Of these, the establishment of a ship technology research center is the most important in terms of stimulating the domestic ship building industry.

2. Fostering of ship builders

Re-evaluation of the education system in order to rejuvenate the extremely small numbers of skilled ship builders.

3. Fostering of related industries

Carrying out of a survey to prepare for the future domestic production of marine engines and marine electrical equipment.

6.2.3 Safe Navigation Management

(1) Issues

The Safe Navigation Management plan has as its objective the creation of conditions so that vessel may operate under completely safe circumstances. The importance of safety measures was discussed previously in the accident analysis and also in the fleet improvement plan, safety related problems were clarified for existing vessels.

This plan deals with safe operation measures for seafarers. In addition to this, it is also necessary to include measures that should be implemented by the owners that retain and operate these vessels, measures covering the problems with existing vessels and furthermore, measures to increase safety awareness of the general public.

This safety operation management plan has many symptomatic treatment characteristics. Because of this amongst other things, it is not taken up as sector plans in Part 2. This section will discuss this subject in detail.

(2) Plan

1) Setting out the safe operation code

These safety measures will mainly affect the owners of relatively large vessels (middle sized and over).

In order to ensure safety during vessel operation, shipping companies must establish "safe operation code". An "safe operations manager" will be appointed to carry out the strict enforcement of these regulations and lecture on necessary measures for ensuring safety. Government agencies will these strict conditions by carrying out inspections. The following lists the clauses concerning the areas of greatest concern (ferries and passenger/cargo carriers) that should be incorporated

into the "safe operation code".

1. Clauses related to ensuring safe operation

   In the making up/altering of operation plans, ship assignments, loading/crewing assignments, total assurance of safety is expected and moreover the approval of the safe operations manager should be obtained.

   A "Navigational Manual" including factors necessary in the ensuring of safety such as operating routes, operating speed etc., weather and sea conditions requiring the suspension of voyage and voyage suspension instructions by the operations manager, is to be made up and carried on vessels while being put into effect by the safe operations manager.

   The following steps will be taken in addition to ensure safe operations

   - Meteorological reporting, water route reporting, port conditions, system for the obtaining and passing on of emergency information

   - The assignment of on-board (vessel) responsibilities, clarification of duty post locations

   - Drills for emergency case, carrying out of emergency drills on a regular basis

   - Strict observance of passenger capacities, carrying out of on-board inspections

   - Observing of maritime laws for prevention of collision etc.

   - Regular contact with destination office

2. Matters that must be strictly observed by passengers etc.

3. Matters concerning operations methods when berthing and setting sail

4. Matters concerning the confirming of safety for vessel and port facilities

5. Matters concerning the handling of accidents and other unusual situations

It would be difficult to apply the regulations discussed here for the small scale shipping companies retaining only small vessels (including individually owned) etc., and so they will participate actively in various types of training programs and rounds of guidance to be discussed

later, in an effort to ensure safety.

2) Safety measures during bad weather conditions

Philippine maritime accidents show a remarkable increase during tropical cyclones of which the majority occur within port areas. Learning from this, it is necessary to obtain weather information and implement measures for rapid sheltering from tropical cyclones.

1. Establishment of a weather information system for vessels

   - Establishment of a communications system for sending the latest weather information available to vessels

   - Interruption of radio and television programming to broadcast tropical cyclone information

   - Official vehicle for passing on information to vessels in port

2. Establishment of committees for tropical cyclone countermeasures in main ports and implementation of appropriate sheltering measures in respective ports

   - The rapid landing of bancas etc. in addition to the moving of vessels into sheltered waters such as rivers, canals and moorages etc., as countermeasures for small vessels

   - The designation of bad weather mooring areas for when vessels are put out to sea to take shelter as a countermeasure for large vessels

3) Safe Operation Countermeasures

1. Strict compliance with safe operation code

   The boarding inspection of vessels according to the code set out and carrying out of safe operations in compliance with "Navigational Manual".

2. Boarding guidance by 3rd party experts

   For ferries and passenger/cargo carriers, in view of the serious nature when there is an accident, receiving information and advice regarding the operating conditions, passenger safety measures and condition of the cargo from 3rd party experts is vital in the prevention of maritime accidents. Therefore guidance should be carried out at regular intervals.

3. Implementing of safety measures based on vessel inspection

If a vessel is judged to be unsafe (because of the level of insufficient stability, maintenance and repairs not being carried out) as the result of inspection, government agencies will be able to put operating restrictions on it which must be strictly complied to by the vessel and its operators.

4. Others

The fleet improvement plan mentioned the increase of passenger capacities due to over conversion in steel hulled passenger ferries and passenger/cargo carriers and lack of watertight bulkheads in wooden hulled vessels as safety problems. Therefore, the following measures have been devised.

- As much as possible the use of cots must be avoided on ferries and passenger/cargo carriers. For ships where stability is a concern, the equilibrium will be lowered.

- When a wooden vessel is flooded, rapid loss of stability or loss of flotation occurs therefore emergency stopgap waterproofing measures will be implemented and powerful water drainage facilities will be installed.

4) Measures for the diffusion of maritime accident prevention philosophy

1. Implementation of maritime safety campaigns

The substantiation, expansion and reinforcing of the Maritime Safety Campaign held every year in June.

2. Holding of maritime accident prevention conferences

Together with the holding of conferences in each region for maritime accident prevention, on-board guidance must be carried out. This is an extremely effective safety measure for small vessels and will provide instruction on a level that can be easily comprehended by the participants.

- Strict compliance with maritime anti-collision rules
- Lookout system enforcement and confirmation of ship position
- Use of life rafts and fire extinguishers etc.
- Various inspections to be carried out before port departure (going fishing etc.)
- Guidance for fishing boats operating in groups

3. Implementation of engine maintenance workshops

Workshops concerning engine maintenance course and inspection are to be held in the respective regions as

countermeasures for the large number of occurrences of engine trouble. These will be held with the cooperation of the makers of the engines used in small vessels.

6.2.4 Aids to Navigation Improvement

(1) Issues

In spite of the surprising results from the special rehabilitation and repair projects in 1985, 1988 and 1989, Philippine aids to navigation improvements are lagging in comparison to neighboring countries. There are currently 371 aids to navigation installations of which all are light aids. Of these 54 installations are not operating due to damage to installation or equipment malfunction. Moreover, of those installations that are operational, there are considerable numbers of installations where the light intensity is insufficient and cases where even standard functions are lacking. In light of the role played by aids to navigation, it is necessary to maintain standard functions with a high rate of reliability. The current inspection and maintenance conditions for this however, are very insufficient.

The improvement plan is divided up into light aids and radio frequency aids, including support systems for operation and maintenance of these aids. The improvement plan will be made with emphasis on light aids so that even vessels without sufficient navigational instruments can make use of them.

Radio frequency aids operate in almost all weather conditions and have a wide service area but different on-board facilities are needed for each kind of system. Considering the state of vessels used in domestic shipping, the use of radio frequency aids (with the exception of landfalls or racons installed together with light aids for the purpose of indicating special aids) should be studied after light aid improvements have reached a certain level.

The level of intensity necessary for light signals depends greatly on sea route conditions and the traffic environment. As a general standard, along a 100 mile coast line there should be 10 to 20 installations. This calculation assumes coastal aids are located along the coast so that coastal navigation at less than 10 miles from the coast can take position fixings on at least 2 points and also assumes other damage signals, port recognition signals and port signals are situated at regular intervals along the coast. Considering the complex sea route conditions in the Philippines with its numerous islands, the necessary number of aids to navigation should be considered as being above this standard.

However there are budget limitations as so the following is submitted as the minimum in location of aids to navigation:

1) One light signal can be seen along all coastal regions

2) When there is a necessary change of direction, 2 or more light aids with a large angle of intersection are visible

3) When there is a necessary change of direction or when operating in a narrow channel, precision position fixes can be taken

4) Hazards close to sea routes are marked, and

5) Channels at harbor entrances and in the inner harbor are marked.

Using these principles, this would work out at an average of approximately 4 aids to navigation installations per 100 miles for the whole of the Philippines. This would be close to the current conditions in Indonesia.

The location of aids to navigation will be planned with set priorities and improvements made in stages. Furthermore, support systems related to aids to navigation operation and maintenance will be improved and facilitate the coordination of these aids.

Equipment and facilities for aids to navigation use will be standardized as much as possible and by use of common spare parts and preserving compatibility, maintainability leading to reliability will be improved. Electrical power should, as much as possible, be supplied using natural energy sources (wind, wave and solar energy).

(2) Plan

Volume of facilities improved for the different types of aids are as follows.

1) Light aids

Lighthouses	22
Light beacons (large)	49
Light beacons (middle sized)	73
Light beacons (small)	101
RLB	19
Light buoys	88

2) Radio frequency aids

Racon	20
Loran C	1
Meteorological broadcast system	7

3) Support system

Workshop/Buoy base	3

Buoy/Lighthouse tender	3
Aids supervision/communications line	1
Training facility	1

The priority order, installation locations and scale of these aids to navigation etc., are detailed in TECHNICAL REPORT.

6.2.5 Search and Rescue System Improvement Plan

(1) Issues

As previously discussed, the current search and rescue system is in a poor state. The SAR vessels that the PCG is equipped with are dilapidated and do not operate satisfactorily. It also be said that the command communications system is not functioning sufficiently.

Furthermore, current search and rescue activities, in a lot of cases, while being led by the PCG are actually carried out by volunteers. Considering the situation outlined above, the search and rescue system must be replete and reinforced in following the areas.

1) Upgrading of SAR vessel improvements and optimum stationing

2) Establishment of a search and rescue personnel training system and maintaining of highly trained personnel

3) Improvement of the information and communication system when there is a maritime accident

4) Fostering and reinforcement of a civilian relief organization

Looking at the results of maritime accident analysis, the number of accidents involving small boats is overwhelmingly large. However, from the point of view of loss of human life, accidents involving large vessels are dominant. Consequently improvements should be brought about so that the rescue system can be responsive to both small and large vessels.

Because of the nature of maritime accident rescue system, improvement relying solely on the private sector is not advisable, basically system improvements will be carried out by government agencies and along with this, efforts to establish an effective maritime accident rescue force as is possible should be made. However from the point of view of proximity to the coastal areas, improvement of a civilian rescue force would be an effective measure.

Based on statistics relating to maritime accident locations, to deal with maritime accidents in the most effective way, analysis of the number of necessary SAR vessels and how they

should be stationed is to be carried out and resulting improvements are to be implemented in stages.

