(h) Shipyard Quality Management

The Study strongly feels the necessity to introduce a quality control system in local shipyards, it is recommended that VINASHIN forms a new department to control the quality of shipyards in three selected key shipyards as shown in the Table 6.3.11..

A new department is required to prepare a quality manual in which the up-to-date management methods and experience are compiled. To supply adequate technical expertise, the following three laboratories, with proper equipment should be attached to the department.

1) Laboratory for Control of Safety at Work
Inflammable gas detector/oxygen content meter/ultrasonic thickness gauge

2) Laboratory for Control of Instrument Calibration
Block gauge/micrometer (inside/outside)/precious weight scale/pressure gauge tester

3) Laboratory for Material Testing and Welding Quality
Universal testing machine (500 kN class)/charpy impact test machine (300 J class)/hardness tester (Rockwell/Brinnel type)/X-ray examination equipment (portable type)/ultrasonic flaw detector/vacuum leak tester

The total investment is estimated at 6.3 billion VND

6.3.4 Ports and Waterways Development Program

This section is the infrastructure part of the master plan. Without a clear picture of the future port network in Vietnam, individual port development might result in excessive and ineffective investment, and even unbalanced national development. This section describes the proposed port and waterway network.

Coastal shipping competes with road and rail transport and also, to some extent, inland waterway transport. Coastal shipping does not need large and deep seaports. Rather, it needs a dense network of ports which are safe, reliable, efficient and economic.

Taking account of future traffic demand and maximum permitted ship size, selected ports and sea-cum-riverways have been initially designed. The maximum coastal ship size by port was determined as follows:

5,000 DWT :	Haiphong(*), Cai Lan, Cua Lo, Danang, Qui Nhon, Nha Trang, Saigon (*), Can Tho
3,000 DWT :	My Tho, Dong Thap, My Thoi
2,000 DWT :	Ninh Binh, Dong Nai
1,000 DWT :	Viet Tri, Hanoi, Thuan An

Note(*): More than 5,000 DWT vessels will be anchored occasionally.

(a) Coastal Shipping Ports Development plan

1) North

Haiphong
- Implementation of the proposed projects in the JICA/Haiphong Port Urgent Rehabilitation Study
- In addition, the Study identified the following measures to be taken urgently:
  - Main Port: acquisition of adequate cargo handling equipment
  - Doan Xa: acquisition of adequate cargo handling equipment/building of new warehouses/improvement of existing wharves/creation of additional apron space
- Conducting a further study regarding both foreign and domestic trade and subsequent implementation

Cai Lan
- Implementation of the proposed projects in the JICA's feasibility study on Cai Lan Port Construction Project on schedule
- Conducting a further study regarding both foreign and domestic trade and its implementation

Hanoi
- Construction of a new berth for coastal shipping (2,000 DWT)
- Replacement of aged cargo handling equipment
- Building of new warehouses and pavement of yards

Viet Tri
- Construction of a new berth for coastal shipping (1,000 DWT)
- Renewal of one existing warehouse and purchase of new cargo handling equipment
- Pavement of yards

Ninh Binh
- Construction of Ninh Phuc area and designation of two coastal shipping berths within the area (an existing one and another under construction, both 2,000 DWT)
- Creation of additional apron space by covering vacant sections with concrete surface up to existing bridged wharves
- Renewal of existing warehouses (Ninh Phuc area)
- Acquisition of adequate cargo handling equipment

2) Central

Cua Lo
- Construction of three new berths for coastal shipping (5,000 DWT)
- Construction of a breakwater against siltation (approx. 1km)
- Execution of dredging work at anchorage area and access route
- Expansion of the port compound by means of reclamation
- Pavement of yards
- Construction of several new warehouses and installation of cargo handling equipment
- Conducting a long-term port development study taking account of foreign trade and transhipment with Laos, etc.

Ha Tinh-
- Conducting a further study on port development taking account of

Quang Binh Port	regional socio-economic development
Thuan An	• Pavement of yards • Construction of a warehouse • Purchase of new cargo handling equipment
Danang	• Construction of a breakwater at Tien Sa area • Execution of dredging work at anchorage area of Tien Sa (270,000 m^3) • Construction of two new berths mainly for coastal shipping at Tien Sa (jetty type, 20,000 DWT) • Replacement of old cargo handling equipment • Removal of three old warehouses and construction of a three-storeyed warehouse at Song Han area • Construction of one new warehouse at Tien Sa • Yard pavement at Song Han • Conducting a long-term port development study in connection with possible deep seaport areas such as Cahn May, Line Chieu and Dung Quat.
Qui Nhon	• Removal of existing warehouses and construction of two warehouses • Removal of aged cranes and installation of mobile cranes • Construction of a wide, paved yard • Procurement of additional forklifts and trucks • Change in port road configuration
Nha Trang	• Construction of two new berths for coastal shipping (jetty type, 5,000 DWT) • Expansion of yard and other land area by reclamation • Construction of paved yards and warehouses • Installation of big mobile cranes

3) South

Saigon	• Installation of adequate cargo handling equipment (mobile cranes, forklifts, etc.) • Removal of seven small, old warehouses and office buildings, and development of two large warehouses instead • Conducting a long-term regional port development study for both foreign and domestic transport in connection with Vung Tau and Thi Vai ports
Dong Nai	• Construction of two new berths for coastal shipping (2,000 DWT) • Installation of cargo handling equipment (mobile cranes and forklifts) • Construction of paved yards and two warehouses
My Tho	• Replacement of outdated cargo handling equipment • Construction of paved yards and warehouses • Extension of existing wharves and creation of additional apron space by covering vacant sections with concrete surface up to existing

	bridged wharves
Dong Thap	• Creation of additional apron space by covering vacant sections with concrete surface up to existing bridged wharves, and extension of existing wharves • Pavement of yards • Installation of cargo handling equipment (mobile cranes and forklifts)
Can Tho	• Restructure old warehouses • Overlay of pavement of yards • Procurement of additional mobile crane and forklifts
My Thoi	• Creation of additional apron space by covering vacant sections with concrete surface up to existing bridged wharves, and extension of existing wharves • Installation of cargo handling equipment (mobile cranes and forklifts)

4) Costing

The study estimates that the above improvement will cost the relevant port operators US$ 240.5 million. This is divided into

civil construction cost (A)	: US$	167.2 million
equipment procurement cost (B)	: US$	27.7 million
design and supervision fee of civil construction (A) x 0.08	: US$	13.4 million
service fee for equipment (B) x 0.03	: US$	0.8 million
contingency (the above item x 0.15)	: US$	31.4 million

(b) Management Improvement for Coastal Shipping Ports

1) Principles

Port operation has to be developed in accordance with three principles: 1) autonomy, 2) self-financing, 3) entrepreneurship. With these principles, ports can offer economical and efficient service, and compete with other modes.

To provide cost effective and flexible service to port users, introduction of competition in port services is vital. Port services include stevedoring, warehousing, waste disposal, pilot service, etc. After the introduction of competition, privatization of these services will follow.

2) Port Charges

Port charges should be set in accordance with the following requirements:

(i) A port operator should set port charges autonomously.
(ii) Port charges should cover personnel costs, operation costs, maintenance costs, and the costs of equipment procurement and facility construction. Finance for infrastructure development, could be derived from a number of sources, such as

subsidy, low-interest public load, commercial loan and accumulation of port profit, in accordance with government policy.

(iii) Port charges should cover the costs of the service provided.

(iv) Port charges should encourage efficiency and discourage inefficient use of resources such as long ship dwell times and excessive storage periods.

(v) Port charges should be set as cheaply as possible in order to compete with other modes.

(vi) Port charges should be simple and rationalized. In this connection, levying unlisted charges must be strictly prohibited.

(vii) A port operator should set port charges without discrimination between domestic and international shipping, and between Vietnamese flag and non-Vietnamese flag ships.

3) Qualified Port Operator

A port operator should not only be responsible for daily operation but also planning future port development. The key tasks for port operators are:

(i) collecting and summarizing port statistics, and continuously developing the related database,

(ii) strengthening of public relations with shippers and shipping companies,

(iii) disposal of outdated equipment and making increased use of small forklifts and promotion of cargo handling on palettes

(iv) adequate staffing plan

(v) Improvement of storage systems

(vi) improvement of cargo handling

(vii) establishment of an adequate maintenance system

(viii) enhancement of safety in port operation, especially among stevedores

(ix) strengthening of security measures

4) Governmental intervention

The central government must review each port development in terms of optimum allocation of public investment and national/regional transport plans and, if necessary, intervene to prevent unfair competition and environmentally unjustifiable port development. The central government should undertake the following tasks:

(i) formulation of a national port system development plan to provide the basis for reviewing each port development plan

(ii) coordination among the related agencies and preparation of the port development budget

(iii) preparation of port related rules and regulations and analysis of standard tariffs

(iv) study of advanced technologies and dissemination of results

(v) inspection on use of port property

(vi) control of sub standard ships and illegal operators

(vii) matters related to national defence and foreign affairs

(c) Sea-cum-Riverways Development Plan

In order to secure access channels to the coastal shipping ports, the Master Plan proposes to develop the corresponding 832km of sea-cum-riverways connecting the coastal shipping ports. Existing and proposed conditions of the respective sections are summarized in Table 6.3.12 and their proposed developments are described below.

1) Red River Delta

Lach Giang - Hanoi Port: Self-propelled vessels of 1,000 DWT used to be navigable on this route until 1983. Such ship movement has been suspended due to insufficient dredging work and lack of route information. Necessary dredging work should be urgently undertaken at least to allow vessels of 1,000 DWT. Further, a feasibility study is also needed to justify the route improvement which would permit access by 2,000 DWT vessels. According to TEDI, a dredging volume of about 2 million m^3 must be removed to construct the route for 2,000 DWT vessels while the dredging work for annual maintenance is estimated at 0.4 million m^3. The feasibility study would also have to consider economical maintenance methods on this route.

Hanoi Port - Viet Tri Port: According to TEDI, the route will be deepened from the current 1.8 m to 2.9 m. After the improvement, the route would be able to accommodate 600 DWT vessels at all times and possibly also certain 1,000 DWT vessels which have a shallow depth design for sea-cum-riverways.

Cua Day - Ninh Binh Port: This route is also proposed to accommodate 1,000 DWT vessels. Since the river flow and depth are quite changeable at the rivermouth, an adequate flow stabilization and depth control method will have to be employed, based on detailed engineering analysis.

Quan Lien Canal: The canal will be developed to connect Ninh Co River with Day River. It is intended to provide sea-cum-riverways vessels with stable navigational conditions and to create favorable conditions for river transport.

Cua Nam Trieu - Haiphong Port: This access channel has the worst sedimentation, i.e., an annual sediment volume of 4.5 million tons. For coastal shipping, the channel is required to receive 5,000 DWT vessels frequently, but rarely to receive more than 5,000 DWT vessels. Therefore, additional dredging work for developing the route is not necessary, although maintenance dredging work is inevitable.

2) Mekong Delta

Cua Dinh An - Can Tho Port: Cua Dinh An is the biggest river mouth in the Mekong Delta with a wide shallow entrance. Since the river mouth dredging (to 4.5 m in depth) in 1991, 5,000 DWT vessels can enter Bassac River utilizing high tides. Concerted efforts should be made to increase the access opportunities of 5,000 DWT vessels and to establish an optimum depth control method.

