CHAPTER 6   MARITIME POLICY FOR COASTAL SHIPPING

CHAPTER 6 MARITIME POLICY FOR COASTAL SHIPPING

In Thailand, there is no clear-cut distinction between domestic coastal shipping and sub-regional coastal shipping apart from the inland waterways and it is rather difficult, or may be impracticable, to separate one from the other at present. However, the Study Team considers it worthwhile to review the current Governmental agencies with the functions thereof and the statutes relating to coastal shipping in Thailand and then make some recommendations.

6.1 Governmental Agencies

In 1979, the Mercantile Marine Promotion Commission Board was set up and the office of the Mercantile Marine Promotion Commission (MMPC) was also established in accordance with the Royal Decree of the Mercantile Marine Promotion Act, B.E. 2521 (1978) with a view to co-ordinating projects and plans relating to the mercantile marine, supervising maritime navigation and executing other duties assigned by the Commission in the field of international ocean shipping.

In 1983, the Thai Government decided that MMPC shall also be responsible for the supervision and policy-making of coastal shipping in Thailand, which, the Study Team considers, is an appropriate action at this time. Details of the functions of MMPC must be worked out with the other Governmental agencies concerned in order to promote the development of coastal shipping in Thailand.

At present, the following agencies are directly and indirectly involved in the service of domestic coastal shipping in Thailand.

(1) Ministry of Communications (See Appendix, Chart A.9-1)

 1) Office of the Permanent Secretary

This office controls the work connected with the planning of long-term policy governing the transportation system of Thailand and is also responsible for the compiling of transportation statistics. The development program of Thai coastal shipping based upon the Fifth National Economic and Social Plan (1982 ∿1986) is being worked out by this Office.

2) Harbour Department (See Appendix, Chart A.9-4)

This Department controls the drafting of laws and regulations governing the navigation of coastal shipping and safety of vessels, the training of seamen, the registration and inspection of vessels, and the construction, maintenance and management of ports and harbours.

3) Office of the Mercantile Marine Promotion Commission (See Appendix, Chart A.9-2)

This Office was established in 1978 as an organization responsible for the drafting and enforcement of the promotion program for international shipping in Thailand. But as stated before, this office will take over the jurisdiction of domestic coastal shipping also.

4) Port Authority of Thailand (See Appendix, Chart A.9-3)

The Authority was founded in 1983 as an official agency controlling the development and management of Thai deep sea ports in response to the expansion of Thai ports and harbours, especially Bangkok Port. The Office of the Port of Bangkok was reorganized into this Authority in 1951. At present, the Authority is engaged in the management of Bangkok Port and Sattahip Commercial Port.

(2) Ministry of Finance

1) Fiscal Policy Office

This office keeps the Minister of Finance informed on general economic conditions, particularly on matters concerning taxes and customs duties. It also has a special duty of studying possibilities for new sources of revenue.

2) Customs Department

Duty must be imposed on cargoes to be exported or imported. Coastal vessels are also put under the supervision of Customs since it is probably for vessels of the Thai flag to carry domestic cargoes and cargoes to be exported or imported on board at the same time. Loading

permits are issued by the Customs house located at the port of loading also for some coastal commodities.

(3) Office of the Prime Minister

1) Office of the Board of Investment

This is an official organization in which applications of incentives provided for promoting investment in coastal shipping are discussed and approved on the basis of whether they are considered beneficial and significant to the economic and social development of Thailand.

2) Office of the National Economic and Social Development Board

This office is the promoting body of the Thai economic and social development plan and is also an organizer of the development program of coastal shipping.

Reviewing the domestic coastal common carrier service, its roles are recognized by all the parties concerned. From the practical point, however, shippers also tend to utilize trucks. Therefore, it is important for the Government to conduct positive administrative directives and guidelines which will stimulate private enterprises engaged in the coastal shipping business.

6.2 Statutes Relating to Domestic Coastal Shipping

The statutes relating to domestic and sub-regional coastal shipping are listed below.

- Thai Vessels Act, B.E. 2481 (1938)
- Navigation in Thai Waters Act, B.E. 2456 (1913)
- Mercantile Marine Promotion Act, B.E. 2521 (1978)
- Port Authority of Thailand Act, B.E. 2494 (1951)
- Investment Promotion Act, B.E. 2520 (1977)
- Customs Law, B.E. 2469 (1926)
- Fifth National Economic and Social Development Plan (1982 1986)

In the aforementioned statutes, each has regulations regarding Thai domestic coastal shipping from its own standpoint such as registration, operation, safety, entry and departure clearance, duty upon the purchase of vessels, etc. However, there does not exist any statute covering all the spheres of domestic coastal shipping. In other words, domestic coastal shipping in Thailand has been allowed to operate under the conditions of "Laissez-faire" or "Free competition".

Although in Thailand domestic coastal shipping is regarded as an important means of transport from the economic and social points of view, its development policy has not yet been established. As a result, particularly the domestic coastal common carrier service towards southern Thailand has been on the decline as the road network has been improved and completed in southern Thailand and at present the domestic coastal common carrier service is not so competitive as trucks.

In order to develop domestic coastal shipping as a state policy, it is recommended that a statute which regulates domestic coastal shipping as a whole be enacted. This point will be amplified further in the forthcoming section on maritime policy.

6.3 Measures for the Development of Domestic Coastal Shipping

According to the analysis of the present situation of Thai domestic coastal shipping, it is probable that domestic coastal shipping other than industrial carriers will be doomed unless any positive measures are taken by the Government. The Study Team considers that no one can hardly neglect the role of domestic coastal shipping as one of the ways for the physical distribution of cargoes in Thailand, and makes the following suggestions as measures to solve this situation.

6.3.1 Status of Domestic Coastal Shipping

First of all, a clear-cut distinction must be made between domestic coastal shipping and international shipping in trade. Secondly, vessels registered with MMPC as "Domestic Trade" can only allowed to participate in domestic coastal shipping and can be placed in a position free from competition with vessels engaged in international shipping. Furthermore, if possible, it is recommended that participation in domestic coastal shipping can not be permitted to operators of international shipping.

For this purpose, it is necessary to enact a statute covering domestic coastal shipping and to establish a Governmental agency having exclusive jurisdiction over domestic coastal shipping. It may be useful to include inland waterways in this agency. The agency must promote domestic coastal shipping and supervise the vessels and operators engaged in domestic coastal shipping for their contribution to the national economy. The agency must give proper guidelines to owners and operators, and take responsibility for the expansion of orderly domestic coastal shipping.

6.3.2 Owners and Operators - Domestic Coastal Shipping

The following three key factors have to be taken into consideration by the Government:

(1) Licensing of operators

(2) Adjustment of tonnage of fleet

(3) Maintaining reasonable freight rates

(1) Licensing of operators

All operators engaged in domestic coastal shipping must obtain a license from or file notice with the agency in charge by submitting the outline of owned vessels, vessels in service, shipping routes, and the operators' activities with their financial status.

The government may choose one of the above two. However, permission is needed in any case for the common carrier prior to operation. Regarding common carrier service, the ports of call, vessels in service, and the type of operation shall be examined beforehand.

(2) Adjustment of tonnage of fleet

When owners take possession of domestic coastal vessels, they must register the vessels at the Harbour Department as usual. Apart from this registration, in order to avoid overtonnage of the domestic coastal fleet and to prevent excessive competition among operators, some system must be established by the agency in charge to stabilize the domestic market in shipping and to adjust the supply and demand of vessels.

(3) Maintaining reasonable freight rates

It tramp and tanker operation, freight rates are fixed by the market, which fluctuate up and down by supply and demand.

Industrial carriers have contracts of affreightment with shippers in most cases, which is, of course, not open to the public.

In the meantime, freight rates quoted by common carriers must be held out for the public and it is desirable that common carriers are requested to file their tariff rates with the agency in charge.

Lastly, every operator must file an annual report covering the volume of cargoes loaded by item and by port of loading/unloading with the agency in charge at the end of year.

6.3.3 Equal Footing with Other Modes of Transportation

In order to carry out the role of domestic coastal shipping as a state policy in parallel with highway transportation and railways engaged in domestic transportation in Thailand, the agency in charge must conduct

a proper administrative directive to the other modes of transport and consider a counterplay by which excessive competition can be avoided. For example, these directives include strict enforcement of payload and tariff rates and the introduction of the principle that beneficiaries (shippers) should pay part of the construction/maintenance costs of roads or railways whenever it becomes necessary.

6.4 Other Actions

It is of urgent necessity to develop domestic coastal shipping by offering as many favours as possible to domestic coastal shipping owners and operators. In this respect, the Study Team recommends followings:

(1) Application of incentives by the Investment Promotion Act

1) Exemption from payment of import duties and/or business taxes on vessels and machinery as may be approved by the Board of Investment

2) Exemption from payment of income tax on the net profit derived from the promoted activity for a period approved by the Board of Investment.

(2) Tax incentives

Besides the exemption from payment of income tax, the following tax incentives can also be considered:

1) Special depreciation may be allowed in addition to the ordinary depreciation

2) Income tax reduction for replacement of old vessels by newly-acquired vessels (Reduced book value for a new vessel)

(3) Simplification of shipping documents (Exemption of deposit by customs law)

Vessels engaged in domestic coastal shipping must be obliged to file only the entry/departure clearance and cargo manifest of the vessels with the Governmental agencies. It is important to permit waivers to the operators of domestic coastal shipping from the Customs law as well as other rules applicable to iternational or sub-regional coastal shipping.

(4) Long-term, low-interest financing

Although in planning the development of domestic coastal shipping direct subsidies by the Government (ship-operating subsidy and ship-building subsidy) are not taken into consideration, there is a need to set up a financial system which helps the owners in purchasing coastal vessels under long-term loans with low interest.

A Government-sponsored finance corporation, if available, must offer the loans to ship owners who are willing to build coastal ships since the domestic market rate of interest in Thailand is rather high compared to that of the international market. Such an offer of loans will directly lead to the improvement of the domestic coastal shipping fleet. For the sake of ship owners who cannot afford to build ships by themselves, joint ship building and ownership of vessels with the Government-sponsored financial corporation is recommendable.

In carrying out such measures it is important to make decisions after obtaining comments not only from the Governmental agencies concerned, but also from domestic coastal shipping operators and owners. There will be a need to set up an association of domestic coastal ship owners and operators or to reorganize and reinforce the existing Thai Ship-owners Association in order to meet the requirements from all private sectors.

CHAPTER 7   CARGO DEMAND FORECAST

CHAPTER 7 CARGO DEMAND FORECAST

7.1 Basic Approach - Methodology

The objective of this Chapter is to estimate the future cargo volume carried by coastal shipping between Bangkok and the South. Generally speaking, the methodology for typical cargo forecasts is to work out the future cargo flow situation by considering statistical trends or specific socio economic conditions in past years. There are two different ways of approaching a forecast; macroscopicly and microscopicly. In most analyses of this type, both methods of analysis will be used so as to check the soundness of the results. The macroscopic estimation is regarded as a basic analysis to confirm the feasibility of the whole project, while the microscopic estimation is regarded as a special technical analysis based on various kinds of data and a scientific approach. In the case of this study, however, The Study Team could not arrive at a macroscopic figure due to the uncertainty of the statistical data mentioned in Chapter 3. Fortunately The Study Team was able to collect various kinds of data related to the major commodities, so that The Study Team could derive reliable figures for the major commoditity flows. These results were summed up to reach an estimate for the total cargo flow. In order to achieve more reliable results, the forecast was carried out using two different economic scenarios to cope with the economic alteration in Thailand. Furthermore, the most notable aspect of this analysis is that The Study Team have taken into consideration split of cargo by transportation mode.

The methodology of this Chapter, what The Study Team call "The four step method" is shown in Table 7.1-1.

The first step is to construct the future economic framework of the South based on the National Development Plan and some other socio-economic statistical data. The second step is to calculate the total cargo flow by hinterland/commodity between Bangkok and the South. The third step is to estimate the amounts of cargo caused by each mode on O-D data. This step requires that some political assumptions be made.

The final step is to estimate the coastal shipping cargo flow by commodity/by port.

Table 7.1-1   Economic Growth in the South

Unit: %

	Low Estimate	High Estimate
1981 ∿ 1987	6.6	7.1
1987 ∿ 2000	5.0	7.5

```
  ┌─────────────────────────┐      ┌─────────────────────────┐
  │ The Future Economic      │      │ The Cargo Flow by        │
  │ Framework of South       │      │ Commodity, Provinces     │
  │ Thailand                 │      │ and Mode at Present      │
  └─────────────────────────┘      └─────────────────────────┘

No                    │
                      ▼
              ╱───────────────╲         ┌─────────────────────────┐
             ╱  Feasible or     ╲       │ The Fifth National       │
             ╲     Not          ╱───────│ Development Plan/Some     │
              ╲───────────────╱         │ other Statistics         │
                      │                 └─────────────────────────┘
                    Yes
                      │
  ┌─────────────────────────┐      ┌─────────────────────────┐
  │ The Total Cargo Flow     │      │ Indicators and Basic     │
  │ for 1987, 1992 and       │◄─────│ Units explains the       │
  │ 2000 by Commodity,       │      │ Relation between Cargo   │
  │ by Province.             │      │ Flow and Socio-          │
  └─────────────────────────┘      │ Economic Activity        │
                                   └─────────────────────────┘
  ┌─────────────────────────┐      ┌─────────────────────────┐
  │ The Cargo Split by mode  │◄─────│ Political Assumptions    │
  └─────────────────────────┘      └─────────────────────────┘

  ┌─────────────────────────┐
  │ The Estimated Value by   │
  │ Port and Commodity       │
  └─────────────────────────┘
```
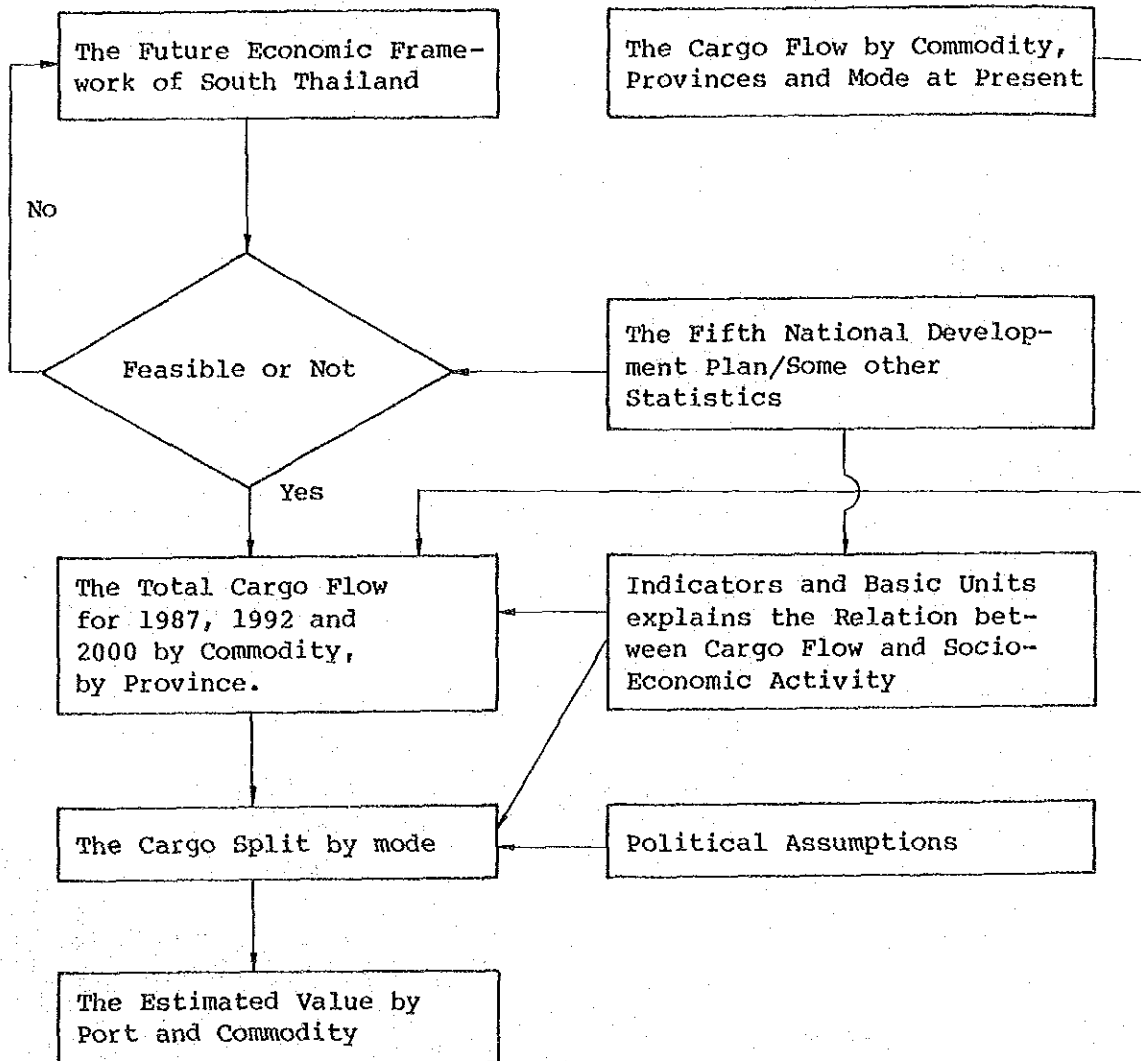
Fig. 7.1-1   Approach of the Future Cargo Forecast

The details of these calculations are attached in Appendix 10.

7.2 Hinterland

A port is surrounded by a sphere of influence within which it can perform the collection or delivery of shipping freight at a cost which is competitive with neighboring ports.

The Study Team call this area its "hinterland". There are six ports located in South Thailand, facing on the Gulf of Thailand, namely Chumphon, Ban Don, Pak Phanang, Songkhla, Pattani and Narathiwat. Prior to analysis, The Study Team defined the hinterland for each port. After examining the flow of major commodities, the road network and some other socio-economic indicators, The Study Team defined the hinterlands of these six ports as follows. And a geographical area is shown in Fig. 7.2-1.

Table 7.2-1   Hinterlands of the Coastal Ports

Port	Hinterland (provinces)
Chumphon	Chumphon, Ranong
Ban Don	Surat Thani, Phangnga, Phuket
Pak Phanang	Nakhon Si Thammarat, Krabi
Songkhla	Songkhla, Satun, Trang, Phatthalung
Pattani	Pattani, Yala
Narathiwat	Narathiwat

7.3   Total Cargo Flow

7.3.1   Southbound Cargo

(1)   General Cargo

According to an estimation based on MOC's statistics, about one million tons of general cargo were carried to the South in 1981, roughly 50 percent of which was carried by truck. This amounted to 40 percent of the total cargo coming into the South (including fuel).

The major destinations being Songkhla, Ban Don, 60 percent was destined for these hinterlands. The future cargo flows to the South in 1987, 1992 and 2000 were calculated as follows. The detail figures, by province by commodity, are attached as Appendix Table A.10-4.
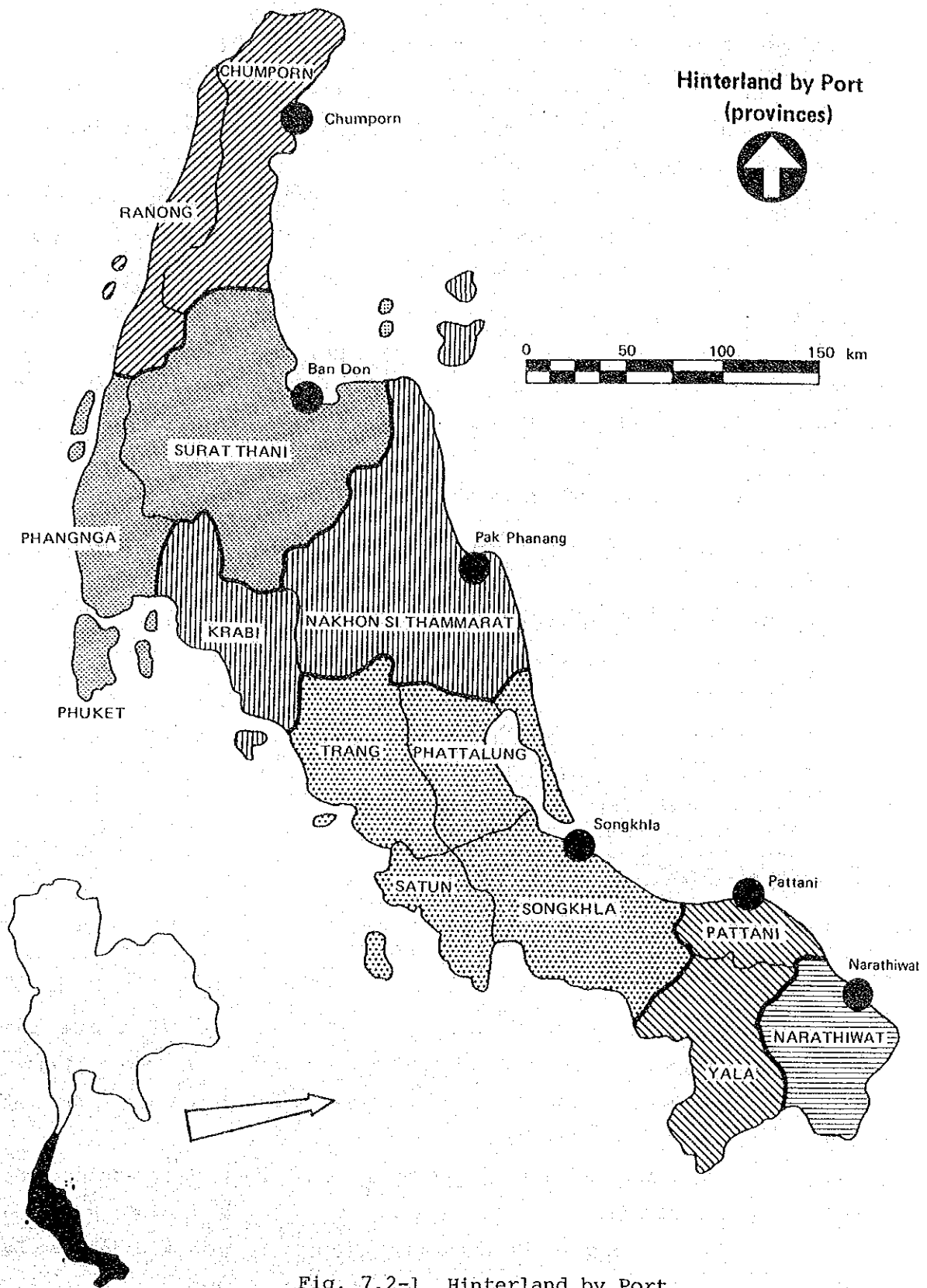
Fig. 7.2-1 Hinterland by Port

Table 7.3-1   Future General Cargo by Hinterland
(Southbound)

Unit: Thousand tons

	Hinterland	Present	Future		
		1981	1987	1992	2000
Low Estimate	Chumphon	145	242	347	519
	Ban Don	250	394	526	783
	Pak Phanang	176	232	279	416
	Songkhla	343	476	615	917
	Pattani	72	111	151	226
	Narathiwat	16	18	21	31
	Total	1,002	1,473	1,939	2,892
High Estimate	Chumphon	145	251	386	719
	Ban Don	250	411	665	1,203
	Pak Phanang	176	242	335	619
	Songkhla	343	495	704	1,302
	Pattani	72	116	168	314
	Narathiwat	16	18	26	46
	Total	1,002	1,533	2,284	4,203

(2) Fertilizer

According to MOC's statistics 44 thousand tons of fertilizer were carried to the South in 1978. Shipping, rail and road transport carried shares of 30 percent, 40 percent and 30 percent respectively. The major destination for fertilizer is Songkhla. According to team's field survey, the consumption of fertilizer in the South has been increasing significantly in recent years, so a shipping company opened fertilizer freight service between Bangkok and Songkhla in 1980. The major consumers of fertilizer are rice farmers and rubber plantations. The future cargo flow is estimated based on statistical data such as the crop area, the percentage of this area treated with fertilizer (by crop), the amount of fertilizer used per unit area, and the future crop area. The forecasts for fertilizer carried to the South in 1987, 1992 and 2000 were calculated as follows.