In addition, maritime accidents along coastal areas where there are numerous accidents involving small vessels, during good weather conditions in particular, civilian rescue forces are effective. Because sufficient SAR vessel improvements cannot be expected in the near future, as a countermeasure to small vessel maritime accidents occurring along the coastal areas, it is important to foster and strengthen these civilian rescue organizations. This means not just search and rescue activities, but also the passing on of weather information during emergencies and the diffusion of various maritime information and other activities covering a wide range can be considered. Because the strengthening of civilian rescue organizations is a regional issue, it will be taken up in detail as Pre F/S subject.

The information communications system used in the occurrence of maritime accidents and the resulting rescue operations is a precondition of the effective carrying out of search and rescue activities. This subject will be covered as a main topic in the Telecommunications Improvements Plan.

There is a low level of proficiency largely due to the high PCG personnel rotation frequency. It is desirable that search and rescue be designated as a specialist job and that search and rescue should be possible as a long term assignment.

In addition, in order to operate the SAR vessels outlined in the following plan, in a smooth and effective manner, training and operations plans for crews and maintenance crews etc., are indispensable and regarding this the current conditions will be studied in detail and be taken up as a Pre/F/S subject.

Other equipment/facilities that should be considered;

1. Fixed and rotating winged aircraft

2. Upgrade of the Coast Guard Security Group for special rescue operations such as the rescue of passengers/crew entrapped in capsized vessels and the evacuation of passengers/crew by rotating winged from disaster stricken vessels in bad weather etc.

3. A training center for the carrying out of training for search and rescue activities

These are necessary components but will not be implemented until the year 2010.

(2) Plan

3 types of SAR vessels will be used (large, medium and small sized) each having differing characteristics with regard to operations areas, and sea worthiness and this combination will bring about effective improvements.

1) Large SAR vessels

SAR vessels having high seaworthiness and range along with the ability to deal with maritime accidents in bad weather and far out to sea.

Gross tonnage	1200
Length	90 meters
Maximum speed	20 knots
No. of days at sea continuously	15
Range	3,000 miles
Crew	60
Other	Helipad
	Fin stabilizers

2) Middle size SAR vessels

With considerable seaworthiness and range, and the ability to handle most maritime accidents under normal conditions including along the coastal areas.

Gross tonnage	350
Length	50 meters
Maximum speed	24 knots
No. of days at sea continuously	7
Range	1,400 miles
Crew	30

3) Small size SAR vessels

Designed for inner harbor and coastal area use, mainly for handling close-to-shore maritime accidents.

Gross tonnage	23
Length	20 meters
Maximum speed	25 knots
No. of days at sea continuously	2
Range	200 miles
Crew	10

A formula for optimum stationing of rescue vessels was developed at the Japanese Maritime Security Agency and is used in the "SAR Vessel Stationing Plan". Based on reports of the 1989 and 1990 maritime accidents and calculating using this formula, accident coverage depending on the number of search and rescue SAR vessels in operation are shown on the following page.

Coverage	SAR Vessels			
	Large	Medium	Small	Total
100%	3	8	7	18
90%	2	5	2	9
80%	1	3	2	6
70%	1	3	1	5
60%	0	2	1	3
50%	0	1	1	2

The result of this calculation shows that concentrating on improving medium sized rescue boats is desirable.

It is desirable to sufficiently improve the rescue forces but considering the current rescue system conditions and the necessary budget for rescue boat improvements, it is appropriate to carry out improvements as follows

In considering the limited budget, vessel design standardization in terms of supply and construction is desirable. Priorities for improvement in making up the fleet should be placed the uniformity of medium sized rescue boats with speed capabilities similar to those of small SAR vessels and with the ability to carry out rescue operations covering all primary sea routes. When considering repairs and crew leave, the necessary number of vessels assigned to any one station is 2.

Stationing of these medium size SAR vessels will be carried out according to the following.

1) Short term plan (until 1995)

   2 medium sized SAR vessels will immediately replace the 2 vessels currently stationed at Manila and Cebu. These 2 vessels will have the following objectives

   1. dealing with maritime accidents in and around Manila and Cebu ports which experience large numbers of maritime accidents

   2. dealing with maritime accidents occurring on the Manila - Cebu sea route which is the most important domestic sea route.

   To fulfill these objectives, each vessel should be stationed in Manila and Cebu. This will result in the capability of being able to handle about 50% of maritime accidents such as occurred in 1989 and 1990 (when equipped with the extra 2 vessels under normal stationing conditions). These 2 vessels will be supplied from overseas.

2) In the long term plan (from 1996 to 2010), 4 medium sized SAR vessels will be brought into service. These will be stationed one each at Manila, Cebu, Davao and Puerto Princessa. This will result in a total of 6 vessels with

the capability of handling 80% of accidents such as occurred in 1989 and 1990. These 4 vessels will be of the same design as those SAR vessels supplied in the short term plan and will be constructed locally with the plans being purchased.

3) Even at the completion of the long term plan, search and rescue system improvements will not be sufficient. As a future plan it is necessary to develop the capability to handle 100% of accident occurrences and to this end this means 18 stations with 36 vessels. However, in considering cost effectiveness, it is at least necessary to equip 10 stations with 20 ships (6 small, 10 medium and 4 large, giving an accident handling capability of 93%). Priorities for SAR vessel improvements in this case are given below.

   1. Until the time that all main sea routes are covered by medium sized SAR vessels, emphasis will be placed on the stationing of small sized SAR vessels in areas with frequent maritime accident occurrences.

   2. The stationing of large sized patrol boasts is planned after the completion of small sized SAR vessel stationing.

   The fleets of small and medium sized SAR vessels will have an operational life of 20 years and large sized SAR vessels will have an operational life of 25 years.

6.2.6 Maritime Communications

(1) Issues

The MCP/TEL project being carried out by DOTC currently, includes Project Phase I (improvement of the communications system handling mainly official communications between coastal stations and ship stations). This project has already obtained OECF loans and is currently being executed, and if the necessary functions can be added to the project, it will become the nucleus of a maritime safety telecommunications system. This can be achieved by the addition of automatic accident report receiving equipment, emergency communications equipment for when accidents occur and a navigation warning system for domestic shipping.

In addition by establishing a command communications system linking the PCG headquarters and PCG stations, introducing conditions so that vessels will be equipped with EPIRB while monitoring the financial conditions of the shipping companies and the installation of LUT for COSPAS/SARSAT, the maritime safety telecommunications system will be complete, albeit on a low level.

Following on from these improvements, further improvements will be made to simplify the use of the system and reinforce

the still vulnerable parts of the system.

(2) Plan

This plan is divided up into 6 projects;

1) The HF Network linking the PCG headquarters, 8 CG regional headquarters and 133 bases

The PCG command communications system will be reinforced by the installation of shortwave transceivers of the 400W output class for PCG headquarters - regional stations of the 100W class for PCG base links.

2) Upgrading of MCP/TELOF to reinforce functionality of maritime safety telecommunications

Facilities will be added to the Manila Coastal Station System currently under construction, such as three 5KW transmitters, three receivers, six automatic alert receivers and one NAVTEX broadcasting unit and these will be able to be directly operated from the PCG/RCC.

3) INMARSAT Earth Ship Station Installation

INMARSAT Earth Ship Stations will be installed at each of the PCG/RCCs in Manila, Cebu, Davao and Zamboanga and will be used as telecommunications facilities for domestic RCCs and those of neighboring countries.

4) Installation of a land-based COSPAS/SARSAT receiver station

A land-based EPIRB receiver station will be constructed on at Cebu. This will enable the early notification of a disaster and confirmation of disaster location (the position of the emergency beacon) in the event of a maritime accident.

5) Construction of PCG Coastal Stations.

For the time being PCG telecommunications will be handled by the upgraded MCP/TELOF (2.), but along with the increase in the volume of telecommunications, it will become necessary to have independent coastal stations. These telecommunications system will be installed in the 8 stations and will have NAVTEX, MF, HF and VHF systems linking land-to-land and land-to-sea based.

6) Installation of electronic equipment to RCC

An electric exchange system will be installed in each district. There will be a line directly linking this exchange system to LUT and related agencies.

APPENDIX-1
Summary of Proposed Work Program

Coast & Geodetic Survey Department
National Mapping & Resource Information Authority (NAMRIA)

1. Ten-year-plan - Hydrographic Survey of National Ports
   Detailed hydrographic survey for the publication of new large scale harbor charts.

2. Five-year-plan - Survey of Sealanes
   Detailed hydrographic survey of important sealanes for the delineation of Traffic Separation Scheme (TSS) on large scale charts.

3. Basic Hydrographic Survey of Southwest Coast of Palawan and the Kalayaan Island Group.

4. Five-year-plan, National Oceanographic Program - Oceanographic Cruises of Philippines waters within the Exclusive Economic Zone (EEZ).

5. Delimitation Survey of the Proposed Archipelagic Baselines of the Philippines - Global Positioning System (GPS) Observations to determine Geographic Positions of base points.

6. Nautical Charting Program - Publications of large-scale nautical charts and Revision/metrication of existing charts-continuing program.

7. Publication of other Nautical Publications
   - Coast Pilot Book - 1993
   - Notice to Mariners - (continuing)
   - List of Lights - 1990

8. Densification of National Geodetic Control Network - (continuing)

7. GENERAL EVALUATION

A package of proposed projects is economically, financially and environmentally evaluated.

7.1 Economic Evaluation

The following economic benefits can be expected with reduction in maritime accidents.

1. The preservation of human life and cargo
2. Preventing loss and damage to vessels
3. Reduction of transport costs
4. Efficient use of the maritime infrastructure
5. Increase in the reliability of domestic shipping

However, it turned out to be difficult to quantify 3. 4. and 5. from a nationwide view. Then damage of maritime accidents was estimated in terms of human life, cargo and hull. As a result, the estimated damage was accumulated to be 58,666.3 million pesos from 1992 to 2010 with assumption of Case 2 of maritime accident forecast in Chapter 4. This is considered to be the damage without proposed projects.

It is difficult to forecast accidents with implementation of proposed projects. In this study, the acceptable risk degree to public transport (below 10^{-4} per trip) which A. Kuhlman insists on internationally is applied to such a forecasting procedure.

Japan has already achieved this risk degree. On the other hand, in the Philippines, maritime accidents in 2010 will be projected at 100 with attainment of this degree.