Table 6.3.12
PROFILE OF SEA-CUM-RIVERWAYS

Section	Existing Condition	Proposed Condition
Red River Delta		
Lach Giang - Hanoi Port (199 km)	1) Barge 4 x 200 ton 2) 1.80 m 3) 30 m	1) 1,000 DWT 2) 3.5 m 3) 44 m
Hanoi Port - Viet Tri Port (75 km)	1) Barge 4 x 200 ton 2) 1.80 m 3) 30m	1) 1,000 DWT 2) 2.90 m 3) 35m
Cua Day - Ninh Binh Port (57 km)	1) Barge 4 x 200 ton 2) 1.80 m 3) 30 m	1) 1,000 DWT 2) 3.50 m 3) 44 m
Quan Lien Canal (3 km)	(not developed)	1) 1,000 DWT 2) 3.50 m 3) 44 m
Cua Nam Trieu - Haiphong Port (36 km)	1) 5,000 DWT 2) 7.85 m 3) 80 m	1) at least 5,000 DWT 2) 7.85 m 3) 80 m
Mekong Delta		
Cua Dinh An - Can Tho Port (80 km)	1) 3,000 DWT 2) 6.55 m 3) 100 m	1) 5,000 DWT 2) 7.0 m 3) 100 m
Can Tho Port - Cho Moi (95 km)	1) 2,000 DWT 2) 4.5 m 3) unknown	1) 3,000 DWT 2) 5.5 m 3) 100 m
Cua Tien - My Tho Port (55 km)	1) 1,000 DWT 2) 3.8 m 3) unknown	1) 3,000 DWT 2) 5.5 m 3) 100 m
My Tho Port - Cho Moi (137 km)	1) 3,000 DWT 2) 5.7 m 3) unknown	1) 3,000 DWT 2) 5.7 m 3) 100m
Vung Ganh Rai - Saigon Port Saigon Port (65 km)	1) less than 20,000 DWT 2) 6 - 11.5 m 3) 150 - 200 m	1) 10,000 DWT 2) 10 m 3) 125 m
Cat Lai - Dong Nai Port (30 km)	1) unknown 2) unknown 3) unknown	1) 2,000 DWT 2) 4 m 3) 50 m

Note: 1) Allowable Ship Size
2) Designed Water Depth
3) Bottom Width

Can Tho Port - Cho Moi: It is said that some shoals hamper the smooth navigation of 5,000 DWT vessels. However the difficulty is expected to be less for 3,000 DWT vessels.

Cua Tien - My Tho Port: Cua Tien is the critical point for 3,000 DWT vessels in this section. With consideration of available data, the minimum depth is estimated at 2.5 m. This gives 3,000 DWT vessels access to My Tho Port only at high tide. Since hydrographic and sedimentary condition is quite complicated in the river mouth, further engineering examination is needed.

My Tho Port - Cho Moi: This section is less problematic than the section further down stream. Following the dredging work at Cua Tien, this section is expected to experience increased traffic volume, especially, medium-size vessels. On the other hand, My Thuan Bridge is now being planned between My Tho Port and Dong Thap Port. The responsible agency should incorporate the future river traffic into the bridge design.

Cat Lai - Dong Nai Port: According to the port operator, Dong Nai Port can accommodate 2,000 DWT vessels at present. To determine the availability of this route, an accurate hydrographic survey should be immediately conducted.

Vung Ganh Rai - Saigon Port: Since this route presently accommodates more than 10,000 DWT vessels, there is physically no problem for coastal shipping vessels.

In conclusion, the development cost except for the access channels to Haiphong, Saigon and Dong Nai ports is roughly estimated at US$ 26 million.

(d) Management Improvement for Sea-cum-Riverways

Vessels must pay careful attention to safe navigation on sea-cum-riverways due to their narrow width, shallow depth, many obstacles and poor navigational aids, etc. To enjoy reliable and efficient operation, the following measures should be incorporated into a proper maintenance system.

1) Periodical Hydrographic Survey

The modern survey ships and survey equipment should be provided. In particular, the selected 832km sea-cum riverways must be surveyed immediately.

2) Strict Implementation of Dredging Work

Based on the accurate hydrographic survey, an adequate dredging work plan should be worked out and implemented. A fleet of new dredgers should be provided.

3) Removal of obstacles and installation of navigation aids

It is reported to IWB that there are more than 300 obstacles on rivers. The worst obstacles are wrecked ships which number 500. They should be immediately moved out.

For safe nighttime operation, coloured buoys and light beacons should be installed at proper intervals on both sides.

4) Formulation of Preventive Measures against Sedimentation

Some sea-cum-riverways are easily silted while others are not. Adequate preventive measures should be carefully worked out based on scientific analysis. The options are either to repeat dredging works periodically or to construct a permanent structure.

To establish the above maintenance system, the following administrative improvements are necessary.

1) Clarification of Administrative Responsibility

Regarding sea-cum-riverways administration, the demarcation between VINAMARINE and IWB should be clearly defined. A single administration body in this field should be considered as an alternative.

2) Public Information

The navigation information such as routes, depth, seasonal variation, navigational aids and ports should be publicly advertised by a responsible authority.

The IWB estimates the maintenance cost of a sea-cum-riverway per km as follows:

15.8 million VND in 1996
22.4 million VND in 2000
28.8 million VND in 2010

The rate is always about 60% higher than for the average inland waterway. The tendency towards higher maintenance costs is explained by traffic increases and larger fleets.

The maintenance cost of the proposed sea-cum-riverways (832 km in total) is therefore estimated at US$ 1.7 million in 2000 and US$ 2.2 million in 2010.

6.3.5 Coastal Shipping Management Modernization Program

The aim of this section of the report is to analyse ways to develop the organisations and, especially, the skills of management and administrative staff of shipping operators and ancillary services to implement the service and fleet development plan outlined in Section 6.3.3, especially regarding new types of operation, and the fostering of small operators.

(a) General Management Improvement Needs

Improvements are required in two areas, namely

- weak organisational structure, especially regarding marketing and customer relations, and
- lack of management knowledge in modern business and ship operating methods.

There are a number of aspects in which management improvements can be made. However when proposing changes it is important to take into account current constraints in Vietnam. In particular

- the uncertain business environment which makes long term planning difficult,
- the limited finance available for making improvements, and
- the lack of time, money and resources available in Vietnam for management or administrative staff training.

Taking account of current financial and business constraints, the following aspects are important areas where improvements can be made in many existing shipping enterprises over the next few years.

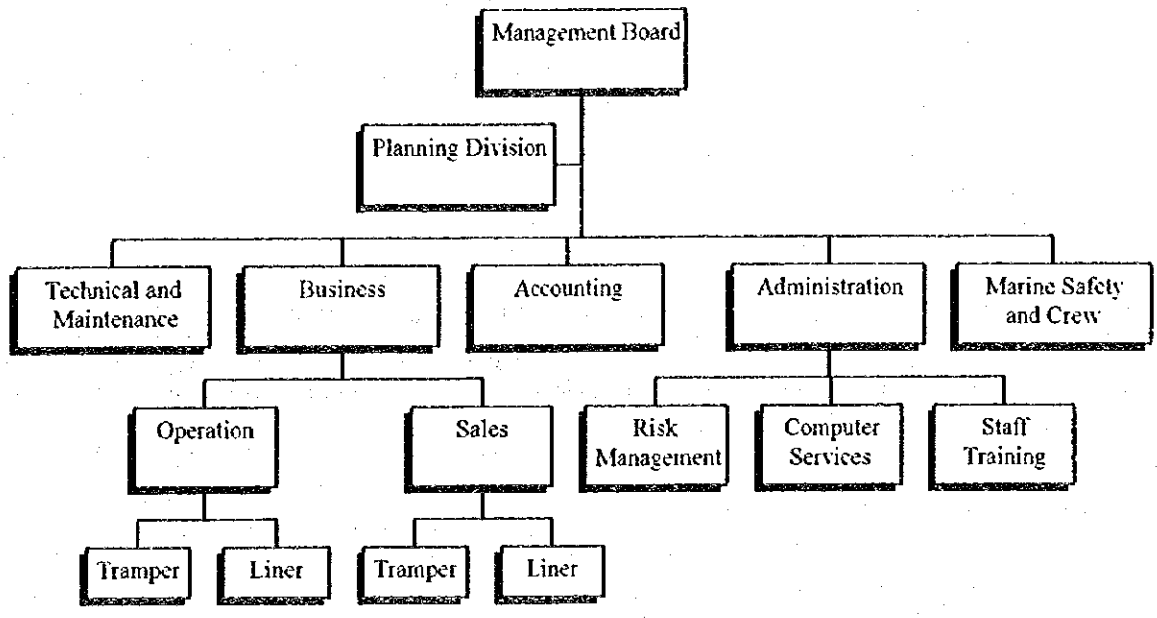
1) Strengthening Marketing

Marketing divisions are a vital part of the business department of any shipping operator for performing cargo canvassing and maintaining good customer relationships, but are very weak in Vietnamese ship operators. The typical position of the marketing or sales division is indicated in Figure 6.3.10.

The marketing division needs to be staffed with strongly motivated personnel. The responsibilities of the marketing division and the basis for staff remuneration must be clearly defined (ideally related to net revenue) so that the staff are motivated to seek ways to carry as much traffic as possible at least cost.

Many existing operators would need to increase the number and quality of staff currently deployed in marketing. More attractive employment terms may have to be offered to recruit good sales managers.

Figure 6.3.10
EXAMPLE ORGANIZATION OF A SHIPPING COMPANY



Particular aspects of marketing which are important to strengthen are

- effective procedures for the speedy settlement of customer claims for delays or damage to cargo are important to maintain good customer relations,
- business strategy, especially towards volume contracts,
- methods of assessing effects of carrying various traffics on profitability, which take account of effects of cargo/customer characteristics on revenue potential.

2) Strengthening Service Planning

Planning is another function which is very weakly represented in most operators in Vietnam. A clear scope of responsibilities, defined in more detail in annual work plans, in terms of reports and information to be produced by certain dates, is important to establish priorities in the work of the planning division and ensure the right information is available to management at the right time.

Important aspects which require particular attention include:

- traffic forecasting,
- market research,
- vessel scheduling and allocation methods,
- vessel acquisition planning, and
- strategy for cost control.

3) Computerisation

As management data requirements become greater the need for computer data systems will become more important. This too could require a specialised division, as shown in Figure 6.3.10. Features of computing needs include

- a wide range of data handled, including traffic, ship and customer statistics and accounts, and
- possibilities for useful exchange of data with customers, port operators and customs.

4) Internal Communication

Improvement could be made in communication of ideas and information within division, branches and the organisation as a whole. In particular management can benefit from ideas generated throughout the organisation for cost and level of service improvements and for restructuring suggestions.

5) Risk Management

The insurance business is not particularly well developed in Vietnam and, in the uncertain business environment of Vietnam, insurance is expensive. Risk management is therefore important for ship operators, particularly to assess alternative strategies in terms of reducing risks and extent of insurance cover.

6) Diversification

Continued diversification by shipping operators into ancillary services such as chartering, brokering, manning agency is possible as a strategy to reduce business risks and add value.

(b) Introduction of New Services

As mentioned in Section 6.3.2, the main type of new service which could be introduced during the master plan is the scheduled liner service. The liner service can offer a high quality, fast and reliable service which is particularly attractive to valuable cargoes, which have high revenue potential. In order to realise this potential, however, expert management is required to guarantee reliable customer service. Liner services offer an opportunity for coastal shipping to carry containerised and other unitised traffic, but this requires suitable handling facilities at the ports. Container transport offers possibilities for transport companies to offer door-to-door transport.

Particular know-how is required by management intending to operate scheduled liner services, covering the following areas:

- marketing, especially identifying and canvassing potential customers and gaining their interest in using modern cargo handling methods on scheduled services,
- scheduling services to achieve efficient utilisation of vessels and other equipment,

- planning acquisition of ships and other equipment (including obtaining appropriate finance),
- inventory management methods for containers,
- setting tariffs for containers, and
- establishing suitable control methods for scheduled services to minimise delays and to give customers information about their cargoes.

There is currently little knowledge in Vietnam about liner service concepts, but many foreign managers have considerable experience with operating such services. Although training programmes can introduce the basic principles and enable potential operations to be planned and evaluated, Vietnamese operators have to gain foreign expertise through joint venture agreements or other arrangements. However present legislation restricts the extent to which foreign partners can become involved in domestic coastal shipping; this seriously constrains Vietnamese operators.