Table 7.3-2 Future Fertilizer Flow by Hinterland (Southbound)

Unit: Thousand tons

	Hinterland	Present	Future		
		1981	1987	1992	2000
Low/High Estimate	Chumphon	7	8	12	26
	Ban Don	11	23	39	80
	Pak Phanang	8	45	71	137
	Songkhla	70	54	91	179
	Pattani	2	16	28	60
	Narathiwat	1	11	20	42
	Total	99	157	261	524

(3) Construction Material

The volume of construction materials carried to the South in 1981 was 236,000 tons, of which 82 percent when carried by truck. The major destinations for these materials are Songkhla, Surat Thani and Nakhon Si Thammarat.

Recently, the growth of the construction sector of the GPP has been very rapid. This tendency will continue for some time. The future cargo flow to the South in 1987, 1992 and 2000 are obtained by using statistics on the cargo flow and the GPP of the construction sector.

Table 7.3-3   Future Construction Material Flow
by Hinterland (Southbound)

Unit: Thousand tons

	Hinterland	Present	Future		
		1981	1987	1992	2000
Low Estimate	Chumphon	31	52	69	116
	Ban Don	58	107	164	277
	Pak Phanang	22	38	55	104
	Songkhla	101	229	290	344
	Pattani	19	53	89	121
	Narathiwat	5	11	17	32
	Total	236	490	684	994
High Estimate	Chumphon	31	52	89	208
	Ban Don	58	112	221	376
	Pak Phanang	22	40	68	177
	Songkhla	101	241	297	409
	Pattani	19	56	97	152
	Narathiwat	5	12	23	62
	Total	236	513	795	1,384

(4) Rice

According to MOC's statistics 54 thousand tons of rice were carried to the South in 1981, 60 percent of which was carried by truck. The most important related to rice transportation in Thailand is that coastal shipping companies are not able to carry rice because of the complicated Custom's procedures. The consumption of rice is expected to grow in proportion to the growth of the population.

Table 7.3-4 Future Rice Flow by Hinterland (Southbound)

Unit: Thousand tons

	Hinterland	Present	Future		
		1981	1987	1992	2000
Low/High Estimate	Chumphon	17	20	21	24
	Ban Don	6	6	8	8
	Pak Phanang	13	14	15	17
	Songkhla	7	8	8	9
	Pattani	5	6	6	7
	Narathiwat	6	7	7	8
	Total	54	61	65	73

(5) Maize

In 1981, 29,000 tons of maize were carried to the South. The consumption of maize is assumed to grow in proportion to the growth of the live stock population.

Table 7.3-5 Future Maize Flow by Hinterland (Southbound)

Unit: Thousand tons

	Hinterland	Present	Future		
		1981	1987	1992	2000
Low/High Estimate	Chumphon	2	5	7	15
	Ban Don	2	9	13	20
	Pak Phanang	1	9	13	25
	Songkhla	24	17	25	46
	Pattani	–	4	7	12
	Narathiwat	–	1	2	2
	Total	29	45	67	120

(6) Fuel

In 1980, 855 tons of fuel were consumed in the South, some 8 percent of the domestic consumption. After examining various statistics, The Study Team concluded that fuel consumption is proportional to the total GDP.

The future cargo flow to the South is as follows.

Table 7.3-6 Future Fuel Flow by Hinterland (Southbound)

Unit: Thousand tons

	Hinterland	Present	Future		
		1981	1987	1992	2000
Low Estimate	Chumphon	103	124	144	158
	Ban Don	246	312	326	351
	Pak Phanang	139	136	134	148
	Songkhla	284	286	301	331
	Pattani	90	102	116	127
	Narathiwat	55	46	45	49
	Total	917	1,006	1,066	1,170
High Estimate	Chumphon	103	171	258	475
	Ban Don	246	431	633	1,074
	Pak Phanang	139	188	261	480
	Songkhla	294	395	554	1,021
	Pattani	90	142	207	380
	Narathiwat	55	63	90	165
	Total	917	1,390	2,003	3,595

7.3.2 Northbound Cargo

(1) General Cargo

According to MOC's statistics, 104 thousand tons of cargo when carried to Bangkok in 1981.

The future cargo flow to Bangkok is proportional to the growth of GPP (manufacture sector) in the South.

The future cargo flow to Bangkok is as follows.

Table 7.3-7 Future General Cargo Flow by Hinterland (Northbound)

Unit: Thousand tons

	Hinterland	Present	Future		
		1981	1987	1992	2000
Low Estimate	Chumphon	14	25	36	66
	Ban Don	19	37	56	112
	Pak Phanang	15	24	34	56
	Songkhla	47	77	107	189
	Pattani	6	8	10	15
	Narathiwat	3	5	7	12
	Total	104	176	250	450
High Estimate	Chumphon	14	25	43	104
	Ban Don	19	39	73	202
	Pak Phanang	15	25	41	88
	Songkhla	47	80	131	306
	Pattani	6	9	13	23
	Narathiwat	3	5	8	18
	Total	104	183	309	736

(2) Forestry Products

As mentioned in Chapter 2, the Government has a policy to preserve the Kingdom's forests.

Therefore the Study Team assumed that the demand for fuel wood will decline in the case of high economic growth, but will increase if the national economy remains inactive.

The future transport of forestry products is as follows.

Table 7.3-8 Future Forestry Products Flow by Hinterland (Northbound)

Unit: Thousand tons

	Hinterland	Present	Future		
		1981	1987	1992	2000
Low Estimate	Chumphon	261	293	324	380
	Ban Don	109	122	136	159
	Pak Phanang	53	60	66	77
	Songkhla	25	29	31	36
	Pattani	13	15	16	19
	Narathiwat	7	8	9	10
	Total	468	527	582	681
High Estimate	Chumphon	261	261	261	261
	Ban Don	109	109	109	109
	Pak Phanang	53	53	53	53
	Songkhla	25	25	25	25
	Pattani	13	13	13	13
	Narathiwat	7	7	7	7
	Total	468	468	468	468

(3) Fish Products

According to Chapter 2, the future fish products flow to Bangkok is as follows.

Table 7.3-9   Future Fish Products Flow (Northbound)

Unit: Thousand tons

	Hinterland	Present	Future		
		1981	1987	1992	2000
Low Estimate	Chumphon	188	212	234	274
	Ban Don	183	206	227	267
	Pak Phanang	40	47	51	59
	Songkhla	128	144	159	186
	Pattani	34	38	42	50
	Narathiwat	11	12	14	16
	Total	584	659	727	852
High Estimate	Chumphon	188	347	384	449
	Ban Don	183	693	765	896
	Pak Phanang	40	87	96	112
	Songkhla	128	309	341	400
	Pattani	34	253	375	439
	Narathiwat	11	12	14	16
	Total	584	1,701	1,975	2,312

(4) Vegetable/Fruit

As for the vegetable crops and fruit, there are no production statistics available by province. So The Study Team used the actual transport statistics of 1981 and the projected economic growth of each crop.

The vegetables and fruit mainly originate in the upper south provinces and are transported by truck.

Table 7.3-10 Future Vegetable/Fruit Flow (Northbound)

Unit: Thousand tons

	Hinterland	Present	Future		
		1981	1987	1992	2000
Low/High Estimate	Chumphon	25	34	42	59
	Ban Don	41	53	67	95
	Pak Phanang	12	17	20	29
	Songkhla	6	9	12	16
	Pattani	5	7	8	12
	Narathiwat	2	3	3	5
	Total	91	123	152	216

(5) Rice

Northbound rice originates in only three provinces, namely Nakhon Si Thammarat Phatthalung and Songkhla, since these provinces are the main producing provinces in the South.

The future flow of rice to Bangkok is correlated to the growth rate of rice production in Thailand.

Table 7.3-11 Future Rice Flow (Northbound)

Unit: Thousand tons

	Hinterland	Present	Future		
		1981	1987	1992	2000
Low/High Estimate	Chumphon	-	-	-	-
	Ban Don	-	-	-	-
	Pak Phanang	25	30	34	42
	Songkhla	18	22	25	30
	Pattani	-	-	-	-
	Narathiwat	-	-	-	-
	Total	43	52	59	72

(6) Rubber to Bangkok

In 1981, 80,000 tons of rubber were transported to Bangkok. After completion of the Songkhla Port, the flow of rubber to Bangkok will decline.

It is assumed that only a few rubber processing factories located in the upper south district will send their goods to Bangkok.

Examining the distances to port and the factories' locations only Surat Thani and Pak Phanang will be able to send rubber to Bangkok.

Table 7.3-12 Future Rubber Flow (Northbound)

Unit: Thousand tons

	Hinterland	Present	Future		
		1981	1987	1992	2000
Low/High Estimate	Chumphon	-	-	-	-
	Ban Don	30	19	25	35
	Pak Phanang	50	34	45	60
	Songkhla	-	-	-	-
	Pattani	-	-	-	-
	Narathiwat	-	-	-	-
	Total	80	53	70	95

7.3.3 Total Cargo Flow

The figures for total cargo by commodities are shown in Fig. 7.3-1.

The remarkable difference between the southbound low and high growth scenarios comes from the difference in fuel cargo.

The low estimate trend shows that fuel will not increase while in the case of high, it will increase a great deal.

Northbound cargo is not expected to increase even if economic growth maintains a high level, except for fish products.

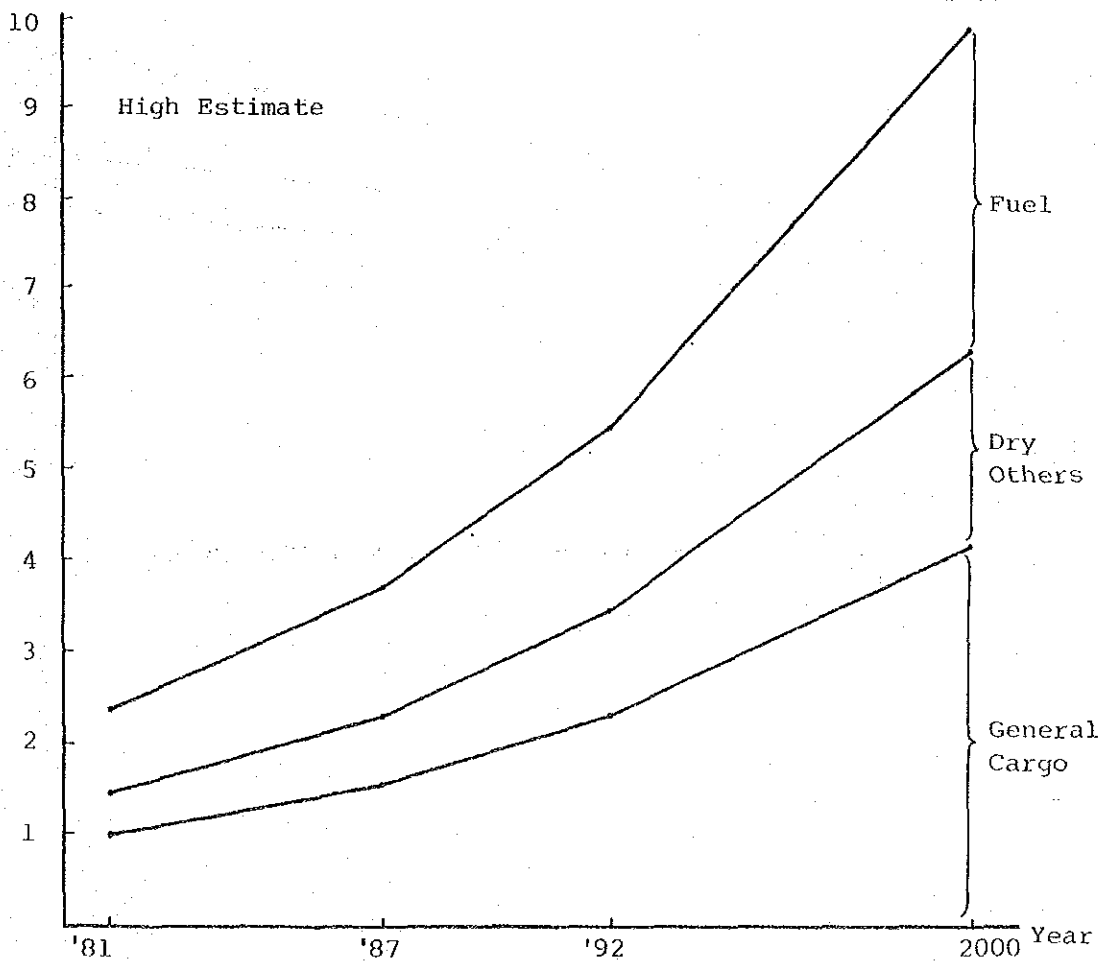The detailed figures by commodity are attached in Appendix Table A.10-39.
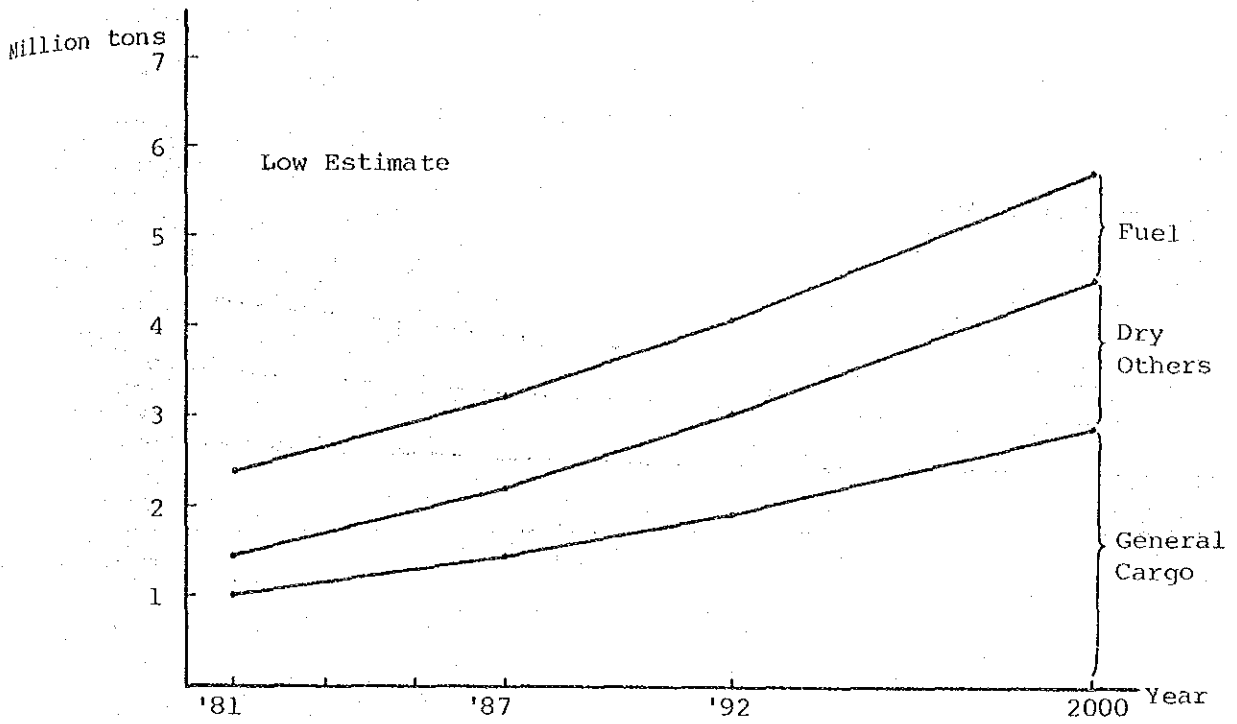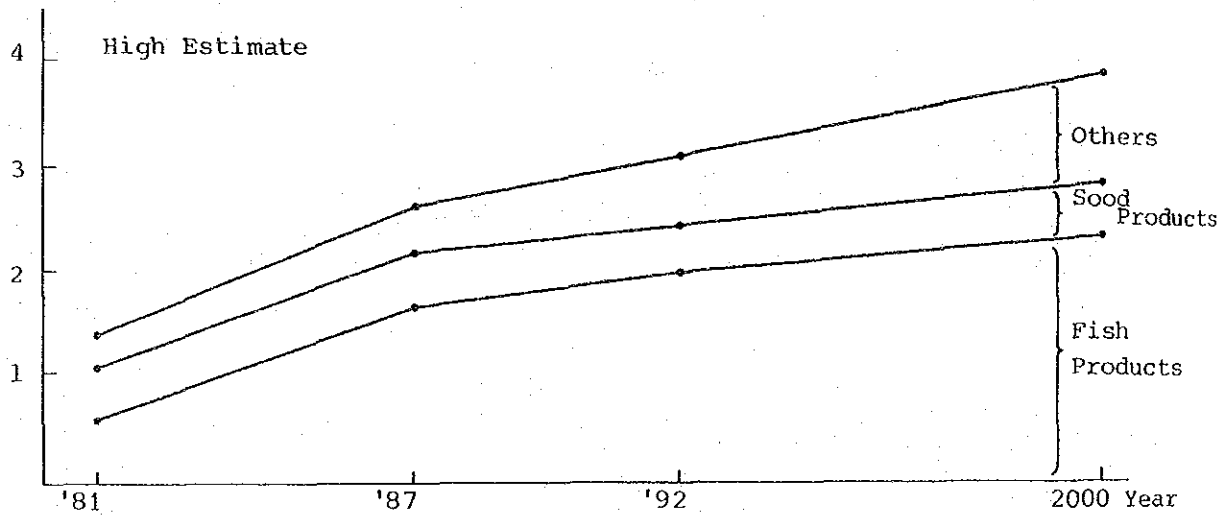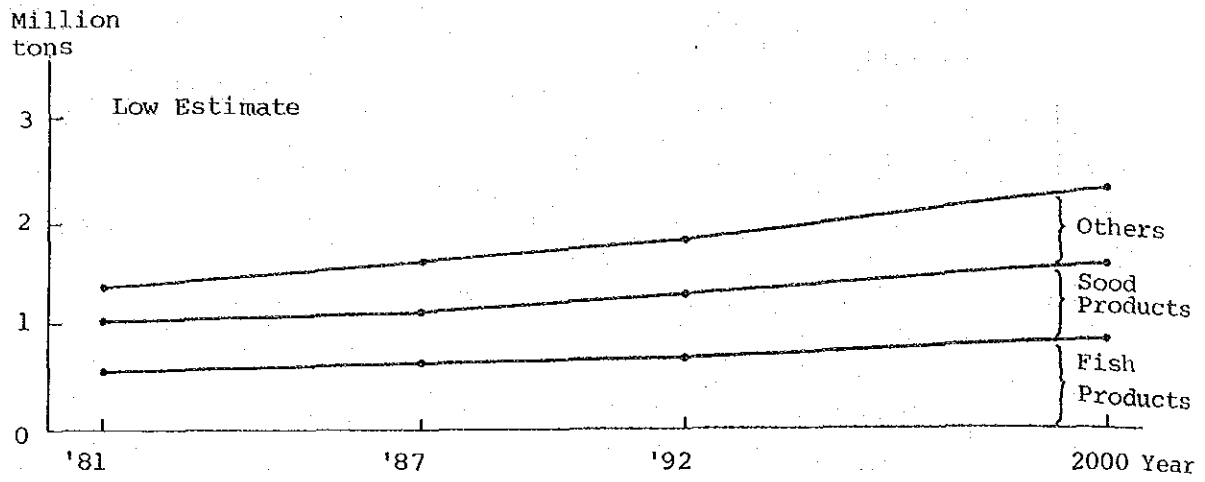
Fig. 7.3-1 Future Total Cargo Flow (Southbound)

Fig. 7.3-2 Future Total Cargo Flow (Northbound)

The figures for each hinterland as shown in Fig. 7.3-3.

