	-	0.208	0.247

Table 19.2.24 Projected Revenues from Parking Fees

Fish Port	Revenue from Parking Fees (2009) PhP million	Revenue from Parking Fees (2016) PhP million	Revenue from Parking Fees (2025 – 2040) PhP million
A. Regional Fish Ports			
1. Bislig	-	0.038	0.039
2. Camaligan	-	Not applicable.	Not applicable.
3. Davao	0.117	0.127	0.142
4. Iloilo	0.246	2.015	2.304
5. Lucena	0.452	0.455	0.484
6. Sual	0.109	0.441	0.499
B. Municipal Fish Ports			
1. Calabanga	-	Not applicable.	Not applicable.
2. Sta. Cruz	-	Not applicable.	Not applicable.
3. Concepcion	-	0.067	0.068
4. Atimonan	-	0.014	0.015
5. Subic	-	0.031	0.037

Another potential source of income may be fees from wastewater treatment. Water fees are estimated based on 80% of the total cost of water consumed in the course of wastewater treatment. The estimated revenues from wastewater treatment fees for each fish port is presented in Table 19.2.25.

Table 19.2.25 Projected Revenues from Wastewater Treatment Fees

Fish Ports	Total Water Volume Used cum	Water Charge PhP/cum	Total Cost of Water Used PhP million	Revenue from Wastewater Treatment[a] PhP/year
A. Regional Fish Port				
1. Bislig	4,563	13.00	0.169	0.135
2. Camaligan	27,375	25.00	0.684	0.548
3. Davao	20,531	26.00	0.534	0.427
4. Iloilo	95,813	67.11	6.430	5.144
5. Lucena	27,375	60.40	1.653	1.323
6. Sual	27,375	25.00	0.684	0.548
B. Municipal Fish Port				
1. Calabanga	5,475	25.00	0.139	0.110
2. Sta. Cruz	2,281	26.00	0.593	0.047
3. Concepcion	2,281	67.11	0.153	0.122
4. Atimonan	3,650	60.40	0.220	0.176
5. Subic	7,756	25.00	0.194	0.155

[a] Wastewater treatment revenue is based on 80% of total cost water utilized for wastewater treatment.

3) Projected Profit and Loss and Cash Flow Statements

All incremental revenues and costs of each regional and municipal fish port were projected over a 30-year period which, in turn, served as basis for creating their respective incremental profit and loss and cash flow statements. These projected profit and loss statements provided the basis for the projected cash flow statements which, in turn, served as the basis for calculating the financial internal rate of return (FIRR) and benefit-cost ratio for each fish port analyzed. The projected profit and loss statements are presented in Appendix 12, Tables 12.2.1 to 12.2.11 while the cash flow statements are presented in Appendix 12, Tables 12.3.1 to 12.3.11.

(3) Economic Analysis

The economic analysis was conducted to quantify the incremental economic benefits and costs generated in the course of Project implementation which, in turn, served as a basis for assessing the economic viability of the individual fish ports as well as the whole Project. Incremental economic benefits and costs were mainly derived by comparing the benefits and costs under "with project" situation with those estimated under "without project" situation. For this purpose, all benefits and costs which were in financial values were converted to economic values by applying the world price numeraire. In this approach, economic price of tradable goods were set equal to their financial price. Financial non-traded goods/resources were converted to economic terms by a standard conversion factor (SCF) of 0.90 while labor costs were adjusted by a shadow wage rate (SWR) of 0.60.

1) Economic Costs

Port-specific investment costs were converted to their economic values by applying a SCF which was estimated for each port. These port-specific SCF for converting financial investment costs to economic values are shown in Table 19.2.26.

Table 19.2.26 Estimated SCF for Converting Investment Costs

Fish Port	Estimated SCF
A. Regional Fish Ports	
1. Bislig	0.9860
2. Camaligan	0.9912
3. Davao	0.9897
4. Iloilo	0.9902
5. Lucena	0.9802
6. Sual	0.9902
B. Municipal Fish Ports	
1. Calabanga	0.9785
2. Sta. Cruz	0.9798
3. Concepción	0.9790
4. Atimonan	0.9746
5. Subic	0.9752
Balatan (for reference)	0.9848

2) Economic Benefits

For each specific fish port, economic benefits were identified to have significant impact on the economy, whether on a regional scale or on the national level. These benefits were then quantified, converted to their economic values, and then included in the calculation of the EIRR for each fish port. The following are the economic benefits considered in the economic analysis:

a) Economic Benefits from Improved Fish Quality

This represents the increase in price (and in the available quantity) of fish marketed and

transacted within the fish port due to improved market facilities and readily available ice from the established ice making facilities. The quantification of incremental economic benefits essentially applied the "with project" versus "without project" approach. The following information were used in the quantification of this economic benefit for each fish port (Table 19.2.27).

Table 19.2.27 Information for Quantifying Benefits from Improved Fish Quality

Fish Port	Without Project		With Project	
	Average Price PhP/kg	Fish Volume MT	Average Price PhP/kg	Fish Volume MT
A. Regional Fish Ports				
1. Bislig	-	-	-	-
2. Camaligan	-	-	-	-
3. Davao	58.75	415	64.63	1,399
4. Iloilo	75.01	23,403	82.51	26,294
5. Lucena	75.28	19,136	82.81	20,675
6. Sual	-	-	-	-
B. Municipal Fish Ports				
1. Calabanga	37.44	5,660	39.31	5,773
2. Sta. Cruz	129.19	2,719	135.65	3,257
3. Concepción	44.57	2,438	46.80	2,458
4. Atimonan	79.00	3,247	82.95	3,253
5. Subic	70.98	7,890	74.53	8,868
Balatan (for reference)	68.01	2,815	71.41	2,815

b) Economic Benefits from Value-adding Facilities – HACCP

Estimates of economic benefits from HACCP facilities were based on the difference in the total value of products processed in these facilities and the total cost of resources used in processing. All the resources utilized in the processing are assumed to be mainly non-traded. Therefore, these were converted to their economic values by 0.9, the SCF applied in the economic analysis. The economic value of processed products that are intended for the world market (about 10% of processed products) were valued at their financial price while the financial price of those sold in the local market (about 90%) were adjusted by 0.9 to arrive at their economic value. Table 19.2.28 presents the economic values applied in the analysis.

Table 19.2.28 Economic Benefits from HACCP Facilities

Fish Port	Value of Processed Products (PhP million)	Processing Cost (PhP million)	Net Financial Value-added (PhP million)	Economic Value-added Exported Products (PhP million)	Economic Value-added Products Sold Domestically (PhP million)	Total Economic Value of Processed Products (PhP million)
Davao	89.568	76.964	12.604	11.344	1.134	12.478
Camaligan	356.033	257.510	98.523	88.671	8.867	97.538
Iloilo	193.340	171.305	22.035	19.832	1.983	21.815
Sual	92.160	74.518	14.297	12.867	1.287	14.154

c) Economic Benefits from Local Fish Processing Facilities

Estimates of economic benefits from local fish processing facilities were likewise based on the difference in the total value of products processed in these facilities and the total cost of resources used in processing. As all the resources used in the processing process are mainly non-traded, these were converted to their economic values by 0.9, the SCF applied in the economic analysis. Likewise, as all of the processed products from these facilities are mainly for sale in the domestic market, the total value-added was adjusted

by 0.9 to arrive at its economic value. Table 19.2.29 presents the economic values applied in the analysis.

Table 19.2.29 Economic Benefits from Local Fish Processing Facilities

Fish Port	Value of Processed Products (PhP million)	Processing Cost (PhP million)	Net Financial Value of Processed Products (PhP million)	Net Economic Value of Processed Products (PhP million)
Iloilo	37.660	36.830	0.830	0.747
Lucena	5.377	4.713	0.664	0.598
Sual	43.200	38.013	5.187	4.668

d) Economic Benefits from Improved Health

With the Project, environmental and working conditions at the fish ports are expected to improve with the establishment of improve port management and better market facilities for transacting business. A wastewater treatment facility will also be constructed in each port which is expected to improve the environmental condition for working within the port premises. It was assumed that "without project" situation, environmental and working conditions at the fish ports are not as sanitary as compared with the conditions under "with project" situation. Given this situation, it was further assumed that a portion of the affected population working and living within or near the port area will experience some form of gastro-intestinal ailment due to poor sanitation and unhygienic conditions within the area. Based on data obtained from the Department of Health (DOH), the morbidity rate of persons acquiring gastro-intestinal ailments (e.g., diarreah) is about 0.7076% which is the probability of persons living under unsanitary conditions will get sick of diarreah. Estimates also obtained from DOH indicate that the total cost of treatment is about PhP2,000 for a 2-3 day medical treatment. Based on these information, the total economic benefits were derived for each fish port as follows:

Total number of persons sick = (total affected people) x (morbidity rate)
Total medical treatment cost = (total number of persons sick) x (PhP2,000/treatment)
Total cost per year = (total medical treatment cost) x (5 occurrences per year per person)

Under "with project" situation the economic benefits were assumed to be the savings from the total cost per year (i.e., total cost per year for medical treatment) due to the avoidance of gastro-intestinal ailments resulting from improved sanitary and hygienic conditions in the fish ports. Although the impact of this type of benefit is not significant, it was nevertheless included in the economic analysis to emphasize the importance of the improvement of the fish ports' wastewater treatment facility. The economic benefits from improved health as attributed to improved sanitary and hygienic conditions due to the establishment of wastewater facilities are presented in Table 19.2.30.