(c) Specialised Vessel Operation

Specialised vessels, if fully utilised, can carry cargoes at lower costs than general cargo vessels. However they require high capital investment for specialised ships and port equipment. Since operators of specialised vessels would be expected either to be working as a transport unit of an industrial company, or as a general carrier on the expectation of a long term contract with such a customer, marketing considerations are not as crucial as for other types of ship operations. Nevertheless management has to develop expertise in the following areas.

1) Acquiring Vessels and related Equipment

Management requires expertise in purchasing the equipment and experience in implementing such operations to ensure that the optimum equipment is acquired. In many cases it may be preferable to charter specialised vessels, especially in the initial stages of developing a new service. In this case experience in chartering such vessels from overseas is required.

2) Operations

Management needs specialist knowledge in the cargo handling techniques involved with specialised vessels. Special training is required for seafarers on tankers (see Section 6.3.7).

3) Environmental Protection

The risk of oil spills and air pollution during loading and unloading of cement requires that special preventive and insurance measures are taken. These particular management requirements make it difficult for existing Vietnamese ship operators to develop specialised ship operations without assistance such as training programmes and foreign partnerships. Unfortunately the restrictions on foreign participation in coastal shipping make it very difficult for Vietnamese operators to develop specialised vessel operation.

(d) Fostering of Small- and Medium-Scale Operators

Small-scale operators experience difficulties obtaining finance because they have little collateral and are perceived as being a high credit risk. Some of these operators, particularly in the local government sector, do not have the necessary business experience and rely on other operators to manage operations. Others, including most private operators, have plenty of business acumen but have limited knowledge in specific areas of shipping such as use of modern vessels and ways to finance vessel acquisitions. Many private operators encounter regulatory constraints, especially regarding access to international services, which limit flexibility and vessel utilisation.

Although need for assistance will vary from operator to operator, they all require

- the opportunity to develop their businesses freely without unnecessary regulatory obstacles,
- access to credit on the same basis as their competitors,
- access to business information, including modern shipping practices, changes in government policy and regulations (both international and domestic), and
- a means for having their views represented at government level so that these can be taken account of in policy making.

Taking account of these needs, support can be given in the following areas.

1) Simplification of Regulations

Many operators are confused about the rules of business because these have not been clearly defined in regulations, or because they have changed from time to time. Government can assist by making clear the rules, expressed in understandable, everyday language rather than the language used by lawyers, and be readily available for reference in VINAMARINE offices.

2) Avoiding Discriminatory Finance or Assistance in favour of State Operators

Assisting state operators undermines the competitiveness of private operators who constitute most of the future small-scale operators. As mentioned earlier, this requires careful targeting of assistance for developing the international fleet of VINALINES. If concessionary finance is to be given to operators, perhaps through ODA financed schemes, it should be made available to all operators on the same basis.

3) Shipping Information

If a library were to be established by VINAMARINE which specialised in maritime transport, with foreign trade magazines and other sources containing information about shipping developments in Vietnam and abroad, consideration should be given to allowing access to registered operators. Particular items of information of potential interest to operators include

- descriptions of modern shipping practice,
- availability of different vessel types in the world market (for new and second-hand vessels),
- world-wide ship charter rates,
- sample documents from other countries of potential application in Vietnam (such as sample contracts for carriage of particular cargoes), and
- names and addresses of organisations that could be potential sources of information or finance, or business partners (especially operator associations in other countries).

4) Promotion of Voluntary Shipping Associations

The government can encourage shipping operators to form associations by creating a forum for the interchange of views between government and industry. This is important for government in order to base policy on the actual problems experienced by the operators. The formation of voluntary associations of operators would improve the flow of information to government and provide an effective means of dissemination of information back to the industry. By offering information and advice, such associations could also assist operators in securing credit on a self-help basis with minimum help from government.

6.3.6 Secondary Transportation Improvement Program

Coastal shipping is advantageous for bulk cargo and long-distance haulage but it is not so attractive in providing door-to-door, punctual, fast and damage free service. Provided that coastal shipping is combined effectively with secondary transport and efficient port operation, however, many of the disadvantages can be improved. To realize an economically optimum modal split in cargo haulage, coastal shipping must be developed in coordination with secondary transport and related services. (Refer to Figure 6.3.11)

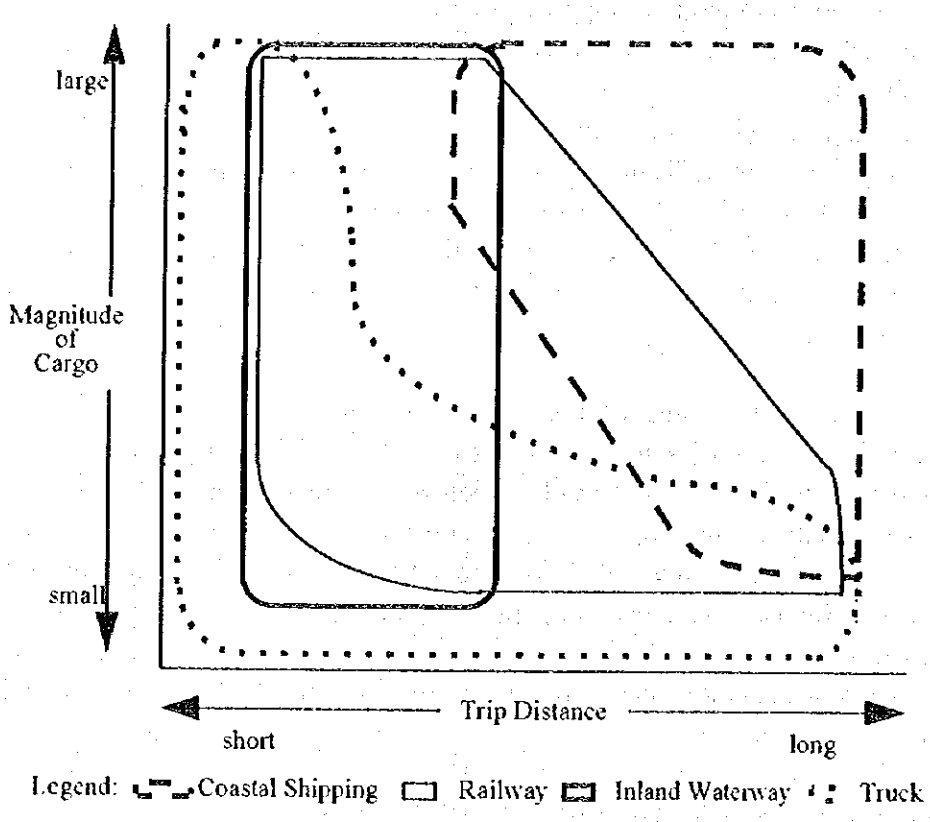


Figure 6.3.11
CONCEPTUAL MODAL SPLIT IN CARGO HAULAGE

(a) Improvement of Inland Water Transport

Inland water transportation is vital in many provinces of Vietnam. According to IWB (Inland Waterways Bureau), traffic demand will increase from 25 million tons in 1995 to more than 100 million tons in 2010. Coastal shipping is required effectively to integrate with inland water transport, particularly in the two delta areas.

The main ways in which inland water transport can be improved as a secondary mode of coastal shipping are as follows:

1) Modernization and enlargement of river craft
Small barges should be replaced with large ones (around 200 tons). Groups of barges (1,200 - 1,600 tons) should be assigned to major routes. The speed of river craft, which is currently low at 5-8 km/h, should increase to 8 km/h for tow-tug barges and 15 km/h for self-propelled ships.

2) Encouragement of containerization
Containerization and other unitized forms will reduce cargo handling work and time in transhipment between coastal shipping vessels and river craft. For the same reason, cargo handling on pallet is also desirable.

Although LASH is a unique system that can operate on both river and sea ways, the Master Plan endorses containerization on barges and coastal shipping vessels as being more advantageous from an economic viewpoint.

3) Fostering of private operators

Increased competition, between market responsive operators of inland water services, increases the convenience of coastal shipping considerably. The number of private operators can be expected to grow not only in the South but also in the North.

4) Improvement of river ports

River ports must handle cargo efficiently and carefully. Cranes and forklifts should be increasingly used and cargo should be more carefully stored.

5) Improvement of riverways for safe and nighttime navigation

Nighttime navigation is a strong requirement of river craft operators. Enlargement of river craft and increase in river traffic will make safe navigation an urgent issue.

(b) Availability of Secondary Transportation serving Coastal Shipping Ports

Availability of secondary transportation varies among the existing 16 coastal shipping ports. The Study identified the following planning issues:

1) Road transport

All the ports are accessible to road transport. The access roads to Viet Tri, Cua Lo, Qui Nihon, My Tho, My Thoi and Can Tho ports are satisfactory. Other ports need some improvement as follows:

Cai Lan Port	:	The access road should be paved and widened.
Hanoi Port	:	The access road should be paved and widened, although many houses stand along the road.
Haiphong Port	:	The access road to Doan Xa District should be paved and widened in spite of urbanization.
Ninh Binh Port	:	The access road to Ninh Phuc District should be paved, widened and straightened.
Thuan An Port	:	The access road should be widened.
Danang Port	:	The access road to Tien Sa District should be widened using the land vacated by a recently removed railtrack.
Nha Trang Port	:	The access road should be widen and loosely inclined.
Saigon Port	:	Since the existing access road is always congested, an alternative should be developed.
Dong Nai Port	:	The access road should be paved and widened and the intersection with National Route 1A should be equipped with traffic lights.
Dong Thap Port	:	The access road should be widened.

2) River transport

All the ports except Cai Lan, Qui Nhon and Nha Trang are served by rivers, and so river transport is a valuable secondary mode of transportation.

There are largely two kinds of transhipment between coastal vessels and riverborne craft, i.e., provisional landing and direct transhipment. In the latter case, floating cranes can offer safe and efficient transshipment. However, only Haiphong, Saigon, My Thoi and Can Tho ports are equipped with floating cranes.

3) Rail transport

Currently, railway sidings serve only three ports; at Viet Tri, Haiphong and Ninh Binh. The siding in Danang Port has been removed. On the other hand, a railway track could be extended from Ha long Station to Cai Lan Port in the future.

Rail transport serves as a secondary mode of transport for coastal shipping only in the north where a substantial railway network has been developed.

Table 6.3.13
AVAILABILITY OF SECONDARY TRANSPORT BY PORT

Port Name	River	Road	Rail
Viet Tri	√	√√	√
Cai Lan	-	√	√
Hanoi	√	√	-
Haiphong	√√	√	√
Ninh Binh	√	√	√
Cua Lo	√	√√	
Thuan An	√	√	-
Danang	√	√	
Quy Nhon	-	√√	-
Nha Trang	-	√	-
Saigon	√√	√	-
Dong Nai	√	√	-
My Tho	√	√√	-
Dong Thap	√	√	-
My Thoi	√√	√√	-
Can Tho	√√	√√	-

Note) √ : available
√√ : available in good condition

(c) Development of Ancillary Service Industries

As new modern industries are being established in Vietnam, there is a need for a modern distribution system relying on logistics techniques that provide manufacturing inputs as and when they are required, and also deliver finished products promptly and cheaply. To

provide such distribution systems, ancillary service industries have to become much more important in conjunction with coastal shipping operators.
Existing freight forwarders, who concentrate on international traffic, have virtually no experience of modern distribution systems. However foreign manufacturing companies are establishing factories in Vietnam and many will seek, not only to have efficient door to door delivery systems for their products, but also to develop local component and parts suppliers, linked through their own logistics systems.

Specialist freight forwarders must acquire rapidly the expertise to provide efficient multimodal transport services using road, rail, air and coastal shipping services. However the government does not encourage foreign participation in freight forwarding which would allow transfer of know-how. There is a danger that this will

- limit the development of the Vietnamese freight forwarding industry,
- encourage manufacturers to develop in-house freight forwarding activities rather than using specialist freight forwarders, and
- even limit the scope of foreign investment in manufacturing products intended for the domestic market.