Songkhla, Ban Don, Chumphon account for roughly 70 percent of the total southbound cargo flow.

In the case of high economic growth, Songkhla and Ban Don contribute to the growth of the flow.

While Northbound flow, in the case of the low growth scenario, shows that the shorter the distance to Bangkok the quarter the cargo flow will be, in the case high growth the cargo flow from Ban Don will be the largest in volume due to the increasing transportation of fish products.
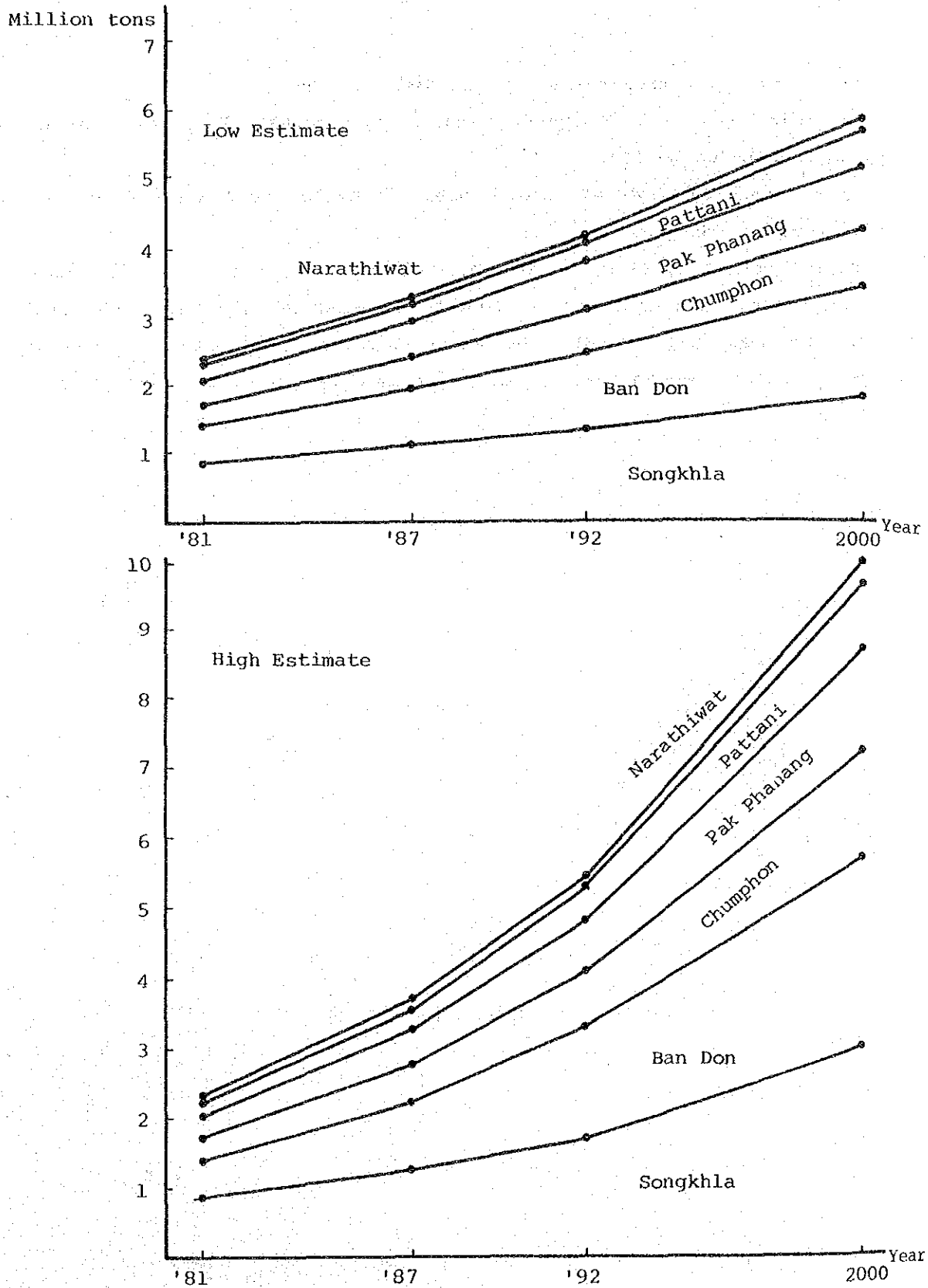
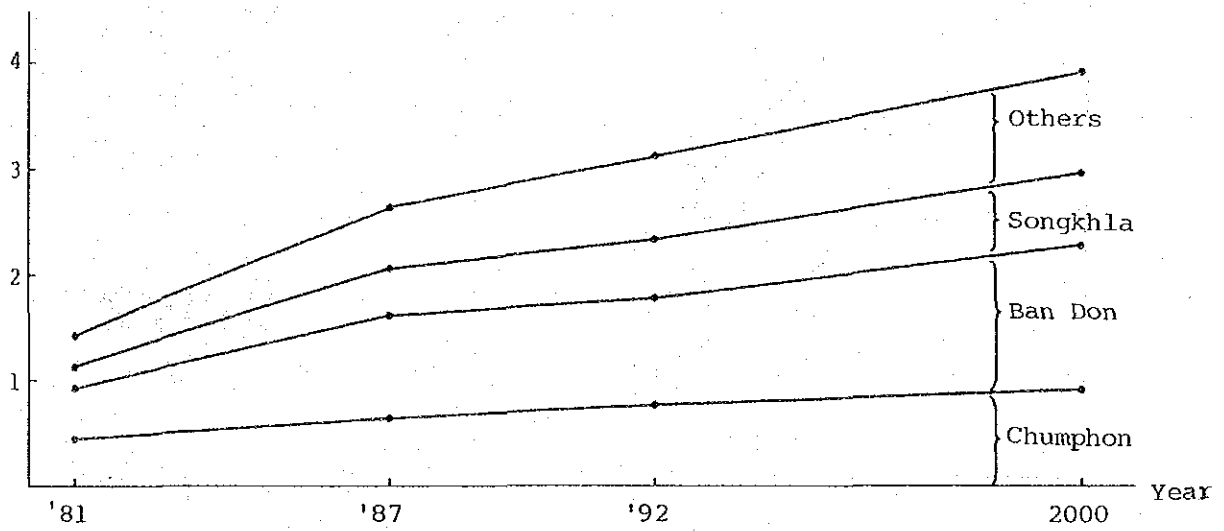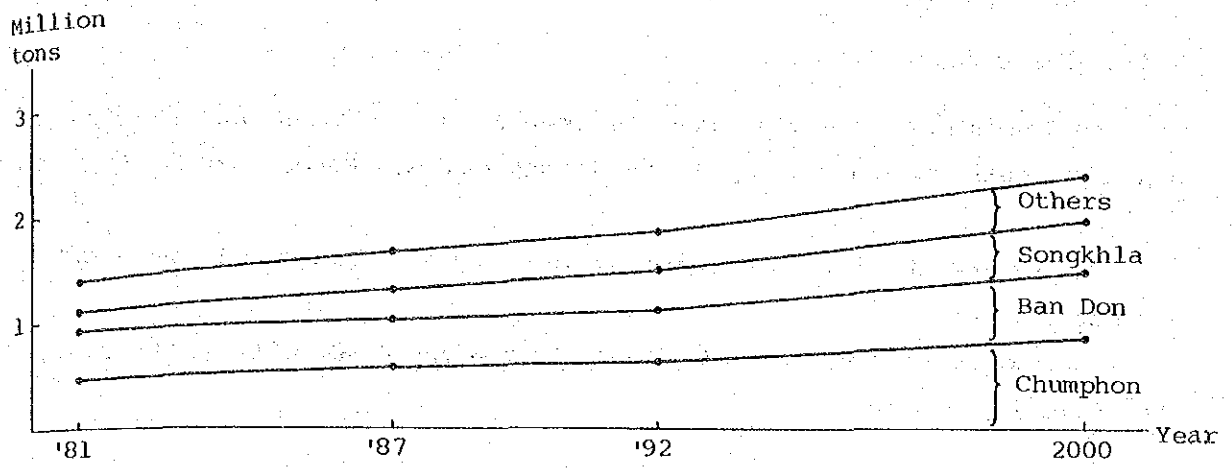Fig. 7.3-3 Future Total Cargo Flow by Hinterland (Southbound)

Fig. 7.3-4 Future Total Cargo Flow by Hinterland (Northbound)

7.4 The Cargo Split by Mode

7.4.1 The Concept

As The Study Team mentioned in Chapter 3 the cargo between Bangkok and the South is carried by three transportation modes; road, rail and ship.

The selection of a mode mainly depends on the distance between origin and destination.

To make this easy to understand, The Study Team will explain using the following figure.
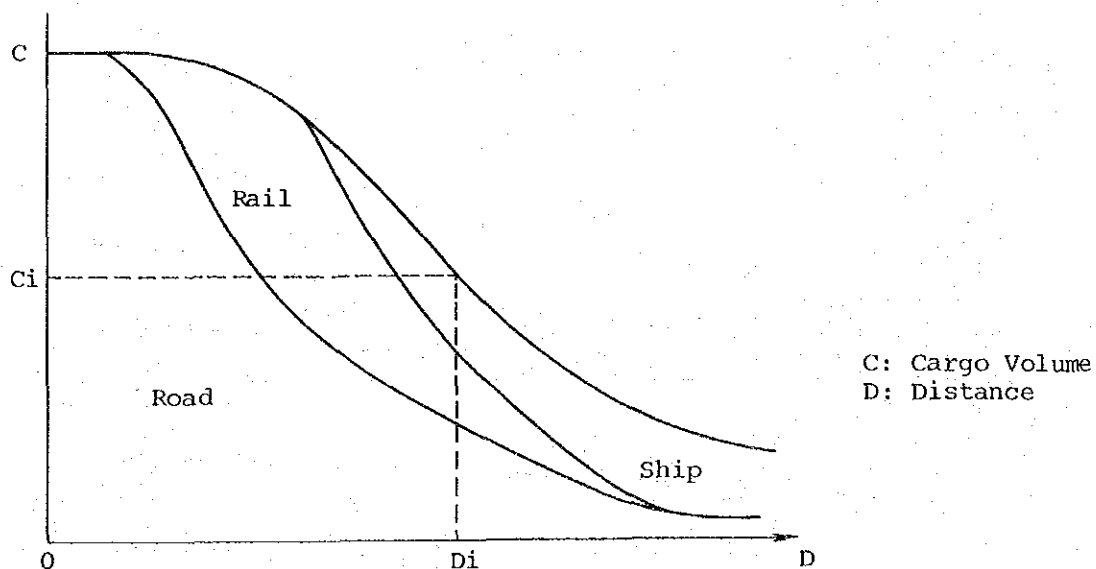
Fig. 7.4-1 Concept of Modal Split

The volume of cargo "Ci" carried over a distances Di km declines gradually in proportion to the distance. If Di is small, in other words, in case of a short transportation distance, most cargo is carried by road. If the distance is intermediate, much of the cargo is carried by rail, while over long distances, most cargo is carried by ship.

This tendency is an universal phenomena caused by the differences in the transport freight rates and services.

A detailed flow of the figures by commodity is attached in Appendix 10.

7.4.2 The Percentage of Cargo Commodity by Ship (by Hinterland)

From this analysis The Study Team can calculate the curves representing the modal distribution of cargo including the percentages of cargo carried by ship for each hinterland by commodity.
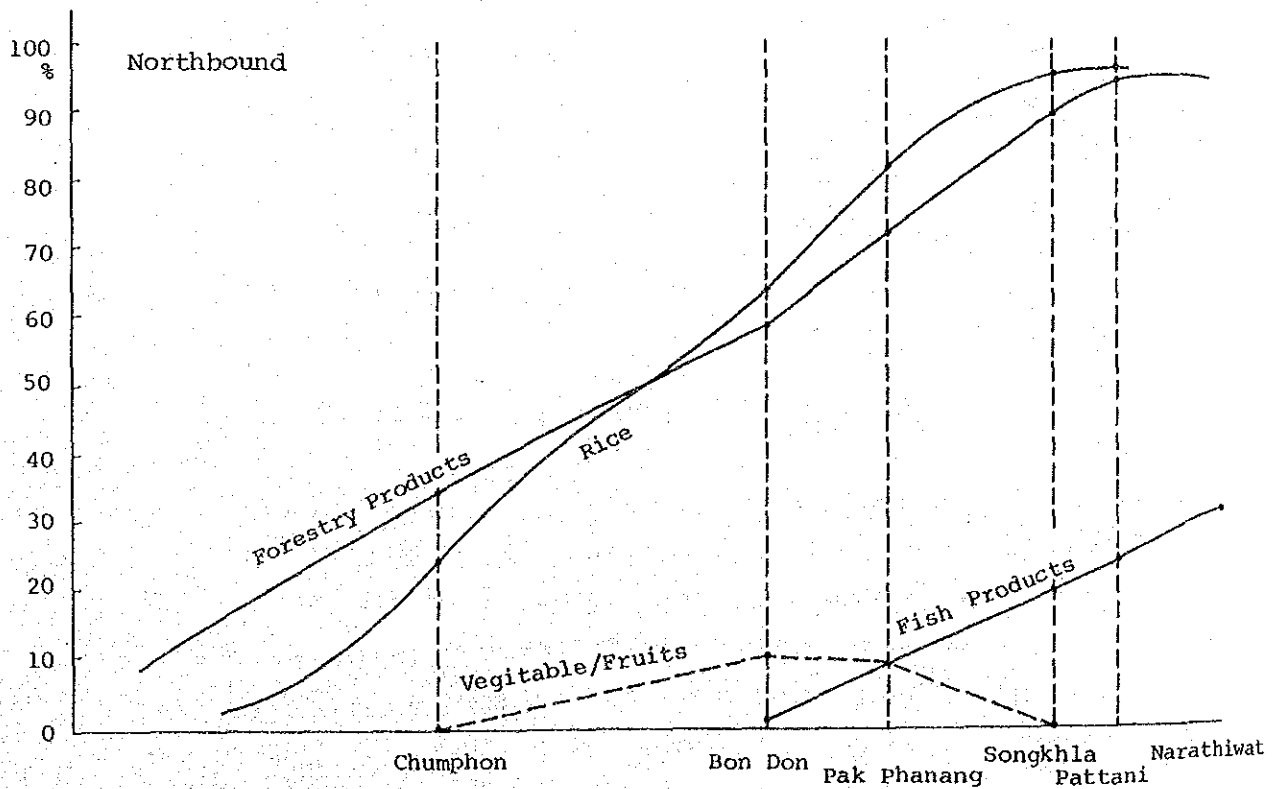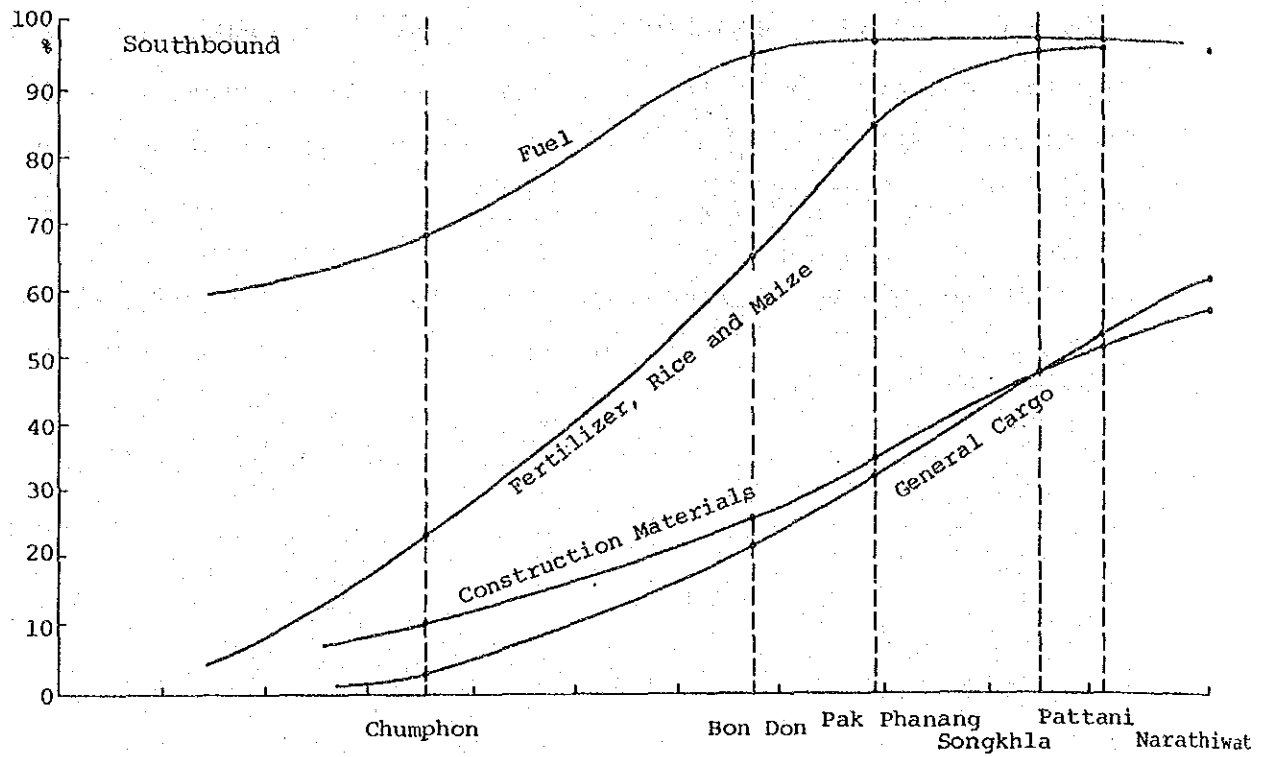
Fig. 7.4-2 Percentage of Cargo Carried by Ship and Distance

7.5 The Shipping Cargo Volume by Port

By multiplying the total cargo volume of each hinterland by that hinterland's shipping percentage, the Study Team can arrive at the following graphs.

From these graphs, The Study Team can easily understand the following terms.

1) From the view point of cargo volume, it is expected that Songkhla, Pak Phanang, Ban Don and Pattani will become major local ports for common carrier service.

2) A northbound service, however, will be hopeless due to a lack of cargo in some of the ports.

3) Songkhla and Ban Don can also play an important role in fuel transportation. The dredging work in Ban Don (Tha Thong) will produce a tremendous benefit for petroleum transportation.

4) Looking at this data, The Study Team can see that it is needless to develop public facilities at Narathiwat, Chumphon.