Table 19.2.30 Economic Benefits from Improved Health Condition

Fish Port	Total Affected Persons	Total Sick Persons[a]	Total Cost of Medical Treatment[b] PhP million	Total Savings in Medical Treatment[c] PhP million
A. Regional Fish Ports				
Bislig	11,440	81	0.812	0.731
Camaligan	4,500	32	0.320	0.288
Davao	11,700	83	0.831	0.747
Iloilo	9,000	64	0.639	0.575
Lucena	12,500	88	0.888	0.799
Sual	5,200	37	0.369	0.277
B. Municipal Fish Ports				
Calabanga	3,600	25	0.256	0.230
Sta. Cruz	5,400	30	0.383	0.345
Concepcion	4,500	32	0.319	0.288
Atimonan	1,800	13	0.128	0.115
Subic	3,500	25	0.248	0.234
Balatan (for reference)	5,400	38	0.383	0.345

[a] Based on a morbidity rate of 0.7076% as gathered from the Department of Health website.
[b] Total sick persons x PhP2,000/treatment x 5 times the ailment may occur in a year.
[c] Assumed that the reduction in the occurrence of gastro-intestinal ailments is 90% per year.

e) Economic Benefits from Increased Human Productivity

Economic benefits are expected to be derived from increased human productivity accruing to improved health of affected persons. Although the impact of this type of benefit is likewise not significant, it was included in the economic analysis to emphasize the importance of the improvement of the fish ports' wastewater treatment facility. The economic benefits quantified represents the additional number of days that affected persons are able to work due avoidance of getting sick of gastro-intestinal ailments. This was valued based on the total number of work-days lost due gastro-intestinal ailments and conversely, this represents the benefits (or total additional number of days these persons are able to work) if the affected persons do not contract the disease. The estimated economic benefits due to increased human productivity are presented in Table 19.2.31.

Table 19.2.31 Economic Benefits from Increased Human Productivity

Fish Port	Total Number of Sick Persons	Total Number of Work-days Lost[a]	Economic Wage Rate[b] PhP/day	Value of Reduced Number of Work-days Lost[c] PhP million
A. Regional Fish Ports				
Bislig	81	1,215	159	0.193
Camaligan	32	480	139	0.068
Davao	83	1,245	159	0.198
Iloilo	64	960	150	0.144
Lucena	88	1,320	142	0.187
Sual	37	555	144	0.799
B. Municipal Fish Ports				
Calabanga	25	375	139	0.052
Sta. Cruz	30	450	159	0.072
Concepcion	32	480	150	0.072
Atimonan	13	195	142	0.028
Subic	25	375	144	0.054
Balatan (for reference)	38	570	139	0.079

[a] Assumed that each afflicted person will lose 3 work-days and may be afflicted 5 times a year or about 15 work-days lost per person per year.
[b] Adjusted by SCF of 0.9.

The value of reduced number of work-days lost by persons afflicted with gastro-intestinal ailments, conversely, is an estimate of the total economic benefits if the same number of persons are prevented from getting sick due to improved sanitary and hygienic conditions at the fish port as a consequence of constructing a wastewater treatment facility and maintaining clean market facilities.

f) Other Economic Benefits Specific to a Fish Port

Economic benefits from savings in fuel cost are expected to be realized by fish carrier and catcher boats by transferring their operations from General Santos FPC to the newly expanded Bislig FPC. It is estimated that about PhP323.327 million each year will be saved in fuel cost by fishing vessels by the transfer.

In Iloilo FPC, economic benefits will accrue from the construction of the breakwater which will contribute to substantial amount of savings in cost of repair of port facilities caused by strong wave action brought about by typhoons. In the absence of the breakwater, continued damage on the concrete slope slab and revetment will occur due to strong wave action. Also, the absence of the breakwater will require regular port basin dredging/maintenance as well as slipway repair and maintenance. The schedule of cost of repair of the Iloilo FPC port facilities if the breakwater is not constructed is presented in Table 19.2.32.

Table 19.2.32 Schedule of Repair Cost of Iloilo FPC Port Facilities

Type of Repair	Cost PhP million	Frequency
1. Repair on quay wall	6.348	Year 1
	0.317	Every year
	1.270	Every 5 years
2. Repair of concrete slope slab	1.150	Every year
	11.500	Every 10 years
3. Port basin maintenance/dredging	19.872	Year 1, Year 11, Year 21
4. Slipway repair and maintenance	7.657	From Year 1 and every 5 years
5. Repair of revetment	7.820	From Year 1 and every 5 years

In Lucena FPC, the construction of the breakwater will likewise bring about significant yearly economic benefits. If the existing breakwater is not improved, continued damage to port facilities will occur and will require considerable repair works every five years. The improvement of the pier will make fish unloading more efficient and allow this activity to be carried out on a regular basis as without the breakwater, shutdown of the pier will be required whenever damages occur on the facility. The economic benefits that are expected to be realized by improvements of the port facilities (particularly the breakwater and pier) at Lucena FPC comprise of: (i) reduced damage to port facilities amounting to about PhP114.147 million; (ii) reduced losses in revenue from fish landing and transshipment of about PhP6.926 million; and (iii) savings fuel, labor, and ice cost in fish unloading amounting to about PhP3.679 million.

In Sual FPC, benefits will be derived from reduced losses in fish feed and from maintaining fish feed quality at premium price due to readily availability of ice at the fish port. In a scenario where ice is not readily available, an economic loss of about PhP84.041 million per year will be incurred by *bangus* producers and an additional loss of about PhP5.603 million will be incurred due to quality loss which will force producers to sell at about 5% lower than the premium price. The prevention of these losses under "with project" scenario represents the benefits derived from the rehabilitation of the Sual FPC.

19.2.3 Results of the Analysis

(1) Financial Analysis

1) Financial Viability of Individual Fish Ports

The financial viability of each fish port was assessed based on the estimated incremental revenues and expenses calculated for the individual port. These incremental revenues and expenses served as basis for estimating port-specific FIRR and benefit-cost ratio cover a period of 30 years, the assumed life of the Project. The results of the financial analysis indicate that all of the regional and municipal fish ports are financially viable as their respective FIRR exhibited a value greater than 2.2%, the weighted average cost of capital (WACC) assumed in the analysis. A summary of the FIRR values and benefit-cost ratios calculated for each of the regional and municipal fish ports is presented in Table 19.2.33 while the details of the FIRR calculations for each fish port are presented in Appendix 12, Tables 12.3.1 - 12.3.11.

Table 19.2.33 Summary of FIRR Calculations for Fish Ports

Fish Port	FIRR	Benefit: Cost Ratio
A. Regional Fish Ports		
1. Bislig	3.8%	2.67
2. Camaligan	3.9%	2.34
3. Davao	3.3%	2.65
4. Iloilo	4.0%	2.28
5. Lucena	4.3%	2.86
6. Sual	4.1%	2.68
B. Municipal Fish Ports		
1. Calabanga	4.2%	2.72
2. Sta. Cruz	3.7%	2.52
3. Concepción	4.0%	2.64
4. Atimonan	5.4%	2.59
5. Subic	5.2%	2.72
Balatan (for reference)	Negative	

2) Important Financial Indicators for Monitoring Financial Performance of Individual Fish Ports

In order to ensure that the individual fish ports remain financially viable, port management should strictly monitor some important financial indicators at the end of each year. These indicators pertain to the following:

(i) **Operating Ratio**
which measures the coverage of operating expenses by operating revenues.

(ii) **Break-even Point (in PhP)**
which indicates the level of operating revenues must be realized to be able to recover all fixed and variable expenses.

(iii) **Return on Sales**
which measures how large an operating margin each fish port has on its total sales (or revenue). The lower the return on sales (or revenue), then so is the operating margin, which implies that larger sales (or revenue) must be made to make an adequate return on investment.

(iv) **Debt service ratio**
which provides a measure of how the fish port's annual revenues are able to cover its annual debt (i.e., loan amortization plus loan interest payment).

The financial indicators presented in Table 19.2.34 provide indicative levels that need to be maintained by each fish port throughout its operational life in order to be able to sustain financial viability. Anytime the values of these indicators are observed to be below the

values presented in the table, port management must immediately critically review its operational performance and carryout remedial measures in order to improve operational efficiency and financial performance to the level required for specific fish ports.

Table 19.2.34 Financial Indicators for Monitoring Financial Performance of Ports

Fish Port	Operating Ratio[a]	Break-even Point[b] (PhP million)	Return on Sales[c]	Debt-service Ratio[d]
A. Regional Fish Ports				
Bislig	0.42	24.273	38%	1.09
Camaligan	0.56	13.826	28%	1.38
Davao	0.47	2.460	34%	0.86
Iloilo	0.68	66.483	21%	1.80
Lucena	0.40	5.346	39%	1.32
Sual	0.48	12.42	34%	1.09
B. Municipal Fish Ports				
Calabanga	0.46	1.160	35%	1.02
Sta. Cruz	0.41	1.031	39%	0.67
Concepcion	0.39	0.918	39%	0.76
Atimonan	0.46	0.682	35%	1.12
Subic	0.47	0.867	34%	1.08

[a] Operating ratio = Cost of operation ÷ Total revenue

[b] Breakeven point (PhP) = Total fixed expenses + (Total revenue x (Total variable expenses ÷ Total revenue))

[c] Return on sales = Net profit after tax and debt service ÷ Total revenue

[d] Debt Service Ratio = Net profit ÷ Annual debt service
Net profit equals revenues less expenses; excluding non-cash and interest charges)

Anytime the values of these indicators are observed to be below the values presented in the table, port management must immediately critically review its operational performance and carryout remedial measures in order to improve operational efficiency and financial performance to the level required for specific fish ports.

3) Financial Viability of the Whole Project (Regional and Municipal Fish Ports)

The financial viability of the whole Project was likewise assessed. The calculated FIRR for the whole Project was estimated at about 4.1% and a benefit-cost ratio of 2.17.

4) Financial Viability of the Whole Project (Regional Fish Ports Only)

In the event that the LGUs, where the intended investments on municipal fish ports are envisioned to be implemented, are unable to raise the counterpart fund requirements, the financial viability of the Project (based only on the financial performance of the regional fish ports) was likewise carried out. Based on this assessment, the calculated FIRR for the whole Project was estimated at about 4.1% and a benefit-cost ratio of 2.16. This implies that there is no significant impact on the overall Project financial viability if the municipal fish ports are excluded from the Project.