Table II.5
Risk of Maritime Accidents in the Philippines

Year	No. of Trips	No. of Accidents	Risk Degree
1989	48,822	279	5.715^{-3}
2010	100,821	100	9.919^{-4}

In this case, total loss with proposed projects is estimated at 18,304.7 million pesos. On the other hand, discrepancy of both losses between "with project situation and without project situation" is considered as the benefit of proposed projects. Then benefits of human life, cargo and hull may be expected 40,361.7 million pesos.

The expected benefits per the estimated projects' cost in economic price is calculated to be 2.31. In despite of preliminary assessment, the proposed projects can be justified from a economic view point. Therefore, we lay stress on the implementation of these projects swiftly and efficiently.

Table II.6
Estimated Benefit from Proposed Projects
(in million pesos)

YEAR	NO. OF ACCIDENTS		EXPECTED REDUCTION IN ACCIDENTS (A)-(B)	ESTIMATED LOSS		EXPECTED BENEFIT WITH PROJECTS (C)-(D)
	WITHOUT PROJECTS (A)	WITH PROJECTS (B)		WITHOUT PROJECTS (C)	WITH PROJECTS (D)	
1992	330	258	72	1,775.0	1,387.7	387.3
1993	357	250	107	1,920.2	1,344.7	585.5
1994	384	241	143	2,065.4	1,296.4	769.0
1995	412	232	180	2,216.0	1,247.9	968.1
1996	439	223	216	2,361.4	1,199.5	1,161.9
1997	466	214	252	2,506.5	1,151.1	1,355.4
1998	493	206	287	2,651.7	1,108.0	1,543.7
1999	520	197	323	2,797.0	1,059.6	1,737.4
2000	547	188	359	2,942.2	1,011.2	1,931.0
2001	574	179	395	3,087.3	962.8	2,124.5
2002	601	170	431	3,232.7	914.3	2,318.4
2003	628	162	466	3,377.9	871.3	2,506.6
2004	655	153	502	3,523.1	822.9	2,700.2
2005	683	144	539	3,673.7	774.6	2,899.1
2006	710	135	575	3,819.0	726.2	3,092.8
2007	737	126	611	3,964.2	677.7	3,286.5
2008	764	118	646	4,109.3	634.7	3,474.6
2009	791	109	682	4,254.6	586.3	3,668.3
2010	816	100	716	4,389.1	537.8	3,851.3
TOTAL	10,907	3,405	7,402	58,666.3	18,304.7	40,361.7

7.2 Financial Study

The proposed projects can be classified from the financial view point as follows;

- Those to be carried out as development projects
- Those to be executed under normal budgeting of related agencies such as MARINA
- Those to be planned to enhance maritime safety with negligible budget.

In this section, a study is intended for the development projects which need extra budget as a project basis, with estimates of future financial capabilities. Projects's cost coming under this category is listed in Table II.7 along with estimated available funds.

Table II.7
Comparison Estimated Maritime Infrastructure Available Funds
And Targeted Project Costs
(in million pesos)

		Short Term Plan	Long Term Plan
Transport Sector	Estimated Available Funds	8,247	40,622
- Maritime Transport	Proposed Project Costs	1,599	5,489
	Share (%)	19.4%	13.5%
Communication Sector	Estimated Available Funds	2,105	10,367
- Maritime Telecomm.	Proposed Project Costs	95	832
	Share (%)	4.5%	8.0%

The total infrastructure projects costs amount to 1,694 million pesos and 6,321 million pesos for the short and long term investments respectively. In the maritime transportation sector, the project cost makes up 13.5 to 19.4% of the estimated available government funds. In the telecommunications sector the project makes up 4.5 to 8.0%. Judging from the share of project costs to available funds by sector, a package of the proposed projects is deemed to be feasible.

7.3 Environmental Study

It is apparent that safety improvement projects make contributions not only increasing safety levels but also to preserving the natural environment through reducing the number of accidents involving vessels which cause excessive pollution of the ocean. It is recommendable to apply the "1976 Protocol relating to the International Treaty for the prevention of oil slicks due to vessels" and improve the oil/water separation system to prevent oil leakage from vessels.

8. PRIORITY SETTING AND IMPLEMENTATION PROGRAM

8.1 Priority Setting

The proposed projects were ranked in order of planning priority, economic evaluation and others including urgency, implementability, possible use of existing facilities and involvement of the private sector.

8.2 Implementation Program and Priority Projects

(1) Concepts of Implementation Program

The implementation program of this study is indicated in Table II.9. This program has the following four concepts for its formulation.

Table II.8
Conceptual Framework of Projects Programming

	URGENT RESPONCE		LONG TERM ISSUE
Main Elements of Maritime Transport - Seafarers - Fleet	(objective) - to upgrade maritime education corresponding to need of qualified seafarers (project) - upgrading training facilities - retraining of teaching staff	⇨	To develop practical education system
	(objective) - to improve fleet quality (project) - revising PMMRR - strengthening ship inspection body	⇨	To foster shipbuilding industry and promote ship replacement
Safe Operation Management	(objective) - to diffuse strict enforcement of safe navigation (project) - strengthening operation management regulation against large vessels - diffusion of accident prevention measures	⇨	To establish safely navigational system
Maritime Infrastructure	(objective) - to support traffic movement on waters safely (project) - developing communication on a national network - deployment SAR fleet and construction of navaids on Manila - Cebu corridor	⇨	To develop useful infrastructure on a nationwide scale

1) The proposed master plan covers three territories such as main elements of maritime transport (seafarers and fleet), maritime infrastructures (aids to navigation, maritime communication and deployment of SAR fleet) and safe operation management. Therefore the program should be considered as a package of these territories and must be implemented in step.

2) Among them, to strengthen the main elements of maritime transport is the most important. However projects concerning fleet and seafarers may not be expected to be immediate effects. To offset this kind of time lag, strict enforcement of safe operation management is required in short term.

3) Taking consideration of current situation of Philippine waters, maritime communication and SAR activity should be encouraged as first priority projects among infrastructure ones. Because communication facilities provide necessary information for safe navigation and SAR activity aims to rescue human life and minimize damage of hull and cargo. Especially they are the most important measures when vessel are in distress or in need of assistance.

4) Various efforts should concentrate on the Manila - Cebu corridor with taking account of traffic volume transported and maritime accidents occured in past and now. In case of the infrastructure development including navaid, communication facility and deployment of SAR fleet, the Manila - Cebu corridor is considered to be the first priority sea lane.

(2) A Package of Priority Projects

Based on abovementioned concepts, the following projects were identified as a package of priority projects;

<u>The seafarer education sector</u>

1. Reduction in the number of schools and the upgrading of facilities at the remaining schools
2. Re-training of teaching staff in the use of new teaching materials
3. Creation of a training curriculum for the practical training of students on civilian vessels
4. Introduction of a licensing system for crews of small vessels

<u>The vessel upgrading sector</u>

1. Revision of PMMRR and setting of standards for wooden hulled vessel and FRP vessel construction
2. The upgrading of the vessel inspection system according to the above standards

The safe operations management sector

1. Improvement of operations management regulations and their enforcement
2. The establishment of tropical cyclone shelters and complete diffusion of information regarding such
3. Implementing of compulsory safe operations countermeasures
4. Diffusion of accident prevention philosophies

The aids to navigation sector

1. Restoration of "Out of operation" signs and upgrading of aids lacking functionality
2. Improvement of coastal operations aids, port aids, hazard signals and regulation signals
3. Workshop and buoy base improvements, building of replacement buoy and lighthouse tenders (3 stations and 3 vessels)

However, 1 and 2 are to be implemented in order starting from those with the highest level of restorability while 3 calls for implementation of 1 vessels to 1 station for each of the plan stages (initial, intermediate and final).

The search and rescue sector

1. Stationing of 2 medium sized SAR vessels (Japanese-built)
2. Stationing of 4 medium sized SAR vessels (Philippine-built), sheduled for implementation in the final stage of the plan

The maritime telecommunications sector

1. Establishing of a PCG HF network
2. Addition of a line for SAR use to the MCP/TELOF project
3. Installation of a Local User Terminal (LUT) for COSPAS/SARSAT use, scheduled for implementation in the final stage of the plan

Table II.9
Implementation Program

NO. 1

	SHORT TERM	LONG TERM		
	1992 - 1995	- 2000	- 2005	- 2010
[MARITIME SAFETY EDUCATION]				
101 TO UPGRADE TRAINING FACILITIES				
102 SCREAMLINE THE SIZE OF STUDENT				
103 FORMULATION OF A CURRICULUM FOR APPRENTICESHIP				
104 RETRAINING OF TEACHING STAFF AND SEAFARERS				
105 CC FOR SEAFARERS MANNING 35 GRT VESSELS AND BELOW				
106 SAFETY INFORMATION DRIVE THROUGH NON-FORMAL MEANS				
107 SUBSIDIARY TO FILIPINAS				
108 CONSTRUCTION OF TRAINING SHIPS		1 VSL	1 VSL	1 VSL
109 TO ESTABLISH NEW ORGANIZATION TO POSSESS TRAINING SHIPS				
110 STRUCTURAL REORGANIZATION				
111 COMMUNITY-BASED EDUCATION				
[FLEET IMPROVEMENT]				
201·202 SHIP INSPECTION BODY				
203 IMPORTATION ASSISTANCE				
204 FINANCIAL ASSISTANCE				
205 AMENDMENT OF PMMRR				
206 DOMESTIC PRODUCTION POLICY				
207 SCRAP AND BUILD POLICY				
208 SOFT LOAN FOR INDUSTRY MODERNIZATION				
209 MARITIME INDUSTRY COOPERATION SYSTEM				
210 ESTBLISHMENT OF SHIPBUILDING TECHNOLOGY CENTER				

NOTE : PRIORITY PROJECT

	SHORT TERM	LONG TERM		
	1992 - 1995	- 2000	- 2005	- 2010
211 EDUCATION OF SHIPBUILDING ENGINEERS				
212 DOMESTIC PRODUCTION OF RELATED INDUSTRIES				
[AIDS TO NAVIGATION]				
301 DEVELOPMENT OF VISUAL AIDS				
302 RESTORATION OF "OUT OF OPERATION" AIDS				
303 IMPROVEMENT OF AIDS LACKING FUNCTIOS				
304 LORAN - C				
305 RACON				
306 NAVAID REMOTE MONITORING AND TELECOMMUNICATION NETWORK				
307 WORKSHOPS AND BUOY BASES (3 ST.)	1 ST.	1 ST.	1 ST.	
308 BUOY/LIGHTHOUSE TENDERS (3 VSL.)	1 VSL	1 VSL	1 VSL	
309 TRAINING OF PERSONNEL				
[SEARCH AND RESCUE]				
401 TWO MEDIUM SAR VESSELS (FOREIGN BUILT)	2 VSLS			
402 FOUR MEDIUM SAR VESSELS (PHILIPPINE BUILT)		1 VSL	2 VSLS	1 VSL
[MARITIME SAFETY COMMUNICATION]				
501 REGULATION OF ON BOARD RADIO FOR SMALL VESSELS				
502 PCG/HF NETWORK				
503 MCP/TELOF P-I				
504 INMARSAT SES				
505 COSPAS/SARSAT LUT				
506 PCG EXECLUSIVE COAST STATIONS(8)				

NOTE : PRIORITY PROJECT

	SHORT TERM	LONG TERM		
	1992 - 1995	- 2000	- 2005	- 2010
507 ELECTRIC EQUIPMENTS TO RCC				
[SAFE OPERATION MANAGEMENT]				
601 OPERATION MANAGEMENT REGULATION				
602 ESTABLISHMENT TROPICAL CYCLONE SHELTERS AND DIFFUSION OF INFO.				
603 IMPLEMENTING OF COMPULSORY SAFE OPERATIONS COUNTERMEASURES				
604 DIFFUSION OF ACCIDENT PREVENTION PHILOSOPHIES				

NOTE : PRIORITY PROJECT

III PROJECT IMPLEMENTATION STUDIES

1. PROPOSED STUDIES

Further studies will have to follow this master plan study in the following two(2) fields.