To reduce these dangers the government can support the industry in the following ways.

1) Encouraging Foreign Participation in Freight Forwarding
Because freight forwarding is an intrinsic part of manufacturing, it would be logical for government to treat it in the same way when considering proposals for foreign investments. This would allow majority foreign-owned freight forwarders to establish businesses in the country, possibly for a specified period following new business start-ups. Such a period would allow Vietnamese partners to acquire the necessary expertise and to develop their own independent businesses.

2) Increasing Transparency of Regulations
Planning multimodal transport involves knowledge of a multitude of rules and regulations applying to each mode, as well as for freight forwarding itself. Although the government has made substantial progress in developing transport law in recent years, more remains to be done to specify precise rules which can be applied with minimum discretion by enforcement agencies.

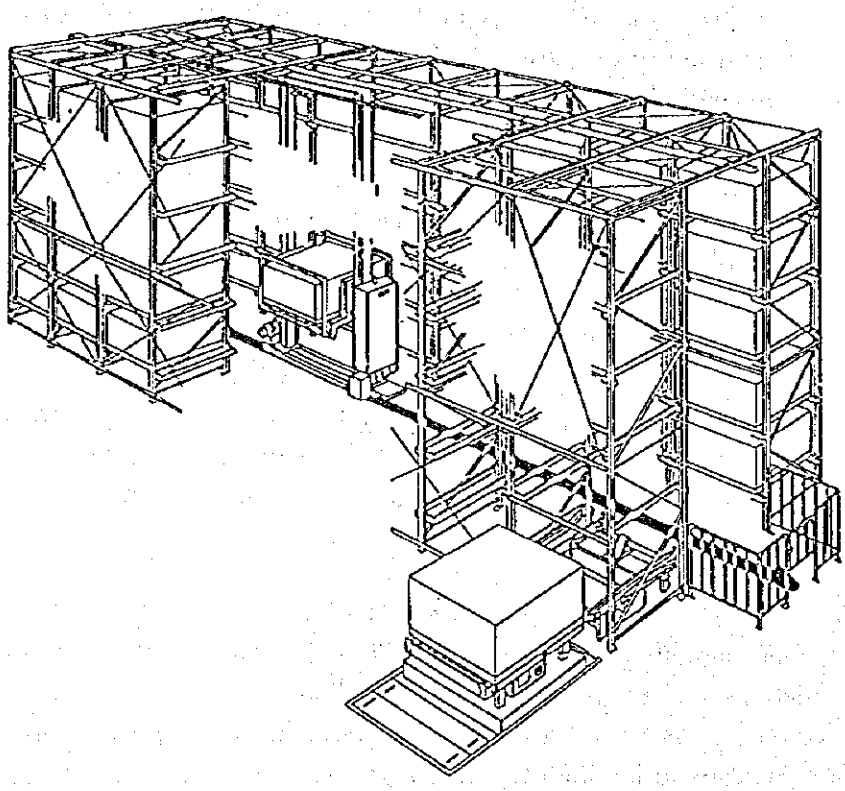
3) Dissemination of Information
In addition to establishing a forum for the exchange of views between government and operators or their representatives (such as the Vietnam Freight Forwarders Association), the government can encourage ODA support in training and supply of information needed by freight forwarders about modern transport and distribution methods, which could be obtained from foreign sources.

The warehousing business should not be confined to port compounds. Modern warehouse operators must offer various services ranging from low cost to high value-

added, within a wide range of options. Two examples of these, a distripark as an advanced warehouse, and a dryport as a strategic industrial development, are described below.

1) A distripark offers sophisticated space for a host of diverse activities: cargo consolidation and deconsolidation, storage and repacking. The distripark intends to attract, and is home to, numerous multi-national corporations and international forwarders. Its facilities are comparatively expensive due to automation (refer to Figure 6.3.12), computerization and strict security service. Singapore is famous for a series of distripark developments. Distriparks are also potentially viable in Vietnam, especially behind large ports.

Figure 6.3.12
AUTOMATED STORAGE RACK SYSTEM



(2) A dry port is an area-wise development where a truck terminal, bonded warehouses, CFS (Container Freight Station) and office buildings for forwarding agents, etc. are developed under an elaborated layout plan. The development potential of dry ports is high in the Hanoi-Haiphong area and the HCM City - Vung Tau area.

6.3.7 Maritime Human Resources Development Program

For the successful development of coastal shipping, maritime human resource development will be one of the primary factors. This is especially important for administrative personnel in shipping, ports and waterways; for management of shipping companies; for operations staff in ports and waterways; and for engineering service in shipyards. Development of maritime safety and environment and competency for seafarers is indispensable. This requires specialized knowledge and experience and therefore personnel must receive substantial education and training.

(a) Seafarers Supply Plan

1) Expected Seafarers

Competent seafarers are always necessary. The definition of competence, however, varies with type of vessel.

From now on, the Vietnamese shipping industry needs the following competent seafarers who

- operate modernized vessels and are familiar with advanced technology such as automatic control systems,
- operate various kinds of vessels such as general cargo vessels, container vessels, tankers and other specialized vessels,
- are qualified as both deck officer and engine officers, and
- have experienced of the educational/training equipment required by the relevant international conventions such as STCW - 78/95, SOLAS and MARPOL.

2) Demand for Seafarers

According to VINAMARINE, there are 8,000 seafarers in Vietnam in 1996, including 1,800 officers and 6,200 ratings who are engaged in either Vietnamese vessels or foreign vessels.

In line with traffic increases in both coastal and international shipping, the number of Vietnamese seafarers is projected to be 13,184 in 2000 and 17,396 in 2005.

3) Demand and Supply Analysis

The existing maritime schools will be able to meet the demand for increasing number of seafarers, i.e., 1,897 persons between 1996 and 2000, and 2,234 persons between 2001 and 2005. It is however anticipated that there would be a considerable shortage among the Group A seafarers who are capable of modern ship operation rather than small vessels (except Class 4 officers). On the other hand there would be an over-supply among the Group B seafarers. Such unbalanced situations could be overcome by means of retraining.

Table 6.3.14

FUTURE DEMAND FOR VIETNAMESE SEAFARERS IN 2000/2005

	Officers					Ratings			Grand Total
	Class 1	Class 2	Class 3	Class 4	Total	Deck/ Eng	Cater-ing	Total	
Year 2000									
Group A	800	601	189		1,590	2,398		2,398	3,988
Group B	825	1,046	476	1,148	3,495	4,623	1,078	5,701	9,196
Total	1,625	1,647	665	1,148	5,085	7,021	1,078	8,099	13,184
Increasing Demand from Year 1996									
Group A	191	237	65	0	493	714	0	714	1,207
Group B	51	50	23	99	223	300	167	467	690
Total	242	287	88	99	716	1,014	167	1,181	1,897
Year 2005									
Group A	1,435	1,546	441	0	3,422	5,008	0	5,008	8,430
Group B	750	878	399	1,184	3,211	4,272	1,483	5,755	8,966
Total	2,185	2,424	840	1,184	6,633	9,280	1,483	10,763	17,396
Increasing Demand from Year 2005									
Group A	242	313	85	0	640	923	0	923	1,563
Group B	45	36	17	102	200	272	199	471	671
Total	287	349	102	102	840	1,195	199	1,394	2,234

Note) Group A : Seafarers who will be engaged on vessels of more than 51 GRT and of less than 10 year-old in 2000 and 15 year-old in 2005.

Group B : Seafarers who will be engaged on vessels of less than 50 GRT or of more than 11 year-old in 2000 and 16 years old in 2005

(b) Improvement of VIMARU and MTTS

1) VIMARU (Vietnam Maritime University)

VIMARU in Haiphong and the branch school in HCM City need to upgrade educational and training equipment as well as instructors. The improvement will be undertaken through two phases.

(Up to Year 2000)

- Installation of basic training and education equipment,
- Installation of advanced equipment such as ARPA (Automated Radar Plotting Aid) simulation system, GMDSS training set and diesel engine plant with auxiliary engine (or engine room simulator system)
- Retraining of instructors
- Revision of training programs, syllabi and curricula

(Year 2001 - 2010)

- Further installation of advanced equipment if technically and economically justifiable.

The following types of equipment will be acquired in the Master Plan period:

- Radar simulator with ARPA
- Celestial observation
- Gyro compass training set
- Fire prevention and fire fighting appliances
- Life saving apparatus
- Loading calculator for stability training
- Diesel engine plant
- Bilge separation mini-process model
- Electrical and electronic equipment
- Workshop machinery
- Testing and measuring equipment
- Radio communication and GMDSS training set

The investment in the above equipment will cost VIMARU about 200 billion VND.

2) MTTS (Maritime Technical and Training School)

MTTSs in Haiphong and HCM City also need improvement in facilities, training programs, equipment, curricula, syllabi, and instructors. However, the precise needs are not clear, so far, and the following steps need to be taken to define training needs:

- The present curricula and syllabi should be scrutinized for compliance with the requirements of international conventions and the demand for Vietnamese seafarers.
- On this basis, the training programs and equipment needs should be reviewed.

(c) Training of Seafarers for Tanker Operation

Nowadays huge tankers such as VLCC (very large crude oil carrier) have achieved economic oil haulage with a limited number of seafarers onboard. However once a serious marine accident occurs the marine environment is at risk from the danger of a large oil spill. In order to prevent such accidents and pollution at sea, international conventions, MARPOL and STCW0-78195, define various regulations. In Vietnam, oil haulage will increase, especially on coastal waterways, due to the Dung Quat oil refinery project. The training of tanker seafarers will have to become of more serious concern.

Today, the Maritime Training Center in VIMARU Haiphong and the South Seafarers' Training and Employment Center in the VIMARU branch, HCM City provide the training courses related to tanker operation. However they concentrate on theoretical knowledge with little practical training, due to lack of training tools.

There is considerable scope for improvement in current training courses. A cargo handling simulator is the most suitable equipment because it makes trainees familiar with

various operations such as cargo loading/unloading and inert gas operation. The simulator is composed of the following devices;

- cargo valve control console
- inert gas system control panel
- local valve operation panel
- viewing service system
- pumping sound synthesizer system
- instructor console for controlling and managing simulator operation

It is also suggested that experienced instructors be assigned to the courses.

The price of two cargo handling simulators is 30 billion VND.

(d) Ship Operator Management and Administrative Staff Training

The analysis of coastal shipping management modernization requirements reveals that two types of training are required (excluding training for new types of services which are outlined in Section 6.3.5):

- general training for management in various aspects of business methods,
- specific training for a range of personnel involved in marketing, computer services, technical and financing activities.

1) General Management Training

The areas in which general management training is required include

- financial planning, especially how to assess potential management strategies in coastal shipping and how to secure advantageous finance,
- operational planning, especially how to assess the effect of alternative ship operating strategies on costs and revenues,
- staffing, especially how to assess staffing needs and to motivate staff,
- legal matters, covering future legal obligations arising from international agreements,
- risk management, covering identification of development strategies that avoid certain risks and ways to insure against unavoidable risks, and
- English language training.

Although formal lecture courses and guided reading have an important role to play in meeting these training needs, practical on-the-job training is vital in most of these areas. Many larger shipping operators would be able to set up formal training programmes which used invited specialists from external (often foreign) organisations. However the required practical training experience would be more difficult to acquire without the co-operation of a foreign shipping company - through allowing on-the-job training for particular staff within a foreign organization.

2) Specific Training

To strengthen the sales department as proposed in this chapter, marketing staff require training in

- practical forecasting techniques (applicable under the uncertain conditions of Vietnam) based on commodity or passenger flow analysis and information from particular customers,
- pricing, especially the principles of pricing in a market economy based on competitive conditions and marginal cost analysis, and
- assessing the factors that affect profitability of different vessel types.