(2) Economic Analysis

1) Economic Viability of Individual Fish Ports

The economic viability of each fish port was assessed by estimating its economic internal rate of return (EIRR) and benefit-cost ratio over an expected life of 30 years. The results of the economic analysis indicate that all of the regional and municipal fish ports are economically viable as their respective EIRR exhibited a value greater than 15%, the

economic opportunity cost of capital (EOCC) assumed in the analysis. A summary of the EIRR values and benefit-cost ratios calculated for each of the fish ports is presented in Table 19.2.35 while the details of the EIRR calculations for each fish port are presented in Appendix 12, Tables 12.4.1 - 12.4.12.

Table 19.2.35 Summary of EIRR Calculations for Fish Ports

Fish Port	EIRR	Benefit: Cost Ratio
A. Regional Fish Ports		
1. Bislig	23.3%	1.53
2. Camaligan	31.1%	2.23
3. Davao	77.0%	2.75
4. Iloilo	27.1%	1.95
5. Lucena	44.0%	3.66
6. Sual	18.2%	1.18
B. Municipal Fish Ports		
1. Calabanga	18.0%	1.41
2. Sta. Cruz	36.9%	2.64
3. Concepción	23.4%	2.05
4. Atimonan	23.8%	1.69
5. Subic	26.3%	3.03
Balatan (for reference)	24.8%	1.73

2) Economic Viability of the Whole Project (Regional and Municipal Fish Ports)

The economic viability of the whole Project was likewise assessed. The calculated EIRR for the whole Project was estimated at about 27.8% and a benefit-cost ratio of 1.94.

3) Economic Viability of the Whole Project (Regional Fish Ports Only)

In case the LGUs, where the intended investments on municipal fish ports are envisioned to be implemented, are not able to raise the counterpart fund requirements the economic viability of the Project (based only on the economic performance of the regional fish ports) was likewise carried out. Based on this assessment, the calculated EIRR for the whole Project was estimated at about 28.2% and a benefit-cost ratio of 1.95. The overall Project EIRR is slightly higher as the economic benefits derived from the regional fish ports are greater in magnitude than those derived from the municipal fish ports. Therefore, the averaging effect tends to lower the EIRR value for the whole Project if the municipal fish ports are included in the analysis.

(3) Sensitivity and Switching Value Analysis

1) FIRR Sensitivity and Switching Value Analysis

FIRR sensitivity analysis focused on the potential risks that were perceived to possibly confront each of the fish ports (and the Project as a whole) during Project implementation and over their respective economic life. These include: (i) the possible occurrence of an increase in fish port investment costs by 10%; (ii) a possible decrease in port revenues by 10%; (iii) simultaneous increase in fish port investment costs and a decrease in port revenues; (iv) an increase in port O&M costs by 10%; (v) a simultaneous increase in port O&M costs and a decrease in port revenues by 10%; and (vi) a simultaneous increase in port investment costs, O&M costs, and a decrease in port revenues by 10%. Tables 19.2.36 and 19.2.37 present the results of the FIRR sensitivity and switching value analysis for each of the regional and municipal fish port, respectively.

Table 19.2.36 Summary of Results of the FIRR Sensitivity and Switching Value Analysis (Regional Fish Ports)

Item	Bislig FPC			Camaligan FPC			Davao FPC		
Base FIRR[a]	**3.8%**			**3.9%**			**3.3%**		
Benefit:Cost Ratio	**2.67**			**2.34**			**2.65**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable for Sensitivity and Switching Value Analysis	**Recalculated FIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated FIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated FIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 10%	3.2%	1.58	31%	3.2%	1.89	26%	2.6%	2.26	16%
(ii) Revenues decrease by 10%	2.8%	2.77	15%	2.4%	3.85	12%	2.0%	4.05	9%
(iii) Increase in investment costs and decrease in revenues by 10%	2.2%	4.24	10%	1.9%	5.28	9%	2.4%	2.89	11%
(iv) Operation and maintenance (O&M) costs increase by 10%	3.7%	0.42	95%	3.6%	0.88	49%	3.2%	0.27	>100%
(v) Revenues decrease and O&M costs increase by 10%	2.6%	3.22	14%	2.0%	4.81	9%	1.9%	4.35	8%
(vi) Investment costs and O&M costs increase and revenues decrease by 10%	2.0%	4.67	9%	1.4%	6.47	7%	1.2%	6.41	5%
Item	**Iloilo FPC**			**Lucena FPC**			**Sual FPC**		
Base FIRR[a]	**4.0%**			**4.3%**			**4.1%**		
Benefit:Cost Ratio	**2.28**			**2.86**			**2.68**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable for Sensitivity and Switching Value Analysis	**Recalculated FIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated FIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated FIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 10%	3.3%	1.79	28%	3.5%	1.74	32%	3.4%	1.73	31%
(ii) Revenues decrease by 10%	2.5%	3.81	12%	2.9%	3.09	15%	2.8%	3.34	14%
(iii) Increase in investment costs and decrease in revenues by 10%	1.8%	5.42	8%	3.7%	1.25	30%	2.1%	4.90	10%
(iv) Operation and maintenance (O&M) costs increase by 10%	3.5%	1.11	39%	4.2%	0.23	>100%	3.9%	0.52	85%
(v) Revenues decrease and O&M costs increase by 10%	2.0%	5.03	9%	2.8%	3.34	14%	2.5%	3.90	12%
(vi) Investment costs and O&M costs increase and revenues decrease by 10%	1.4%	6.57	7%	2.2%	4.90	10%	1.9%	5.44	9%

[a] Financial internal rate of return (FIRR) is compared with WACC of 2.2%.

[b] Sensitivity indicator (S.I.) represents the elasticity of the FIRR to a change variable. If S.I. is greater than 1, the FIRR is sensitive to a change in variable. If S.I. is equal or less than 1, the FIRR is not sensitive to change.

[c] Switching value (S.V.) indicates by how much percentage change a variable may vary to maintain an FIRR equal to the WACC of 2.2%. A high S.V. (%), implies that the FIRR is not sensitive to a change in the variable. A low value implies that the FIRR is sensitive to a change in the variable. A high or low S.V. is assessed relative to the values of the other change variables for a particular fish port.

Table 19.2.37 Summary of Results of the FIRR Sensitivity and Switching Value Analysis (Municipal Fish Ports)

Item	Calabanga MPC			Sta. Cruz MPC			Concepcion MPC		
Base FIRR[a]	**4.2%**			**3.7%**			**4.0%**		
Benefit:Cost Ratio	**2.72**			**2.52**			**2.71**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable	**Recalculated FIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated FIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated FIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 10%	3.4%	1.85	36%	3.1%	1.68	34%	3.3%	1.85	33.0%
(ii) Revenues decrease by 10%	2.8%	3.48	16%	2.7%	2.70	18%	2.6%	3.42	15.0%
(iii) Increase in investment costs and decrease in revenues by 10%	2.1%	5.13	11%	2.2%	4.22	12%	2.0%	5.07	10.5%
(iv) Operation and maintenance (O&M) costs increase by 10%	4.1%	0.40	>100%	3.6%	0.28	>100	3.8%	0.38	>100%
(v) Revenues decrease and O&M costs increase by 10%	2.6%	3.90	14%	2.6%	2.99	15%	2.5%	3.82	13.5%
(vi) Investment costs and O&M costs increase and revenues decrease by 10%	1.9%	5.54	10%	2.1%	4.49	11%	1.9%	5.35	10.0%
Item	**Atimonan MPC**			**Subic MPC**			**Balatan MPC**		
Base FIRR[a]	**5.4%**			**5.2%**			**negative**		
Benefit:Cost Ratio	**2.59**			**2.72**					
Results of the Sensitivity and Switching Value Analysis									
Change Variable	**Recalculated FIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated FIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated FIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 10%	4.5%	1.60	52%	4.4%	1.50	56%			
(ii) Revenues decrease by 10%	3.8%	2.97	21%	3.8%	2.69	23%			
(iii) Increase in investment costs and decrease in revenues by 10%	3.0%	4.43	15%	3.1%	4.04	16%			
(iv) Operation and maintenance (O&M) costs increase by 10%	5.2%	0.40	>100%	5.0%	0.32	>100%			
(v) Revenues decrease and O&M costs increase by 10%	3.6%	3.41	18%	3.6%	3.03	20%			
(vi) Investment costs and O&M costs increase and revenues decrease by 10%	2.8%	4.75	14%	2.9%	4.36	15%			

[a] Financial internal rate of return (FIRR) is compared with WACC of 2.2%.

[b] Sensitivity indicator (S.I.) represents the elasticity of the FIRR to a change variable. If S.I. is greater than 1, the FIRR is sensitive to a change in variable. If S.I. is equal or less than 1, the FIRR is not sensitive to change.

[c] Switching value (S.V.) indicates by how much percentage change a variable may vary to maintain an FIRR equal to the WACC fo 2.2%. A high S.V. (%), implies that the FIRR is not sensitive to a change in the variable. A low value implies that the FIRR is sensitive to a change in the variable. A high or low S.V. is assessed relative to the values of the other change variables for a particular fish port.

The sensitivity analysis of the port-specific FIRR values indicated that the FIRRs are very sensitive to: (i) a simultaneous increase in fish port investment costs and a decrease in port revenues; (ii) a simultaneous increase in port O&M costs and a decrease in port revenues by 10%; and (iii) a simultaneous increase in port investment costs, O&M costs, and a decrease in port revenues by 10%. This is implied by the calculated sensitivity indicators for these change variables which exhibited values greater than 1. These results were confirmed by the switching value analysis which indicated that small percentage change in these change variables will result in significant drop in the FIRR values, down to the acceptable level of 2.2%.

In most of the sensitivity scenarios, the recalculated FIRR values remained greater than the WACC. This is especially true for scenarios where costs or revenues were independently changed to determine the recalculated FIRR. However, under scenarios where both costs/revenues were increased/decreased simultaneously, most of the regional fish ports (i.e., Bislig, Camaligan, Davao, and Sual) and some of the municipal fish ports (i.e., Calabanga, Sta. Cruz, and Concepcion) exhibited recalculated FIRRs values lower than 2.2%, but were positive and greater than 1%.