(1) Studies needed for facilitating the implementation of projects proposed in the master plan study.

The following studies are recommended in accordance with the priority projects selected in the previous sector.

<Seafarer>

1) Implementation Study of Seafarer School Education Improvement Project

The project aims at improvement of seafarer school education through renovating the dilapidated and obsolete equipments and materials for education, and retraining the teachers using the renovated equipments. The study purpose is to formulate the implementation plan for - 1) the renovation of teaching equipment and materials, - 2) streamlining schools and - 3) teacher retraining programs.

2) Implementation Study for Retraining Teaching Staff and Seafarers

The key factor for upgrading the technological level of the Philippine seafarers is practical training on vessels with modern equipments. For this purpose it is of need to formulate Implementation plan/programs for practical training on vessels, including plans of utilization of the existing vessels and provision of new vessels for practical training. Especially it is of great significance to establish efficient operation/management systems of practical training vessels.

<Vessel>

3) Study for Vessel Safety Standard and Vessel Inspiration System

Studies must be implemented aiming at strict vessel safety standard and strengthening vessel inspection system for enforcement of the standards.

This study include - 1) review of PMMRR, - 2) setting up of structural safety standards of vessels covering conversion vessels and wooden hull vessels.

4) Study for Interisland Shipping and Shipbuilding Development Plan

The study shall be made with the emphasis on Relaxation of duty on imported goods for maintenance and repair, Financial assistance for vessel renewal and national shipbuilding policy.

<Safety Navigation>

5) Safe Navigation Study

The purpose of the study is to review the existing safe navigation system, regulations and practices, and propose measures for their substantial enforcement.

<Maritime Telecommunication>

6) Study for Implementation Program of Upgrading of MCP/TELOF to Reinforce Functionality of Maritime Safety Telecommunication.

7) Feasibility Study for HF Network Linking PCG and Regional Headquarters and 133 Bases.

<Search and Rescue>

8) Implementation Study of SAR Vessel Improvement

Implementation program of 2 medium sized SAR vessels replacing the vessels in Manila and Cebu must be formulated covering procurement of vessels, operation/management plan, organization, training system of crew, SAR system.

<Aids to Navigation>

9) Implementation Study for Aids to Navigation Improvement Project

This master plan study set forth the basic plan of Aids to navigation improvement, which shall be followed by the implementation study, engineering study and so on.

(2) Regional Maritime Transportation Safety Project Plan Study

The Master Plan Study placed the emphasis on the national projects. As stated before it is apparent that regional maritime safety measures are of equal importance for maritime accident prevention in the Philippines.

Accordingly regional maritime transportation safety study should follow the national master plan study. Since some of the national projects proposed in the master plan must be implemented in the regional context, implementation plans for those projects also must be elaborated in the regional maritime transportation safety study.

10) Cebu Regional Maritime Transportation Safety Project Plan Study

The study aims at formulation of model regional maritime safety plan in the Cebu area, which shall be replicated in the rest of the country. It covers - 1) strengthening regional maritime safety system, community-level safety activities, - 2) regional SAR system along with reinforcing SAR auxiliary, - 3) regional telecommunication system, - 4) safety countermeasures for accidents during bad weather conditions.

2. PRE FEASIBILITY STUDY

2.1 Purpose of Study

The study is to be defined as preparatory work for the implementation of further study for the proposed projects in the Master plan. Accordingly the purpose of study is to specify the components of the proposed projects and justify them, and to outline the scope of work for the necessary study for project implementation.

2.2 Selection of Projects for Pre Feasibility Study

Among the 10 projects listed in the proposed studies in the preceding section, the following three(3) projects were selected for Pre Feasibility Study.

1) Cebu Regional Maritime Transportation Safety Project

2) Vessel Safety Standard And Vessel Inspection System Upgrading Project

3) Aids to Navigation Upgrading Reliability Project

In the previous section 10 projects were listed for further study. They cover the fields of seafarer, vessel, safe navigation, aids to navigation, telecommunication, search and rescue.

Among these fields the projects which need further in-depth study are in the fields of

Safe navigation focusing on the safety countermeasures for accidents during bad weather conditions, which is of great importance for maritime accidents prevention in the Philippines,

Vessel inspection which is instrumental to the modernization of shipping and shipbuilding in the Philippines, and

Aids to Navigation where the project size and volume becomes tremendously large to cover all the waters under the jurisdiction of the Philippines.

Thus, in addition to the importance of projects the necessity of further study is major criteria for the project selection for pre feasibility study.

2.3 Cebu Regional Maritime Transportation Safety Plan

2.3.1 Current conditions of the Cebu Region Maritime Transportation Safety System

(1) Regional Organization System

The framework of the regional organization system for maritime transportation safety for Cebu is shown in Chart - where PCG (2CGD in Cebu) has the main responsibility for maritime transportation safety directives and search and rescue and PMO (Port Management Office) under the control of PPA has the main responsibility for port management. The shipping companies pass on these directives and information to the vessels in the sea freighting industry, while the Barangay (captains and councils) play this role along the coastal regions, and the PCG Civilian Auxiliary Unit (PCGA) does this for search and rescue.

(2) Maritime Disaster Prevention Activities

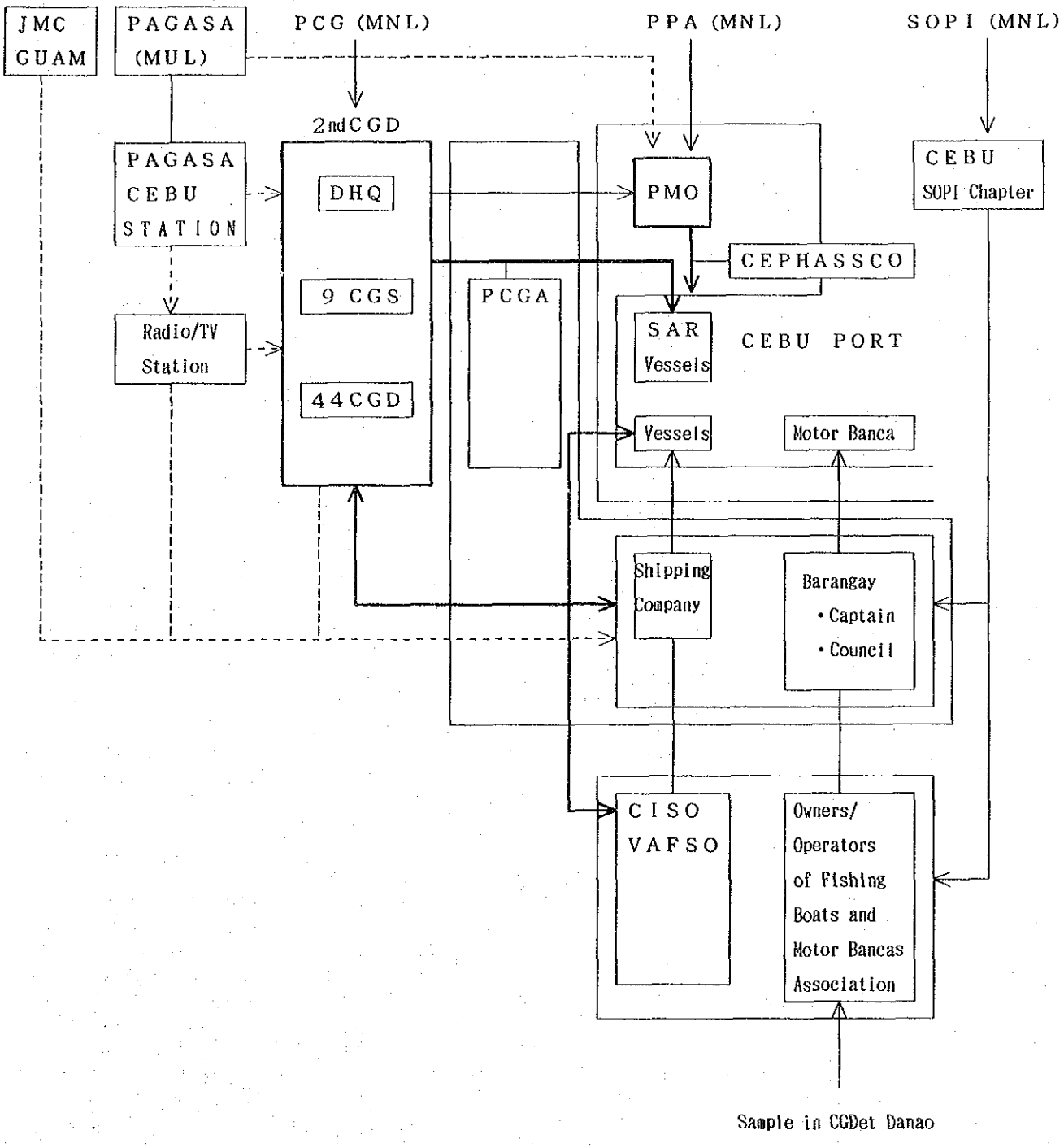
1) 2CGD is responsible for port exit authorization, enforcement of safety regulations concerning vessels and crew members by way of vessel boarding inspections, implementation of ORE/SOLAS drills and crew training drills, in working towards the prevention of maritime disasters.