Computing staff require a range of knowledge covering

- basic hardware and software knowledge (obtainable from computer or software companies),
- computer skills required to use computer applications effectively,
- programming and maintenance of computer systems to develop and maintain specialist applications required by the company, and
- data control to ensure the integrity and security of the data used by the company.

Larger companies would need to be able to link computer across the country for speedy data exchange and processing.

Finance staff need training in

- basic accounting methods recognised in other countries,
- financial aspects of law,
- new forms of taxation such as VAT being introduced in Vietnam, and
- financial management techniques.

The training needs of management and administrative staff in Vietnamese coastal shipping organisations are vast. In practice priorities have to be established to ensure that emphasis is given to those areas where training resources can be most effectively used. Because of the general weakness of marketing in Vietnamese organisations it is appropriate to give high priority to marketing training. However practical management training in business methods appropriate in the market economy are equally vital.

Unfortunately it is difficult to see how even the priority training needs can be achieved without a great deal of co-operation from foreign shipping organisations. Although such co-operation could be forthcoming from foreign shipping organisations engaged in partnership arrangements, this option would not be available to most operators in coastal shipping.

For this reason there is a strong case for government to seek assistance from ODA sources for training in coastal shipping. The emphasis should be on marketing and

management methods in a marketing economy, and on the introduction of new forms of operation. Emphasis should also be given to training the trainer, so that knowledge obtained from foreign training programmes gets filtered down as broadly as possible. Supported training opportunities should be available to all operators on the same basis.

(e) Training of Port Related Personnel

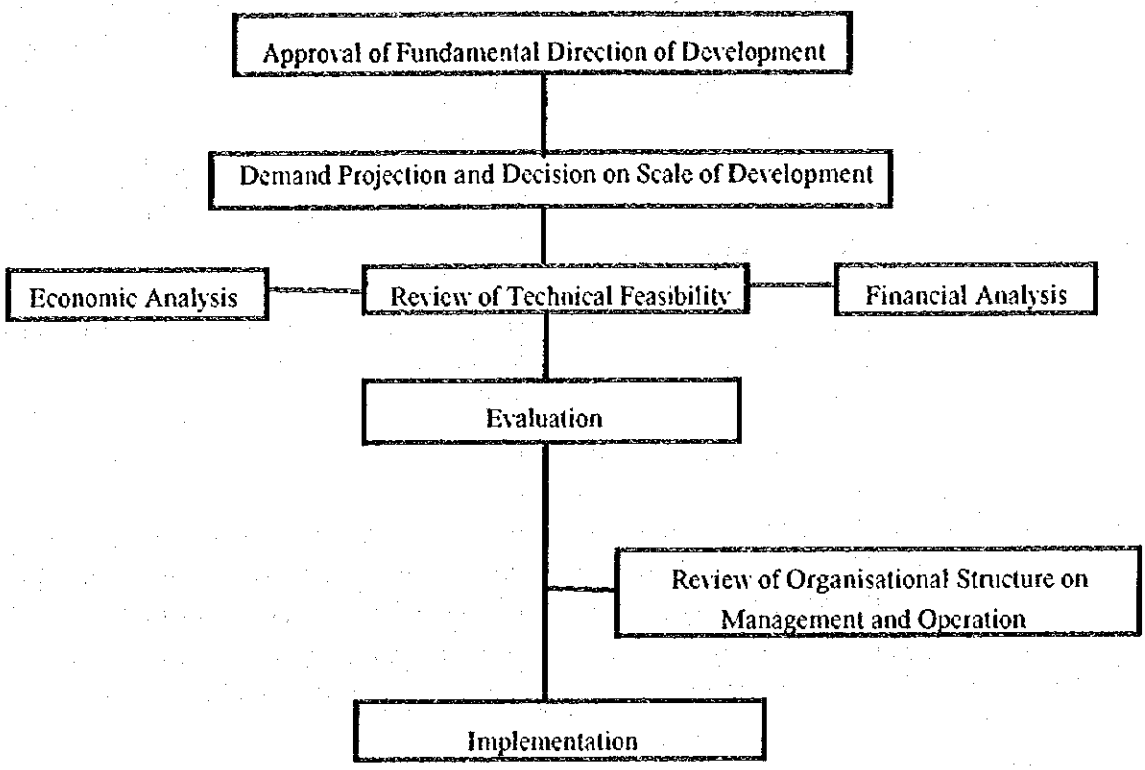
Higher quality and capability of staff will lead to improvement of port services, especially in ports where regular training and seminars are conducted.

1) Managerial staff

To managerial staff, a self-improvement concept should be introduced. Through training sessions, ways of efficient management and adapting to new tasks should be learned. Some of the themes to be covered are: significance of maritime transportation to regional socioeconomic growth: to be a good public servant as well as a good marketing staff; competitive and management skills with business foresight; reduction of operation costs; database and statistical analyses; introduction of computers in database analyses, and financial and information management. According to the level of staff, training should be conducted and roles and responsibility of the staff should be clarified.

2) Port planning and technology

Port operators and managers will have to plan and implement feasible port developments based on technical knowledge. A flow chart describing procedures involved in port development, is shown below:



As shown in the chart, in order to prepare and implement a port development plan. Technical knowledge in different fields is required. Also, a development plan needs to be systematically developed for it to be implemented. Therefore, training in different fields will be required. This type of training may be conducted through international expert exchanges. The possible areas of training are as follows:

- Demand projection: Cargo volume and fleet requirement
- Development planning and site planning
- Technical feasibility studies: design, cost estimation, construction planning, scheduling
- Economic analysis
- Financial analysis
- Organizational planning on management and operation
- Port development plan: systematic planning

3) Operation Staff

Training of operation staff should be aimed at delivering fast, sure, safe, and cost effective cargo handling services. Work plan preparation is a type of training program for line managers. The training should be conducted by inviting loading/unloading managers of shipping companies or sending the managers to shipping companies and shipping agencies.

A training program on efficient loading/unloading methods should be provided for all workers. The training should be undertaken by each gang. Also, to all workers, seminars to prevent malpractices should be provided.

To operators of loading/unloading machinery and equipment, signal-men, and load-attaching and detaching men, training should be provided on each task, including the co-operative elements of the work.

A training program on new technological methods and fast-sure-efficient maintenance methods should be provided to repair and maintenance workers.

f) Training of Maritime Safety Personnel

VIMARU and MTTS currently hold maritime safety-related courses such as "Marine Aids to Navigation" and "Marine Radio Equipment". They are, however, insufficient to raise professional competence in this field. Establishment of a new institution such as the Maritime Safety Academy becomes necessary in the long run. On the other hand, for the time being, the following training opportunities should be provided to active personnel:

1) ATN

- Three months' special overseas ATN training
  - 10 trainees from VMS
  - foreign instructors

- Two months' special domestic ATN training
  - 30 trainees from VMS Regional Offices
  - foreign and Vietnamese instructors

2) SAR

Similar to ATN personnel, SAR active personnel will be retrained in either developed countries or Vietnam. It is necessary to establish an adequate training system for sea communication system operators and maintenance staff in compliance with GMDSS.

(g) Training of Shipbuilding Engineers

For shipbuilding staff such as design, production and repairing engineers, basic knowledge can be obtained in a particular department of VIMARU. They need further practical knowledge and therefore various opportunities for on-the-job training (O-J-T) should be provided.

In building the proposed standardized vessels, the following O-J-T scheme is worth while considering

- The first vessel will be built in a qualified shipyard abroad. On this occasion, some Vietnamese design engineers, production engineers and foremen will be dispatched to the shipyard to join in construction
- The second vessel will be built by them in Vietnam.

(h) Training of Ship Inspectors

Proper training procedures should be established for government inspectors and VIRES surveyors. For this purpose, the following measures have to be duly considered.

- Revision of the VIRES training curriculum,
- Provision of a proper training course for port-state control officers,
- Setting qualification standards of life-raft maintenance personnel
- Assignment of experienced radio inspectors in response to GMDSS.

6.3.8 Maritime Safety Enhancement and Environmental Protection Program

According to the coastal shipping demand forecasts of this study, along with the increase of international shipping, the volume of traffic along the coasts of Vietnam will increase by leaps and bounds, and shipping movements will be complicated, especially in the areas around Haiphong and HCMC. Unfortunately, accidents at sea are bound to increase with the increase of maritime traffic unless preventive measures are taken urgently.

As more serious accidents take place, operational efficiency of ships will decrease, severe damage to ships and property will be brought about, and more loss of human lives will occur.

Furthermore, the demand forecasts estimated that coastal shipping will play a major role in carrying oil and oil products as a result of the implementation of the Dung Quat project. If an oil tanker is involved in an accident, enormous amounts of oil could be discharged into the sea, which will cause serious damage to the coastal environment and fishing industries.

Thus the influence of maritime accidents on shipping, other maritime activities and the environment will be serious and it is essential to establish an adequate maritime safety system which includes more effective ship inspections, search and rescue (SAR) services, maritime communications and aids to navigation for preventing accidents and keeping coastal shipping operating smoothly and efficiently.

In making every effort towards the above purposes, we must start with the fundamental idea "Safety of Life First."

(a) Improvement of Ship Inspection during Shipbuilding

With regard to inspection of new vessels, its regulatory framework is to be strengthened as follows:

(1) introduction of an up-to-date regulation regarding the survey and construction of steel ships, and the procedure for giving approval,
(2) revision of "national standards" and "quality standard",
(3) participation in international conventions and incorporating them in domestic regulations.

In order to catch up with up-to-date ship inspection practices and develop them continuously, it is recommended that testing laboratories will be placed in a governmental organization such as VIRES. The Study proposes two laboratories: one main laboratory in Haiphong and one sub laboratory in HCM City. In this connection, a model service station of inflatable life-raft and radio equipment will be attached to the laboratories.

(b) Improvement of Ship Inspection while Ship Operation

After newly built vessels are put in operation, not only periodical surveys (including docking surveys) but also occasional surveys when vessels are under repair should be carried out.

The items to be inspected during both surveys are indicated in Table 6.3.15 with necessary instruments which will be stored in the proposed testing laboratories at Haiphong and HCM City.

Table 6.3.15

ITEMS AND NECESSARY INSTRUMENTS

	Item	Necessary Instrument
1.	Preparation of safe working environment and specification of the areas in need of repair	• inflammable gas detector • oxygen-gas detector • ultrasonic thickness detector • magnetic particular tester • ultrasonic flaw detector
2.	Qualification of welding materials and welder's capability	• universal testing machine (500 kN class) • carpy impact testing machine (300 J class) • hardness tester (Rockewell, Brinnel type) • X-ray examination equipment (portable type and laboratory for examination) • ultrasonic flaw detector (portable type) • vacuum type leakage detector (portable type) • sample making machine
3.	Periodical calibration of pressure gauges, especially in the case of major pressure vessels	• standard pressure gauge (precision class) • pressure gauge tester (counter-weight balance type)
4.	Periodical calibration of major electrical instruments	• voltmeter calibrator (precision class) • ammeter calibrator (precision class) • standard wattmeter (precision class) • standard resistance conductor (precision class) • insulation resistance tester (500V - 2,000V)
5.	Periodical maintenance of inflatable life-raft onboard	• air-leak test for raft chamber a) accurate manometers, pressure gauges, thermometer b) air pumps for inflating and deflating liferaft c) air ventilator for cleaning and drying liferaft d) testing water-basin capable for air leak test • gas-cylinder test e) scale for weighing inflation gas cylinders f) tools for dismounting inflation gas-cylinders • test chamber for auto-release device • floor seam test supports • models of inflatable life-rafts g) one each complete sets of life-raft h) supporting frame for each type of life-raft i) automatic-release device • spare inventory including pyrotechnics as required by IMP Resolution A. 761 (18) Recommendation on Conditions for the Approval Servicing Stations for inflatable Liferafts.
6.	Periodical Maintenance of Radio equipment onboard	• measuring equipment for Frequency, Voltage, Current, and Resistance • measuring equipment for out put and reflect effect on VHF and MF/HF transmitter • syncroscope • acid tester for checking specific gravity of lead batteries • EPIRB tester for checking correct output from Satellite EPIRB • sealled room arrangement for maintenance work of Satellite EPIRB as recommended IMO Resolution A. 739 (18) Radio Installation Inspection Service Company

(c) Development of Visual ATN

The coastal line of 3,260 km not including Truong Sa Islands and the sea-cum-riverways of 832 km connecting with coastal shipping ports are subject to the plan.