A sensitivity and switching value analysis was likewise carried out for the overall Project FIRR. The results are presented in Table 19.38. The sensitivity analysis of the Project FIRR indicated that it is also very sensitive to: (i) a simultaneous increase in fish port investment costs and a decrease in port revenues; (ii) a simultaneous increase in port O&M costs and a decrease in port revenues by 10%; and (iii) a simultaneous increase in port investment costs, O&M costs, and a decrease in port revenues by 10%. This is implied by the calculated sensitivity indicators for these change variables which exhibited values greater than 1. These results were confirmed by the switching value analysis which indicated that small percentage change in these change variables will result in significant drop in the FIRR values, down to the level of 2.2%.

Table 19.2.38 Summary of Results of the FIRR Sensitivity and Switching Value Analysis (The Whole Project, Regional and Municipal Fish Ports)

Change Variable	Percent Change	FIRR	FNPV	Sensitivity Indicator	Switching Value
	(%)	(%)	(PhP million)		(%)
(i) Investment costs increase by	10%	3.5%	875.886	1.26	50%
(ii) Revenues decrease by	10%	3.0%	444.546	2.69	18%
(iii) Increase in investment cost and decrease in revenues by	10%	2.5%	168.453	3.90	13%
(iv) Operation and maintenance (O&M) costs increase by	10%	3.8%	982.470	0.54	78%
(v) Revenues decrease and O&M costs increase by	10%	2.7%	275.038	3.41	15%
(vi) Investment costs and O&M costs increase and revenues decrease by	10%	2.2%	- 1.055	4.57	12%
Base FIRR[a]	**4.1%**				
Base FNPV[a] (PhP million)	**1,151.978**				

[a] Financial internal rate of return (FIRR) and financial net present value (FNPV) are discounted at 2.2%.

A further analysis was carried out on the sensitivity of the overall Project FIRR excluding the municipal fish ports. The results in Table 19.2.38.a show no significant difference from the analysis with the inclusion of the municipal fish ports.

Table 19.2.38.a Summary of Results of the FIRR Sensitivity and Switching Value Analysis (The Whole Project, Regional Fish Ports Only)

Change Variable	Percent Change	FIRR	FNPV	Sensitivity Indicator	Switching Value
	(%)	(%)	(PhP million)		(%)
(i) Investment costs increase by	10%	3.5%	1,130.897	1.38	50%
(ii) Revenues decrease by	10%	2.9%	634.773	2.84	18%
(iii) Increase in investment cost and decrease in revenues by	10%	2.4%	343.618	4.07	13%
(iv) Operation and maintenance (O&M) costs increase by	10%	3.8%	1,238.283	0.64	78%
(v) Revenues decrease and O&M costs increase by	10%	2.6%	451.004	3.53	15%
(vi) Investment costs and O&M costs increase and revenues decrease by	10%	2.1%	159.850	4.72	12%
Base FIRR[a]	**4.1%**				
Base FNPV[a] (PhP million)	**1,422.051**				

[a] Financial internal rate of return (FIRR) and financial net present value (FNPV) are discounted at 19%.

2) EIRR Sensitivity and Switching Value Analysis

a) EIRR Sensitivity Analysis for Each Regional Fish Port

i) Scenario 1: Sensitivity and Switching Value Analysis at 10% and Fish Quality Improvement assumed at 10%

EIRR sensitivity analysis likewise focused on the potential risks that were perceived to confront each of the fish ports and the Project as a whole during Project implementation and over their respective economic life. These include: (i) the possible occurrence of an increase in fish port investment costs by 10%; (ii) a possible decrease in fish port economic benefits by 10%; (iii) simultaneous increase in fish port investment costs and a decrease in port economic benefits; (iv) an increase in port O&M costs by 10%; (v) a simultaneous increase in port O&M costs and a decrease in port economic benefits by 10%; and (vi) a simultaneous increase in port investment costs, O&M costs, and a decrease in port economic by 10%.

The sensitivity analysis of the port-specific EIRR values indicated that the EIRRs are relatively sensitive to: (i) a simultaneous increase in fish port investment costs and a decrease in port economic benefits; and (ii) a simultaneous increase in port investment costs, O&M costs, and a decrease in port economic benefits by 10%. The sensitivity indicator calculated for each of these scenarios exhibited a value far greater than 1. These results were confirmed by the switching value analysis which indicated that a relatively small percentage change in these change variables will result in significant drop in the EIRR values, down to the acceptable level of 15%. However, it should be noted that the EIRR value is not very sensitive as the switching value analysis indicated that the percentage changes require greater than 30%, in all cases, to have an effect on the EIRR values. Table 19.2.39 presents the results of the EIRR sensitivity and switching value analysis for each of the regional fish port for Scenario 1.

Table 19.2.39 Summary of Results of the EIRR Sensitivity (10%) and Switching Value Analysis (Fish Quality Improvement 10%) :Scenario 1 (Regional Fish Ports)

Item	Bislig FPC			Camaligan FPC			Davao FPC		
Base EIRR	**23.3%**			**31.1%**			**77.0%**		
Benefit:Cost Ratio	**1.53**			**2.23**			**2.75**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable for Sensitivity and Switching Value Analysis	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 10%	21%	0.84	60%	29%	0.69	>100%	63%	1.81	>100%
(ii) Benefits decrease by 10%	21%	0.97	35%	29%	0.81	56%	62%	2.00	64%
(iii) Increase in investment costs and decrease in benefits by 10%	19%	1.75	23%	27%	1.46	40%	51%	3.31	47%
(iv) Operation and maintenance (O&M) costs increase by 10%	23%	0.05	>100%	31%	0.18	>100%	77%	0.03	>100%
(v) Benefits decrease and O&M costs increase by 10%	21%	1.02	33%	28%	1.02	50%	61%	2.03	63%
(vi) Investment costs and O&M costs increase and benefits decrease by 10%	19%	1.81	22%	26%	1.50	38%	51%	3.33	47%
Item	**Iloilo FPC**			**Lucena FPC**			**Sual FPC**		
Base EIRR	**27.1%**			**44.0%**			**18.2%**		
Benefit:Cost Ratio	**1.95**			**3.66**			**1.18**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable for Sensitivity and Switching Value Analysis	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 10%	25%	0.67	>100%	41%	0.69	>100%	16%	0.94	20%
(ii) Benefits decrease by 10%	25%	0.80	49%	41%	0.76	73%	16%	1.12	17%
(iii) Increase in investment costs and decrease in benefits by 10%	23%	1.43	34%	38%	1.40	58%	15%	2.00	10%
(iv) Operation and maintenance (O&M) costs increase by 10%	26%	0.24	>100%	44%	0.01	>100%	18%	0.08	>100%
(v) Benefits decrease and O&M costs increase by 10%	25%	0.87	45%	41%	0.77	72%	16%	1.21	15%
(vi) Investment costs and O&M costs increase and benefits decrease by 10%	23%	1.49	33%	38%	1.41	58%	14%	2.08	9%

[a] Economic internal rate of return (EIRR) is compared with an opportunity cost of capital of 15%.

[b] Sensitivity indicator (S.I.) represents the elasticity of the EIRR to a change variable. If S.I. is greater than 1, the EIRR is sensitive to a change in variable.
If S.I. is equal or less than 1, the EIRR is not sensitive to change.

[c] Switching value (S.V.) indicates by how much percentage change a variable may vary to maintain an EIRR equal to the economic opportunity cost of capital of 15%.
A high S.V. (%), implies that the EIRR is not sensitive to a change in the variable. A low value implies that the EIRR is sensitive to a change in the variable.
A high or low S.V. value is assessed relative to the values of the other change variables for a particular fish port.

ii) Scenario 2: Sensitivity and Switching Value Analysis at 10% and Fish Quality Improvement assumed at 5%

In case the Technical Assistance is not conducted simultaneously with the implementation of the project, a second scenario which assumes only a 5% improvement in fish quality is likewise tested in the sensitivity analysis for the Davao, Iloilo, and Lucena regional fish port complexes where fish quality improvement plays an important role in the EIRR calculation. In the sensitivity analysis, a change scenario for each variable is at 10%. Table 19.2.40 presents the results of the EIRR sensitivity and switching value analysis for each of the regional fish port for Scenario 2.

Table 19.2.40 Summary of Results of the EIRR Sensitivity (10%) and Switching Value Analysis (Fish Quality Improvement 5%) :Scenario 2 (Davao, Iloilo and Lucena Regional Fish Ports)

Item	Davao FPC			Iloilo FPC			Lucena FPC		
Base EIRR	**28.5%**			**17.8%**			**28.1%**		
Benefit:Cost Ratio	**1.57**			**1.18**			**2.07**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable for Sensitivity and Switching Value Analysis	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 10%	25%	1.26	60%	16%	0.79	22%	26%	0.72	>100%
(ii) Benefits decrease by 10%	24%	1.42	36%	16%	1.00	16%	26%	0.81	52%
(iii) Increase in investment costs and decrease in benefits by 10%	21%	2.48	23%	15%	1.74	10%	24%	1.48	35%
(iv) Operation and maintenance (O&M) costs increase by 10%	28%	0.04	>100%	17%	0.47	95%	28%	0.02	>100%
(v) Benefits decrease and O&M costs increase by 10%	24%	1.46	36%	16%	1.14	15%	26%	0.83	51%
(vi) Investment costs and O&M costs increase and benefits decrease by 10%	21%	2.51	22%	14%	1.88	9%	24%	1.50	35%

[a] Economic internal rate of return (EIRR) is compared with an opportunity cost of capital of 15%.

[b] Sensitivity indicator (S.I.) represents the elasticity of the EIRR to a change variable. If S.I. is greater than 1, the EIRR is sensitive to a change in variable.
If S.I. is equal or less than 1, the EIRR is not sensitive to change.