2) A vessel safety check system has been established at the 2CGD sub-organization CG Det, for vessel safety checks on vessels over 3 tons by issuing Vessel Safety departure report. In addition Barangay captains pass on CG Det notifications and guidance to fishermen by way of the Public Safety Committee under the Barangay Council.

3) The shipping companies themselves are implementing crew member training drills, employing skilled seamen and strictly adhering to vessels maintenance safety regulations. In addition, port captains and safety officers are resident in company offices to bring about safe operations and safe dock operations. The 5 surveyed main shipping companies keep copies of the Vessel Operation Manual which sets out operation safety standards for affiliated vessels.

4) CEPHASSCO and SOPI are civilian bodies to cooperate with PCG carrying out maritime transportation safety activities although these activities are regarded as uninspired.

Figure III.1
CEBU Regional Maritime Safety System



The following are problems related to the above maritime disaster prevention activities in the northern Cebu region.

1) 2CGD implements the enforcement of laws and notifications and the person in charge of this work submits various enforcement reports to 2CGD (Vessel Safety Report, Vessel Boarding Report, Operation Readiness Evaluation, Administrative Readiness Evaluation). These reports cover a wide range of matters and include fields requiring specialized knowledge. Because of this, an insufficient specialist knowledge by the people in charge can allow the report to become a mere outcome of paper survey.

2) According to the result of the survey for this study conducted during May 1991 on shipping transportation companies in Manila and Cebu, 25 of the 64 companies surveyed replied that they ran some sort of in-house training. However, in spite of this questionnaire, according to the site survey carried out by this study group in Cebu, there is almost no in-house training being carried out aimed at enhancement of crew safety awareness and upgrade of skills. The Vessel Operation Manual used by shipping companies is based on the PCG Memorandum Circulars and many shipping companies are likely to consider that a system based on these Memorandum Circulars would be sufficient. Moreover, it is a fact that enforcement of the Circulars is not sufficiently being carried out and the shipping companies do not implement appropriate measures for maritime disaster prevention. The earlier Shipping Company Survey shows 48 (75%) companies carry hull insurance, and interviews with insurance companies show these figures to be 30 -40% with vessel classification at 50%. These facts indicates that the awareness level of domestic shipping owner towards operation safety is not high.

3) CEPHASSCO, apart from its objective of promoting dockwork safety and health standards, in the area of sea safety carries out almost no activities worth mentioning. The Cebu city SOPI Chapter sea safety activities are also lackluster. It goes without saying that the diffusion of maritime disaster prevention concepts not just to those concerned in maritime affairs but to citizens in general is effective in maritime disaster prevention. However, apart from the metropolitan areas, considering the situations in the rural regions where there is insufficient incorporation of the regulations based on the Memorandum Circulars put out by PCG, autonomous participation of the people in the rural regions in the diffusion of maritime disaster concepts is still something for the future.

(3) Information distribution system

Information related on Maritime transportation safety mainly consists of 1. meteorological information and alerts, 2. directives (2CGD, PMO -> shipping companies, barangays -> vessels), 3. accident information and assistance requests. An outline of the current communications system in the Cebu region is shown in Figure III.2.

With PAGASA Cebu as the broadcasting base, meteorological information is passed on via the general media (radio, TV) either directly to vessels or through the shipping companies and to motor bancas and fishing boats via the barangays.

PCG directives are passed on DHQ -> CGS -> CGDet in the 2CGD organization to be informed to vessels either via the barangays or directly.

The first reports from a disaster site or a disaster stricken vessel are mostly via wireless (VHF Ch16) for vessels with wireless systems or via vessels in the vicinity or onshore observers in the case of vessels without wireless communications, to the nearest PCG Station or PCG Detachment.

The following are problems concerned with the above information communication system.

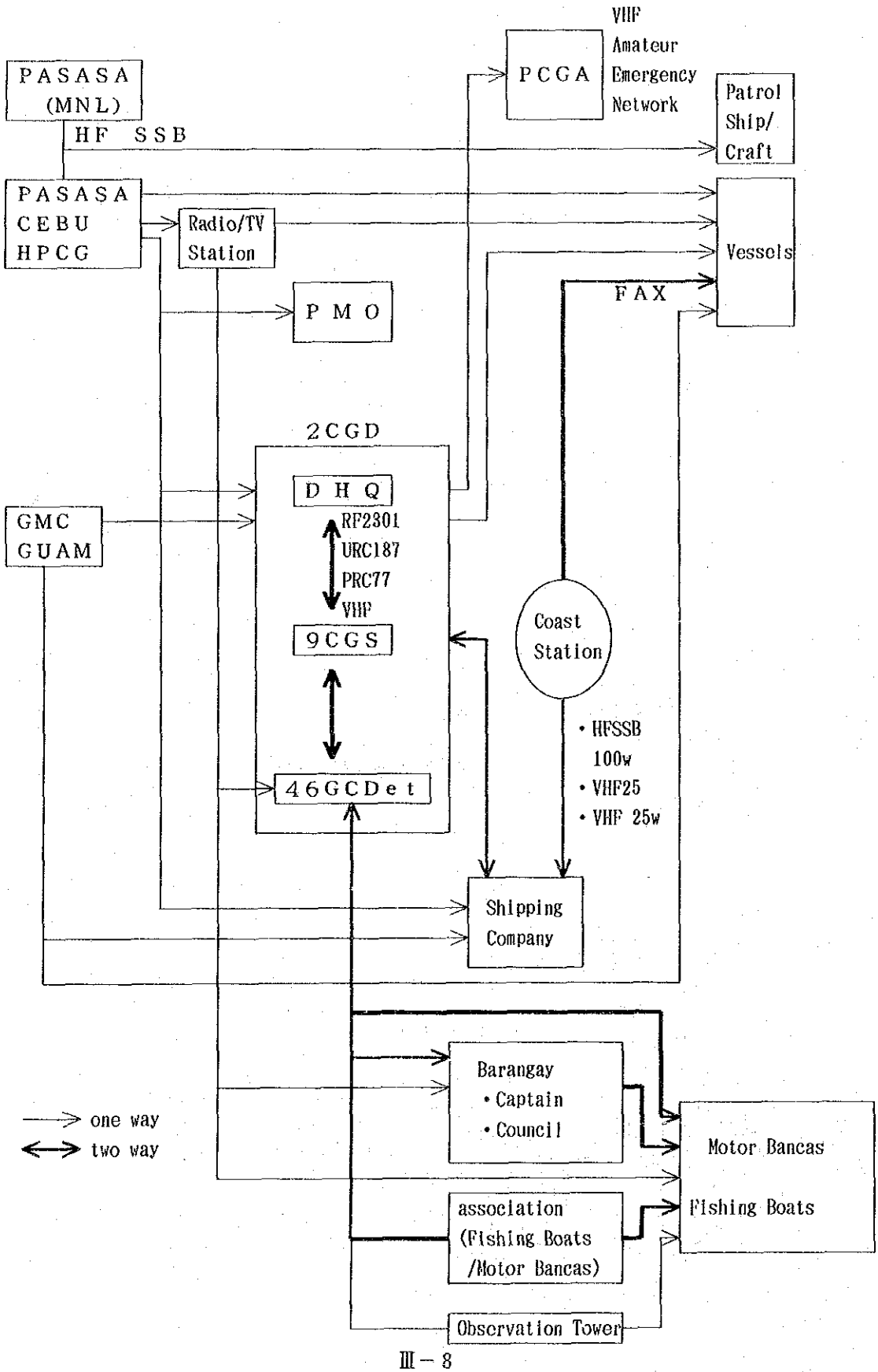
1) Because the Philippines are situated at a crossroad on the tropical cyclone path, forecasting the path of the tropical cyclone is extremely difficult and moreover, it takes time for tropical cyclone information to reach the out regions. This situation results in a lack of trust of PAGASA tropical cyclone information (this has lead to a lot of instances where the shipping companies directly receive short wave broadcasts and meteorological faxes from neighboring countries for reference in their tropical cyclone countermeasures).

2) The regional communication network has a major problem that the basic communication equipment is insufficient and dilapidated. Specifically, many of Coast Guard Detachments, which are the bases of regional information distribution, do not even have telephones let alone facsimile machines. This causes delays in the distribution of information.

   Information like tropical cyclone information is obtained by the barangay captains from 2CGD or the radio and passed on either directly or through the barangay council organization, the transmission of information is tend to be slow.

   In this way, the present information distribution system is limited and transmission of information is not smooth.

Figure III.2
CEBU Regional Maritime Safety Communication System



3) There are numerous cases of fishing boats and motor bancas carrying on their operations either because they have not received tropical cyclone information or because they are ignoring it.

(4) Search and Rescue

SAR operations in the Cebu region are mainly conducted by 2CGD which is the regional PCG organization, with the co-operation of other governmental agencies.

1. Fleet

Patrol Ship (1 vessel)	1 week at sea endurance 4 officers, 30 crewmen
Patrol Craft (4 vessels)	24 hrs at sea endurance 5 crewmen

2. Maintenance staff (6)
(With capability for small scale repairs: Major repairs are carried out at the Cavite naval shipyard or a civilian repair facility)

3. Patrol area
East Visaya, a part of Central Visaya, Northern Mindanao and Cebu region where there will be assigned by CG Station Cebu which has 11 Detachments.

SAR activities are carried out according to the above system but the largest problem is the stationing of SAR vessels. There are patrol ships and craft but they are not able to cover the vast region indicated above and are not able to carry out rapid SAR activities. The equipment is neither sufficient for SAR activities (there is no equipment such as fire fighting equipment or search lights) nor poorly maintained.

Under these conditions, the following means have been devised in an attempt to combat maritime disasters.

1. Use of all vessels that can be mobilized by PCG regardless of size and type

2. Requesting of the Philippine navy and air force to mobilize their resources

3. Requesting the assistance of the Cebu PCG civilian auxiliary organization

4. Requesting of assistance from civilian shipping companies

In addition, the associations made up of fishing boat and motor banca owners and operators are instrumental in cooperating with CG Detachments that do not have vessels (in the case of Danao) when a maritime disaster occurs or when SAR activities become necessary.

The Cebu PCG civilian auxiliary organization is credited with making a major contribution to PCG SAR activities, however, it is based on a volunteer system and not sufficient for SAR activities.

(5) Tropical Cyclone Countermeasures

Tropical cyclone countermeasures for vessels consist of obtaining meteorological information and alerts in advance and taking shelter at a suitable location.

1) Vessel directives

Tropical cyclone countermeasures by the shipping companies are taken based on the Memorandum Circular of PCG and the Memorandum Order of PMO.