The detailed data by commodity/port is as follows.
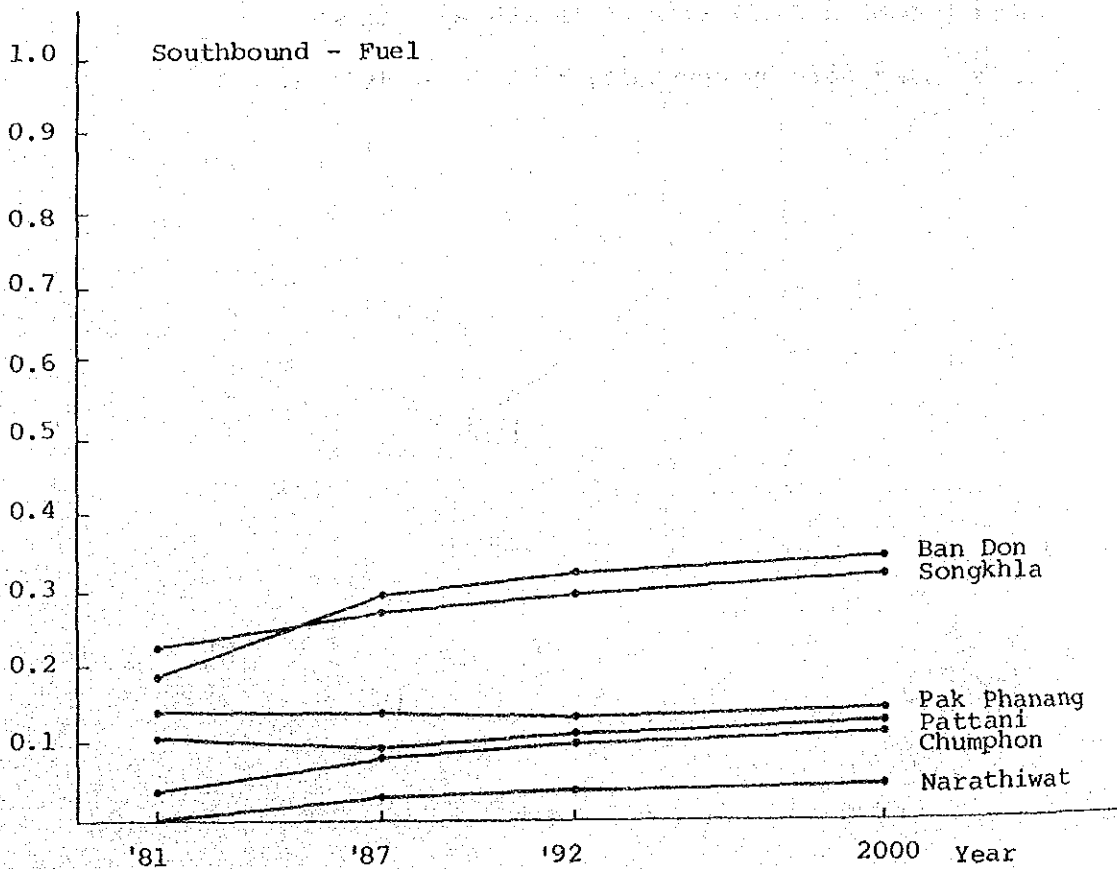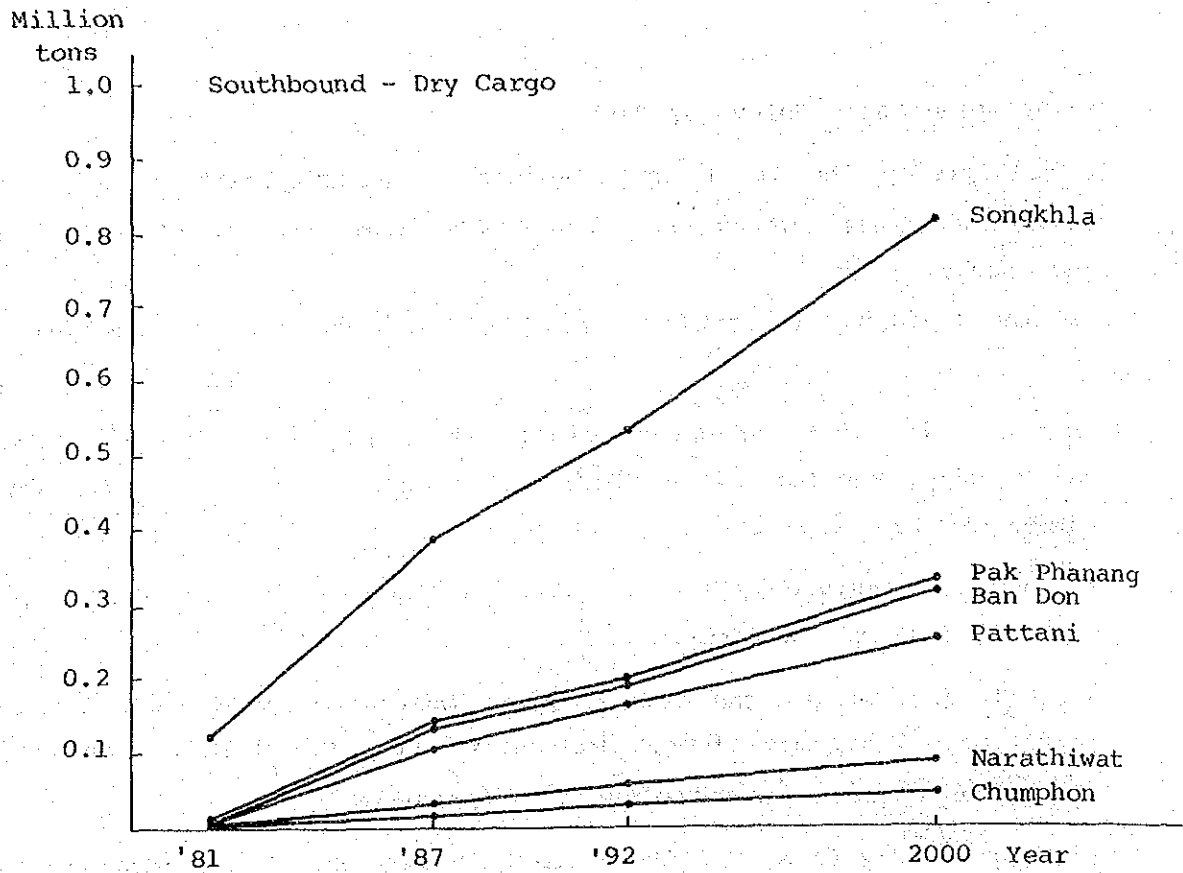
Fig. 7.5-1 Total Sea Born Cargo - Low Estimate (Southbound)
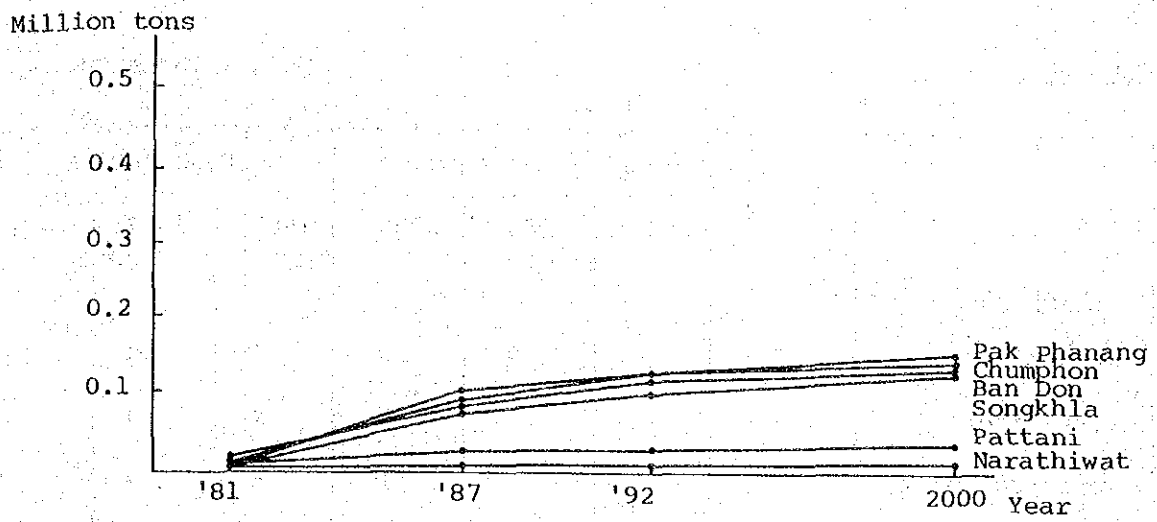
Fig. 7.5-2 Total Sea Born Cargo - Low Estimate (Northbound)

Table 7.5-1 Estimated Cargo Volume by Port

Chumphon   Unit: Thousand tons

	1981	Low Estimate			High Estimate		
		1987	1992	2000	1987	1992	2000
Southbound							
General Cargo	0	6	9	13	7	10	19
Fertilizer	0	2	3	6	2	3	6
Construction M.	0	5	7	11	5	9	21
Rice	0	5	5	6	5	5	6
Maize	0	1	2	4	1	2	4
Dry Total	0	19	26	40	20	29	56
Fuel	44	84	97	107	116	175	321
Total	44	103	123	147	136	204	377
Northbound							
General Cargo	0	0	0	0	0	0	0
Wood Product	0	101	112	131	90	90	90
Fish Product	0	0	0	0	0	0	0
Vegetables F.	0	0	0	0	0	0	0
Rice	0	0	0	0	0	0	0
Rubber	0	0	0	0	0	0	0
Total	0	101	112	131	90	90	90
Grand Total	44	204	235	278	226	294	367

Table 7.5-2 Estimated Cargo Volume by Port

Ban Don   Unit: Thousand tons

	1981	Low Estimate			High Estimate		
		1987	1992	2000	1987	1992	2000
Southbound							
General Cargo	4	83	111	165	87	140	254
Fertilizer	0	14	25	50	14	25	50
Construction M.	0	27	41	70	28	56	95
Rice	0	4	5	5	4	5	5
Maize	0	6	8	13	6	8	13
Dry Total	4	134	190	303	139	234	417
Fuel	193	296	310	339	409	601	1020
Total	197	430	500	642	548	835	1437
Northbound							
General Cargo	3	5	7	11	5	8	17
Wood Product	10	71	79	92	63	63	63
Fish Product	0	3	4	4	11	12	14
Vegetables F.	0	4	7	9	4	7	9
Rice	0	0	0	0	0	0	0
Rubber	0	6	8	11	6	8	11
Total	13	89	105	127	89	98	114
Grand Total	210	519	605	769	637	933	1551

Table 7.5-3 Estimated Cargo Volume by Port

Pak Phanang   Unit: Thousand tons

	1981	Low Estimate			High Estimate		
		1987	1992	2000	1987	1992	2000
Southbound							
General Cargo	7	74	88	132	77	106	196
Fertilizer	0	38	60	116	38	60	116
Construction M.	0	13	19	35	14	23	60
Rice	0	12	13	14	12	13	14
Maize		8	11	21	8	11	21
Dry Total	7	145	191	318	149	213	407
Fuel	135	129	127	141	179	248	456
Total	142	274	318	459	328	461	863
Northbound							
General Cargo	8	13	19	31	14	23	49
Wood Product	0	43	47	55	38	38	38
Fish Product	3	4	5	5	8	9	10
Vegetables F.	0	2	2	3	2	2	3
Rice	0	25	29	36	25	29	36
Rubber	0	10	14	18	10	14	18
Total	11	97	116	148	97	115	154
Grand Total	153	371	434	607	425	576	1017

Table 7.5-4 Estimated Cargo Volume by Port

Songkhla   Unit: Thousand tons

	1981	Low Estimate			High Estimate		
		1987	1992	2000	1987	1992	2000
Southbound							
General Cargo	59	218	282	420	227	322	596
Fertilizer	55	51	86	170	51	86	170
Construction M.	0	105	133	158	111	136	188
Rice	0	8	8	9	8	8	9
Maize	8	16	24	44	16	24	44
Dry Total	122	398	533	801	413	576	1007
Fuel	222	272	286	314	375	526	970
Total	344	670	819	1115	788	1102	1977
Northbound							
General Cargo	5	9	14	27	10	18	46
Wood Product	1	26	28	32	22	22	22
Fish Product	0	27	30	35	59	65	76
Vegetables F.	0	0	0	0	0	0	0
Rice	0	21	24	29	21	24	29
Rubber	0	0	0	0	0	0	0
Total	6	83	96	123	112	129	173
Grand Total	350	753	915	1238	900	1231	2150

Table 7.5-5 Estimated Cargo Volume by Port

Pattani   Unit: Thousand tons

	1981	Low Estimate			High Estimate		
		1987	1992	2000	1987	1992	2000
Southbound							
General Cargo		57	77	115	59	86	160
Fertilizer		15	27	57	15	27	57
Construction M.	0	27	45	61	28	49	76
Rice	0	6	6	7	6	6	7
Maize	0	4	7	10	4	7	10
Dry Total	0	109	162	250	112	175	310
Fuel	114	97	110	121	135	197	361
Total	114	206	272	371	247	372	671
Northbound							
General Cargo	1	1	2	3	2	2	4
Wood Product	2	14	15	18	12	12	12
Fish Product	0	9	10	11	57	85	100
Vegetables F.	0	0	0	0	0	0	0
Rice	0	0	0	0	0	0	0
Rubber	0	0	0	0	0	0	0
Total	3	24	27	32	71	99	116
Grand Total	117	230	299	403	318	471	787

Table 7.5-6 Estimated Cargo Volume by Port

Narathiwat   Unit: Thousand tons

	1981	Low Estimate			High Estimate		
		1987	1992	2000	1987	1992	2000
Southbound							
General Cargo	0	11	13	19	11	16	28
Fertilizer	0	10	19	40	10	19	40
Construction M.	0	7	10	19	7	14	37
Rice	0	7	7	8	7	7	8
Maize	0	1	2	2	1	2	2
Dry Total	0	36	51	88	36	58	115
Fuel	0	44	43	47	60	86	157
Total	0	80	94	135	96	143	272
Northbound							
General Cargo	0	0	0	0	0	0	0
Wood Product	0	8	9	10	7	7	7
Fish Product	0	4	4	5	4	4	5
Vegetables F.	0	0	0	0	0	0	0
Rice	0	0	0	0	0	0	0
Rubber	0	0	0	0	0	0	0
Total	0	12	13	15	11	11	12
Grand Total	0	92	107	150	107	154	284

Table 7.5-7 Estimated Cargo Volume by Port

Bangkok   Unit: Thousand tons

|	1981	Low Estimate			High Estimate		
		1987	1992	2000	1987	1992	2000
Southbound							
General Cargo	70	449	580	864	468	680	1,253
Fertilizer	55	130	220	439	130	220	439
Construction Material	0	184	255	354	193	287	477
Rice	0	42	44	49	42	44	49
Maize	8	36	54	94	36	54	94
Dry Total	133	841	1,153	1,800	869	1,285	2,312
Fuel	708	922	973	1,069	1,274	1,833	3,285
Total	841	1,763	2,126	2,869	2,143	3,118	5,597
Northbound							
General Cargo	17	28	42	72	31	51	116
Wood Product	13	263	290	338	232	232	232
Fish Product	3	47	53	60	139	175	205
Vegetables/Fruit	0	6	9	12	6	9	12
Rice	0	46	53	65	46	53	65
Rubber	0	16	22	29	16	22	29
Total	33	406	469	576	470	542	659
Grand Total	874	2,169	2,595	3,445	2,613	3,660	6,256
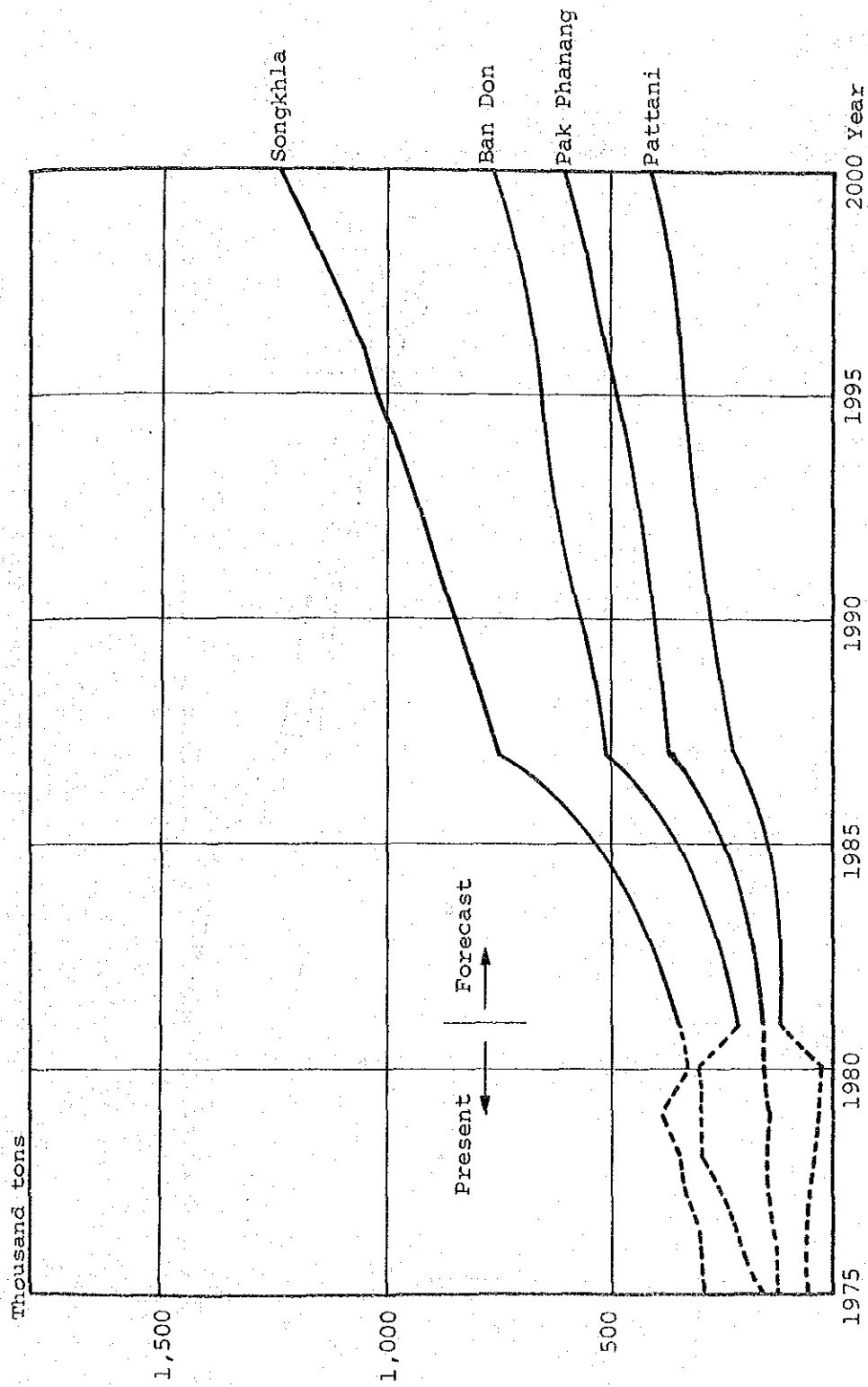
Fig. 7.5-3 Cargo Forecasting of Total (Low Estimate)
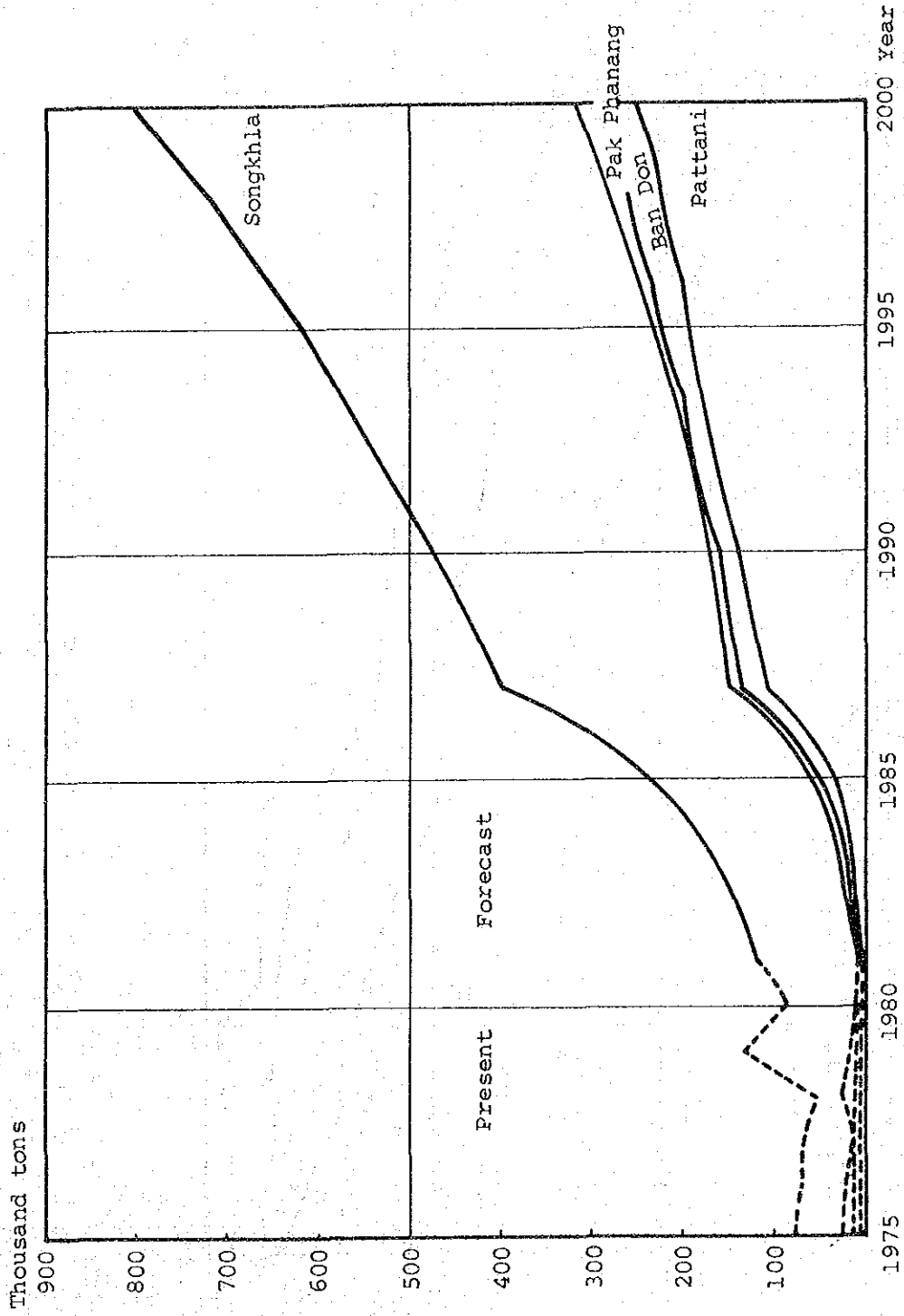
Fig. 7.5-4 Cargo Forecasting of Dry Cargo from Bangkok (Low Estimate)

CHAPTER 8 DEVELOPMENT PLAN OF DOMESTIC COASTAL COMMON CARRIER SERVICE

CHAPTER 8   DEVELOPMENT PLAN OF DOMESTIC COASTAL COMMON CARRIER SERVICE

8.1   Roles of Domestic Shipping

The roles that domestic coastal shipping will play in the transport of the cargoes suitable for coastal shipping described in Chapter 3 are amplified below.   It is expected that these roles will raise the contribution of domestic coastal shipping to the transport of these cargoes up to a level of importance equal with that of railways and trucks.