[c] Switching value (S.V.) indicates by how much percentage change a variable may vary to maintain an EIRR equal to the economic opportunity cost of capital of 15%.
A high S.V. (%), implies that the EIRR is not sensitive to a change in the variable. A low value implies that the EIRR is sensitive to a change in the variable.
A high or low S.V. value is assessed relative to the values of the other change variables for a particular fish port.

iii) Scenario 2: Sensitivity and Switching Value Analysis at 10% and Fish Quality Improvement assumed at 5%

In order to further test the robustness of the EIRR values of each of the regional fish ports, a sensitivity analysis is carried out using 20% change in each of the change scenarios. Table 19.2.41 presents the results of the EIRR sensitivity and switching value analysis for each of the regional fish port for Scenario 3.

Table 19.2.41 Summary of Results of the EIRR Sensitivity (20%) and Switching Value Analysis (Fish Quality Improvement 10%) :Scenario 3 (Davao, Iloilo and Lucena Regional Fish Ports)

Item	Bislig FPC			Camaligan FPC			Davao FPC		
Base EIRR	**23.3%**			**31.1%**			**77.0%**		
Benefit:Cost Ratio	**1.53**			**2.23**			**2.75**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable for Sensitivity and Switching Value Analysis	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 20%	20%	0.78	60%	27%	0.65	>100%	53%	1.53	>100%
(ii) Benefits decrease by 20%	19%	0.99	35%	26%	0.83	56%	49%	1.80	64%
(iii) Increase in investment costs and decrease in benefits by 20%	16%	1.66	23%	22%	1.40	40%	36%	2.63	48%
(iv) Operation and maintenance (O&M) costs increase by 20%	23%	0.05	>100%	30%	0.11	>100%	76%	0.03	>100%
(v) Benefits decrease and O&M costs increase by 20%	18%	1.04	33%	25%	0.98	49%	49%	1.82	63%
(vi) Investment costs and O&M costs increase and benefits decrease by 20%	15%	1.73	22%	22%	1.44	39%	36%	2.64	47%
Item	**Iloilo FPC**			**Lucena FPC**			**Sual FPC**		
Base EIRR	**26.7%**			**44.0%**			**18.2%**		
Benefit:Cost Ratio	**1.91**			**3.66**			**1.18**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable for Sensitivity and Switching Value Analysis	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 20%	23%	0.62	>100%	38%	0.64	>100%	15%	0.88	20%
(ii) Benefits decrease by 20%	22%	0.83	49%	37%	0.78	73%	14%	1.15	17%
(iii) Increase in investment costs and decrease in benefits by 20%	19%	1.38	34%	32%	1.33	58%	11%	1.90	10%
(iv) Operation and maintenance (O&M) costs increase by 20%	26%	0.07	>100%	44%	0.01	>100%	18%	0.08	>100%
(v) Benefits decrease and O&M costs increase by 20%	22%	0.90	45%	37%	0.79	73%	14%	1.24	15%
(vi) Investment costs and O&M costs increase and benefits decrease by 20%	19%	1.45	32%	32%	1.34	58%	11%	1.98	9%

[a] Economic internal rate of return (EIRR) is compared with an opportunity cost of capital of 15%.

[b] Sensitivity indicator (S.I.) represents the elasticity of the EIRR to a change variable. If S.I. is greater than 1, the EIRR is sensitive to a change in variable.
If S.I. is equal or less than 1, the EIRR is not sensitive to change.

[c] Switching value (S.V.) indicates by how much percentage change a variable may vary to maintain an EIRR equal to the economic opportunity cost of capital of 15%.
A high S.V. (%), implies that the EIRR is not sensitive to a change in the variable. A low value implies that the EIRR is sensitive to a change in the variable.
A high or low S.V. value is assessed relative to the values of the other change variables for a particular fish port.

iv) Scenario 4: Sensitivity and Switching Value Analysis at 20% and Fish Quality Improvement assumed at 5%

In case the Technical Assistance is not conducted simultaneously with the implementation of the project, a fourth scenario which assumes only a 5% improvement in fish quality is likewise tested in the sensitivity analysis for the Davao, Iloilo, and Lucena regional fish port complexes. In the sensitivity analysis, a change scenario for each variable is at 20% as a test of the robustness of the EIRR.

Table 19.2.42 presents the results of the EIRR sensitivity and switching value analysis for each of the regional fish port for Scenario 4.

Table 19.2.42 Summary of Results of the EIRR Sensitivity (20%) and Switching Value Analysis (Fish Quality Improvement 5%) :Scenario 4 (Davao, Iloilo and Lucena Regional Fish Ports)

Item	Davao FPC			Iloilo FPC			Lucena FPC		
Base EIRR	**28.5%**			**17.8%**			**28.1%**		
Benefit:Cost Ratio	**1.57**			**1.18**			**2.07**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable for Sensitivity and Switching Value Analysis	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 20%	22%	1.13	60%	15%	0.74	22%	24%	0.67	>100%
(ii) Benefits decrease by 20%	21%	1.37	36%	14%	1.04	15%	23%	0.83	73%
(iii) Increase in investment costs and decrease in benefits by 20%	16%	2.17	23%	12%	1.70	9%	20%	1.41	58%
(iv) Operation and maintenance (O&M) costs increase by 20%	28%	0.04	>100%	17%	0.30	92%	28%	0.02	>100%
(v) Benefits decrease and O&M costs increase by 20%	20%	1.41	36%	14%	1.19	15%	23%	0.84	72%
(vi) Investment costs and O&M costs increase and benefits decrease by 20%	16%	2.20	22%	11%	1.84	10%	20%	1.42	58%

[a] Economic internal rate of return (EIRR) is compared with an opportunity cost of capital of 15%.

[b] Sensitivity indicator (S.I.) represents the elasticity of the EIRR to a change variable. If S.I. is greater than 1, the EIRR is sensitive to a change in variable.
If S.I. is equal or less than 1, the EIRR is not sensitive to change.

[c] Switching value (S.V.) indicates by how much percentage change a variable may vary to maintain an EIRR equal to the economic opportunity cost of capital of 15%.
A high S.V. (%), implies that the EIRR is not sensitive to a change in the variable. A low value implies that the EIRR is sensitive to a change in the variable.
A high or low S.V. value is assessed relative to the values of the other change variables for a particular fish port.

b) EIRR Sensitivity Analysis for Each Municipal Fish Port

Table 19.2.43 presents the results of the EIRR sensitivity and switching value analysis for

each of the municipal fish port.

Table 19.2.43 Summary of Results of the EIRR Sensitivity (10%) and Switching Value Analysis (Municipal Fish Ports)

Item	Calabanga MPC			Sta. Cruz MPC			Concepcion MPC		
Base EIRR	**18.0%**			**36.9%**			**23.4%**		
Benefit:Cost Ratio	**1.41**			**2.64**			**2.05**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 20%	17%	0.76	29%	34%	0.79	>100%	21%	0.84	65%
(ii) Benefits decrease by 20%	16%	0.89	21%	34%	0.89	63%	21%	0.97	37%
(iii) Increase in investment costs and decrease in benefits by 20%	15%	1.60	13%	31%	1.61	46%	19%	1.75	23%
(iv) Operation and maintenance (O&M) costs increase by 20%	18%	0.05	>100%	37%	0.02	>100%	23%	0.04	>100%
(v) Benefits decrease and O&M costs increase by 20%	16%	0.94	21%	33%	0.91	62%	21%	1.02	35%
(vi) Investment costs and O&M costs increase and benefits decrease by 20%	15%	1.65	12%	31%	1.63	61%	19%	1.79	23%
Item	**Atimonan MPC**			**Subic MPC**			**Balatan MPC**		
Base EIRR	**23.8%**			**26.3%**			**24.8%**		
Benefit:Cost Ratio	**1.69**			**3.03**			**1.73**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 20%	22%	0.71	82%	25%	0.37	>100%	21%	0.72	79%
(ii) Benefits decrease by 20%	22%	0.83	42%	25%	0.42	68%	20%	0.89	43%
(iii) Increase in investment costs and decrease in benefits by 20%	20%	1.50	28%	24%	0.79	52%	17%	1.51	28%
(iv) Operation and maintenance (O&M) costs increase by 20%	24%	0.05	>100%	26%	0.02	>100%	25%	0.01	>100%
(v) Benefits decrease and O&M costs increase by 20%	22%	0.89	42%	25%	0.44	66%	16%	1.84	30%
(vi) Investment costs and O&M costs increase and benefits decrease by 20%	20%	1.54	28%	24%	0.81	51%	17%	1.52	28%

[a] Economic internal rate of return (EIRR) is compared with an opportunity cost of capital of 15%.

[b] Sensitivity indicator (S.I.) represents the elasticity of the EIRR to a change variable. If S.I. is greater than 1, the EIRR is sensitive to a change in variable.
If S.I. is equal or less than 1, the EIRR is not sensitive to change.

[c] Switching value (S.V.) indicates by how much percentage change a variable may vary to maintain an EIRR equal to the economic opportunity cost of capital of 15%.
A high S.V. (%), implies that the EIRR is not sensitive to a change in the variable. A low value implies that the EIRR is sensitive to a change in the variable.
A high or low S.V. value is assessed relative to the values of the other change variables for a particular fish port.

A stricter sensitivity analysis of the EIRR values of each of the regional and municipal fish ports was carried out by applying a 20% increase/decrease in costs/benefits and various /combinations of these are presented in Table 19.2.41 and 19.2.44. The results show that the recalculated EIRR values under each risk scenario for individual regional and municipal fish ports are quite robust and stable as they, in general, exhibited values greater or equal to 15%, the economic cost of capital applied as cut-off rate.