1. Based on the PCG Memorandum Circular, port departure is halted according to PAGASA tropical cyclone signal (Signal 1 - under 250 GRT, Signal 2 - under 700 GRT, Signal 3 - all vessels)

2. PMO issues the following Tropical cyclone signals based on the PPA Memorandum Order.

   Signal 1: Prohibition of activities in the anchorage (case by case), arrangement of sufficient number of crew tugboats on standby

   Signal 2: Continuation of Signal 1 conditions with the prohibition of all activities

   Signal 3: Continuation of Signal 1 and 2 conditions with a halt to container and cargo loading and unloading, securing of cargo and loading machinery and the moving out to sea of vessels over 1,000 GRT. Docking of vessels under 1,000 GRT is permitted however they are required to take sufficient precautions.

However, according to PMO, when a Signal 3 is issued, all vessels are advised to move offshore. 2CGD and PMO neither have contact nor cooperate regarding these tropical cyclone countermeasures, each giving their own instructions to the vessels.

This means that 2CGD, based on M.C. 08-90, prohibits departure from port on Storm Signals, while PMO, based on M.O. 23-88, instructs all vessels to move offshore and to "Proceed to anchorage" upon issuance of Storm Signal 3.

Accordingly vessels receiving the 2CGD directive either halt port departure to anchor in port or some ships move out of port to anchorage or to operate without passengers. In addition, vessels still alongside the

wharf, leave wharf side to anchor within the port.

2) Shelter areas

Vessels entering Cebu port average 44 per day during the summer holidays and Christmas season while Monday is the heaviest day of the week up to 100 vessels per day. 2CGD designates Cebu harbor and the Sandoval Shipyard as tropical cyclone shelter areas.

However PMO has designated 19 locations in Cebu harbor, able to accommodate no more than 28 vessels. In special cases such as when a tropical cyclone strikes, apart from the vessels already in the harbor, vessels seeking shelter from the tropical cyclone also enter, making the number of designated anchorages insufficient leading to disorderly anchorages throughout the harbor at unfavorable anchorage locations outside the designated areas.

As explained above, because of the 2CGD directive halting port departure and the PMO directive to move offshore, the harbor becomes congested with vessels unable to obtain sufficient swing area necessary for holding power at the anchorage, anchors slip there are collisions between vessels, in turn leading to the occurrence of maritime disasters. On top of that, vessels delayed in arriving in the harbor to seek shelter sail around searching for anchorage yet again increasing the level of congestion and with the occurrence of bad weather, there is extreme risk of maritime disaster occurring.

This can be assumed to be the basic factor in the disaster resulting from tropical cyclone Ruping (with southerly gusts reaching 107 knots) which caused the capsizing and sinking of 62 vessels and running aground of 22 vessels, involving 84 vessels in all.

3) Bancas and fishing boats under 3 - 5 tons that have received tropical cyclone information from CGDet are beached on a nearby coast while larger ones anchor in nearby shelter areas (e.g. area to the north of Maribago beach, Agus to the south of Maribago beach and the adjacent Santa Rose or Carmen Bay). Carmen Bay is used by Ro-Ro vessels, motor bancas and fishing boats etc., operating along the coast to shelter from bad weather.

2.3.2 Countermeasures

Countermeasures for regional maritime transportation safety planning that should be introduced, based on the above Cebu region maritime transportation safety system conditions and problems, are summarized in the following which has been concentrated into;

1) The implementation of maritime disaster prevention

measures making up the existing system.

2) The taking of accident countermeasures in times of tropical cyclones which make up the majority of maritime disaster causes.

3) Improvements to the maritime communications system and SAR system which make up the basic infrastructure of the regional maritime transportation safety system.

(1) Maritime disaster countermeasures

The following are submitted in order to prevent maritime disasters and bring about maritime transportation safety:

1. Enforcement of laws and notifications relating to maritime disaster prevention measures

2. Amelioration of safety education and training

3. Improvement of the navigation environment

However, considering the level of maturity and actual conditions of the shipping companies, the focal points of regional maritime disaster prevention measures must, for the moment, unavoidably be put on measures which are feasible and can be implemented rapidly. 2CGD is primarily responsible for this area.

1) Enforcement of laws and notifications relating to maritime disaster prevention measures

In order to increase the effect of enforcement of laws and notifications relating to maritime disaster prevention measures, specifically M.C. 08-90 and 04-88 etc., 2CGD should increase the number of ships targeted for;

1. dispatch of boarding teams
2. implementation of ORE/SOLAS drills

Along with the strengthening of this enforcement, the co-operation of the vessel captains and owning shipping companies should also be sought.

In-house training should be given to the 2CGD officers responsible for 1. and 2. prior to being dispatched to ensure they have a thorough knowledge of the main points of implementation.

2) Safety education and training

With 2CGD taking the initiative, the staff responsible for safety and vessel captains of the shipping companies affiliated to CISO and VAFSO are to holding conferences at the 2CGD offices to implement training to include the following.

1. Conditions and factors in the occurrence of maritime disasters
2. Explanations of the objectives and contents of M.C. 08-90, 04-88 etc.
3. Studies of vessels stricken by maritime disaster

Detachment commanders and Barangay captains are to gather before the tropical cyclone and Christmas seasons to discuss the following in an effort to prevent maritime disasters at the Barangay level.

1. Important matters for maritime disaster prevention for each Barangay
2. Explanations of the objectives and contents of M.C. 08-90, 04-88 etc.

(2) Tropical cyclone countermeasures

In the previous chapter, for maritime disasters in times of tropical cyclones, the following was indicated.

1) Trust of PAGASA tropical cyclone information was limited.
2) The tropical cyclone information distribution system is limited and information is not passed on in a smooth manner.
3) Cebu harbor, which is congested during tropical cyclones, is not equipped with mass suitable shelters and anchorages.

In order to handle these problems, the following measures must be implemented.

1) In order to present reliable tropical cyclone information, it is necessary for the PAGASA Cebu Station to have a new meteorological radar and new observation equipment installed to enhance the quality of observations. In addition, the observation stations will probably need to be installed with equipment enabling direct reception from meteorological satellites.

2) In order to establish a tropical cyclone communications system, the following measures must be implemented.

1. Establishment of a detailed tropical cyclone information distribution system between 2CGD, PMO, shipping companies, Cebu observation stations, broadcasting stations and newspaper publishers

2. Establishment of an information communications system between the CG Detachments and the Barangays (captains)

3. Establishment of a tropical cyclone information emergency broadcasting system using radio and television

Vessels required to carry wireless communications equipment are able to obtain tropical cyclone information relatively easily, however those without such equipment rely on radio broadcasts and other vessels for direct tropical cyclone information. Because of this, in order to achieve the efficient diffusion of tropical cyclone information, it is necessary to establish a system whereby the various radio stations interrupt regular programming at regular intervals to give updated tropical cyclone information.

4. Installation of storm alert signals at each fishing village and the equipping of each CG Detachment with an official publicity vehicle.

3) Establishment of a tropical cyclone countermeasures committee

A Tropical Cyclone Countermeasures Committee is to be established to be made up of the 2CGD commandant as the chairman and representatives from 2CGD, PMO, PAGASA Cebu Station and the shipping companies. The committee will meet when Storm Signal alerts are issued, and will discuss the following to advise the captains of vessels in Cebu Port to take tropical cyclone countermeasures.

1. The taking of suitable tropical cyclone countermeasures for Cebu Port considering the latest meteorological information and tropical cyclone path, conditions of vessels in port and past vessel damage conditions in Cebu Port, etc.

2. Selection of shelter ports and anchorages
Selection of suitable shelter ports and anchorages in the vicinity of Cebu Port according to the path of the tropical cyclone.

3. Countermeasures for small vessels under 20 tons
Small vessels under 20 tons, particularly motor bancas and fishing boats, make up the majority of vessels involved in maritime disasters resulting from tropical cyclones, and therefore during tropical cyclones these small vessels should be beached or moved to rivers, anchorages and other sheltered areas.

Furthermore, in order to pass on these countermeasures and tropical cyclone information to vessels, it is necessary to study the establishment of information communication routes within committee members and ways of spreading information to vessels without communication routes by use of a publicity vehicles etc., in advance.

In addition, 2CGD should make up studies and records of information of tropical cyclones and vessels hit by disaster for Cebu Port and the vicinity for reference in tropical

cyclone countermeasures.

4) Establishment of a tropical cyclone shelter system

The designated anchorages in times of tropical cyclones have the following two(2) problems.

1. Physical conditions of the shelter areas

   Aside from Cebu Port, 2CGD has designated Sandoval Shipyard (approximately 3 miles north east of Opon-Mandaue Bridge and south of Bagacay Pt) as a shelter area. Coast Guard Detachment Danao has designated Carmen Bay (approximately 11 mile further north of Bagacay Pt) as a shelter area for small vessels under 500 GRT.

   However, the Sandoval Shipyard is at the end of Cansaga Bay and in order to use the shipyard inlet as an anchorage, because there are no large scale nautical charts or lighthouses, it is not possible to judge the water depth, shape and substance of the seabed or the effects of anchor slippage due to slight changes in the vessels position when selecting and anchorage.

   Carmen Bay is recorded on nautical chart NAMRIA 4465 (Harbors in Cebu) but this chart is based on the survey carried out in 1907. There is a destroyed wooden pier at the entrance to the harbor and there is a wharf used by the Ro-Ro vessel "Golden Arrow" at the end of the harbor: These facts make the chart considerably different from existing conditions. On top of that, because there are no aids to navigation, it is almost impossible to take shelter there in darkness. In order to use Carmen Bay as a shelter area, it is necessary to resurvey the area and produce a large scale marine chart.

   Because of shallow water at low tide at shelter areas at Maribago Beach and other resort areas on Mactan Island, it is not possible to take shelter at low tide and it is necessary to obtain tropical cyclone information early enough to be able to shelter during high tide times.

2. Vagueness of the shelter system

   These designated anchorages are indicated on the Cebu harbor marine chart published by NAMRIA, but because the information isn't published in pamphlet form, it is questionable whether vessel captains have sufficient knowledge of these designated anchorages.

Accordingly, based on the above problems, a basic concept for building a tropical cyclone shelter system is set out in the following.

When a tropical cyclone is forecast to strike, the

rapid grasping of inner harbor congestion conditions and diversion of vessels to shelter areas neighboring Cebu Port in order to prevent a build-up of vessels making for Cebu Port should be considered. In addition the early dispersal of large seaworthy vessels to Mindanao for shelter should also be considered.