(1)   Efficient Use of Energy

The supply of crude oil remains unstable as yet all over the world although the current price of crude oil is being softened by chance. There is much difficulty in predicting when the Tertiary Oil Crisis will occur and this makes long-term economic forecasts more problematic.

In the case of the long-distance transportation of cargoes (i.e., 500 km or more), shipping is the cheapest method of transportation and also the most energy-efficient.   Regarding energy consumption by domestic coastal shipping, an analysis is made as per Appendix 11.

(2)   Economic Stability

In connection with major cargoes, a stable transportation system based upon reasonable freight rates can be secured by having long-term contracts of affreightment on some major cargoes.   That is to say, the transportation costs of major cargoes will be stabilized over a long period of time which will then result in the promotion of a more stable national economy.

(3)   Support to Related Industries

The promotion of the development and expansion of coastal shipping will have far-reaching effects on its ancillary industries such as ship-building, repairing and machinery, etc.

(4) Expansion of Job Opportunities and Technological Improvements

The development of coastal shipping will contribute to the expansion of job opportunities for seamen, longshoremen and other related workers, and the maintenance and improvement of technology.

(5) Environmental Protection

It is considered that in maritime transportation, the problems of air pollution and noise are more avoidable and, in addition, safety is secured compared with land transport especially trucks.

(6) Security of Alternate Transportation Routes (National Security)

As Thailand has 4 neighboring countries, it is probable for Thailand to have difficulties in securing land transportation routes in case of international dispute or sudden disaster by Act of God.

For the sake of the security of transport routes, domestic coastal shipping must be promoted and developed.

(7) Relief from Traffic Congestion and Savings in Road Maintenance Costs

In the Bangkok metropolitan area, traffic congestion is getting worse year by year and 10-wheel truck traffic will have to be restricted in a few years to come. Needless to say, domestic coastal shipping will alleviate this difficulty.

The less the traffic of trucks become over the road between Bangkok and the southern provinces, the smaller the budget needed for the maintenance of the roads.

As discussed above, the private sector is playing the role of the transport of petroleum, fertilizer and logs in the domestic coastal trade. In the future the private sector will be able to respond to the demand by the shippers even if a positive measure is not taken by the Government. A possible problem will be how the Government and private sector work out regarding the plan of the replacement and expansion of current fleet. On top of this, review of the transport system of general cargoes by domestic coastal shipping is of an urgent need. For this reason the service by domestic coastal common carriers between Bangkok and the Southern provinces is taken up in this chapter.

Passenger service also is excluded from our study this time because rail, highway and air are major modes of transportation of passengers and passenger service by vessels can not be competitive with those modes of transportation and also not remunerative for operators and owners.

8.2 Projected Trade Routes and Types of Vessels

8.2.1 Selection of Trade Routes

The distance between Bangkok and Songkhla is 950 km by land and 400 sea miles (740 km) by sea, and Bangkok-Ban Don (Surat Thani) 670 km by land and 296 sea miles (548 km) by sea. These distances exceed the minimum distance required to make coastal shipping viable. The distance between Songkhla and Ban Don by sea is 190 sea miles (350 km) and obviously too short for an independent route.

Accordingly, the shuttle service between Bangkok and Songkhla or 3 ports call (Triangular assignment) of Bangkok-Songkhla-Ban Don is preferable judging from the distance by sea. According to comparatively low estimated figures included in the demand forecast of cargoes (Ref. 7 Cargo Demand Forecast), cargo movement (excluding oil, fertilizer and wood) of each port in 1987 is estimated as mentioned below.

The Study Team estimated that in the port of Songkhla 40 percent from Pattani District and 10 percent from Narathiwat District will be loaded in addition to 100 percent from Songkhla District and also in the port of Surat Thani 20 percent from Pak Panang will be loaded in addition to 100 percent from Ban Don.

Unit: Thousand tons

Port		South- bound	North- bound
Ban Don (Surat Thani)	Surat Thani (100%)	119	13
	Pak Panang (20%)	21	8
	Total	140	21
Songkhla	Songkhla (100%)	346	48
	Pattani (40%)	37	4
	Narathiwat (10%)	2	--
	Total	385	52

Based upon the above, the volume of cargoes are respectively esti-mated to be 385 thousand tons from Bangkok to Songkhla (Southbound), 52 thousand tons from Songkhla to Bangkok (Northbound), 140 thousand tons from Bangkok to Ban Don (Southbound) and 21 thousand tons from Ban Don to Bangkok (Northbound). Thus, the total volume of cargoes are estimated to be 525 thousand tons for Southbound and 73 thousand tons for Northbound respectively.

Included in these figures are the cargoes being currently moved by domestic coastal vessels and the cargoes moved by trucks which can be substituted by vessels. It is considered that the service will be possi-ble without invading the market of existing shipping companies even if each scheme of vessel operation is adopted as stated below.

8.2.2 Selection of the Types of Vessels

The types of vessels which can be used as common carriers are general cargo ships, container ships, RoRo ships, barges of various kinds, and car ferries. Each type has its own advantages and disadvantages. The vessel type must be determined after careful analyses of factors such as amount of cargo, cargo packages, cargo condition as related to shipping revenue, distance, port facilities including godown and warehouse, available funds, number and quality of crew, natural conditions, and legal considerations if any. For the loading of road transport vehicles, types and number of vehicles by loading conditions for each inter-port passage as well as the number of passengers must be ascertained to determine the vessel type.

Container ships can be classified as full container ships or semicon-tainer ships. For the use of full container ships, a vast amount of investment is required in addition to the ship itself for container vans, container handling yard, gantry crane, transtainer, and other equipment. Before adopting full container ships a thorough analysis is required from every angle, namely, types of ships, terminal facilities and equipment, and inland transportation of containers, etc.

In this Report, the financial viability will be examined for three types of vessels as candidates for coastal shipping vessels for Thailand, first, the most popular and typical type of general cargo ship, second,

the RoRo ship which is capable of carrying vehicles and general cargo, and third, the barge system with pusher tug which can be built at a low cost.

The particulars of the general cargo ships, RoRo ships, and the barge system are given below in Table 8.2-1 and in the schematic diagrams in Figures 8.2-1 ∿ 8.2-5.

Table 8.2-1. Particulars of Vessel

Item (Unit)	Type of Vessel	General Cargo Vessel (1,500 DWT Type)	General Cargo Vessel (1,000 DWT Type)	General Cargo Vessel (700 DWT Type)	RoRo Ship	Pusher Barge System	
						Barge	Pusher Boat
(1) Dimension (M)							
	Length (l.o.a.)	69.7	64.5	54.0	103.0	54.5	19.1
	Length (l.o.p.)	65.0	60.0	50.0	95.0	52.0	17.5
	Breadth (mld.)	11.5	10.7	9.3	16.0	9.6	6.5
	Depth (mld.)	6.4	6.0	5.2	10.2	4.5	2.6
	Draft (mld.)	4.3	3.7	3.3	4.7	3.55	2.1
(2)	Deadweight (Carrying capacity in MT)	1,570 (1,450)	1,070 (950)	700 (600)	2,600 (70 units of 10 wheeler)	1,000 (1,000)	-
(3)	Gross Tonnage (GT)	1,190	970	610	3,000	590	80
(4)	Net Tonnage (NT)	750	610	380	1,650	480	30
(5)	Main Engine (PS)	1,600×1	1,200×1	1,000×1	5,000×2	-	400×2
(6)	F.O. Consumption (G/PS/HR)	153	153	157	134	-	163
(7) Fuel Consumption Per Day	at sea (Tons)	4.53	3.40	2.91	24.77	-	2.41
	in Port (Tons)	0.45	0.34	0.29	2.48	-	0.24
(8)	Service Speed (Knots)	11.0	11.0	10.5	18.0	-	9.0
(9)	Hold Volume (Cub. M) (Grain)	2,970	2,200	1,130	-	1,460	-
(10) Number of Crew (Officer + Rating)	First two (2) years	5 + 7 = 12	4 + 5 = 9	4 + 3 = 7	9 + 17 = 26	1 (in Port)	4 + 4 = 8
	From the third year	4 + 5 = 9	4 + 3 = 7	3 + 2 = 5	9 + 17 = 26	1 (in Port)	4 + 4 = 8

1,500 DWT GENERAL CARGO VESSEL

Length (l.o.a.)   69.7 m
Length (l.b.p.)   65.00 m
Breadth (mld.)   11.50 m
Depth (mld.)   6.40 m
Draft (mld.)   4.30 m
Main Engine   1,600 ps × 1 set
Service Speed   abt. 11 knots

Cargo Hold

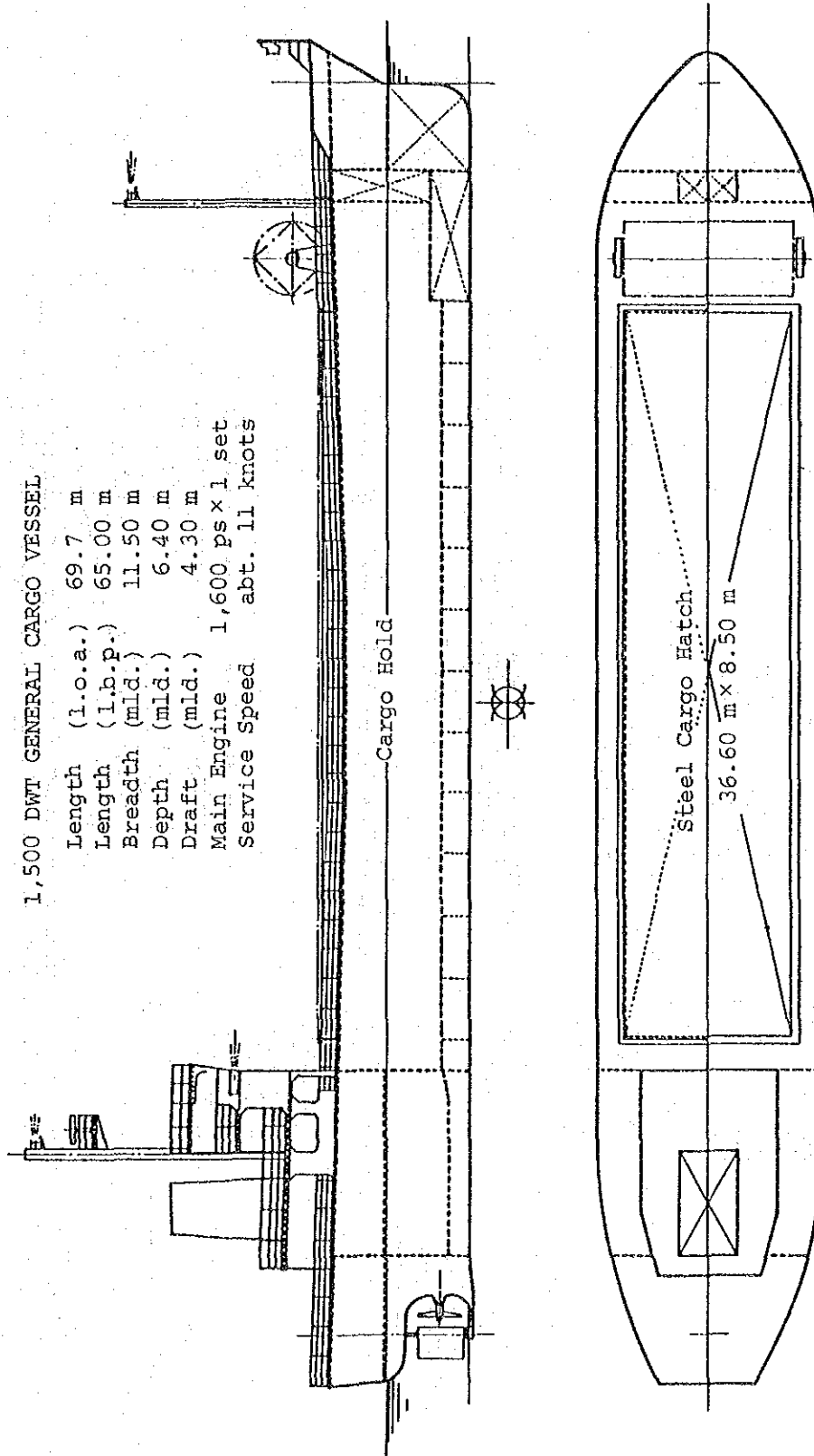Steel Cargo Hatch

36.60 m × 8.50 m

Fig. 8.2-1

1,000 DWT GENERAL CARGO VESSEL

Length (l.o.a.) abt. 64.5 m
Length (l.b.p.) 60.00 m
Breadth (mld.) 10.70 m
Depth (mld.) 6.00 m
Draft (mld.) 3.70 m
Main Engine 1,200 ps×1 set
Service Speed abt. 11 knots

Cargo Hold

Steel Cargo Hatch

33.0 m×7.5 m
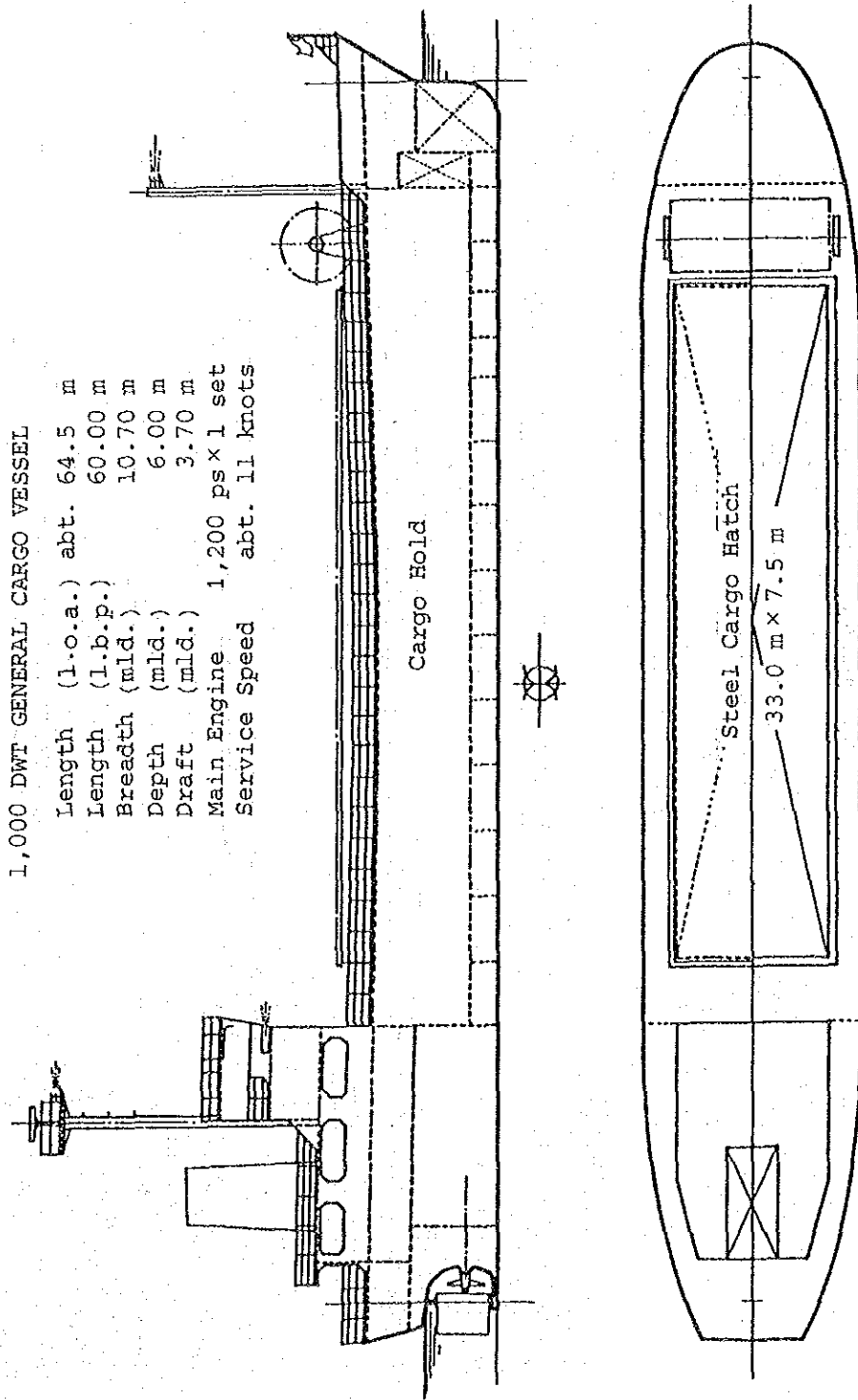
Fig. 8.2-2

700 DWT GENERAL CARGO VESSEL

Length	(l.o.a.)	abt. 54.0 m
Length	(l.b.p.)	50.00 m
Breadth	(mld.)	9.30 m
Depth	(mld.)	5.20 m
Draft	(mld.)	3.30 m
Main Engine		1,000 ps × 1 set
Service Speed		abt. 10.5 knots

Cargo Hold

Steel Cargo Hatch

25.8 m × 7.0 m
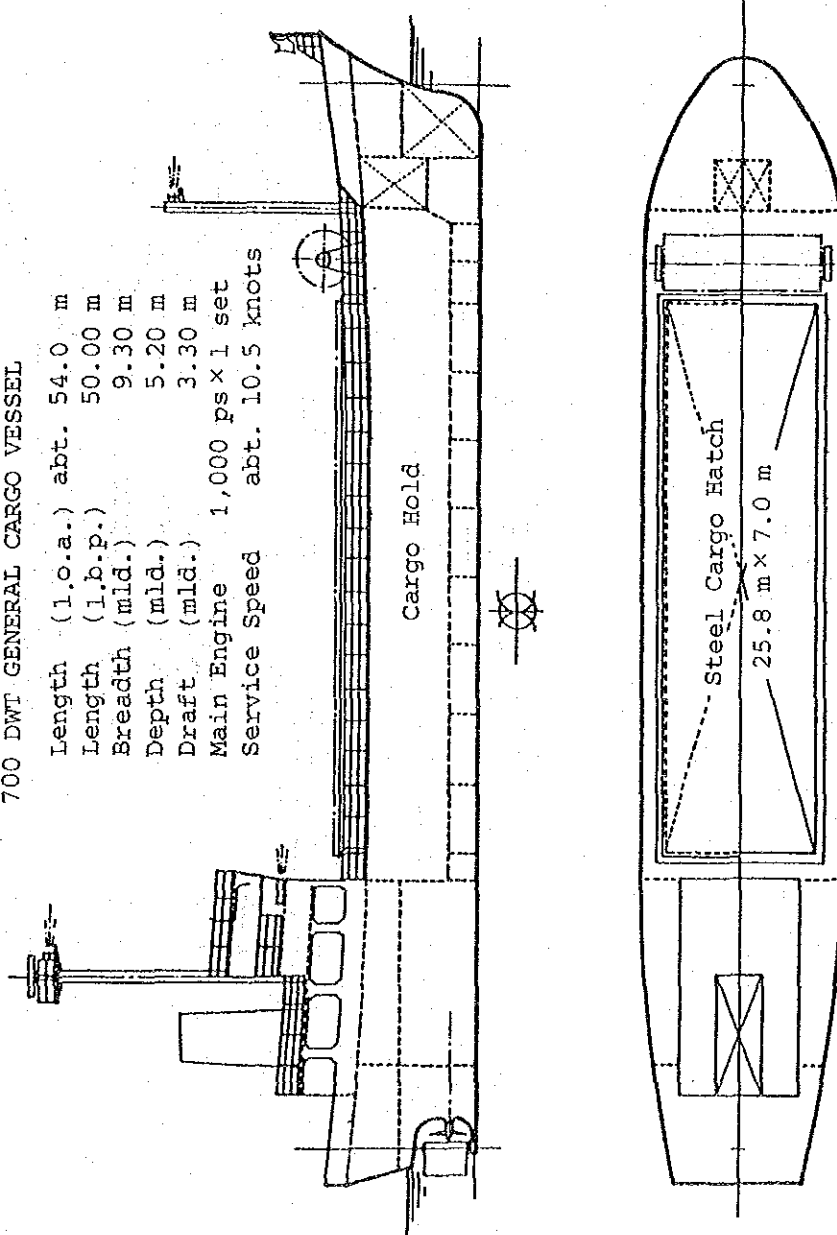
Fig. 8.2-3

2,600 DWT RO/RO VESSEL

Length (l.o.a.)103.0
Length (l.b.p.) 95.0
Breadth (mld.)   16.0
Depth   (mld.)   10.2
Draft   (mld.)   4.7
Main Engine (PS) 5,000 × 2
Service Speed (Knots) 18.0

Number of vehicles to be loaded:
70 units (10 Wheel Truck)
with the occommodotions of 150 drivers
( ) Breakdown by Deck.