1) Lighthouses

Lighthouses will provide coastal vessels with single bearing service[1] by the year 2000 and cross bearing service[2] around large ports and accident prone areas by the year 2010. A lighthouse is functionally composed of the following facilities and equipment:

- power supply (main solar system and sub diesel engine generator system)
- lighting apparatus, lantern and control device in which optical light intensity is more than 16 miles.
- light tower (8-18 m) and power supply house
- radar reflector

The number of required lighthouses is 81 in 2000 and 97 in 2010. Of the existing 55 lighthouses, 20 can be expected to remain operational while 24 will need improvement and rehabilitation, and 11 will need complete reconstruction. As a result, there is a need for construction of 26 new lighthouses up to 2000 and an additional 16 between 2001 and 2010.

Table 6.3.16
LIGHTHOUSE DEVELOPMENT PLAN

Up To Year 2000 Target: 81 units	Operational: 20 units	Existing to be improved: 24 units Existing to be reconstructed: 11 units Newly built: 26 units
Year 2001 to 2010 Target: 97 units	Operational: 81 units	Newly built: 16 units

2) Light Beacons and Illuminated Buoys

Light beacons and lighted buoys are generally configured to show approaching channels to ports and narrow waterways. They are also essential to secure nighttime navigation safety. In Vietnam, they are mainly deployed in the Cua Ong area (Cam Pha Port and Tu Long channel), the Hong Gai area (Ha Long Bay and Hong Gai Port) and around the ports of Haiphong, Cua Lo, Ben Thuy, Danang, Qui Nhon, Nha Trang and Saigon. However, the deployment density is not sufficient to deal with future increased traffic

[1] single bearing service: A vessel within 10 miles offshore can recognize at least one lighthouse.
[2] cross bearing service: A vessel within 10 miles offshore can recognize more than two lighthouses.

levels, and so 77 new light beacons should be installed and 10 existing ones should be rehabilitated (see Table 6.3.17). In this connection, a light monitoring system will be introduced to supervise unmanned light beacons.

Table 6.3.17
LIGHT BEACON AND LIGHTED BUOY DEPLOYMENT PLAN

Area/Port	Light Beacon		Lighted Buoy	
	Operational	To be Rehabilitated	Existing	Additional
Cua Ong	14	1	17	8
Hong Gai	3	1	26	16
Haiphong	17	0	42	16
Cua Lo/Ben Thuy	3	1	8	4
Danang	6	1	11	5
Qui Nhon/Nha Trang	2	1	17	8
Saigon	20	5	58	32
Dinh An	2	0	14	7
Dien Cong	2	0	9	4
Pha Rung	1	0	31	15
Ky Ha	1	0	9	4
Cua Hoi	0	0	23	11
Cua Tieu	0	0	14	7
Thi Vai	0	0	23	11
Thanh Hoa	0	0	16	8
Total	72	10	318	156

The light beacon design should generally be standardized in Vietnam as follows:

- light range: 13 miles
- height of light apparatus: 20 m high above the sea level
- effective light intensity: 9,000 cd
- power supply: solar battery

There are three designs of buoy bodies which have been standardized by VMS as shown in Table 6.3.18. With consideration of waterway length and cardinal turning points, 156 new lighted buoys are required (see Table 6.3.17).

Table 6.3.18
SPECIFICATIONS OF STANDARDIZED BUOY BODY

Parts of materials	Type I ø2M00	Type II ø2M40	Type III ø2M88
Overall height	5.5m	5.7m	6.0m
Focal plane height	4.5m	4.7m	5.0m
Float dimension	2.0m dia.	2.4m dia.	2.88m dia.
Total weight	3.7 ton	5.27 ton	9.4 ton
Buoyancy	4.6 ton	4.7 ton	11.8 ton
Max. Current velocity	3.8 ton	3.8 ton	3.8 ton
Max. Wind velocity	53.0 m/s	53.0 m/s	53.0 m/s
Wave height	3.0 m	3.0 m	3.0 m
Mooring Chain	30.0 mm dia.	34.0 mm dia.	34.0 mm dia.
Bridge Chain	34.0 mm dia.	38.0 mm dia.	38.0 mm dia.
Sinker	Concrete 4 ton	Concrete 6 ton	Concrete 6 ton
Shackle	42.0 mm dia.	45.0 mm dia.	45.0 mm dia.
Swivel	45.0 mm dia.	48.0 mm dia.	48.0 mm dia.

3) Visual Aids for Sea-cum-Riverways

The Master Plan determines 17 coastal shipping ports and their inland access channels to be regarded as sea-cum-riverways in the coastal shipping network.

They also need visual aids at adequate intervals. In principle,

- red and green coloured buoys should be placed every mile to delimit a navigational lane;
- light beacons should be placed every three mile for the same purpose;
- leading lights should be placed to show narrow channels, obstacles and dangerous areas; and
- ten pairs of buoys, painted red and blue, will be placed at entrance channels of the sea-cum-riverways.

Based on the above principles, the Study identifies four leading lights, 88 light beacons and 496 coloured buoys which are to be newly installed along the sea-cum-riverways. (Refer to Table 6.3.19.)

Table 6.3.19
NECESSARY VISUAL AIDS FOR SEA-CUM-RIVERWAYS DEVELOPMENT

Route of River	Type of Signal	Existing (a)	Number Required (b)	New Installations Required (b-a)	Channel Length (in nm)
Lach Giang estuary to Hanoi	Beacon	*58	25	25	76
	Buoy	*283	172	172	
Nam Triew estuary to Hai Hong	Leading light	4	4	0	19
	Beacon	7	7	0	
	Buoy	42	58	16	
Dinh An estuary to Can Tho	Beacon	*14	14	14	43
	Buoy		106	106	
Can Tho to Via Vam Nao pass (Cam bodian border)	Beacon	-	29	29	87
	Buoy	-	90	90	
Soai Rap estuary to Ho Chi Minh	Leading light	10	14	4	35
	Beacon	24	30	6	
	Buoy	58	90	32	
Ho Chi Minh to Dong Nai	Beacon	-	14	14	40
	Buoy	-	80	80	
Total	Leading light	14	18	4	300
	Beacon	31	119	88	
	Buoy	100	596	496	

Note) *: unlighted apparatus

4) Costing

The installation cost of visual ATN up to the year 2010 is estimated at US$ 75.3 million. Since the ATN ought to be strategically installed in association with ports and waterways, the following installation policies have been considered.

Short-term (1997-2000)

- Existing lighthouses will be rehabilitated and reconstructed.
- Additional lighthouses will be installed around busy ports.
- New light beacons and lighted buoys will be installed around busy ports and along congested waterways.

Long-term (2001-2010)

- Additional lighthouses will be installed to provide ships with cross bearing service.
- New light beacons and lighted buoys will be installed along the sea-cum-riverways which are supposed to be developed by the year 2000.

Table 6.3.20
COST ESTIMATION FOR VISUAL ATN

Type	1997-2000	2001-2010	Total
Lighthouses	15.2	6.4	21.6
Light Beacons	20.9	16.3	37.2
Lighted Buoys	4.3	12.2	16.5
Total	40.4	34.9	75.3

(d) Development of Electronic ATN

The RACON system can be universally available to ships, without the need for any special equipment other than radar. The RACON should be installed in major lighthouses or light beacons around main ports or water channels. (Refer to Table 6.3.21).

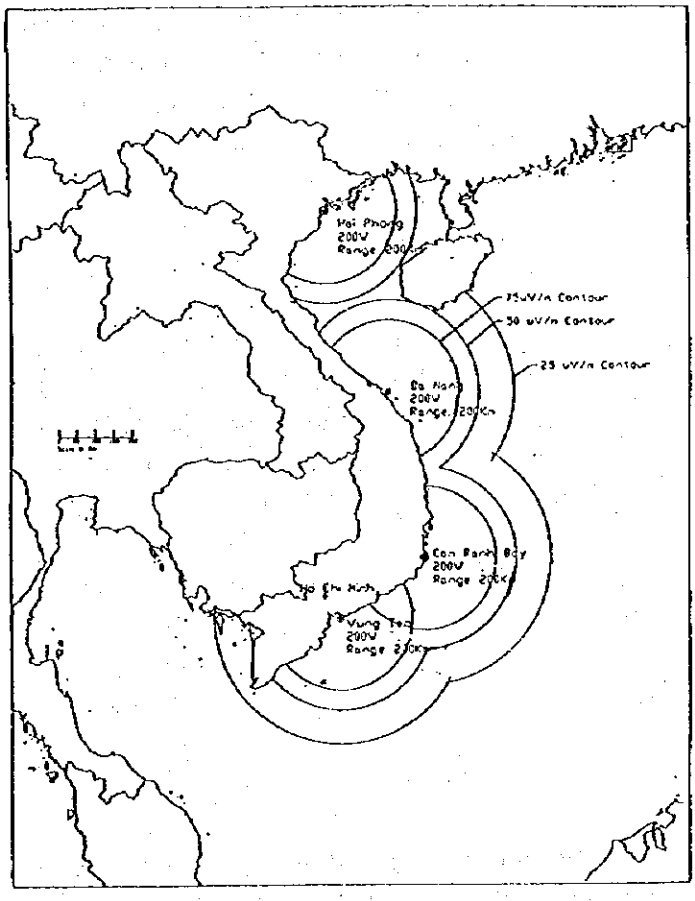
The DGPS (Differential Global Positioning System) and Loran-C vessel positioning systems will both be employed in Vietnam. The former is a popular and economical system for the time being, while the latter is an independent and alternative system which is appropriate in the long term because Loran-C is also being introduced worldwide.

Table 6.3.21
RACON DEVELOPMENT PLAN

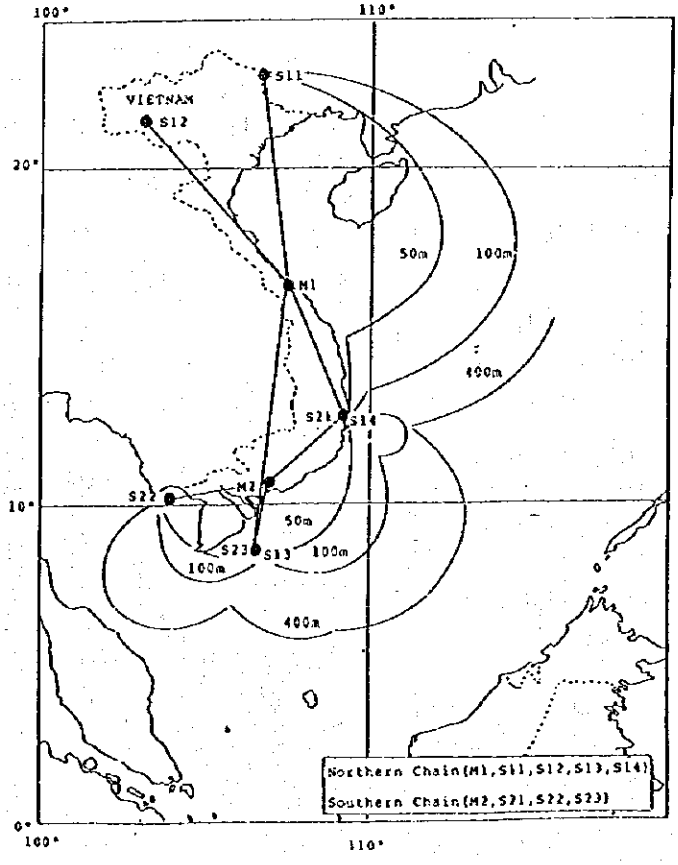
Region	Name of site	Development	
		By 2000	By 2010
I	VINH THUC		O
	CO TO		O
	SOI DEN		O
	HON DAU	O	
	LONG CHAU	O	
	BACH LONG VI	O	
	QUAT LAM		O
	LACH TRAO		O
	HONME	O	
II	THUAN AN		O
	TIEN SHA	O	
	LY SON		O
	BALANG AN		O
III	PHUOC MAI		O
	CUA LAO XANH	O	
	MUI CHUT		O
	HON LON	O	
	HON CHUT		O
	MUI DINH	O	
	PHU QUI	O	
	KE GA	O	
IV	VUNG TAU		O
	CAN GIOHA		O
	BA DONG		O
	DINH AN		O
	BAY CANH	O	
	HON KHOAI	O	
	THO CHU		O
	Total	12	16

Figure 6.3.13
INTRODUCTION OF VESSEL POSITIONING SYSTEM IN VIETNAM

(DGPS)



(Loran-C)



Their operational characteristics are briefly described below.