The following expresses the basics of a tropical cyclone shelter system based on the above basic concept.

1. Vessel capacity of shelter harbors

It is estimated that Cebu Port (excluding those aside from Opon-Mandaue Bridge) in times of tropical cyclones has the capacity to accommodate thirty-five to forty 500 to 1,000 ton standard design cargo vessels with sufficient swing radius. In case that this countermeasures are implemented, the area from Cansaga Bay (including the Sandoval Shipyard area) and Mandaue-Opon Bridge to Bantiano Pt is estimated to have the capability to handle about five 1,000 ton vessels and ten 500 ton vessels making 15 vessels in all along with a considerable number of motor bancas and the end of the harbor. Moreover, it is estimated that Carmen Bay would have the capability to accommodate about 50 vessels, with calculations based on large motor bancas and fishing boats.

Shelter harbor and anchorage improvement plans should be formulated with based on capacity estimation such as above.

2. Diffusion of shelter system information

PMO is to distribute pamphlets etc., to vessels using Cebu port indicating the designated anchorages, and along with this diffusion of information is to also be carried out by use of the NAMRIA published "Notice to Mariners" if necessary.

(3) Basic infrastructure for regional maritime transportation safety

1) Maritime safety communications system

The foundation of the maritime disaster prevention measures and tropical cyclone countermeasures is the communication system as the basic infrastructure. Accordingly, in order to increase maritime transportation safety, the following regional communication system improvements must be implemented with highest priority.

1. As previously mentioned, along with PAGASA preparing reliable meteorological data, meteorological facsimiles are to be installed in observation stations, each CG station and detachment and shipping companies to assure

information distribution.

2. Detachments, on the lower end of the 2CGD organization, are to be equipped with communication systems in which VHF is available.

2) Regional SAR system

CEBU Regional SAR System shall be established through reinforcing of co-operative system between 2CGD and 2CGA. Especially during a certain period of time before the complete improvement of 2CGD SAR system it is of great importance to help upgrading SAR activities by means of developing SAR organization in private sector to meet urgent needs.

The following two(2) measures are proposed to be taken for the improvement of CEBU Regional SAR System.

1. Regional SAR Vessel Improvement
   High-and-moderate-speeded / small-sized SAR vessels shall be respectively located in 2CGD and 2CGA. The former vessel shall be used for 2CGD SAR activities, which 2CGA shall use the latter vessels to help.
   A. The high speed vessel is designed to have seaworthiness which makes SAR activities possible under bad weather conditions, shallow draftline providing for SAR activities in coral reef areas, and easiness of maintenance. The vessel has to run so fast that it can convey the weather information on approaching tropical cyclones to fishing boats out in the sea. The vessel must be provided with fire-fighting and SAR equipment.

   B. The moderate speed vessel with a diesel engine is to be located to help SAR activities even in the bad weather conditions out of the port areas in place of yachts and Motor bancas which the member of 2CGA possess. 2CGD shall lend out the SAR vessel to 2CGA. 2CGA shall operate it under its responsibility.

   Those two SAR vessels must be large enough to have a mobile fire extinguisher and necessary rescue equipment on board.

2. Upgrading of 2CGA
   In addition to the provision of the SAR vessel to 2CGA as stated above, the following measures must be taken for upgrading of SAR activities of 2CGA.

   A. Facsimile machine for weather information to be lent to 2CGA.
   B. The following SAR equipment to be lent to 2CGA.

      1. Wireless set for communication between 2CGD

and 2CGA.
2. Mobile fire extinguisher
3. Projector, portable generator and snooper scope

C. System of bounty for SAR activities and compensation for accidents for the members of 2CGA.

2.3.3 Evaluation

The objective of this study is to embody the regional maritime safety system, particularly in Cebu, as the urgent counter measures to prevent maritime accidents. In this section, a study will be carried out to estimate the damage of maritime accidents themselves and the influence on regional maritime transportation. Especially typhoon Ruping which attacked Cebu area on November 199, is suitable for a case study. Because this disaster is still fresh in our memories and a lot of data is available to analyze the size of damage.

And the proposed measures to prevent maritime accidents will be evaluated with the expected benefits which are assumed through the case study of typhoon Ruping.

(1) Estimated Damage by Typhoon Ruping

The damage by Typhoon Ruping can be divided into two phases. The first is the damage which occurred when typhoon Ruping attacked in an around Cebu Port. And the second is the damage which has occurred after typhoon Ruping attacked.

In this section, the damage is calculated from both two phases in view of a socio-economic aspect. However, the aim of these estimation is to analyze the elements and relationship of each kind of damage.

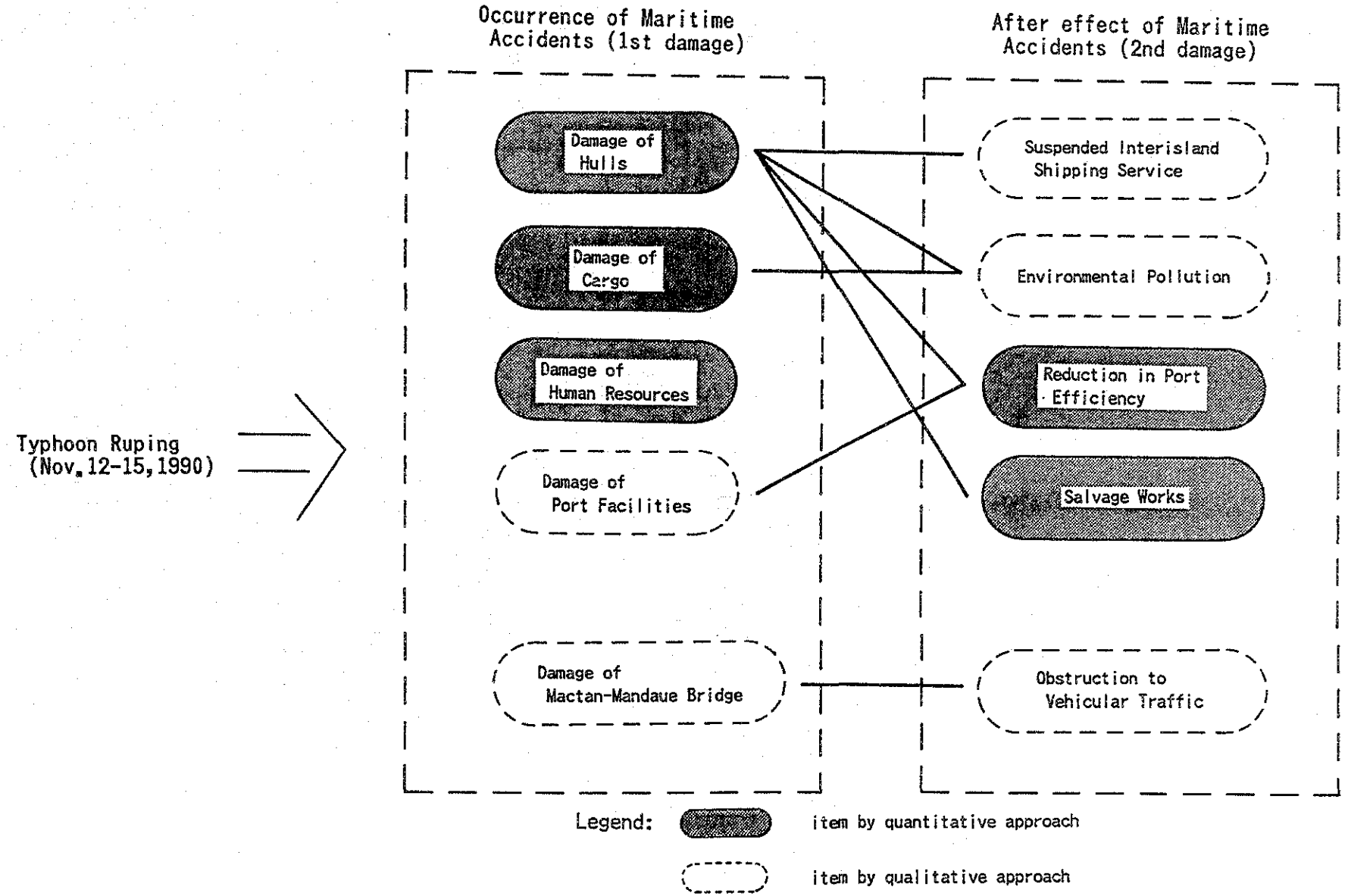
The components of the damage are considered as shown in Figure III.3.

Total amount of the estimated damage was 853.1 million pesos (see Table III.1) which is composed of the following items;

- The same method in Chapter 8 is applied to the estimation of direct damage due to related accidents. Based on the accident data, loss of human lives, sunk or capsized vessels and loss of loaded cargo were 9 persons, 62 hulls and 11,577 tons respectively.

- Reduction in port efficiency means that the vessels which were sunk and left within port area made its efficiency reduced. Derived from PPA data, 2,341 days' running cost per vessel was considered to have been wasted as a aftereffect of Typhoon Ruping.

Figure III.3
Components of Damage with Typhoon Ruping



- Sunk vessels generated the salvage work which has been conducted by local salvors under direction of PCG.

Table III.1
Summary of Estimated Damage by Typhoon Ruping
(in million pesos)

1st damage:	Hulls	598.7
	Cargoes	83.2
	Human lives	3.2
	Sub-total	685.1
2nd damage:	Reduction in port efficiency	117.0
	Salvage works	51.0
	Sub-total	168.0
	TOTAL	853.1

Other items which are difficult to take quantitative approach are follows;

- Damage of port facility was counted 17 structures because many vessels crushed against wharves.

- Environmental pollution seemed to be occurred from the sunk vessels which spilled their fuel.

- As a result of many damaged vessels, the magnitude of interisland shipping service was suspended or called off. This disappeared traffic brought negative influence on regional development.

- The M/V Sanko Elegance struck the Mandaue-Mactan bridge at the height of the typhoon. It was a human error but this accident made made service of bridge stopped completely during about one month.

(2) Components of Proposed Countermeasures

In this study, some countermeasures are proposed variously as follows:

- Establishment of the local association for preventing typhoon disaster at sea

- Construction of a shelter port and an anchorage area for emergency use

- Aids to navigations to guide to shelter area

- A sign tower for storm warning

- Development of local information network

- Search and rescue services, and

- Diffusion of maritime accident preventing philosophy and preparation of related rules and regulations

Cost estimation of the proposed countermeasures would involve the following difficulties;

- Related charts are too old to decide the location of shelter port and to estimate the necessary dredging cost.

