3.2 Shipping

3.2.1 Domestic Coastal Shipping

Of the industrial structure of Thailand, such primary industries as agriculture, fishery, and mining form the basis. These are supported by consumer goods industries consisting of textiles, electronics, fertilizer, automobiles, etc., most of which are manufactured in and around Bangkok, and the key industries of electricity and cement. 99 percent of the crude oil, which is the main energy resource, is imported from abroad. Its domestic transportation system has already been established by three major petroleum companies, and its products to be forwarded to southern Thailand is transported by domestic coastal tanker.

Cement can hardly be expected to become the object of coastal shipping cargo because the cement factory is located in the outskirts of the major market place and the distance for transportation is rather short. Accordingly, the cargoes suitable for coastal shipping are, for the time being, as follows:

Bangkok/Southern Thailand	Southern Thailand/Bangkok
Fuel	Wood products
Fertilizer	Fish products
Maize	Vegetables/Fruit
Rice	Rubber
Construction Material	Rice
General Cargo	General Cargo

Agriculture/fish products and basic materials occupy the majority of cargoes to be transported to and from Bangkok. Especially, the cargoes coming from southern Thailand are confined to agriculture and fish products, and the total volume of southern Thailand/Bangkok cargoes is less than 10 percent of the Bangkok/southern Thailand cargoes.

However, the total volume of coastal shipping cargoes is expected to increase gradually on the assumption that the cargoes of raw materials and processed goods will come out in addition to the existing primary products as a result of the development of eastern and southern Thailand.

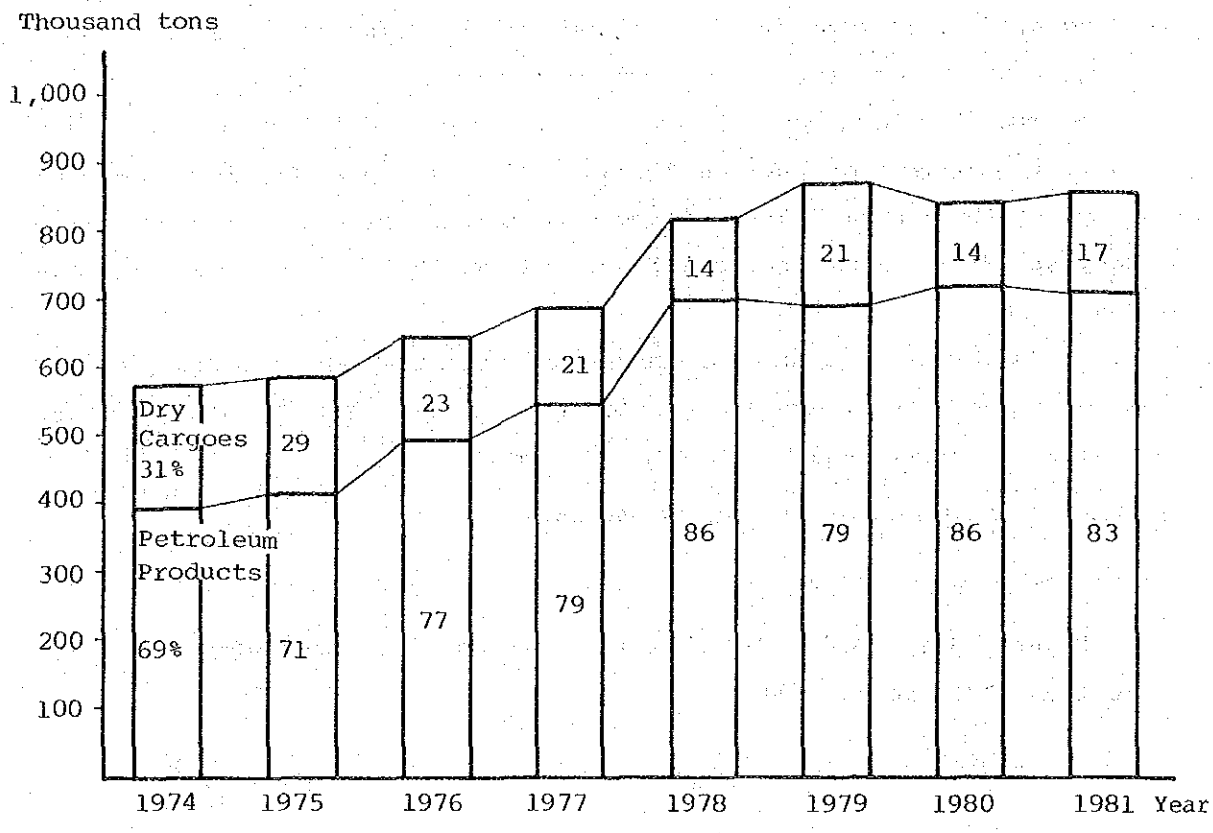
Such possible increase in cargoes is forecasted based upon the fact that the development of eastern Thailand is now under way in accordance with the Fifth National Economic and Social Development Plan with the development of southern Thailand being decided by the forthcoming Sixth National Plan.