DGPS: DGPS is presently used in 21 countries, either in full operation or on a trial basis. The DGPS system in coordination with the Inmarsat communication system can be widely utilized for civil purposes. It has become popular due to the availability of cheap user devices. It is convenient for Vietnam to install lighted buoys along rivers and conduct oceanographic and hydrographic surveys. It should be noted that the United States operates GPS and may suspend it if this serves her national interest.

Loran-C: This system would serve as a vessel positioning system which is independent of any national interest. The development of the Loran-C system is underway, through international cooperation, in the north-west of the Pacific Ocean, under the name of FERNS (Far East Radio Navigation Service). With Vietnam's participation, Loran-C would cover all the coastal areas of the western Pacific.

The cost of the proposed electronic ATN is estimated at US$ 1.1 million for racons, US$ 4.7 million for DGPS and US$ 77.9 million for Lacon-C, respectively.

(e) ATN Supportive Equipment and Facility

1) Support Ships

In addition to the existing fleet, which consists of one buoy tender (400 tons) and nine boats (50 tons), the following support ships will be acquired for ATN purposes.

Table 6.3.22
SUPPORT SHIP DEPLOYMENT PLAN

Type of Vessel	Year of construction expected	Region				Total	Recommendable -tonnage
		I	II	III	IV		
Medium Sized Multi-purpose Ship (buoy tender, supply and rescue)	Up to 2000	0	0	0	1	1	400 ton
	2010	1	0	0	0	1	
Small Multi purpose ship (inspection, patrol, maintenance and rescue)	2000	3	0	2	3	8	*
	2010	0	1	1	0	2	80 ton
Small Boat (patrol, Maintenance)	2000	2	2	2	2	8	5 ton
	2010	2	2	2	2	8	

2) Communication Facility

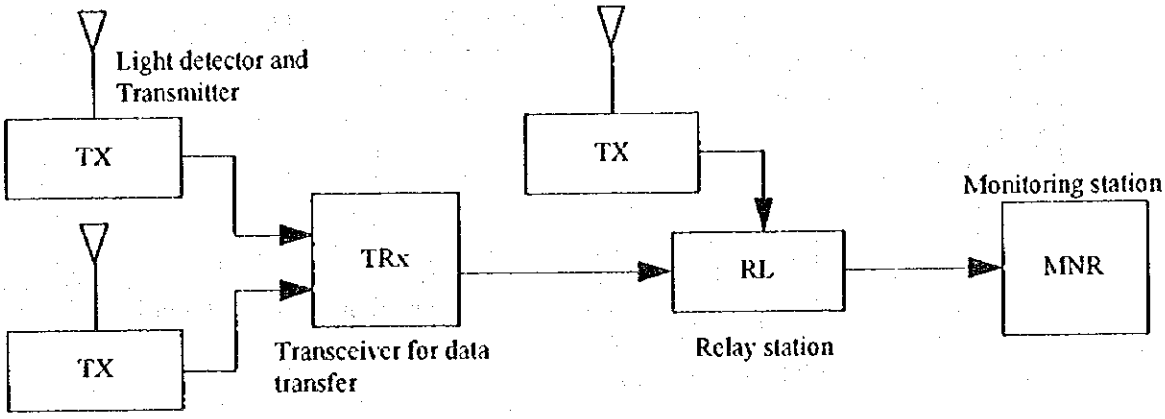
All the lighthouses will be equipped with HV/VHF SSB Transceiver 100W connected to coastal radio stations. A stable communication system between coastal radio stations and ATN supporting vessels will also be essential.

3) Light Monitoring System

A light monitoring system will be introduced to supervise unmanned ATN. Figure 6.3.14 shows the layout of the system.

One system is able to monitor as many as 50 light beacons using more than eight types of monitoring data. Failure of light, abnormality of light characteristics and broken bulbs are principal items monitored. In the case of leading lights, synchronous anomalies are also monitored. The power supply of the light monitoring system should be independent of that of lightbeacons and lighted buoys.

Figure 6.3.14
LIGHT MONITORING SYSTEM



4) Quay and Mooring Facility

Where needed, quay and mooring facilities will be attached to new lighthouses and to some existing lighthouses when rehabilitation work is undertaken.

5) Workshop and Factory

The four existing workshops will be rehabilitated, leaving the two factories to be improved after 2010.

A workshop is designed to be composed of the following equipment:

- Iron work machine
- Wood work machine
- Cutting and welding machine
- Compressor and pump
- Hand tools
- Bench tools
- Transportation equipment
- Generator set
- Test and measuring instrument
- Maintenance instrument

6) Costing

The cost of ATN support facilities is estimated at US$ 78.4 million. Short term priorities include rehabilitating existing workshops and deploying ATN support ships. Eight of the small ships are intended for use in SAR operation as described in the next section. The medium size ship acquired between 2001 and 2010 is also intended for SAR duties, as and when required.

Table 6.3.23
COST ESTIMATION OF ATN SUPPORTIVE FACILITY

	1997-2000	2001-2010	Total
Medium Size Multi-purpose Ship	15.0	15.0	30.0
Small Multi-purpose Ship	24.0	6.0	30.0
Small Boat	2.2	2.2	4.4
Light Monitoring System	0.0	11.1	11.1
Workshop	2.9	0	2.9
Total	44.1	34.3	78.4

Note: (1) The SAR fleet includes an additional seven medium ships which are not included in this table.

(f) SAR System Development Plan

An adequate SAR system needs exchange of real-time information, swift coordination among the related agencies and effective execution of SAR procedures. This is illustrated as a draft SAR coordination network in Figure 6.3.15.

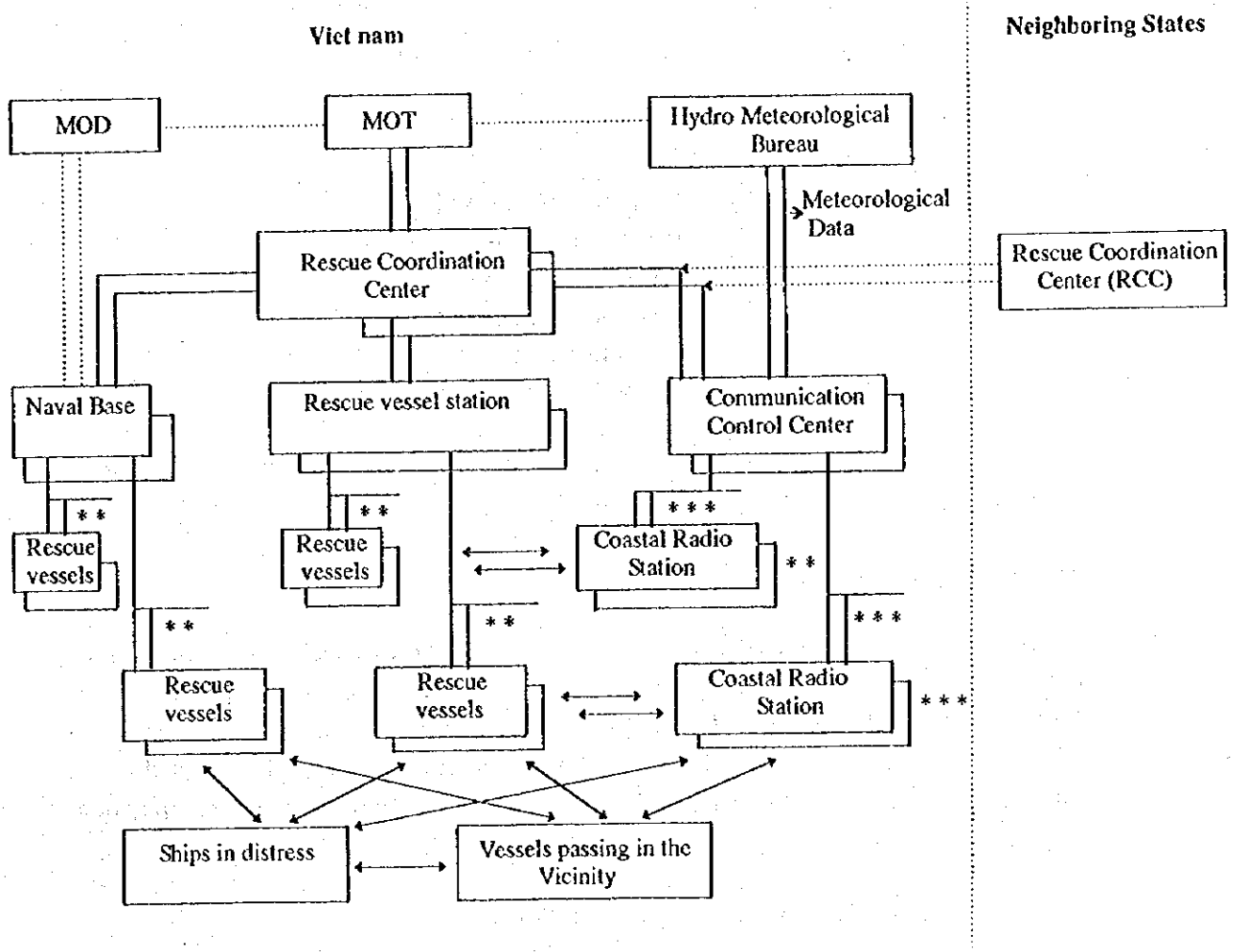
In the network, the Rescue Coordination Centers (RCC), rescue fleet and Coastal Radio Stations (CRS) will play important roles, and therefore they have been further investigated in the Master Plan.

1) Rescue Coordination Centers (RCC)

RCCs will be established at Haiphong, Danang and Vung Tau, in order to make SAR chains of command as simple as possible. They will form part of the international SAR network in accordance with the SAR convention. Since these RCCs will be established

within existing premises, only nominal costs for telephones and other equipment are incurred.

Figure 6.3.15
SAR COORDINATION NETWORK (DRAFT)



2) Rescue Fleet

The following two types of ships will be deployed:

Medium Size Multi-purpose Rescue Vessel

Gross Tonnage:	400 tons
Function:	SAR operation and fire-fighting, towing and oil boom lifting service
Area Coverage:	150 miles from coast

Deployment:	3 vessels in Haiphong 2 vessels in Danang 3 vessels in Vung Tau
Cost:	US$ 15 million per vessel

One of these vessels is assumed to be acquired between 2001 and 2010 as an ATN vessel in Haiphong, and the cost for this is included in Table 6.3.23. The additional cost of the remaining seven vessels is US$ 105 million.

Small Multi-purpose Rescue Craft

Gross Tonnage:	80 tons
Function:	SAR operation and ATN support
Area Coverage:	30 miles from coast
Deployment:	3 vessels in Haiphong 2 vessels in Danang 3 vessels in Vung Tau
Cost:	US$ 3 million per vessel

All these vessels are included as ATN small multi-purpose ships in the cost estimate in Table 6.3.23.