- Then, it is also impossible to settle the position of aids to navigations and a sign tower.

- Organizational proposal and encouragement to use existing facilities are difficult to estimate costs.

(3) Conclusion

This pre feasibility study analyzes the characteristics of maritime accidents in Cebu and attempts to identify and define the most pressing problems and issues. Based on these works, the countermeasures to prevent the repetition of the same disaster are proposed. Accordingly these countermeasures will contribute to reduce maritime accidents to a great extent. Therefore the estimated damage due to typhoon Ruping would be assumed to be a port of the expected benefits of proposed countermeasures.

On the other hand, it is impossible to estimate these costs at present. Conversely taking consideration of the following points, the proposed countermeasures should be given shape in near future.

- Regarding to the construction of shelter port, the location should be determined in the light of term and cost.

- Geographic features of the archipelago such as many islands, long and changeable coastal lines, will be utilized effectively.

- Existing facilities will be made best use in harmony with related ones.

The necessity of proposed countermeasures is to implement with urgency and with cost-effectiveness. As for benefit, it will be expected a great deal. Therefore, the viability of this plan can be judged to be high.

Further study will make it possible to confirm what countermeasures discussed in this study will cost in order to prevent tropical cyclone damage. Considering this study to date, we think that from the point of view of

tropical cyclone damage, the costs for preventing tropical cyclone damage are extremely small.

This can also be said for other regions. By way of the proposed F/S, the result of passing on suitable technology will be that the Philippines will be able to implement similar countermeasures on its own for other regions.

From this point of view, we propose the conduct a Feasibility Study centering around the discussed countermeasures in this study.

The expected results of this study are:

1. Establishment of a concept for shelter area improvements for the Cebu region

2. Specific concepts for countermeasures for vessels in bad weather conditions in the Cebu region

3. Clarification of maritime transportation safety planning areas (shipping, education, channels, signals, harbors, meteorology, communications, search and rescue, others)

4. Transfer of planning technology for bad weather handling concepts

2.4 Vessel Inspection System Upgrading Project

2.4.1 Analysis of Conditions Relating to Vessel Upgrading

(1) Transfer of vessel inspection duties from PCG to MARINA

EO 125/125A indicates the transfer of jurisdiction of PCG to MARINA, however as of February 1992, this has not been implemented, yet. In addition the transfer of PCG from the navy to the Ministry of Transport and Communications is also being prepared. Because of this, it is assumed that there will be small variations in the inspections system in 1992.

(2) Vessel inspection engineers

The current MARINA and PMO shipbuilding engineers will be used as inspection engineers with the slight insufficiencies being made up by employing engineers from outside. However, the greatest misgivings are that the skills of the engineers vary greatly giving rise to the possibility of unfair inspections. This kind of unfairness cannot be tolerated in inspections and therefore the upgrading of skills is a necessary precondition. There are currently almost no cases of new shipbuilding in the Philippines so that once basic training has been completed in the Philippines, it will probably be necessary for shipbuilding training to be carried out in developed countries.

(3) Revision of PMMRR

In order to comply with SOLAS '74, a revision of PMMRR is being carried out and this is due to be completed in 1992. Inclusion of the shipbuilding standards for wooden hulled vessels and FRP vessels into PMMRR has not yet been scheduled and at present data from the USA, Norway and Japan is currently being collected.

(4) Classification

Currently MARINA is advising that classifications be obtained from the International Vessel Classification Association for vessels over 500 GRT. In addition, vessels under 500 GRT are being classified according to the Philippine Registration Authority (PRS) although the PRS has no rules and regulations. Classification policies are effective in maritime accident prevention and therefore in reducing insurance costs although this effect is limited.

It should be noted that the classification is not responsive to the issue of this study that excessive passenger capacities are hindering safety of vessels. Classification is concerned with structural strength and equipment reliability relating to safe operation and does not cover vessel safety and stability. The Philippine government has responsibility for ensuring safe operation by the establishing of passenger capacity, accommodation and life saving equipment standards and must recognize that the revision of PMMRR is for the achievement of this objective.

(5) Imports

Strict vessel inspection will result in more repairs than are currently carried out in terms of both scale and time for the check items leading on to lower operational time and higher repair costs. In other words it will force lower profitability and result in a drop in production. Accordingly, the government will need to ease tariffs and taxes and simplify the import procedure for shipping materials, engines and spare parts etc.

The following two(2) current policies are related to this.

1. Tariffs and taxes

A. Philippines Inter-island Shipping Development Act

This law, in order to promote sound development of the shipping industry, prepares foreign currency and allows for the waiving of import tariffs for the import of vessel spare parts and containers for vessel owners and operators.

B. Finance Policy

Preparation of foreign currency is necessary but because the demand for foreign currency is great, the shipping industry must compete with other high priority industries. Approximately $50 million is necessary and with this 5 - 10 used vessels in good condition can be purchased.

The above policies will become incentives for the vessel owners and operators to upgrade and modernize dilapidated vessels. However, they have the following problems.

A. They are not incentives for the ship builders. Lists materials and spare parts required for vessel maintenance are not compiled by the owners but rather by the ship builders. The vessels are inspected at the ship builders and because the purchase and import of necessary materials is carried out after list compilation, there is a delay in the arrival of those materials.

B. Only an extremely small number of vessels are able to receive the benefits of this PISDA and it is not effective in promoting the development of the Philippine domestic shipping industry.

C. This law encourages the importation of used vessels and does not necessarily lead to motivation of the domestic shipbuilding industry.

2. Simplification of import procedure

Domestic shipping documentation procedures involve 8 government departments and based on this alone, the simplification of import procedures will not be an easy job.

2.4.2 Strengthening of the Vessel Inspection System

1) Establishment of a vessel inspection organization

A new vessel inspection organization should be established within MARINA to take over the vessel inspection functions from PCG. This new organization is to be under the chief vessel inspector who shall be of MARINA vice director rank and its primary functions shall be as follows.

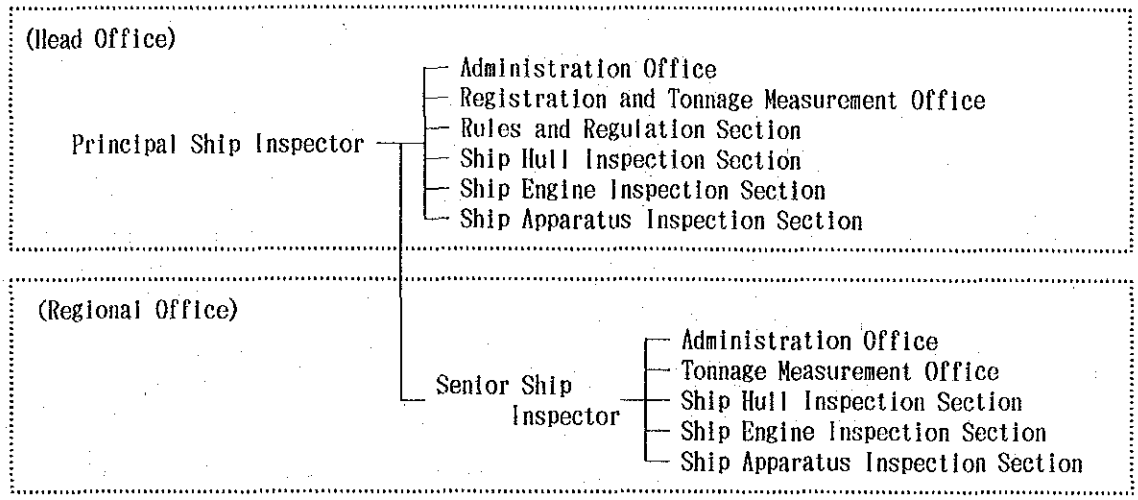
1. Central Office (Manila)

Approval of plan of new vessel construction and vessel conversion. Issue of license and certificate, vessel registration, rules and regulations, technical supervision of the shipbuilding industry, correspondence to international convention, preparation and maintenance of the inspection manual, legal matters

2. Regional Offices

Inspection (compliance with approved plan design), inspection of existing vessels, mandatory inspections for issuance of inspection certificates, unscheduled inspection of material readiness

The organization system is as follows.



2) Establishing of Vessel Inspection Points and Training

Basically the necessary staff for vessel inspection transferred from PCG will be added to the number of MARINA engineers. The necessary staff concerned directly with vessel inspection will be given course training according to the following.

1. Basic training

It is not permissible for unfair inspections because of inspectors. Therefore vessel inspectors will be given basic academic knowledge of shipbuilding and repairs from the point of view of the inspectors.

2. Overseas Training

Because there is almost no new vessel construction in the Philippines and there is a lack in the variety of vessels repaired, skills are to be upgraded by training overseas in countries advanced in shipbuilding.

3) Vessel Inspection Implementation Methods

1. Leagal base

The legal base for vessel inspection is the PMMRR which has no regulations regarding the construction standards for wooden hulled vessels, FRP vessels and aluminium vessels, etc. These standards must be established

urgently.

2. Implementation methods

A. Setting of extension periods

For vessel maintenance, usually vessels enter the dock for repairs to the various sections to carried out at a certain interval. It generally takes 20 to 30 days but because all materials, parts and auxiliary parts must be imported into the Philippines and because of a shortage of engineers, etc., there are delays that lengthen the time in dock (it is not unusual for time frames of 2 to 3 months). This extended repair time results in a lowering of profitability and giving rise to the possible decline of the shipping industry. Accordingly, measures providing extension periods in the inspections to carry out improvements in stages is unavoidable (it is necessary to put suitable operating restrictions on vessels during this period).

B. Division of inspection responsibilities

It is not permissible for duplication of mission in either the inspections carried out by the vessel classification association or the government. Accordingly, it is necessary that the scope of the inspection and division of responsibilities be clarified. Specifically, from the point of view of ensuring the safety of human life at sea, vessels transporting passengers should undergo direct government inspections.

2.4.3 Study of Philippine Vessel Upgrade Measures

In parallel with the strengthening of the vessel inspection system and shipbuilding industry, it is necessary to implement various vessel upgrade projects and the following are the primary measures.

(1) Ship scrapping industry

It can be said that there is sufficient possibility to establish a ship scrapping industry in the Philippines where there is abundant labor and low wage levels. Accordingly it is necessary to consider the disposal of the scrap. With the Philippine National Steel Corporation taking the scrap, it is possible to produce locally the steel materials for shipbuilding and if this is carried out, it brings benefits not only to the shipping industry and shipbuilding industry, but it can be expected to also increase employment and improve trade deficit, etc.

(2) Shipbuilding technology center