Table 19.2.44 Summary of Results of the EIRR Sensitivity (20%) and Switching Value Analysis (Municipal Fish Ports)

Item	Calabanga MPC			Sta. Cruz MPC			Concepcion MPC		
Base EIRR	**18.0%**			**36.9%**			**23.4%**		
Benefit:Cost Ratio	**1.41**			**2.64**			**2.05**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 20%	15%	0.71	29%	31%	0.73	>100%	20%	0.78	65%
(ii) Benefits decrease by 20%	15%	0.91	21%	30%	0.90	63%	19%	0.99	37%
(iii) Increase in investment costs and decrease in benefits by 20%	12%	1.54	13%	26%	1.50	46%	16%	1.64	23%
(iv) Operation and maintenance (O&M) costs increase by 20%	18%	0.05	>100%	37%	0.02	>100%	23%	0.04	>100%
(v) Benefits decrease and O&M costs increase by 20%	15%	0.97	21%	30%	0.92	62%	19%	1.03	35%
(vi) Investment costs and O&M costs increase and benefits decrease by 20%	12%	1.59	12%	26%	1.52	61%	16%	1.68	23%
Item	**Atimonan MPC**			**Subic MPC**			**Balatan MPC**		
Base EIRR	**23.8%**			**26.3%**			**24.8%**		
Benefit:Cost Ratio	**1.69**			**3.03**			**1.73**		
Results of the Sensitivity and Switching Value Analysis									
Change Variable	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**	**Recalculated EIRR**	**S.I.[b]**	**S.V.[c]**
(i) Investment costs increase by 20%	21%	0.66	82%	24%	0.35	>100%	21%	0.72	79%
(ii) Benefits decrease by 20%	20%	0.85	42%	24%	0.45	68%	20%	0.89	43%
(iii) Increase in investment costs and decrease in benefits by 20%	17%	1.43	28%	22%	0.79	52%	17%	1.51	28%
(iv) Operation and maintenance (O&M) costs increase by 20%	24%	0.05	>100%	26%	0.02	>100%	25%	0.01	>100%
(v) Benefits decrease and O&M costs increase by 20%	19%	0.91	42%	24%	0.47	66%	16%	1.84	30%
(vi) Investment costs and O&M costs increase and benefits decrease by 20%	17%	1.47	28%	22%	0.81	51%	17%	1.52	28%

[a] Economic internal rate of return (EIRR) is compared with an opportunity cost of capital of 15%.

[b] Sensitivity indicator (S.I.) represents the elasticity of the EIRR to a change variable. If S.I. is greater than 1, the EIRR is sensitive to a change in variable.
If S.I. is equal or less than 1, the EIRR is not sensitive to change.

[c] Switching value (S.V.) indicates by how much percentage change a variable may vary to maintain an EIRR equal to the economic opportunity cost of capital of 15%.
A high S.V. (%), implies that the EIRR is not sensitive to a change in the variable. A low value implies that the EIRR is sensitive to a change in the variable.
A high or low S.V. value is assessed relative to the values of the other change variables for a particular fish port.

c) EIRR Sensitivity Analysis for the Whole Project

A sensitivity and switching value analysis was likewise carried out for the overall Project EIRR. The overall EIRR was based on a 10% improvement in fish quality. The results are presented in Table 19.2.45. The sensitivity analysis of the Project EIRR indicated that it is also very sensitive to: (i) a simultaneous increase in fish port investment costs and a decrease in port economic benefits; and (ii) a simultaneous increase in port investment costs, O&M costs, and a decrease in port economic benefits by 10%. The sensitivity indicator calculated for each of these scenarios exhibited a value far greater than 1. These results were confirmed by the switching value analysis which indicated that a relatively small percentage change in these change variables will result in significant drop in the EIRR values, down to the level of 15%. It should be noted, however, that the EIRR value is not very sensitive as the switching value analysis indicated that the percentage changes require greater than 30%, in all cases, to have an effect on the EIRR values.

Table 19.2.45 Summary of Results of the EIRR Sensitivity (10%) and Switching Value Analysis (The Whole Project, Regional and Municipal Fish Ports)

Change Variable	Percent Change (%)	EIRR (%)	ENPV (PhP million)	Sensitivity Indicator	Switching Value (%)
(i) Investment costs increase by	10%	26%	2,125.752	0.68	>100%
(ii) Benefits decrease by	10%	26%	1,864.170	0.81	49%
(iii) Increase in investment cost and decrease in benefits by	10%	24%	1,641.747	1.50	33%
(iv) Operation and maintenance (O&M) costs increase by	10%	28%	2,321.409	0.04	>100%
(v) Benefits decrease and O&M costs increase by	10%	25%	1,837.405	0.86	46%
(vi) Investment costs and O&M costs increase and benefits decrease by	10%	24%	1,614.982	1.54	32%
Base EIRR[a]	**27.8%**				
Base ENPV[a] (PhP million)	**2,348.174**				

A further analysis was carried out for a scenario of the LGUs not being able to raise the required counterpart funding. In this scenario the EIRR sensitivity analysis was carried out only for all of the regional fish ports under the assumption that the Project will only consist of these fish ports. The results of the sensitivity analysis is shown in Table 19.2.45.a below. It may be observed that there were no significant changes in the recalculated EIRR values for each change variable as shown in the values under the EIRR column.

Table 19.2.45.a Summary of Results of the EIRR Sensitivity (10%) and Switching Value Analysis (The Whole Project, Regional Fish Ports Only)

Change Variable	Percent Change (%)	EIRR (%)	ENPV (PhP million)	Sensitivity Indicator	Switching Value (%)
(i) Investment costs increase by	10%	26%	1,966.485	0.74	>100%
(ii) Benefits decrease by	10%	26%	1,723.767	0.87	49%
(iii) Increase in investment cost and decrease in benefits by	10%	24%	1,520.357	1.55	33%
(iv) Operation and maintenance (O&M) costs increase by	10%	28%	2,144.167	0.05	>100%
(v) Benefits decrease and O&M costs increase by	10%	26%	1,698.039	0.92	46%
(vi) Investment costs and O&M costs increase and benefits decrease by	10%	24%	1,494.628	1.60	32%
Base EIRR[a]	**28.2%**				
Base ENPV[a] (PhP million)	**2,169.895**				

[a] Economic internal rate of return (EIRR) and net present value (ENPV) are discounted at 15%

A stricter sensitivity analysis of the Project EIRR was carried out by applying a 20% increase/decrease in costs/benefits and various combinations of these are presented in Table 19.2.46. The results show that the calculated EIRR values under each risk scenario are quite stable and robust as they, in general, exhibited values greater or equal to 15%, the economic

cost of capital applied as cut-off rate.

Table 19.2.46 Summary of Results of the EIRR Sensitivity (20%) and Switching Value Analysis (The Whole Project, Regional and Municipal Fish Ports)

Change Variable	Percent Change	EIRR	ENPV	Sensitivity Indicator	Switching Value
	(%)	(%)	(PhP million)		(%)
(i) Investment costs increase by	20%	24%	1,903.329	0.66	>100%
(ii) Benefits decrease by	20%	23%	1,380.165	0.85	49%
(iii) Increase in investment cost and decrease in benefits by	20%	20%	935.320	1.45	33%
(iv) Operation and maintenance (O&M) costs increase by	20%	28%	2,294.645	0.02	>100%
(v) Benefits decrease and O&M costs increase by	20%	23%	1,326.635	0.91	46%
(vi) Investment costs and O&M costs increase and benefits decrease by	20%	19%	881.790	1.50	32%
Base EIRR[a]	**27.8%**				
Base ENPV[a] (PhP million)	**2,348.174**				

a Economic internal rate of return (EIRR) and net present value (ENPV) are discounted at 15%

A further analysis was carried out for a scenario of the LGUs not being able to raise the required counterpart funding. In this scenario the EIRR sensitivity analysis was carried out only for all of the regional fish ports under the assumption that the Project will only consist of these fish ports. The results of the sensitivity analysis is shown in Table 19.2.46.a below. It may be observed that there were no significant changes in the recalculated EIRR values for each change variable as shown in the values under the EIRR column.

Table 19.2.46.a Summary of Results of the EIRR Sensitivity (20%) and Switching Value Analysis (The Whole Project, Regional Fish Ports Only)

Change Variable	Percent Change	EIRR	ENPV	Sensitivity Indicator	Switching Value
	(%)	(%)	(PhP million)		(%)
(i) Investment costs increase by	20%	24%	1,763.075	0.69	>100%
(ii) Benefits decrease by	20%	23%	1,277.639	0.88	49%
(iii) Increase in investment cost and decrease in benefits by	20%	20%	870.818	1.48	33%
(iv) Operation and maintenance (O&M) costs increase by	20%	28%	2,118.439	0.05	>100%
(v) Benefits decrease and O&M costs increase by	20%	23%	1,226.182	0.94	46%
(vi) Investment costs and O&M costs increase and benefits decrease by	20%	20%	819.361	1.53	32%
Base EIRR[a]	**28.2%**				
Base ENPV[a] (PhP million)	**2,169.895**				

[a] Economic internal rate of return (EIRR) and net present value (ENPV) are discounted at 15%

20. Conclusion and Recommendations

20.1 General

Based on the fish port planning and prioritization concept as discussed in Chapter 10, the primary objective of the Project is the improvement and modernization of facilities and services for unloading, handling and processing of fishery products to meet current needs and demand of the fishery industry, and the increase port revenues to appropriate level for sustainable operation and management of fish ports. Mutual benefits and synergy effects are envisioned for port users and PFDA as the administrator and operator to achieve the objectives of the Project.

The relations between foregoing objectives under national level higher plans and the Project purpose with relevant in/output are summarized in following Table 20.1.1.