Crew & Driver's Quater

Car-Space (20)
Car Space (33)
Car-Space (17)

Main Deck

Car Space

Tank Top

Car Space

E/R
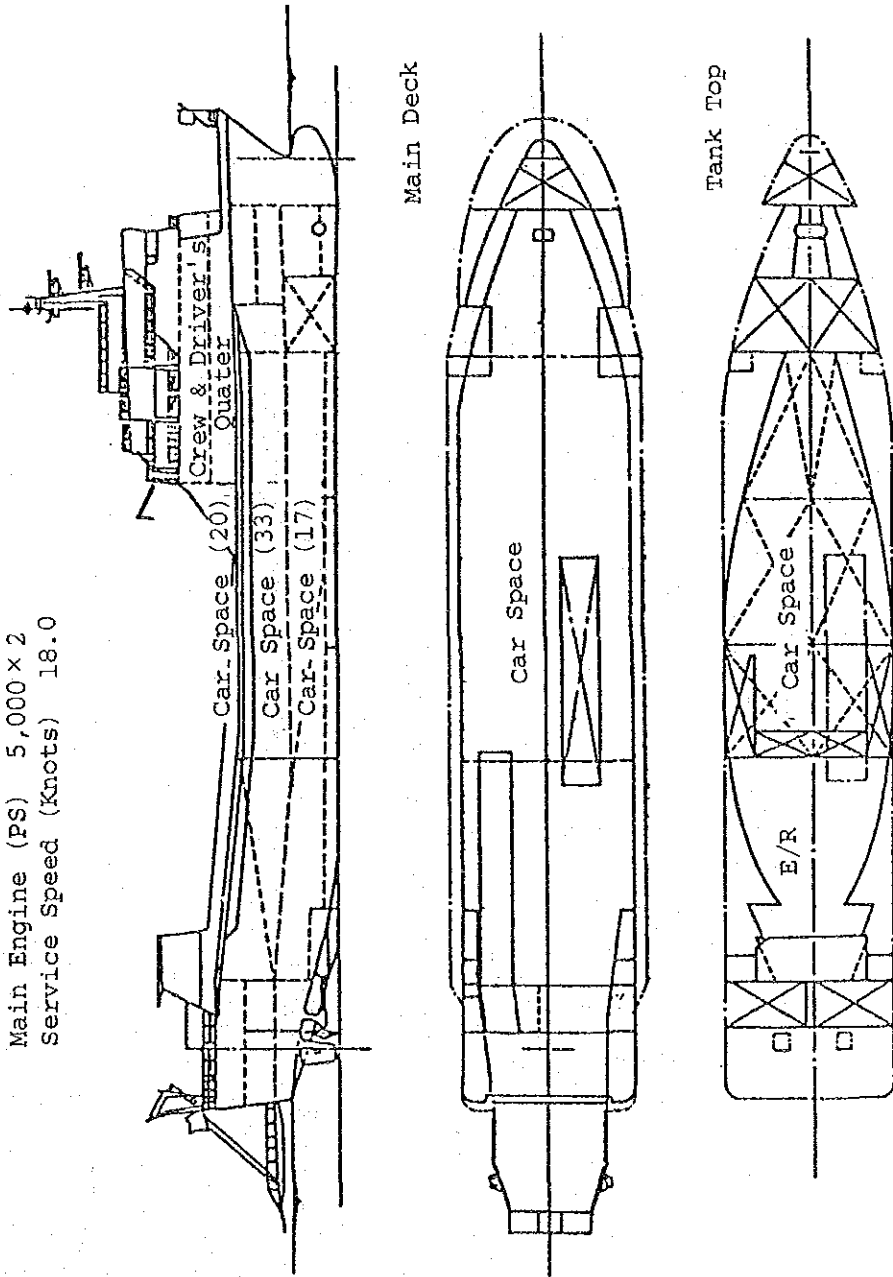
Fig. 8.2-4

1,000 DWT/PUSHER-BARGE SYSTEM

PUSHER

Length, (l.o.a.)		19.10 m
Length (l.o.p.)		17.50 m
Breadth, (mld.)		6.50 m
Depth, (mld.)		2.60 m
Draft, (mld.)		2.10 m
Main Engine		400 ps × 2
Complement		6 ∨ 8
Train sea speed	abt. 9 knots	

BARGE

Length, o.a.		54.50 m
Length on D.L.W.L.		52.00 m
Breadth, mld.		9.60 m
Depth, mld.		4.50 m
Draft, mld.		3.55 m
Deadweight	abt.	1,000 t
Cargo Hatch		32.40 × 6.00 m

Fig. 8.2-5

- 217 -

The general cargo ship seems to be one of the most widely applicable, suitable vessel type for Thailand since it can carry any cargo mixed with other cargo depending on the cargo packages such as bagged, or crated, bulky cargo, heavy cargo, and so forth.

The RoRo ship is designed to carry road-going vehicles such as cars, trucks and trailers as well as general cargo. Considering the dominant role of road transportation in Thailand, this type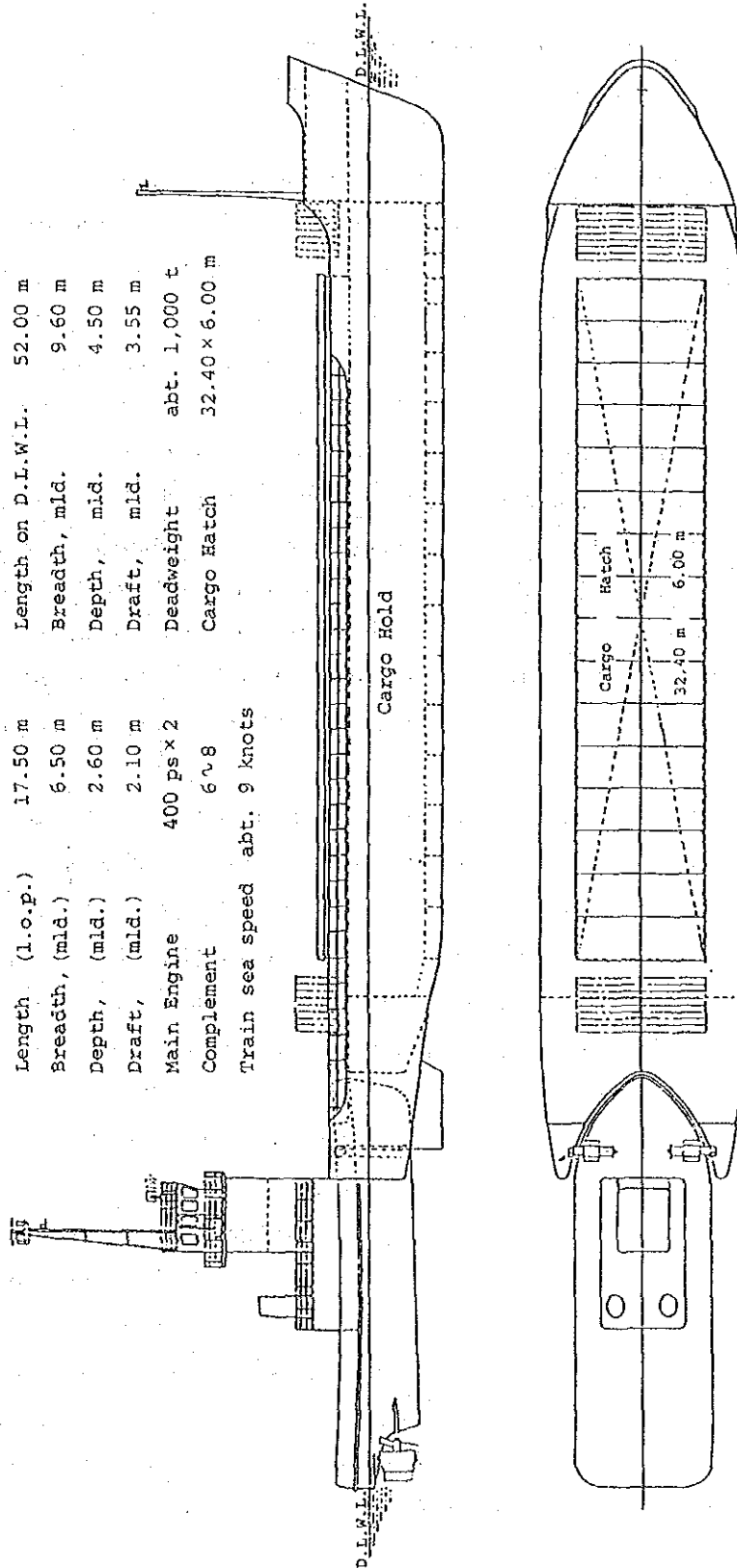 seems to be promising as is the case in other countries in recent years. By means of loading trucks with their cargo, substantial savings are possible in fuel costs and labor costs. Usually, drivers are not needed when trucks are on board. It is only necessary to dispatch a corresponding number of drivers at both ends. Disadvantages of this type are the high cost of ship relative to other general cargo ship and pusher barge, and the necessity of special berths for vehicles to load and unload themselves by running on the ship's rampway. In order to eliminate the latter disadvantage, the RoRo ship may be designed in accordance with the existing berths. However, in this case a ship so designed may not be put in operation on other routes.

There are two types of barge systems, one with a tug boat pushing barges from behind and the other with a tug boat pulling barges from the fore. For long navigation at sea such as the case of this study, the pusher barge is more suitable. The barge itself is the most primitive form of vessel, and because of its simplicity the cost of the vessel is lower not only in comparison with the RoRo ship but with the general cargo ship. The best advantage of this type is the excellent capital recovery rate when a number of barges and a tug are put together as a fleet. When five general cargo ships are required for a route, the same amount of cargo could be transported by five barges of the same capacity as the general cargo ship and two tugs, resulting in savings worth three tugs. While a general cargo ship has to stay in a port for several days for loading and unloading, a comparable barge/tug fleet can detatch a tug and a barge or two for proceeding to another port while the remaining part of the fleet stays at the original port. If a combination of a barge and a tug is compared with a general cargo ship, the former is more costly.

However, if the comparison is made between a barge system and a fleet of ships, the former can be considered more economical.

However, the barge system is operated with a number of barges and tugs as a set for a specific route, this set may become unsuitable once relocation of the set to an other route becomes necessary depending on the difference in distance, port conditions and so forth. In other words, the economic advantage of the barge system may be weakened unless its route is fixed. In addition, the barge system requires the task of detatching and connecting tugs and barges.

8.2.3 Prices of Vessels

Prices of new vessels fluctuate throughout the year depending on the world market, supply and demand. In this study, the price of each vessel for 1986 has been set up based on the market price of 1983 with the estimated annual increase rate of 3 percent, as shown in Table 8.2-2.

In the price of the vessel are included the cost for owners and the interest during the period of construction at the dock yard.

Table 8.2-2 Prices of Vessels

Type of Vessel	General Cargo Vessel			RoRo Ship	Pusher Barge System	
	1,500 DWT Type	1,000 DWT Type	700 DWT Type		Pusher	Barge
Price per Vessel (1983)	฿ 31,625,000	฿ 25,875,000	฿ 20,125,000	฿268,333,000	฿ 12,266,700	฿ 9,870,800
Price per Vessel (1986)	฿ 34,557,490	฿ 28,274,310	฿ 21,991,130	฿293,215,060	฿ 13,407,083	฿ 10,790,833
No. of Vessels in Service	4 – Case 1 7 – Case 4	6 – Case 2 10 – Case 5	7 – Case 3 13 – Case 6	3 – Case 13	3 – Case 15	7 – Case 15
Total Investment	Case 1 ฿138,230,000 Case 4 ฿241,902,400	Case 2 ฿169,645,900 Case 5 ฿282,743,100	Case 3 ฿153,937,900 Case 6 ฿285,884,700	Case 13 ฿879,645,200	Case 15 ฿ 40,221,250	Case 15 ฿ 75,535,833 ฿115,757,083

8.2.4 Scheme of Operation

As the scheme of operation, the Study Team would like to choose the following 15 cases upon taking into consideration the types of vessels and ports of calling.

Case	Type of Vessel		Price of Vessel	Route
1	General Cargo Vessel	(1,500 DWT Type)	100%	BK-SK-BK
2	"	(1,000 ")	"	"
3	"	(700 ")	"	"
4	"	(1,500 ")	"	BK-SK-ST-BK
5	"	(1,000 ")	"	"
6	"	(700 ")	"	"
7	"	(1,500 ")	50%	BK-SK-BK
8	"	(1,000 ")	"	"
9	"	(700 ")	"	"
10	"	(1,500 ")	"	BK-SK-ST-BK
11	"	(1,000 ")	"	"
12	"	(700 ")	"	"
13	RoRo Ship	(2,600 ")	100%	BK-SK-BK
14	"	(2,600 ")	50%	"
15	Pusher Barge System	(1,000 ")	100%	"

BK: Bangkok

SK: Songkhla

ST: Ban Don (Surat Thani)

(1) Case 1   1,500 DWT Type G.C. Vessel (2 ports call)

Four ships are assigned for the round-trip service between Bangkok and Songkhla. One voyage takes 9 days. Three voyage service is available per week.

(2) Case 2   1,000 DWT Type G.C. Vessel (2 ports call)

Six ships are assigned for the round-trip service between Bangkok and Songkhla. One voyage takes 8 days. Five voyages are available per week.

(3) Case 3   700 DWT Type G.C. Vessel (2 ports call)

Seven ships are assigned for the round-trip service between Bangkok and Songkhla. One voyage takes 6 days. The service is available everyday (every 21 hours).

(4) Case 4   1,500 DWT Type G.C. Vessel (3 ports call)

Seven ships call at 3 ports such as Bangkok, Songkhla and Ban Don. One voyage takes 10.5 days. 4 voyages are available per week.

(5) Case 5   1,000 DWT Type G.C. Vessel (3 ports call)

Ten ships call at three ports such as Bangkok, Songkhla and Ban Don. One voyage takes 9.5 days. Daily service is available.

(6) Case 6   700 DWT Type G.C. Vessel (3 ports call)

Thirteen ships call at three ports such as Bangkok, Songkhla and Surat Thani. One voyage takes 8 days. The 11 voyages are available every week.

(7) Cases 7-12

Operating service is set in the same way as from Case 1 to Case 6, with the difference in ship's price of 50 percent.

(8) Cases 13 and 14   RoRo Ship

Three RoRo ships with the speed of 18 knots are assigned for the round-trip service between Bangkok and Songkhla. One voyage takes 3 days. Daily service is available. Case 14 is based on the reduced price of the vessel to 50 percent and service is the same as Case 13. RoRo ships load vehicles (mainly, cargo trucks).

In the case of the RoRo ship, three alternative cases can be considered such as:

1) Only trailers are loaded into the RoRo ship after the trailers are separated from the trailer heads for drive.

2) Regular trucks popular in Thailand are loaded into the RoRo ship without drivers while at the ports of loading and unloading the drivers are prepared.

3) Trucks with drivers are loaded into the RoRo ship.

The last case, however, is assumed herewith. At the time of loading and unloading, the trucks run on the rampway of the ship. Depending upon the conditions, terminals are sometimes needed. At the same time, a parking area has to be prepared for the trucks.

(9) Case 15   Pusher Barge System

Operation is projected by a fleet with 3 pusher tugs and 7 barges. The rotational frequency of a tug is 4.5 days per voyage, that of barge being 10.5 days per voyage. Accordingly, the barge to be loaded and unloaded is assigned for service every 1.5 days.

The Summary of the operation schedule of these 15 cases is given below in Table 8.2-3 and in Appendix Figure A.12-1, A.12-2. Meanwhile, the annual operating ratio of every vessel is calculated as 95 percent, with the working days being 345 per year.

Table 8.2-3 Scheme of Operation for 15 Cases

Case	Type of Vessel DWT	Route		Days Per Rounds Voyage BK	BK-SK (400')	SK	SK-BK (400')	Spare	Days/ Round Voy.	No. of Vo. per Year / No. of Vessel	Quantity of Cargo per (One way) (KT)	Service Interval	Voy./ Week
1, 7	1,500	BK-SK-BK	Sea Port	2.5	1.7	2.5	1.7	0.6	9.0	38/4	220,400	54 hrs.	3.1
2, 8	1,000	"	Sea Port	2.0	1.7	2.0	1.7	0.6	8.0	43/6	245,100	32 hrs.	5.3
3, 9	700	"	Sea Port	1.0	1.8	1.0	1.8	0.4	6.0	57/7	239,400	20.5 hrs.	8.2
15	Pusher Barge	"	Sea P.	0.15	2.1	0.15	2.1	–	4.5	77/3 (Pusher)	231,000	36 hrs.	4.7
			Sea P.	3.0	3.1	3.0	2.1	0.3	10.5	33/7 (Barge)			
13, 14	RoRo Vessel	"	Sea Port	0.33	1.0	0.33	1.0	0.34	3.0	115/3	313,950 (13KT of 24,150 Units)	24 hrs.	7

Case	Type of Vessel DWT	Route		Days Per Rounds Voyage BK	BK-SK (400')	SK	SK-ST (190')	ST	ST-BK (296')	Spare	Days/ Round Voy.	No. of Vo. per Year / No. of Vessel	Quantity of Cargo per (One way) (KT)	Service Interval	Voy./ Week
4, 10	1,500	BK-SK- ST-BK	Sea Port	2.5	1.7	2.0	0.9	1.0	1.3	1.1	10.5	33/7	334,950	36 hrs.	4.7
5, 11	1,000	"	Sea Port	2.0	1.7	1.5	0.9	1.0	1.3	1.1	9.5	36/10	342,000	22.8 hrs.	7.4
6, 12	700	"	Sea Port	1.0	1.8	1.0	0.9	0.5	1.4	1.4	8.0	43/13	335,400	14.8 hrs.	11.4

Remark 1. Days in Port were calculated by the following bases

Cargo handling capacity : 30 tons/hrs./gang

No. of Gangs : 2 gangs

Working time : 13 hrs./days (from 08:00 to 24:00)

Remark 2. Refer to Appendix Figure A.12-1 and A.12-2 for the details of RoRo and Pusher Barge schedule.

8.2.5 Preconditions for Analysis

The analysis of the study is made on the following preconditions:

(1) Berthing priority

In the Bangkok Port, the Port Authority of Thailand has set a rule of "First Come, First Served" for berthing arrangement. However, in this study the preferential berthing shall be granted at the fixed berth of each pivotal port of calling, namely, Bangkok, Songkhla and Ban Don (including Tha Thong). Otherwise, regular berth service cannot be maintained, resulting in the loss of competition to land transportation.

(2) Financing

Two financial resources shall be taken into consideration in this study, domestic and international, details of which are as follows.

	Domestic *	International **
Down payment, Minimum ratio	not fixed	20% or more
Interest Rate	14.50%	8% or more
Term for Repayment	10 ~ 15 years	within 8.5 years
Grace Period	3 ~ 5 years	not fixed

* IFCT (Industrial Finance Corporation of Thailand) Preferential terms and conditions

** OECD Conditions

In this report, 8.0 percent interest (8-year repayment, no grace period) shall be applied for 80 percent of the vessel price and 14.5 percent (10-year repayment, no grace period) shall be applied for the other 20 percent of the vessel price. The interest for revolving funds has not been taken into consideration.

(3) BOI Incentives

Every kind of incentive allowed by the Board of Investment shall be applied for this project to the maximum possible. Duty, business tax and municipal tax shall not be levied against the vessels and the machineries

purchased from abroad under this project. Other direct shipbuilding and ship-operating subsidies by the Government shall not be taken into consideration in this study.

(4) Documentation

At present, operators are required to prepare several documents in order to prevent smuggling, and also to deposit a fixed amount of money for certain commodities at the customs office prior to loading the cargo into the vessel.

The Study Team recognizes some steps are needed for the prevention of smuggling. However, in this study, the Study Team considers that the Cargo Manifest should be the only document to be submitted to the customs office for domestic coastal service.

(5) Trucking Rates and Regulations

The Study shall be worked out based on the regular ETO Tariff rates and regulations, particularly the weight limitation of 10-wheel trucks. However, another analysis shall be required to cover prevailing practices of road transportation, overloading and the discounting of freight rates.

8.3 Financial Analysis

Two methods of financial analysis are taken up in this project, Profit/Loss Analysis and Investment Return Analysis.

8.3.1 Profit/Loss Analysis

Profitability will be calculated year by year for ten years after the start of operation. The starting point of the evaluation will be the beginning of 1987 when the Songkhla deep sea port will be completed.

The profitability by each vessel or fleet is calculated in accordance with the following items:

(A) REVENUE

(B) OPERATING EXPENSES

 (1) Port Charge

 (2) Stevedorage

 (3) Fuel Oil

 (4) Agency Fee

 (5) Other Expenses

 (6) Total

(C) OPERATING PROFIT

 (A) - (B)

(D) VESSEL EXPENSES

 (1) Crew Cost

 (2) Maintenance, Repairs & Supplies

 (3) Insurance

 (4) Administrative Expenses

 (5) Others

 (6) Total

(E) INTEREST

(F) PROFIT BEFORE DEPRECIATION

 (C) - (D + E)

(G) DEPRECIATION

(H) PROFIT AFTER DEPRECIATION

 (F) - (G)

(I) INCOME TAX

(J) PROFIT (H) - (I)

Foreign exchange rates to be used will be US$1.00 = 23 Baht and US$1.00 = 240 yen. Preliminary estimate for the inflation rate is 6 percent per annum from 1987 onward based on the figures shown below. However, for some items rates applicable will be assigned on a case by case basis as will be explained later.

Inflation Rate (%)

1975	5.3	
1976	4.2	
1977	7.6	
1978	7.9	Source: Economic Commerce Department
1979	9.9	
1980	19.7	
1981	12.7	
1982	5.2	
1983	4.0	Source: Bank of Thailand (Estimate)
1984	5.5	
1985	7.1	Source: NESDB (Estimate)
1986	8.2	
1987 1988	Average 6.0 (Estimate)	

(1) Revenue

Revenue is calculated by multiplying the freight rate by the volume of cargo to be transported. Regarding the cargo volume, The Study Team estimated 100 percent of the space would be fully loaded Southbound and 10 percent Northbound for General Cargo Vessel and Pusher Barges, and 100 percent in both directions for RoRo ships.