3) Coastal Radio Stations (CRS)

CRSs will be installed or upgraded in accordance with the introduction of GMDSS. CRSs use several wave bands such as MF, VHF and HF. In connection with GMDSS, DSC/VHF (digital selective call/very high frequency) will be installed at 30 stations while NAVTEX and DSC/MF (digital selective call/middle frequency) will be installed at some major stations. This would cost US$ 33.8 million including construction, equipment and engineering service costs.

The development schedule is proposed as follows:

	1977 - 2000	2001 - 2010
RCC	3 centers	—
Rescue Fleet	8 small craft	8 medium vessels
CRS	30 stations	—

The three CRSs at Haiphong, Danang and Vung Tau will have to be connected with the RCCs closely. and they should have the following functions:

- Management and control of maritime safety information (MSI) for NAVTEX broadcasting;
- Remote control and monitoring of neighboring CRSs; and
- Maintenance of communication facilities equipped on vessels and vehicles.

Finally, a single integrated organization is desirable to develop and carry out the proposed SAR system smoothly. It is necessary to find the practical way in which the SAR related organizations such as VMS, Port Authorities, salvage companies and VISHIPEL would be functionally unified.

(g) Other Improvements in Maritime Safety

1) Maritime Accidents Statistics

The current maritime accidents statistics are insufficient and far from integrated. Therefore they should be improved by the following measures and policies:

- Design and implement a fixed format for accident recording
- Investigate each accident thoroughly and promptly
- Describe accident statistics by means of figures, charts and illustrations
- Treat the accidents in which human lives were involved with special attention
- Analyze accident causes in depth and record rescue activities precisely
- Publish the statistics periodically
- Designate one responsible agency for the above tasks at a national level

2) Ship Reporting System

A Ship Reporting System is recommended to be set up under the SAR Convention 1979. Vietnam is expected to become a participant in the convention and therefore it is worth the government considering the introduction of the system.

Under the system, information given by ships such as position and navigation schedule is processed by computers. When a ship is reported to be in distress, other ships navigating in the vicinity can be identified by computer and asked to give assistance.

In consideration of the specific circumstances of the country such as meteorological and oceanographic conditions, geography and shipping development, it would be valuable for Vietnam to have a direct reporting system. However implementing this would take many years. For the time being, it is advisable to utilize SINGREP (Singapore Ship Reporting System) which covers all the Vietnamese coastal sea area southwards from Latitude 17 degrees N, and JASREP (Japanese Ship Reporting System) which covers all the coastal sea area northwards from Latitude 17 degrees N.

h) Establishment of National Oil Spill Protection System

According to the NEA, more than fourteen oil spill accidents have occurred on Vietnamese waters between 1989 and 1996. Only VIETSOVPETRO (VSP), a joint-venture firm, has an oil spill base and equipment.

Under such a situation, the establishment of a national oil spill protection system, consisting of the following components, is considered an urgent issue:

1) Establishment of Organization of Marine Oil Pollution Control

Although previous oil accidents were treated by local organizations such as Provincial Committees and individual firms, the Central Government should have taken a leading role. A nationwide organization should be established at four levels.

- central level : MOSTE is the responsible ministry
- regional level : Three regional offices in Haiphong, Danang and HCM City
- provincial level
- local level

2) Preparation of Oil Spill Contingency Plan

The oil spill contingency plan is to define an emergency reporting system and chain of command among the four levels. For this purpose, the plan should carefully look into: 1) vulnerable facilities, likely oil spill locations and priorities for protection, 2) available logistics and operational forces including navy.

3) Preparedness of Oil Spill Response Equipment and Facilities

Individual oil distributors must be ready for an oil spill accident with necessary equipment and facilities such as oil booms, oil skimmers, oil absorbents, chemicals, working boats, storage tanks, etc. In addition, central and local governments must hold proper equipment and facilities which should be specified by a further study.

4) Preparation of Liability and Insurance System against Marine Oil Spill Incidents

It is advisable for Vietnamese Government to participate in the CLC Treaty 1969 (an international treaty for civil liability towards oil spill damage) and FUND Treaty for Compensation of Oil Spill Damage 1971. Shipowners should also have P&I insurance.

5) Participation in International Convention (OPRC) and Regional Cooperation (OSRAP)

After the above issues are solved, especially (1), (2) and (3), Vietnam is required to participate in OPRC and ASEAN OSRAP.

6.4 Evaluation

6.4.1 Economic Analysis

The Master Plan consists of numerous interrelated elements, many of which affect international and waterway transport in addition to coastal shipping. The purpose of the analysis described below is to indicate the approximate level of costs and benefits attributable to proposed coastal shipping improvements, so that the overall economic feasibility of the Master Plan can be assessed. The potential beneficiaries of the coastal shipping improvements are also identified.

Such an analysis cannot reveal the economic feasibility of individual elements of the Master Plan. It is more appropriate to consider these detailed aspects when formulating short term plans.

(a) Costs of the Master Plan

Implementing the Master Plan would incur expenditure in a wide range of areas. The pattern of expenditure is summarised in Table 6.4.1. Not all the listed expenditure is directly related to the Master Plan and is likely to be incurred independently of the Master Plan. Some expenditure has been proposed as part of other development plans and can be regarded as committed projects.

The major expenditure occurs in acquiring ships and improving port infrastructure. This constitutes US$ 986 and 302 million respectively, which is about 56% and 17% of the total of US$ 1,756 million. The ship acquisition costs are estimated assuming that existing vessels are scrapped after 20 years and replaced by new ones (if not more than 3,000 DWT) or by second-hand ones (if larger). No allowance is made for chartering rather than purchase of some foreign vessels, which could reduce capital requirements, especially in the short term. These assumptions are in accordance with Alternative 3 fleet acquisition programme (with Dung Quat project) defined earlier. The port expenditure is that estimated to be required for coastal shipping alone; it includes rehabilitation of existing infrastructure, and construction of new facilities and acquisition of equipment in order to meet the projected demand at both general ports and specialised ports (excluding those required exclusively for oil transport).

Table 6.4.1
SUMMARY OF EXPENDITURE PROPOSED IN THE MASTER PLAN

Category of Expenditure	Mainly Incurred by	Amount (US $ millions)		
		Up to 2000	2001 to 2010	Total
Fleet Expansion and Modernisation				
- Vessel Acquisition[1]	Ship Operators	225.9	760.6	986.5
- Improvement of Ship Construction Yards	Ship Yards	0.0	14.3	14.3
- Improvement of Ship Repair Yards	Ship Yards	8.6	8.2	16.8
- Shipyard Quality Management Center	Ship Yards	0.0	0.6	0.6
Ports and Waterways Development[2]				
- Coastal Shipping General Ports Infrastructure	Port Operators	173.2	67.3	240.5
- Coastal Shipping Specialized Ports Infrastructure	Port Operators	26.4	35.0	61.4
- Sea-Cum-Riverway Infrastructure Improvement	VINAMARINE/ IWB	13.2	12.8	26.0
Coastal Shipping Management Modernisation				
- Training in Modern Operating Methods	Ship Operators	N/A	N/A	N/A
Secondary Transport Improvement Programme				
- Improvement of River and Road Infrastructure	IWB/VRA	N/A	N/A	N/A
Maritime Human Resources Development Programme				
- Improvement of VIMARU and MTTS	VINAMARINE/VIMARU	4.5	18.2	22.7
- Training Equipment for Tanker Operation	VIMARU	0.0	2.7	2.7
Maritime Safety Enhancement and Environment Protection Programme				
- Establishing Testing Laboratories	VIRES	1.3	0.0	1.3
- Aids to Navigation Equipment	VMS	43.8	129.2	173.0
- Maritime Safety Vessels (for ATN and SAR)	VINAMARINE/VMS etc.	41.2	128.2	169.4
- Sea Communication Equipment	VISHIPEL/Ship Operators	36.8	3.6	40.4
TOTAL		574.9	1,180.7	1,755.6

NOTE (1) Including oil tankers (assuming the Dung Quat project is implemented)
(2) Oil facilities excluded

Other significant items include improvements to sea-cum-riverways (such as dredging, aids to navigation, and maritime safety vessels, which are expected to incur US$ 26 million, 173 million and 169 million respectively. Although the dredging cost applies only to sea-cum-riverways used by domestic rather than international shipping, virtually all of the ATN and maritime safety expenditure is required along other sea-cum-riverways (such as the main rivers serving HCMC and Haiphong) and along the coast, for use not only by coastal shipping but also by international shipping (see Table 6.4.2). Only US $ 28.5 million is required for ATN on sea-cum-riverways not used by international shipping (and this is only for certain visual aids). Costs of dredging and similar improvements to road and river infrastructure connecting ports have been excluded because these are mainly associated with general transport needs, unrelated to coastal shipping ports.

Table 6.4.2

PROPOSED MASTER PLAN EXPENDITURE ON VISUAL ATN (US $ million)

	up to 2000	2001 to 2010	Total
Coastal Seaways	36.1	6.4	42.5
Sea-cum-Riverways			
- used mainly by international ships	4.3	0.0	4.3
- used mainly by domestic ships	0.0	28.5	28.5
All	40.4	34.9	75.3

SOURCE: JICA Study Team

Only part of the training costs (US $ 25.4 million for equipment at VIMARU and MTTS) are directly associated with coastal shipping because they have been based on the development needs of all types of shipping. On the other hand, the sea communication equipment, which require expenditure of US $ 40 million, is of benefit not only for coastal shipping, but also for international shipping, inland waterways and even the fishing industry.

(b) Benefits of the Master Plan

Several components of the Master Plan are expected to have an important influence on shipping activity itself, through reducing vessel operating costs, increasing level of service and improving the utilisation of infrastructure. In addition, as shown in Figure 6.4.1, the Master Plan has a broad influence on the maritime environment and the national transport system as a whole.

In particular, implementing the Master Plan would increase the competitiveness of the national transport system, improve effectiveness of investment in infrastructure, and reduce environmental costs associated with other modes such as road accidents. The Master Plan would enable coastal shipping to play an increased role in domestic freight and passenger transport. This would lower transport costs for existing traffic or even provide new opportunities for economic activity. In overall terms this would promote economic development not just in the main economic centres of the Red River and Mekong River deltas, but also at other places served by coastal shipping ports.

The distance between these two main economic activity centres is high so that, if cheap freight transport is not available between them, imported goods are often likely to be consumed instead of domestically produced goods. By increasing the domestic market for locally-produced products and providing an increased range of domestic inputs, scarce foreign currency is conserved. In this sense, the Master Plan benefits would be distributed widely through the Vietnamese economy, promoting domestic production in the agricultural, industrial and construction sectors and freeing foreign currency for vital purposes.

Coastal shipping provides the main means of connecting the islands of Vietnam with the mainland. Therefore it offers particular benefits to the island economies (both by promoting economic activity and personal mobility). In the field of tourism, improved passenger coastal shipping services can offer attractive services that not only have beneficial impacts on the island economies but also on the economy as a whole, through increasing the number of tourists visiting the country.

The broad range of impacts of the Master Plan results in numerous beneficiaries, as shown in Figure 6.4.1. Probably the main beneficiaries would be coastal shipping customers. However transport operators and other groups are also likely to benefit. The extent to which customers rather than transport operators benefit from the Master Plan improvements depends on the competitive situation in the coastal shipping market: if there is adequate competition then most of the benefit from improved coastal shipping should accrue to the customers (and then on to the economy as a whole through lower prices for goods and services, and reduced use of foreign exchange). Without such competition the improvements may not affect costs significantly, or could result merely in increased profits of transport companies.

Reduced maritime accident and environmental costs can affect not only customers and ship operators, through less loss and damage to cargo and ships, but also the community as a whole. In particular, communities living along coasts and rivers will benefit from any reduction in pollution caused by accidents and other shipping-related factors. Other benefits could accrue from implementing the Master Plan - for example the ship building industry could benefit from opportunities to develop new ship building and repair services. However this would only represent a benefit to the country if these industries are internationally competitive, offering services at least as attractive as those provided in neighbouring countries.