Table 20.1.1 Correlation of Project Objectives with National Plans

Objectives of **MTPDP**		*** Poverty Eradication** *** Job creation** *** Food security**						
Major focus of **AFMA**		Enhancing the income of fisher folks	△	○		○	△	△	○
		Food security	△	△		○	△	△	○
		Enhancing global competitiveness	△	△			○	△	△
		Sustainability				△	△		△
Major key points of **CNFIDP**		1. Appropriate fishery resource management							
		2. Conservation of fishery habitats							
		3. Intensified fishery resource use		△			○	○	○
		4. Full utilization of aquaculture and commercial fisheries	△	△					
		5. Enhancing competitiveness of products	△	△			○	△	△
		6. Reduction of post harvest losses	△	△		○	△	△	○
		7.Improvement of fisheries management system and structures				△	△		△
The Nationwide Fish Ports Project (Package III)	Project purpose, outputs and indicators (PDM: Project Design Matrix)	Project purpose	Proper operation and management of fish ports to the satisfactions of port users.						
		Outputs	Smooth and safe berthing of fishing boats and unloading of fish	More fish unloading and fish boats use		Preserving & sustaining fish quality	Value adding of fishery products	Full use of fish port facilities	Enhancing fish value
		Indicators	Shortening of waiting time for mooring of fishing boats	Improving fish unloading volume	Enhancing number of fishing boat entries	Ice production volume	Fish processed products	Improving the Lease rate of fish port facilities	Wholesale price of fishery products
	Project input (facilities/ services)	Basic port facilities (Breakwater, Pier, Landing Facility)	○	○	○	△			
		On-shore facilities (market, cold storage)		△	△	○	△	○	○
		Fish processing facilities (HACCP, Local processing)		△	△	△	○	○	○
		Ship repair facilities	△		△			○	
		Others (shops, utilities)		△	△			○	△

Notes: ○: Primary relation, △: Secondary relation
MTPDP: Medium Term Philippine Development Plan 2004-2010
AFMA: Agriculture and Fisheries Modernization Act
CNFIDP: Comprehensive National Fisheries Industries Development Plan (2008-2027)

20.2 Conclusion

(1) Market Halls

In order to accommodate the excess volume of fish trading activities as well as to ensure smooth transaction of fish under hygienic condition to comply with GMP/SSOP requirements, the Market Hall will be renovated and expanded by approximately twice the size of the existing capacity for Iloilo and Lucena Fish Ports. Wastewater including water from floor washing will be collected and treated to maintain hygiene/sanitation of the Market Halls and its surroundings. The building structure will be constructed of reinforced concrete (R/C) roof and columns for durability against high wind pressure generated by typhoons incidences and corrosion for minimal maintenance cost. Market Hall will be newly provided for Davao FPC and Bislig FPC for local fish handling activities to avoid fish deterioration and to improve effective and efficient fish trading system.

All the selected existing Municipal Fish Ports for improvement under the Project are dilapidated and the wooden truss supporting the roofs of the market halls should be demolished and replaced with RC roof slab for lifetime durability. The space is also quite constricted for daily fish marketing activities. For this reason, all the selected municipal ports for rehabilitation and improvement will be provided with R/C structure Market halls for durability against corrosion and typhoons.

(2) HACCP Compliant and Laboratory Facilities

To meet the increasing demand of existing small- to medium-scale fish processors in and around the regional fish ports, internationally accepted fish processing facilities will be installed for Iloilo, Sual, Camaligan and Davao FPCs. The facility is an all-in-one complex, as a standard model, including a flake ice making machine, air-blast freezer, cold storage, processing area and other associated rooms, to facilitate the obtaining of HACCP accreditation and implementation. In addition, laboratory facility with the least possible capacity to reduce on cost will be installed to expedite the pre-export inspection of fishery products as well as to improve the HACCP monitoring capability/capacity of the fish ports.

With the facilities and supporting services of PFDA in joint cooperation with BFAR, the export of fishery products from the fish ports project will increase to approx. 2,600 MT/year. With the facilities, it is also possible to diversify export outlets to other destinations including the USA and EU markets.

(3) Waste-water Treatment Plant

Wastewater discharged from the market halls, fish processing area and HACCP fish processing facilities will be gathered and treated in the wastewater treatment facility to be included in the scope of works for all candidate fish ports. The wastewater treatment system will be provided not only for environmental clearance and HACCP authentication application purposes but as an indispensable facility to substantially improved fish port service to enhance hygienic conditions for handling and processing of fish for value adding.

(4) Iloilo Fish Port Breakwater

Iloilo Fish Port Complex (IFPC) should be rehabilitated and improved not only for fresh fish market function but also as one of the bases of fishing operation for the South China Sea. For this purpose, the eastern side of IFPC will be provided with a breakwater to improve port calmness to

cater to Iloilo based fishing boats and those coming from other areas such as Cebu, Bantayan, Negros thereby making available a one-stop fishery operation for berthing, mooring, fish-landing/marketing, preparation, fueling, icing, watering, repairing lay-by/refugee and etc. for fishing boats to have a reliable fishing base all year round. The existing west breakwater was provided to shelter the port basin from predominant waves from the southwest direction. Therefore, the east breakwater will be provided to shelter the port from southeast/northeast monsoon waves to improve wave calmness at the port basin and mooring areas from 88% to 96%.

(5) Lucena Breakwater

The existing Breakwater of Lucena FPC was damaged by recent typhoons. In order to avoid further damage, immediate rehabilitation is needed. The breakwater is essential to shelter the fishing port activity in LFPC where more than half of the fish hauls are landed by fishing boats. The rehabilitation is also necessary to maintain fish trading activities, which are currently the trading gate of NCR for fish coming not only from Southern Luzon but also from Visayas.

(6) Sual Pier Rehabilitation and Expansion

The size and capacity of the exiting pier of Sual Fish Port was designed for 100-ton capacity fishing boats in the 1980's. The pier was subjected to damage due to the use of heavy cranes for cargo unloading by much bigger sized ships than that of the design capacity. Periodic use of cargo vessels for agro supply such as fertilizer and cattle feed is expected so that strengthening and expansion of the pier is required. Simultaneously, in order to revive fish port activity, there is a need to invite milk fish cage operators in Sual cove to use Sual FPC. The multi usage of the pier for fish boats and commercial cargo vessels will be advantageous for both PFDA and end users (fish cage operators, cargo vessel operators and LGU alike).

(7) Refrigeration Facilities

The existing refrigeration buildings in Iloilo, Sual and Lucena FPC will be rehabilitated and improved appropriate for processing and storing of fish, meat and chicken for local use so as to ensure the effective utilization of the existing facilities by accommodating other agro-fishery products.

The existing large cold storages will be compartmentalized as effectively used by small- and medium-scale lessees to reduce on electrical cost. This improvement was conceived to meet the fluctuating supply of raw fish materials as well as well as to stabilize and supplement the supply of fish by processed/frozen fish during lean seasons, and to meet the demand for cold storage by small and medium-scale operators. Freon will be used as the medium of refrigerant for coolers for each cold store compartment.

Additional ice making plants will be provided for Iloilo, Sual, Camaligan and Bislig FPC mainly to supply fishing vessels, aquaculture farms and Municipal Fish Ports for postharvest handling and preservation of fish hauls, meat and chicken for distribution.

The existing machineries and cold store rooms will be utilized to the extent practicable. Certain parts of the refrigeration machineries such as evaporative condensers for ice making plant will be replaced with atmospheric type for ease of maintenance. Almost all the compressors for cold store rooms will be replaced with new ones because they have heavily deteriorated and that operation will not be economical because of the size. The Ice making tank with herring-bone coil for Iloilo will be replaced with new one. Durability and economical use were the bases in determining whether to retain or replace major machineries.

(8) Solar Power Generation System

Comprehensive study was made on the viability of solar power generation system, taking into account the high cost of commercial power and the initial investment cost of solar system and advantages on reduction of CO2 emission by solar system. As a result, of the 6 Regional Fish Ports, only Iloilo is the port viable due to prevailing high cost of commercial power. The recommended system will simply be the solar power generation system without the provision of batteries (for storing of generated electricity) for direct use at daytime only to reduce on power rate charge. Excess electricity generated by the solar system can be sold to PECO.

(9) Ship Repair Facilities

As part of the basic facilities of a fish port, the income generating existing Slipways for Iloilo and Sual FPCs will be rehabilitated. The proposed Bislig FPC will also be provided with new slipway facilities.

(10) Bislig Fish Port Complex (BFPC)

The development of Bislig Fish Port is essential for the fishing fleet that are to transfer to Bislig from General Santos to tap the rich fishing grounds of the eastern seaboard because of the expiry of the fishing agreement with the Indonesian Government. The development of Bislig FPC was therefore conceived as base of operation for fish vessels to locate in Bislig because of its proximity to the eastern seaboard fishing grounds. The development of fish port is being strongly requested by General Santos- and Davao-based fishing operators. The fish port will be provided with a pier, basin, ship repair facilities (including slipway and repair shop) ice making plant and ice storage. A breakwater will also be provided to shelter the port basin and mooring areas from northeast waves to enhance port availability. PICOP（a paper mill company plant）owns the property but was abandoned due to log-ban. The alienation of the PPA (Philippine Port Authority) RoRo jetty is also being requested so that the RoRo jetty could also be included as part of the fish port facilities. Sufficient space should be acquired for the construction of fish port facilities and for the expected development of privately owned fish processing canning factories in the area.

The eastern neighboring coastal areas should also be acquired for future expansion, and the layout plan prepared by the JICA Survey Team is deemed as preliminary for the development of BFPC. To facilitate the transportation of perishable fish products from Bislig to Davao and General Santos, the immediate paving of the National Road from Bislig to Trento at the diversion from Maharlika Highway is essential for the successful implementation of the Project. Of the 50km long section of the National Road 2/3 is still under construction by DPWH or has not yet been paved.

(11) Project Cost and Implementation Schedule

The total estimated cost of the Project including the cost of construction/equipment, physical contingency, price escalation, design/construction management consulting service tax, cost for land acquisition of Bislig FPC and PFDA Project Management Office counterpart personnel expenses is estimated at Php 5.3 billion to be implemented in 7 years at proportions of 85 % ODA loan and 15 % Government counterpart.

(12) Environmental and Social Consideration

Land acquisition for the proposed construction of Bislig FPC will be undertaken by PFDA. Adverse social problems associated with land acquisition are not expected to occur.