In the case where a General Cargo Vessel calls at 3 ports, it is estimated that in Southbound, 70 percent of cargoes for Songkhla and 30 percent for Ban Don are loaded from Bangkok and Northbound 5 percent of cargoes from each port, total 10 percent of loading capacity, for Bangkok are loaded.

Freight rates applicable to shipper/consignee are to be equal to 90 percent of the trucking rate except RoRo service, a 10 percent incentive by domestic coastal service, and also to be adjusted by absorbing drayages and cargo handling charges at loading and discharging ports.

In this study, as the bases of the freight rate, is worked out on the following ways.

A) ETO Tariff rates as of Jan. 1984

B) Prevailing rates, at about 20 percent less than ETO Tariff rates

The projected freight rates are given in Table 8.3-1.

Table 8.3-1 Projected Freight Rate

Unit: Bahts

C/S	Truck Rate (To and from Bangkok)	Rate with Incentive (10%)	Drayages	Cargo Handling Charges	Net Rate	Projected Rate	Rate for Barges (90%)	Rate for RoRo
A	ETO Tariff							
	Songkhla 631	568	112	15	441	440	395	4,800
	Ban Don (Surat Thani) 446	401	112	15	274	270	—	—
B	Prevailing Rate (ETO 80%)							
	Songkhla 505	455	112	15	328	325	290	3,200
	Ban Don (Surat Thani) 357	321	112	15	194	190	—	—

Remarks:

1. ETO freight rates as of Jan. 1984 shall remain unchanged up to 1987.

2. Annual increases of freight rates shall be 3 percent from 1987 and 5 percent from 1992.

3. Freight rates for RoRo ships are assumed to be equal to truck rates and calculated on a per-unit basis. (Payload, 13 Tons)

4. Freight rates for Pusher Barges shall be fixed at the level of 10 percent less than that of General Cargo Vessel because of the longer transit time.

5. The vessel having no cargo gears in this project, its cargo is to be loaded/discharged by mobil crane and the charge for hire is to be included in stevedorage.

The bases for the calculation of the projected freight rates are as follows:

General Cargo Vessel

1) ETO tariff rate (10 wheel truck/payload: 13 tons)

As of Jan. 1984

Route	Tariff	฿/Vehicle	฿/ton	฿/km/Vehicle
1) Bk/ within 30 km		800	62	8.67
2) Bk/Surat Thani (Ban Don)	672 km	5,800	446	8.63
3) Bk/Nakhonsi Thammarat	789 km	6,830	525	8.66
4) Bk/Songkhla	950 km	7,960	612	8.38
5) Bk/Hatyai	976 km	8,200	631	8.40
6) Bk/Narathiwat	1,176 km	9,800	754	8.33

2) Drayage

Trucking charges at both ends are calculated based on ETO trucking tariff rates as follows:

Drayage at local ports is estimated at 80 percent of ETO tariff as no traffic congestion is anticipated.

    Bangkok area : Dist. is within 30 km .... 62 ฿/ton

    Ban Don area : Dist. is within 30 km .. 62 80% ≒ 50 ฿/ton

    Songkhla area : Dist. is within 30 km .. 62 80% ≒ 50 ฿/ton

Drayage by route are as follows:

    Route 2) Bangkok/Ban Don : 62 + 50 = 112 ฿/ton

    Route 5) Bangkok/Hatyai : 62 + 50 = 112 ฿/ton

3) Cargo handling charges at ports

In general, cargo handling charges are estimated at around 2/3 of stevedorage, which is 25 ฿/ton each at both ends with volume of double-handled cargo being estimated at about half of all cargo. Therefore, the average handling charge will be 7.5 ฿/ton (15 ฿/ton × 1/2) per Port.

RoRo Ship

1) General data for 10-wheel truck

Size	:	W 2.50 m L 10.00 m
Weight	:	Tare weight 7 Ton, Payload 13 Ton, Total 20 Ton
Engine Power	:	168 Hp
Price	:	฿700,000
Average Life	:	10 years
Fuel Consumption:		3.5 km/LTR (Legal & Paved Road)

2) Average number of trips, kilometerage

Average Trip Length km	Annual Kilometerage	Number of Trip per Year
25	15,000	300
50	25,000	250
75	35,000	235
100	45,000	225
150	50,000	165
200	60,000	150
250	65,000	130
300	70,000	115
350	75,000	105
400	80,000	100
500	90,000	90
600	100,000	85
700	110,000	80
800	120,000	75
900	130,000	70
1,100	150,000	68

Souce: Study of Trucking Industry (Aug. 1983)

3) Trucking Costs

a) Operating costs of ETO truck

(฿/km)

1.	Fuel	2.241 ฿/km
2.	Lubrication oil	0.092
3.	Maintenance & Spareparts	1.089
4.	Tyre cost	0.703
5.	Drivers allowance	0.625
	Total	4.75 ฿/km

Source: Study of Trucking Industries (Aug. 1983)

b) Fixed costs

i) Fixed costs (B/Month)

Capital

    Depreciation (10 years)   5,833 Bahts

    Interest (14.5%/year)   4,652

Office Expenses

    Driver's salary   4,800

Administration   1,112
(Inc. registration, Insurance, etc.)

Others (building, etc.)   9,000

             Total   25,397 Bahts

ii) Fixed costs (B/Km)

Average trip length (km)	Monthly Kilometerage	Fixed cost @ B/km
30	1,500	16.93
75	2,917	8.71
100	3,750	6.77
200	5,000	5.08
300	5,833	4.35
500	7,500	3.39
700	9,167	2.77
900	10,833	2.34
1,100	12,500	2.03

c) Trucking costs and tariffs

Average	A	B	A + B	C	Profit	
Trip length (km)	Operating cost	Fixed cost	Total cost	ETO tariff	Per km C – (A + B)	Per month
30	4.75	16.93	21.68	38.67	16.99	30,582
75	4.75	8.71	13.46	15.92	2.46	7,176
100	4.75	6.77	11.52	14.73	3.21	12,038
200	4.75	5.08	9.83	10.87	1.04	5,200
300	4.75	4.35	9.1	9.71	0.61	3,558
500	4.75	3.39	8.14	8.98	0.84	6,300
700	4.75	2.77	7.52	8.76	1.24	11,367
900	4.75	2.34	7.09	8.65	1.56	16,899
1,100	4.75	2.03	6.78	8.58	1.80	22,500

4) Cost of 10-wheel truck to be loaded in RoRo Ship

Year 1983

1.	Route	Bk/Songkhla	Bk/Narathiwat
2.	Operation Annual operation ratio: 95%	One round trip/ 4.95 days 70 trips/year 5.988 trips/month	One round trip/ 5.10 days 68 trips/year 5.667 trips/month
3.	Average Distance	120 km/round trip 700 km/month 8,400 km/year 84,000 km/10 years	520 km/round trip 2,947 km/month 35,364 km/year 353,000 km/10 years
4.	Cost of Truck (Fixed cost)	25,397 ฿/month 4,354 ฿/round trip	Same as left 4,482 ฿/round trip
5.	Operation cost	4.75 ฿/km 570 ฿/round trip	Same as left 2,470 ฿/round trip
6.	Estimated profit	10,000 ฿/month 1,714 ฿/round trip	Same as left 1,765 ฿/round trip
7.	Estimated total cost	6,638 ฿/round trip	8,717 ฿/round trip

Road distance for truck: in Bangkok area : 30 km average

in Songkhla area : 30 km average

Songkhla-Narathiwat: 230 km average

5) Freight rates for RoRo ships

BK/Hatyai (Songkhla)

ETO tariff   8,200   2 ...... 16,400 ฿ (round trip)

Trucking cost   (-) 6,638 ฿ (round trip)

Balance for RoRo   9,762 ฿ (round trip)

4,881 ฿ (one way)

BK/Narathiwat (via Songkhla)

ETO tariff   9,800   2 ...... 19,600 ฿ (round trip)

Trucking cost   (-) 8,717 ฿ (round trip)

Balance for RoRo   10,883 ฿ (round trip)

5,442 ฿ (one way)

Accordingly, the Study Team projected the freight rate for RoRo ship between Bangkok and Songkhla at 4,800 ฿ per vehicle. Meanwhile, the freight rate based on the prevailing trucking rate (estimated 80% of ETO tariff) should be set at 3,200 ฿ per vehicle.

Note: $\dfrac{(16,400 \times 80\%) - 6,638}{2} = 3,241 \div 3,200 \text{ B}$

pusher-Barge System

As mentioned above, freight rates for pusher barges will be fixed at 10 percent below that of the projected rate for General Cargo Vessel, as shown in Table 8.3-1.

(2) Expenses

All expense items, including operating expenses and vessel costs are calculated in Table 8.3-2 as the bases for the computation of profitability for the 15 cases. The main items are amplified here.

1) Port Charges

a) Bangkok

In accordance with the Port Authority of Thailand Tariff, the port charges of Bangkok shall be as follows:

i) Channel dues

This is a tariff collected from vessels sailing through the channel to the inner area.

The rates are: Vessels of net registered tonnage under 500 tons will not pay channel dues.

Vessels of net registered tonnage from 500 to 1,000 tons will pay 3 Bahts per ton.

Vessels of net registered tonnage over 1,500 tons shall pay 5 Bahts per ton.

ii) Wharfages

This tariff is for bringing a vessel up alongside the wharf, tying to and releasing from the wharf. It is charged by net registered tonnage of each vessel with a rate of 1.50 Bahts per ton for each call for the first 3 days (72 hours).

After this period, the tariff is 0.70 Baht/ton a day or part of a day, but if the wharf is used for over 7 days, 1.00 Baht/ton will be collected for each day or part of a day.

iii) Garbage charges

Each vessel alongside the wharf will pay 100 Baht/day or part of a day.

It is assumed that the above port charges will be increased by 2 percent a year.

Table 8.3-2 Bases for the Computation of Profitability of 15 Cases

Case	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Type of vessels	GCV 1500T (100%)	GCV 1000T (100%)	GCV 700T (100%)	GCV 1500T (100%)	GCV 1000T (100%)	GCV 700T (100%)	GCV 1500T (50%)	GCV 1000T (50%)	GCS 700T (50%)	GCV 1500T (50%)	GCV 1000T (50%)	GCV 700T (50%)	RORO (100%)	RORO (50%)	PUSHER (100%) BARGE
Route	BK-SK-BK	BK-SK-BK	BK-SK-BK	BK-SK-ST-BK	BK-SK-ST-BK	BK-SK-ST-BK	BK-SK-BK	BK-SK-BK	BK-SK-BK	BK-SK-ST-BK	BK-SK-ST-BK	BK-SK-ST-BK	BK-SK-BK	BK-SK-BK	BK-SK-BK
(1) DWT	1,570	1,070	700	1,570	1,070	700	1,570	1,070	700	1,570	1,070	700	2,600	2,600	BARGE 1,000 × 7
(2) GT	1,190	970	610	1,190	970	610	1,190	970	610	1,190	970	610	3,000	3,000	BARGE 590 × 7 / TUG 80 × 3
(3) NT	750	610	380	750	610	380	750	610	380	750	610	380	1,650	1,650	BARGE 480 × 7 / TUG 30 × 3
(4) Cargo Capacity (ton)	1,450	950	600	1,450	950	600	1,450	950	600	1,450	950	600	70 units	70 units	1,000 × 7
(5) Working Ratio (%) (Number of Voyage year)	95 (38 Voy)	95 (43 Voy)	95 (57 Voy)	95 (33 Voy)	95 (36 Voy)	95 (43 Voy)	95 (38 Voy)	95 (43 Voy)	95 (57 Voy)	95 (33 Voy)	95 (36 Voy)	95 (43 Voy)	95 (115 Voy)	95 (115 Voy)	95 (231 Voy)
(6) Ship Price (Baht)	34,557,490	28,274,310	21,991,130	34,557,490	28,274,310	21,991,130	17,278,745	14,137,155	10,995,565	17,278,745	14,137,155	10,995,565	293,215,060	146,607,530	115,757,083
(7) Annual Loading Quantity per Ship (ton)	60,610	44,935	37,620	52,635	37,620	28,380	60,610	44,935	37,620	52,635	37,620	28,380	Truck 16,100 units	Truck 16,100 units	254,100
S/B (100%)	S/B 55,100	40,850	34,200	47,850	34,200	25,800	55,100	40,850	34,200	47,850	34,200	25,800	8,050 units	8,050 units	231,000
N/B (10%)	N/B 5,510	4,085	3,420	4,785	3,420	2,580	5,510	4,085	3,420	4,785	3,420	2,580	8,050 units	8,050 units	23,100
(8) Revenue / Annual increase	(7) × ₿ 440(321) first 4 years 3%/year second 5 years 5%/year	Same as case 1	Same as case 1	(7) × [1] × Average Freight Rate	Same as case 4	Same as case 4	Same as case 1	Same as case 1	Same as case 1	Same as case 4	Same as case 4	Same as case 4	(7) × ₿4,800(₿3,200) first 4 years 3%/year second 5 years 5%/year	Same as case 13	(7) × ₿395(₿290) first 4 years 3%/year second 5 years 5%/year
(9) Port Charge (₿)	264,100 annual increase 2%/year	244,670 Same as case 1	76,380 Same as case 1	245,850 Same as case 1	213,555 Same as case 1	79,120 Same as case 1	264,100 Same as case 1	244,670 Same as case 1	76,380 Same as case 1	245,850 Same as case 1	213,555 Same as case 1	79,120 Same as case 1	1,730,750 Same as case 1	1,730,750 Same as case 1	1,106,490 Same as case 1
Stevedorage (₿)	3,636,600 annual increase 5%/year	2,696,100 Same as case 1	2,257,200 Same as case 1	3,158,100 Same as case 1	2,257,200 Same as case 1	1,702,800 Same as case 1	3,636,600 Same as case 1	2,696,100 Same as case 1	2,257,200 Same as case 1	3,158,100 Same as case 1	2,157,200 Same as case 1	1,702,800 Same as case 1	Nil	Nil	15,246,000 Same as case 1
Fuel Oil (₿)	2,900,846 annual increase 5%/year	2,401,238 Same as case 1	2,710,435 Same as case 1	2,900,694 Same as case 1	2,322,805 Same as case 1	2,390,328 Same as case 1	2,900,846 Same as case 1	2,401,238 Same as case 1	2,710,435 Same as case 1	2,900,694 Same as case 1	2,322,805 Same as case 1	2,390,328 Same as case 1	25,453,410 Same as case 1	25,453,410 Same as case 1	10,020,525 Same as case 1
Agency Fee (₿)	3% of (8)	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1
Others (₿)	5% of (8)	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1	Same as case 1
(10) Crew Cost (₿)	1987 1,979,000 / 1988 2,119,000 / 1989 1,888,000 / after 1990 year annual increase 7%/year	1987 1,578,000 / 1988 1,690,000 / 1989 1,570,000 / Same as case 1	1987 1,318,000 / 1988 1,410,000 / 1989 1,167,000 / Same as case 1	Same as case 1	Same as case 2	Same as case 3	Same as case 1	Same as case 2	Same as case 3	Same as case 1	Same as case 2	Same as case 3	1987 4,265,000 after 1988 year annual increase 7%/year	Same as case 13	1987 4,758,000 / 1988 5,091,000 / 1989 5,097,000 after 1990 year annual increase 7%/year
Maintenance Repairs & Supplies (₿) 2% of Ship Price	691,150 annual increase 5%/year	565,486 Same as case 1	439,822 Same as case 1	Same as case 1	Same as case 2	Same as case 3	Same as case 1	Same as case 2	Same as case 3	Same as case 1	Same as case 2	Same as case 3	5,864,302 annual increase 5%/year	Same as case 13	2,315,142 annual increase 5%/year
Insurance (₿) 1% of Ship Price	345,575 no increase for for 10 years	282,743 Same as case 1	219,911 Same as case 1	Same as case 1	Same as case 2	Same as case 3	Same as case 1	Same as case 2	Same as case 3	Same as case 1	Same as case 2	Same as case 3	2,932,151 no increase for 10 years	Same as case 13	1,157,571 no increase for 10 years
Others (₿) 2% of Ship Price	691,150 annual increase 5%/year	565,486 Same as case 1	439,822 Same as case 1	Same as case 1	Same as case 2	Same as case 3	Same as case 1	Same as case 2	Same as case 3	Same as case 1	Same as case 2	Same as case 3	5,864,302 annual increase 5%/year	Same as case 13	2,315,142 annual increase 5%/year
Administration (₿)	1,010,068 annual increase 5%/year	673,379 Same as case 1	577,182 Same as case 1	577,182 Same as case 1	404,027 Same as case 1	310,790 Same as case 1	Same as case 1	Same as case 2	Same as case 3	Same as case 4	Same as case 5	Same as case 6	1,346,758 annual increase 5%/year	Same as case 13	4,040,273 annual increase 5%/year
(11) Interest (%) Repayment	80% 27,645,992 × 0.08 / 20% 6,911,498 × 0.145 + (2)	80% 22,619,448 × 0.08 / 20% 5,654,862 × 0.145	80% 17,592,904 × 0.08 / 20% 4,398,226 × 0.145	Same as case 1	Same as case 2	Same as case 3	80% 13,822,996 × 0.08 / 20% 3,455,749 × 0.145	80% 11,309,724 × 0.08 / 20% 2,827,431 × 0.145	80% 8,796,452 0.08 / 20% 2,199,113 0.145	Same as case 7	Same as case 8	Same as case 9	80% 234,572,040 × 0.08 / 20% 58,643,020 × 0.145	117,286,020 × 0.08 / 20% 29,321,510 × 0.145	92,605,664 × 0.08 / 20% 23,151,419 × 0.145
(12) Depreciation (₿)	27,645,992 per year + (3)	22,619,448 per year	17,592,904 per year	Same as case 1	Same as case 2	Same as case 3	13,822,996 per year	11,309,724 per year	8,796,452 per year	Same as case 7	Same as case 8	Same as case 9	234,572,040 per year	117,286,020 per year	92,605,664 per year
(13) Income Tax	+ (4)														
(14) Revolving Fund	+ (5)														
(15) Fleet (Number of vessels)	4	6	7	7	10	13	4	6	7	7	10	13	3	3	BARGE 7 / TUG 3
(16) Total Investment (₿)	138,229,960	169,645,860	153,937,910	241,902,430	282,743,100	285,884,690	69,114,980	84,821,930	76,968,955	120,951,215	141,371,550	142,942,345	879,645,180	439,822,590	115,757,083
(17) Annual Loading Quantity per a Fleet (S/Bound)	220,400	245,100	239,400	334,950	342,000	335,400	220,400	245,100	239,400	334,950	342,000	335,400	24,150 unit	24,150 unit	231,000

Notes: (1) Case 1∿ Case 14: Profitability for one vessel

Case 15 : Profitability for entire barge fleet

*[1]: Average Freight Rate

    a) Based on ETO Tariff

$$\text{Freight to Songkhla} = \frac{100}{110} \times \frac{7}{10} \times \cancel{B} \ 440 \times Q \qquad\qquad 1$$

$$\text{Freight to Ban Don} = \frac{100}{110} \times \frac{3}{10} \times \cancel{B} \ 270 \times Q \qquad\qquad 2$$

$$\text{Freight from Songkhla} = \frac{10}{110} \times \frac{5}{10} \times \cancel{B} \ 440 \times Q \qquad\qquad 3$$

$$\text{Freight from Ban Don} = \frac{10}{110} \times \frac{5}{10} \times \cancel{B} \ 270 \times Q \qquad\qquad 4$$

Average Freight Rate = ₿ 385.909

    b) Based on Prevailing Market Rate

$$\text{Freight to Songkhla} = \frac{100}{110} \times \frac{7}{10} \times \cancel{B} \ 325 \times Q \qquad\qquad 1'$$

$$\text{Freight to Ban Don} = \frac{100}{110} \times \frac{3}{10} \times \cancel{B} \ 190 \times Q \qquad\qquad 2'$$

$$\text{Freight from Songkhla} = \frac{10}{110} \times \frac{5}{10} \times \cancel{B} \ 325 \times Q \qquad\qquad 3'$$

$$\text{Freight from Ban Don} = \frac{10}{110} \times \frac{5}{10} \times \cancel{B} \ 190 \times Q \qquad\qquad 4'$$

Average Freight Rate = ₿ 282.04

*[2]: (1) 80% of ship's price: 8% per year, 8 years with no grace

    (2) 20% of ship's price: 14.5% per year, 10 years with no grace

*[3]: Fixed Depreciation for 10 years with 20% Residual Value

*[4]: 40% of Profit after Depreciation

*[5]: Nil

- 241 -

b) Songkhla

Construction of the new deep sea port of Songkhla is scheduled to be completed by the end of 1986. Therefore, a new port tariff is not available at this stage. We temporarily calculate the port charge for the port of Songkhla in accordance with the Port Authority of Thailand Tariff, which is same as the port charge of Bangkok mentioned above.

c) Ban Don (Tha Thong)

According to the Ban Don Port Tariff which Surat Thani Provincial Administration has authorized on the 15th of June, 1983, for the new Tha Thong port, the port charges of Ban Don are as follows:

i) Wharfage

1. Cargo vessel berthing at the Port to discharge customers' cargo to be stored or/to load customers' cargo being stored within the port shed shall be charged wharfage 2,000 Baht per 24 hours.