In this section, we will discuss the coastal shipping cargo flow and the major commodities which are carried now. After that, we will describe the Thai Flag Vessels and the coastal shipowners.

(1) Coastal Shipping Cargo Flow by Commodity

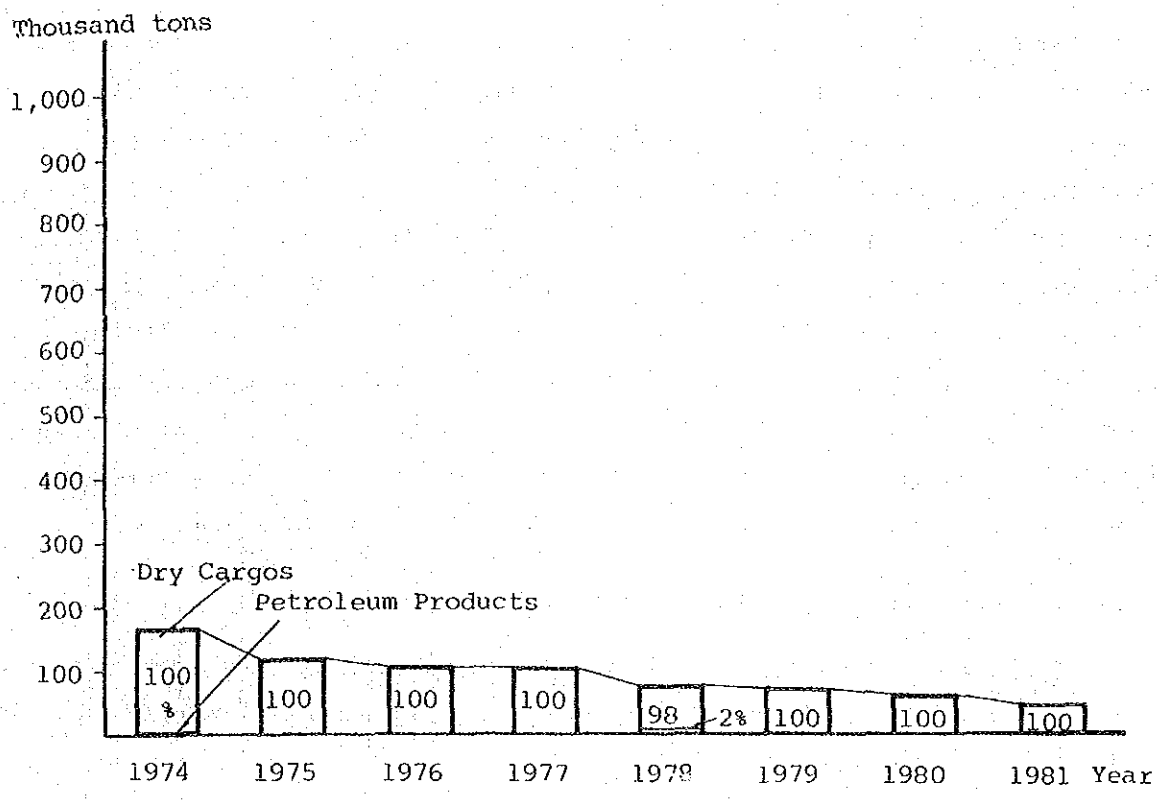
1) Total Cargoes

Figures 3.2-1 and 3.2-2 show the volumes of dry and petroleum cargo flow from 1974 through 1981.



Source: Appendix, Table A.5-1

Fig. 3.2-1 Coastal Shipping Cargo Flows (Bangkok to The South)



Source: Appendix, Table A.5-1

Fig. 3.2-2 Coastal Shipping Cargo Flows (The South to Bangkok)

As can be seen, the volume of cargo going south is considerably greater than that going north, with the gap between the two growing wider every year. In 1974, the volume going south was 3.5 times greater versus 18.5 times for 1981. Further, the volume going south has been increasing over these years (at an average of 6.0 % per year) while that going north has been decreasing (average 15.7 %). The rate of decrease from year to year for northbound cargo is much greater (2.6 times) than the rate of increase for southbound cargo. The flow of cargo northbound by ship will thus disappear entirely in a very short time if this trend is allowed to continue. Reduced competition to other modes of transportation will result in reduced pressure on them to keep their freight rates low.