(13) Technical Assistance

The estimated benefits under the Project can be obtained not only by the physical structures (facilities and equipment) but also through operational and managerial services to be provided under technical assistance (soft component for fish port operation and management). The following are major tasks are to be implemented under technical assistance:

a) Processing of fish products appropriate for the local markets will be developed to induce fish processors to embark on fish processing using the project facilities (trial run to justify the scope of rehabilitation and improvement works for the existing Refrigeration Building).

b) Adding value to both fresh fish and processed fish as special products with the end in view of commanding higher prices as the ultimate objective is the use of the fish port facilities by inducing more buyers and sellers.

c) Increasing the number of fish processors for HACPP accreditation to foster the export and diversification of sales outlets, by strengthening the current capabilities of agencies concerned on HACCP planning and implementation.

d) Efforts will be exerted for the review of fish port facilities fees and charges to be revised to the extent practicable based on the recommendations provided for in the F/S Report to ensure hygienic and sustainability of operation and maintenance of the fish ports. Furthermore, trial run for the outputs described in activities 1) - 3), should be conducted for demonstration to potential fish port users.

20.3 Recommendations

Based on the results of the Survey, the Project was assessed as technically, economically and financially viable. Moreover, the provision of appropriate facilities for each fish port in terms of economic benefits are substantial in terms of value adding of processed fish to generate foreign exchange earnings. However, in order to achieve sustainable operations for each fish port the following essential conditions should be fully considered:

1) Port management should seriously consider increasing the market charges and buyer/seller fees based on 1% of the value of the volume of fish landed at the fish port. The prevailing fees should be incrementally increased annually until the recommended rates are attained by 2025 at the latest;

2) Fish landing fees and transshipment fees may be retained at current rates but it is recommended that these be gradually increased at reasonable rates mutually acceptable to the port management and fish producers. This is justifiable because of the substantial improvements to be made for development of the essential port facilities for value adding of fish products;
3) For Iloilo FPC, electricity charge must be reduced by adopting solar power generation system from the current rate of PhP11.30/kwh to Php 8.40/kwh to sustain the operation of the refrigeration facilities which is the major source of revenue of the FPC. This will in turn

encourage more entrepreneurs to relocate to Iloilo FPC because of the lower power rates. Based on key informants, many businesses had to relocate outside Iloilo City to avail of the lower power cost;

4) For Sual FPC, the products of mariculture fish-cage should be handled at SFPC with fish unloading rate of Peso 6.00/tub instead of present Peso 2.80/tub. Close coordination between private sector, LGU and PFDA is indispensible.

5) In Bislig FPC, Camaligan FPC, and Iloilo FPC, port management should develop and implement an aggressive marketing plan/strategy to entice potential entrepreneurs to relocate and invest in these port complexes. Effective marketing of the port facilities include the renting out raw lands that is available for commercial use to generate the needed revenues to sustain the operation of the complexes;

6) Technical assistance on port management is deemed critical for strengthening the capacity of PFDA staff and concerned agencies such as BFAR in operating, maintaining and managing the proposed value-adding and laboratory facilities. In this regard, each port should (prior to commencement of Project operation) organize the staff/personnel to be trained under the technical assistance. A system and program of incentives and reward (e.g., promotion and providing competitive salaries) must be developed to maintain those who have been trained from leaving the complex to seek better opportunities. This system of incentives/rewards must be competitive to the extent possible; and

7) As the investments on value-adding facilities to be installed for the regional fish ports are considerably high, and considering that the facilities will be the major of the complexes, port management should carry out O&M including maintenance whenever necessary on regular basis. Breakdowns brought about by insufficient funds and late action will certainly be detrimental to the sustainability of operations due to loss in revenue accruing from the non operation of the facilities. This will adversely affect port financial performance. The funds for renewal of depreciated machinery/facility will also be required.

8) The establishment of PMO (Project Management Office) of PFDA is essential in the implementation of the Project.

9) Important components to be confirmed by PFDA for the Japanese Yen Loan Project formation.

The probable pre-loan arrangement time schedule is indicated in Table 20.3.1. NEDA Board confirmation of ICC (Investment Coordinating Committee) approval is expected end of November 2010.

Prior to issuing the application to NEDA and other relevant government agencies including the DENR for ECC, RDC among others, the following arrangement and confirmation are considered indispensable, i.e.,

1) Land for the project (Bislig)
2) Confirmation of the intention of fish port users including the LGU, fishers, fish brokers, fish boat owners and others (Bislig, Iloilo, Sual)
3) Confirmation of the progress of action made for the improvement of access road (Bislig)
4) Confirmation on t from the LGU and/or local electric company for utilities such as water supply, electrical power supply, solid waste collection and treatment.

Based on the above discussions, the list of suggested actions to be taken by PFDA is described in Table 20.3.2 hereunder and Appendix 19.

Table 20.3.1 Schedule of Required Preparation Works Towards Loan Agreement (L/A)

Work	Responsible Agency	CY 2010						CY 2011												CY 2012	
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Submission of Final F/S Report to DA/PFDA	JICA	x																			
Preparation of I/P	DA/PFDA	xxxx																			
Preliminary examination by NEDA (?)	NEDA		xxxx	xx																	
Endorsement by RDC	RDC			xx																	
Endorsement by DNR (Environmental Compliance Certificate)	DNR			xx																	
Endorsement by BFAR (Operation of laboratory)	BFAR			xx																	
DOF-CAG Review for GOCC projects (?)	DOF-CAG																				
NCC Review for relending programs (?)	NCC																				
DBM Certificate (?)	DBM																				
Submission of Required Documents to ICC Secretariat	DA/PFDA				x																
Project Evaluation by ICC-Secretariat	ICC				xxx																
Review of PER by ICC-Technical Board & Cabinet Committee	DA/PFDA				x	xx															
NEDA Board confirmation on ICC approval	DA/PFDA					xx															
Loan Application to JICA	DA/PFDA						x														
JICA Appraisal	JICA																xxx				
Preparation and submission of budget proposal to DBM	DA									xx											
Technical Budget Meeting	DBM										xxxx	xxxxx									
Submission of Budget to Presidential Office for approval	DBM												x								
Submission of Budget to Cabinet for approval	PO													x							
DBM Certificate	DBM														x						
Annual Meeting on Aid Projects between GOJ and GOP	GOJ/GOP															xx					
Exchange of Notes (E/N)	GOJ/GOP																			xx	
Loan Agreement (L/A) between JICA and GOP	JICA/GOP																				xx

Abbreviations:
ICC: Investment Coordinating Committee
DNR: Dept. of Natural Resources
RDC: Regional Development Council
DBM: Dept. of Budget Management
GOCC: Government Owned & Controlled Cooperation
I/P: Implementation Program
E/N: Exchange of Notes
L/A: Loan Agreement
DOF-CAG: Corporate Affairs Group, Dept. of Finance
NCC: National Credit Council

Table 20.3.2 Actions to be Taken by PFDA

No	Project component	Description	Agency concerned	Required paper	Action Taken
Iloilo Regional Fish Port					
1	Electric power supply	MOU with PECO to supplement commercial power by use of solar power generation for IFPC. power supply in daytime.	PECO	MOU	2010 03 25 Confirmation Letter of PECO
2	Breakwater, dredging, quay	Verification of the intent of private boat operators to transfer to IFPC upon completion of the construction of the east breakwater and associated facilities for improvement	LGU, Private boat Operator		2010 03 08 Request Letter of PFDA to DOTC
3	Fresh water supply	Verification of water supply capacity from MIWD for the increase in demand from 100 ton/day to 300 ton/day	Metro Iloilo Water District	MOU	2010 04 19 Confirmation Letter of MIWD
Sual Regional Fish Port					
4	Refrigeration Bldg. Equipment	Negotiation/dialogue with the lessee(BARI) regarding the conditions of the lease contract for the Ref. Bldg/Equipment about re-bidding prior to the rehabilitation of the facilities.	Bolinao Agro Inc.	MOU	2010 04 26 BARI/PFDA meeting
5	Pier	MOU on the demarcation of the responsibilities of cargo boat operators for agro-supply of products (fertilizer etc) calling at SFPC.	PPA	MOU	2010 03 08 Request Letter of PFDA to DOTC
		Verification of the intent of private shipping operators (VP Marketing, Seen Sam Shipping) to continue or increase the number of calling at SFPC.	LGU, Private shipping Co.,		
6	Pier, fish feed storage	MOU for the landing/handling of milk fish hauls from fish cages to SFPC	LGU/ Fish cage operator	MOU	
Lucena Regional Fish Port					
7	Fresh water supply	Official t letter of request for increase in demand of water to 300 ton/day	Quezon Metropolitan Water District	Official request letter PFDA to QMWD	2010 03 08 Request Letter to QMWD
		MOU to confirm the supply of water to 300 ton/day	ditto	MOU	
		Development of additional deepwell (s) should the need arises	PFDA		
Camaligan Regional Fish Port					
8	Land fill for expansion of backup area	If PFDA's funding is available, immediate implementation highly desirable.	PFDA		

No	Project component	Description	Agency concerned	Required paper	Action Taken
9	Additional Cold Storage	Verify the intent of private processor for the use of the additional cold storages	PFDA/Private Sector		2010 04 14&15 Letter of interest of Private processors
Davao Regional Fish Port					
Bislig Regional Fish Port					
10	PPA Ro/Ro Pier at Tabon	Turn- over of facilities from PPA to PFDA	PPA	MOU	2010 02 15 Concurrence of PPA
11	Proposed fish port site	5 to 8 ha land acquisition(including access road)	LGU/PCOP	MOU	2010 04 28 Reply Letter of Bislig City
12	Access Road/Tabon	Ditto	LGU/PCOP	MOU	
13	Access Road/Tabon	In case PICOP access roads not available, evacuation and, resettlement of squatters.	LGU		
14	Runway	Confirmation not to utilize runway	LGU/PCOP	MOU	2010 04 26 PFDA Letter to Bislig City
15	Access Road/Trento	Confirmation on the pavement work schedule	DPWH Region XIII		2010 04 12 Letters to DPWH Region XIII, and to Bislig City
16	Municipal landing	Verification of the demarcation line for fish landing	LGU	MOU	
Calabanga Municipal Fish Port					
17	proposed project site	Land acquisition for Fish handling shed	LGU	MOU or deed of donation	2010 04 14 Calabanga LGU Resolution No. 2010-95
All Selected Municipal Fish Ports					
18		Presentation of layout plans/project components to stakeholders Confirmation of Project Cost sharing by LGU.	LGU/Fishers		