2. Cargo vessel berthing at the Port without discharging or loading cargo or with loading cargo being stored/or with discharging cargo to be stored outside the port area or port shed shall be charged wharfage 3,500 Baht per 24 hours.

3. Cargo vessel berthing at the Port to load/discharge overside cargo to be charged wharfage 3,500 Baht per 24 hours.

4. Small coaster (lighter) berthing at the Port whether to load/discharge cargo or not shall be charged wharfage 500 Baht per 24 hours per boat.

    Note: Wharfage rates as mentioned in 1-4 are charged for 24 hours even if vessels stay less than 24 hours, or if over 24 hours, the period beyond 24 hours to be charged as follows:

    A. If more than 12 hours but not exceeding 24 hours, to charge the rate for 24 hours (full rate additional).

    B. If not more than 12 hours, to charge half the rate for 24 hours (half rate additional).

5. Foreign cargo vessel to be charged pilotage in and out of port at rate of ฿6,000 - per vessel each time.

6. Foreign cargo vessel and coaster to be charged mooring of ฿800 - per vessel.

7. Foreign cargo vessel or coaster of large size coming to berth to be charged tugboat fee of ฿1,500 - per hour.

   Assumed annual port charge increase rate of 2 percent after 1987 with the current rate remaining unchanged until 1986.

2) Stevedorage

   All three ports: ฿ 30 per ton - 1987

   RoRo ships shall not be applied any stevedorage as trucks can be loaded and unloaded by themselves.

   The stevedorage rate shall be increased 5 percent a year after 1987.

3) Fuel Oil

   Consumption per year: $(C \times Ds + 1/10 \times C \times Dps) \times$ voyages/year

   C (consumption per days); Consumption (g/hr/ps) $\times$ ps $\times$ 80% (mco)

   $\times$ 24 hrs + 10% (for generator)

   Ps ....; Metric Horse Power

   Ds ....; Days at sea

   Dps ....; Days in port and spare

   mco ....; Maximum Continuous Output

   Price of fuel oil: US$ 185 (or 4,255 ฿) per M/T (1,500 second)

   Assumed annual fuel oil increase rate is 5 percent after 1987 with current rate remaining unchanged until 1987.

4) Agency Fee

   3 percent of Revenue

5) Other Operating Expenses

   5 percent of Revenue

6) Crew Costs

The annual crew costs of each vessel is given in Table 8.3-3. In this Study, replacement crews are not taken into account because of the field survey, it is found out that most owners or operators will not maintain replacement crews in their house.

7) Maintenance, Repairs and Supplies

2 percent of vessel price

Assumed annual increase rate: 5 percent

8) Insurance

1 percent of vessel price

No annual increase is anticipated.

9) Other Vessel Expenses

2 percent of vessel price

Assumed annual increase: 5 percent

10) Depreciation

10 percent equal depreciation for 10 years with the residual value of 20 percent will be calculated in accordance with Section 65 bis of the Revenue Code and Royal Decree issued under the Revenue Code governing deduction of deterioration and depreciation of assets (No. 145) 1983.

11) Administrative Expenses

Any new coastal shipping company is supposed to have its office in Bangkok and have two husbanding agents in both Songkhla and Ban Don. Annual office expenses for such a company are supposed to be 3,490,140 Bahts in 1983, 4,040,273 Bahts in 1987 details of which are found in Appendix Table A.13-3.

The Assumed annual office expenses increase rate is 5 percent.

Table 8.3-3　Crew Cost per Vessel

Unit: Bahts

Type of Vessel		B Year	C Number of Crew	D Basic Crew Wage Per Month	E Food Allowance for Crew Per Month	F Total Crew Cost Per Year (14×D + 12×E)	G Annual Crew Cost Increase Rate
G.C.V.	1,500 DWT	1987	12	90,200	21,600	1,979,000	5% for 4 years from 1983 to 1987
		1989	9	87,800	18,540	1,888,000	
	1,000 DWT	1987	9	72,800	16,200	1,578,000	7% for 10 years from 1987 to 1997
		1989	7	73,900	14,420	1,570,000	
	700 DWT	1987	7	61,600	12,600	1,318,000	
		1989	5	55,300	10,300	1,167,000	
Pusher of Pusher Barge System		1987	*10 1/3	71,200	18,600	1,586,000	
		1989	* 9 1/3	76,800	19,300	1,699,000	
RoRo Vessel		1987	26	194,200	46,800	4,265,000	

* No. of Crew for Pusher is including crew for Barges

Breakdown of crew wages are shown in Appendix Tables A.13-1 (1) ～ (5)

Current crew wages which were obtained by the field surveys and projected wages are shown in Appendix Table A.13-2.

12) Income tax

In accordance with Section 66 of the Revenue Code of the King of Thailand, Income Tax is 40 percent of net income (Profit after depreciation).

(3) Outcome of Analysis

Based on the aforementioned terms and conditions, the profit/loss forecasts have been calculated in each case, vesselwise and then fleet-wise, in two ways: 1) based on ETO Tariff rates and rules, and

2) based on prevailing market rates and practices.

1) Based on ETO tariff rates and rules

From Table 8.3-4, profit can be expected in all cases except for the RoRo service in Case 13. From the ninth year on, however, a small profit is possible even in Case 13. (Appendix Table A.13-4)

The Study Team, however, considers that the average freight revenue per ton or per truck is unreasonably high and that the outcome itself is inappropriate to reality. Further evaluation on this basis is therefore meaningless and suspended.

2) Based on prevailing rates and practices

a) Two Groups among Fifteen Cases

From Table 8.3-5, the 15 cases can be divided into two groups, one which shows profit for 10 years operation as in Cases 1, 2, 3, 7, 8, 9, 10 and 15, and the other which shows deficits as in Cases 4, 5, 6, 11, 12, 13 and 14.

The outcome indicates the following points:

1. 3 ports call is less profitable than 2 ports call due to the cost increase attributable to the decrease of revenue, the longer distance of the voyage, and the increase in the number of ports of call.

2. Larger vessels are more profitable than smaller vessels.

3. Cases 7 to 12, in which the price of vessel is reduced by 50 percent, needless to say, show much more profitability.

Table 8.3-4 Profit and Loss of 15 Cases on Fleet Bases for 10 Years, Based on ETO Tariffs (1/2)

Unit: Thousand Bahts

Case	1	2	3	4	5	6	7
(a) Revenue	1,262,924	1,404,432	1,371,909	1,683,311	1,718,910	1,685,671	1,262,924
(b) Operating expenses							
(1) Port charge	11,560	16,092	5,831	18,858	23,440	11,258	11,560
(2) Stevedorage	182,988	203,460	198,723	278,054	283,890	278,460	182,988
(3) Fuel oil	145,948	181,188	238,602	255,409	292,190	390,793	145,948
(4) Agency fee	37,876	42,108	41,160	50,449	51,590	50,583	37,876
(5) Other expenses	63,124	70,326	68,642	84,105	85,950	84,253	63,124
(6) Total	441,496	513,174	552,958	686,875	737,060	815,347	441,496
(c) Operating profit (a) - (b)	821,428	891,258	818,951	996,436	981,850	870,324	821,428
(d) Vessel expenses							
(1) Crew cost	93,848	116,286	102,928	164,234	193,810	191,152	93,848
(2) Maintenance, etc.	34,768	42,636	38,745	60,844	71,060	71,955	34,768
(3) Insurance	13,840	16,980	15,400	24,220	28,300	28,600	13,840
(4) Administrative exp.	50,812	50,790	50,792	50,792	50,810	50,856	50,812
(5) Others	34,768	42,636	38,745	60,844	71,060	71,955	34,768
(6) Total	228,036	269,328	246,610	360,934	415,040	414,518	228,036
(e) Interest	61,852	75,918	68,901	108,241	126,530	127,959	30,928
(f) Profit before depreci. (c) - (d + e)	531,540	546,012	503,440	527,261	440,280	327,847	562,464
(g) Depreciation	110,600	135,720	123,130	193,550	226,200	228,670	55,280
(h) Profit after depreci. (f) - (g)	420,940	410,292	380,310	333,711	214,080	99,177	507,184
(i) Income tax	168,376	154,112	152,117	133,497	85,630	45,266	202,880
(j) Profit (h) - (i)	252,564	246,180	228,193	200,214	128,450	53,911	304,304
(k) Revenue tons	2,424,400	2,696,100	2,633,400	3,684,450	3,762,000	3,689,400	2,424,400
(l) Revenue/ton (a/k) (B)	520.9	520.9	520.9	456.9	456.9	456.9	520.9
(m) Cost/ton ($\frac{a-h}{k}$) (B)	347.3	368.7	376.5	366.3	396.9	430.0	311.7

- 247 -

Table 8.3-4 Profit and Loss of 15 Cases on Fleet Bases for 10 Years, Based on ETO Tariffs (2/2)

Case	8	9	10	11	12	13	14	15
(a) Revenue	1,404,432	1,371,909	1,683,311	1,718,910	1,685,671	2,744,796	2,744,796	1,188,294
(b) Operating expenses								
(1) Port charge	16,092	5,831	18,858	23,440	11,258	56,862	56,862	12,111
(2) Stevedorage	203,460	198,723	278,054	283,890	278,460	0	0	191,763
(3) Fuel oil	181,188	238,602	255,409	292,190	390,793	960,435	960,435	126,045
(4) Agency fee	42,108	41,160	50,449	51,590	50,583	82,368	82,368	35,646
(5) Other expenses	70,326	68,642	84,105	85,950	84,253	137,232	137,232	59,435
(6) Total	513,174	552,958	686,875	737,060	815,347	1,236,897	1,236,897	425,000
(c) Operating profit (a) - (b)	891,258	818,951	996,436	981,850	870,324	1,507,899	1,507,899	763,294
(d) Vessel expenses								
(1) Crew cost	116,286	102,928	164,234	193,810	191,152	176,787	176,787	62,151
(2) Maintenance, etc.	42,636	38,745	60,844	71,060	71,955	221,268	221,268	29,117
(3) Insurance	16,980	15,400	24,220	28,300	28,600	87,960	87,960	11,580
(4) Administrative exp.	50,790	50,792	50,792	50,810	50,856	50,823	50,823	50,815
(5) Others	42,636	38,745	60,844	71,060	71,955	221,268	221,268	29,117
(6) Total	269,328	246,610	360,934	415,040	414,518	758,106	758,106	182,780
(e) Interest	37,962	34,454	54,124	63,270	63,986	393,642	196,824	51,799
(f) Profit before depreci. (c) - (d + e)	583,968	537,887	581,378	503,540	391,820	356,151	552,969	528,715
(g) Depreciation	67,860	61,600	96,740	113,100	114,400	703,710	351,870	92,610
(h) Profit after depreci. (f) - (g)	516,108	476,287	484,638	390,440	277,420	-347,559	201,099	436,105
(i) Income tax	206,448	190,519	193,858	156,170	110,955	9,723	82,809	174,443
(j) Profit (h) - (i)	309,660	285,768	290,780	234,270	166,465	-357,282	118,290	261,662
(k) Revenue tons	2,696,100	2,633,400	3,684,450	3,762,000	2,689,400	483,000	483,000	2,541,000
(l) Revenue/ton (a/k) (B)	520.9	520.9	456.9	456.9	456.9	5,682.8	5,682.8	467.6
(m) Cost/ton ($\frac{a-h}{k}$) (B)	329.5	340.1	325.3	350.0	381.7	6,402.4	5,266.4	286.7

Table 8.3-5 Profit and Loss of 15 Cases on Fleet Bases for 10 Years, Based on Prevailing Market Rates (1/2)

Unit: Thousand Bahts

Case	1	2	3	4	5	6	7
(a) Revenue	932,864	1,037,400	1,013,355	1,230,236	1,256,250	1,231,815	932,864
(b) Operating expenses							
(1) Port charge	11,560	16,092	5,831	18,858	23,440	11,258	11,560
(2) Stevedorage	182,988	203,460	198,723	278,054	283,890	278,460	182,988
(3) Fuel oil	145,948	181,188	238,602	255,409	292,190	390,793	145,948
(4) Agency fee	27,988	31,134	30,436	36,876	37,700	36,946	27,988
(5) Other expenses	46,616	51,870	50,589	61,495	62,820	61,594	46,616
(6) Total	415,100	483,744	524,181	650,692	700,040	779,051	415,100
(c) Operating profit (a) - (b)	517,764	553,656	489,174	579,544	556,210	452,764	517,764
(d) Vessel expenses							
(1) Crew cost	93,848	116,286	102,928	164,234	193,810	191,152	93,848
(2) Maintenance, etc.	34,768	426,636	38,745	60,844	71,060	71,955	34,768
(3) Insurance	13,840	16,980	15,400	24,220	28,300	28,600	13,840
(4) Administrative exp.	50,812	50,790	50,792	50,792	50,810	50,856	50,812
(5) Others	34,768	42,636	38,745	60,844	71,060	71,955	34,768
(6) Total	228,036	269,328	246,610	360,934	415,040	414,518	228,036
(e) Interest	61,852	75,918	68,901	108,241	126,530	127,959	30,928
(f) Profit before depreci. (c) - (d + e)	227,876	208,410	173,663	110,369	14,640	-89,713	258,800
(g) Depreciation	110,600	135,720	123,130	193,550	226,200	228,670	55,280
(h) Profit after depreci. (f) - (g)	117,276	72,690	50,533	-83,181	-211,560	-318,383	203,520
(i) Income tax	46,912	30,696	23,086	2,947	0	0	81,408
(j) Profit (h) - (i)	70,364	41,994	27,447	-86,128	-211,560	-318,383	122,112
(k) Revenue tons	2,424,400	2,696,100	2,633,400	3,684,450	3,762,000	3,689,400	2,424,400
(l) Revenue/ton (a/k) (B)	384.8	384.8	384.8	333.9	333.9	333.9	384.8
(m) Cost/ton ($\frac{a-h}{k}$) (B)	336.4	357.8	365.6	356.5	390.2	420.2	300.8
(n) C/B (B)	713	746	864	456	450	430	713
(o) H/B (B)	552	648	774	522	621	733	433
(p) ($\frac{h}{a}$) × 100 (%)	12.6	7.0	5.0	-	-	-	21.8

Note: Case 13 & 14 Unit Per Truck

- 249 -

Table 8.3-5 Profit and Loss of 15 Cases on Fleet Bases for 10 Years, Based on Prevailing Market Rates (2/2)

Case		8	9	10	11	12	13	14	15
(a)	Revenue	1,037,400	1,013,355	1,230,236	1,256,250	1,231,815	1,829,886	1,829,886	872,426
(b)	Operating expenses								
(1)	Port charge	16,092	5,831	18,858	23,440	11,258	56,862	56,862	12,111
(2)	Stevedorage	203,460	198,723	278,054	283,890	278,460	0	0	191,763
(3)	Fuel oil	181,188	238,602	255,409	292,190	390,793	960,435	960,435	126,045
(4)	Agency fee	31,134	30,436	36,876	37,700	36,946	54,906	54,906	26,164
(5)	Other expenses	51,870	50,589	61,495	62,820	61,594	91,488	91,488	43,622
(6)	Total	483,744	524,181	650,692	700,040	779,051	1,163,691	1,163,691	399,705
(c)	Operating profit (a) - (b)	553,656	489,174	579,544	556,210	452,764	666,195	666,195	472,721
(d)	Vessel expenses								
(1)	Crew cost	116,286	102,928	164,234	193,810	191,152	176,787	176,787	62,151
(2)	Maintenance, etc.	42,636	38,745	60,844	71,060	71,955	221,268	221,268	29,117
(3)	Insurance	16,980	15,400	24,220	28,300	28,600	87,960	87,960	11,580
(4)	Administrative exp.	50,790	50,792	50,792	50,810	50,856	50,823	50,823	50,815
(5)	Others	42,636	38,745	60,844	71,060	71,955	221,268	221,268	29,117
(6)	Total	269,328	246,610	360,934	415,040	414,518	758,106	758,106	182,780
(e)	Interest	37,962	34,454	54,124	63,270	63,986	393,642	196,824	51,799
(f)	Profit before depreci. (c) - (d + e)	246,366	208,110	164,486	77,900	-25,740	-485,553	-288,735	238,142
(g)	Depreciation	67,860	61,600	96,740	113,100	114,400	703,710	351,870	92,610
(h)	Profit after depreci. (f) - (g)	178,506	146,510	67,746	-35,200	-140,140	-1,189,263	-640,605	145,532
(i)	Income tax	71,400	58,597	27,090	2,150	0	0	0	58,213
(j)	Profit (h) - (i)	107,106	87,913	40,656	-37,350	-140,140	-1,189,263	-640,605	87,319
(k)	Revenue tons	2,696,100	2,633,400	3,684,450	3,762,000	3,689,400	483,000	483,000	2,541,000
(l)	Revenue/ton (a/k) (B)	384.8	384.8	333.9	333.9	333.9	3,788.6	3,788.6	343.3
(m)	Cost/ton $(\frac{a-h}{k})$ (B)	318.6	329.2	315.5	343.3	371.9	6,250.8	5,114.9	286.1
(n)	C/B (B)	746	864	456	450	430	739	739	584
(o)	H/B (B)	506	605	403	478	564	2,058	1,450	404
(p)	$(\frac{h}{a}) \times 100$ (%)	17.2	14.5	5.5	-	-	-	-	16.7

4. RoRo vessels operation show much deficit as the capital investment is rather large and cannot be paid off by the operating profit.

5. The pusher barge system is the most profitable even though the freight rate is 10 percent less than that of general cargo vessels.

b) Projected Freight Rates

Table 8.3-6 shows the freight rates in Baht per ton or per truck for the first year, the average freight rate for 10 years in cases 1 to 15, and the level of freight rate needed to reach the break-even point for the first year and for 10 years.

From this table, it is observed that though the projected freight rate is a little higher than the current market rate, general cargo vessels and the pusher barge system can be competitive with the truck transport if they reduce the rate level to the breakeven point.

Table 8.3-6 Projected Freight Rates and Break-even Points

Unit: Bahts/Ton (Cases 13, 14: Bahts/Truck)

	Case	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1st Year	Projected Rate	325	325	325	282	282	282	325	325	325	282	282	282	3,200	3,200	290
	Break-even Point	281	300	307	—	—	—	248	264	274	265	—	—	—	—	249
Average 10 Years	Projected Rate	385	385	385	334	334	334	385	385	385	334	334	334	3,789	3,789	343
	Break-even Point	332	355	364	—	—	—	294	313	324	314	—	—	—	—	295

Source: Appendix, A.13-5 (1) ~ (15)   Profit Loss Analysis for 15 Cases

Appendix, A.13-6 (1) ~ (8)   Profit "O" calculations

(4) Criteria for Case Selection

In recommending some cases out of the 15 cases taken up in The Study, the Study Team would like to point out the following criteria for consideration:

1) Profitability

Viewing from the total period of 10 years, loss after depreciation must not be recorded. For this purpose it is desirable for the loss at the starting time to be transformed to some profit at the early stage of the decade.

Also since 2 ports call is more profitable than 3 ports call as mentioned before, by this Study, 2 ports call of Bangkok and Songkhla shall be taken up, first of all, and the call at Ban Don has been kept open for discussion in the future subject to the cargo demand forecast and freight level.

2) Competitiveness with Truck Service

The feasibility of this route depends upon how general cargoes can be recaptured and transferred from trucking service. To meet this requirement, it is most important to provide the shippers with the competitive services with trucks, which are reasonable freight rates, daily sailings, simple documentation and smooth cargo handling at terminals.

3) Feasibility of Employing RoRo Service

RoRo service can function as a "Highway on the sea" and has the following characteristics:

1. Suitable in the long-distance trade where the sea route is shorter than the overland route.
2. Night-departure, morning arrival schedule is recommendable as night time can be used for navigation.
3. Trucks and Semi-Trailers can be carried with no drivers on board.
4. Both cargoes (trucks) and passengers can be loaded in most cases.
5. In order to accommodate trucks, the vessel must be comparatively larger in GT and DWT.

6. High-powered engines are needed to maintain schedule and to compete with trucks.

In the meantime, from the operators' standpoint, in order to make RoRo service feasible by private sector, following factors are taken into consideration:

1. Cargo movements (loaded trucks), in and out, must be balanced.

2. Headless trucks (Semi-Trailers) must become popular and common in domestic trucking service.

3. Operating and vessel expenses for RoRo being much higher than conventional ones, freight rates for RoRo becomes relatively high.

From the above, the Study Team predicts that RoRo service would be rather premature in the trade between Bangkok and the southern provinces.

8.3.2 Investment Return Analysis

The Study Team reviewed the trade results of 15 cases and calculated the internal rate of return (IRR) of 8 cases which show some profit for 10 years operation, as shown in Appendix 14. The ratios of IRR for 8 cases are as follows:

Case	Vessel	Ports of Call	IRR (%)
1	General Cargo Vessel	BK-SK-BK	16.6
2	General Cargo Vessel	BK-SK-BK	11.8
3	General Cargo Vessel	BK-SK-BK	10.6
7	General Cargo Vessel (Price 50%)	BK-SK-BK	38.2
8	General Cargo Vessel (Price 50%)	BK-SK-BK	30.3
9	General Cargo Vessel (Price 50%)	BK-SK-BK	28.1
10	General Cargo Vessel (Price 50%)	BK-SK-ST-BK	13.6
15	Pusher Barge System	BK-SK-BK	21.2

Apart from cases 7 to 10, with vessel prices of 50 percent, Cases 2 and 3 seemingly are unattractive as the IRR ratios are less than the prime rate in Bangkok. Only Cases 1 and 15 are considered feasible by private sectors in Thailand.