2) Dry Cargoes

Figures 3.2-3 and 3.2-4 show the breakdown of dry cargo flow by major commodity that was transported by ship between Bangkok and the South from 1974 through 1981.

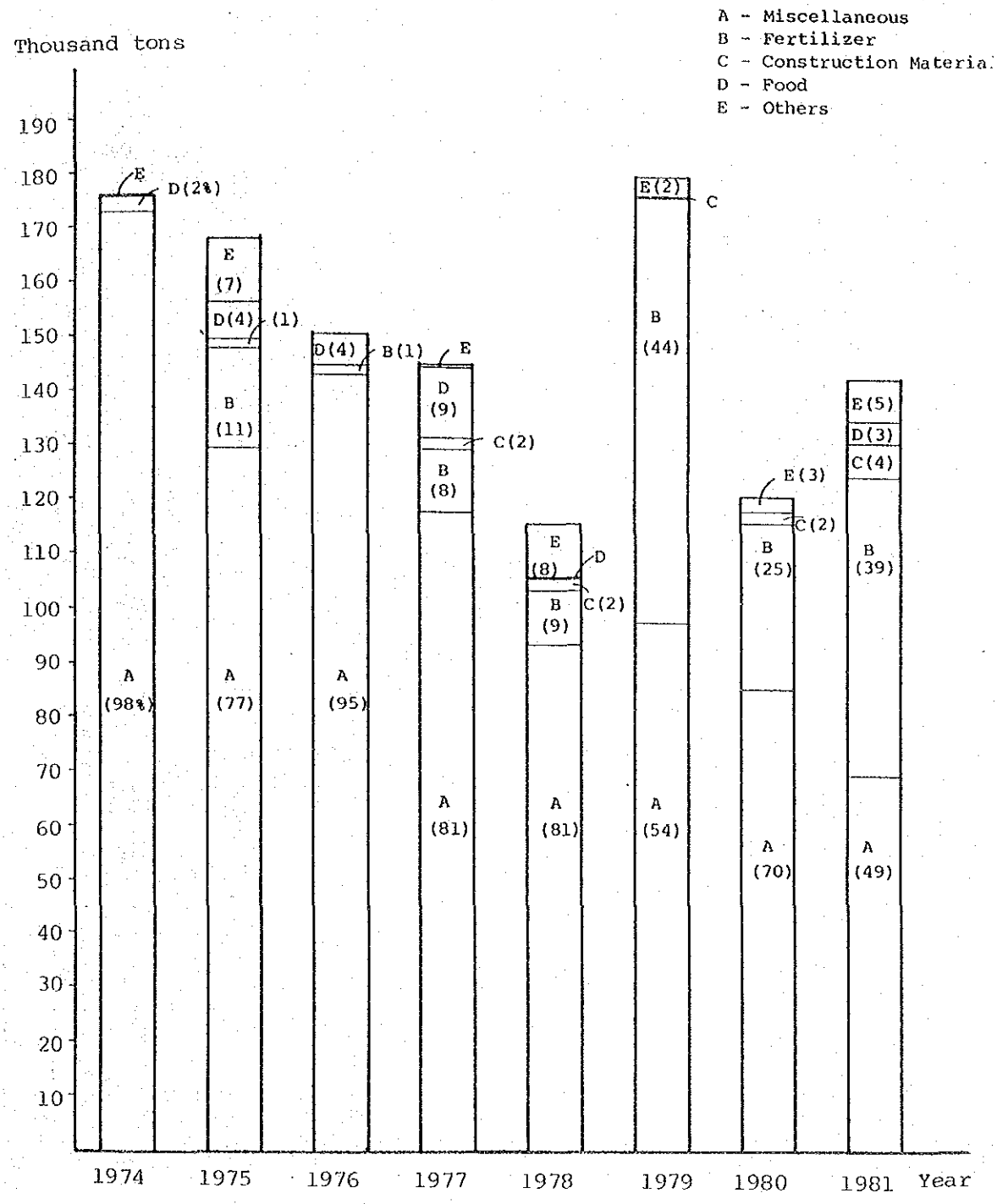
(2) Domestic Coastal Shipping Cargoes and their Carriers

First of all, an analysis will be made with respect to the present situation of transportation regarding petroleum, fertilizer, and logs, which are the major cargoes of domestic coastal shipping in Thailand and then the general trend of common carriers for general cargoes will be taken up.

1) Petroleum

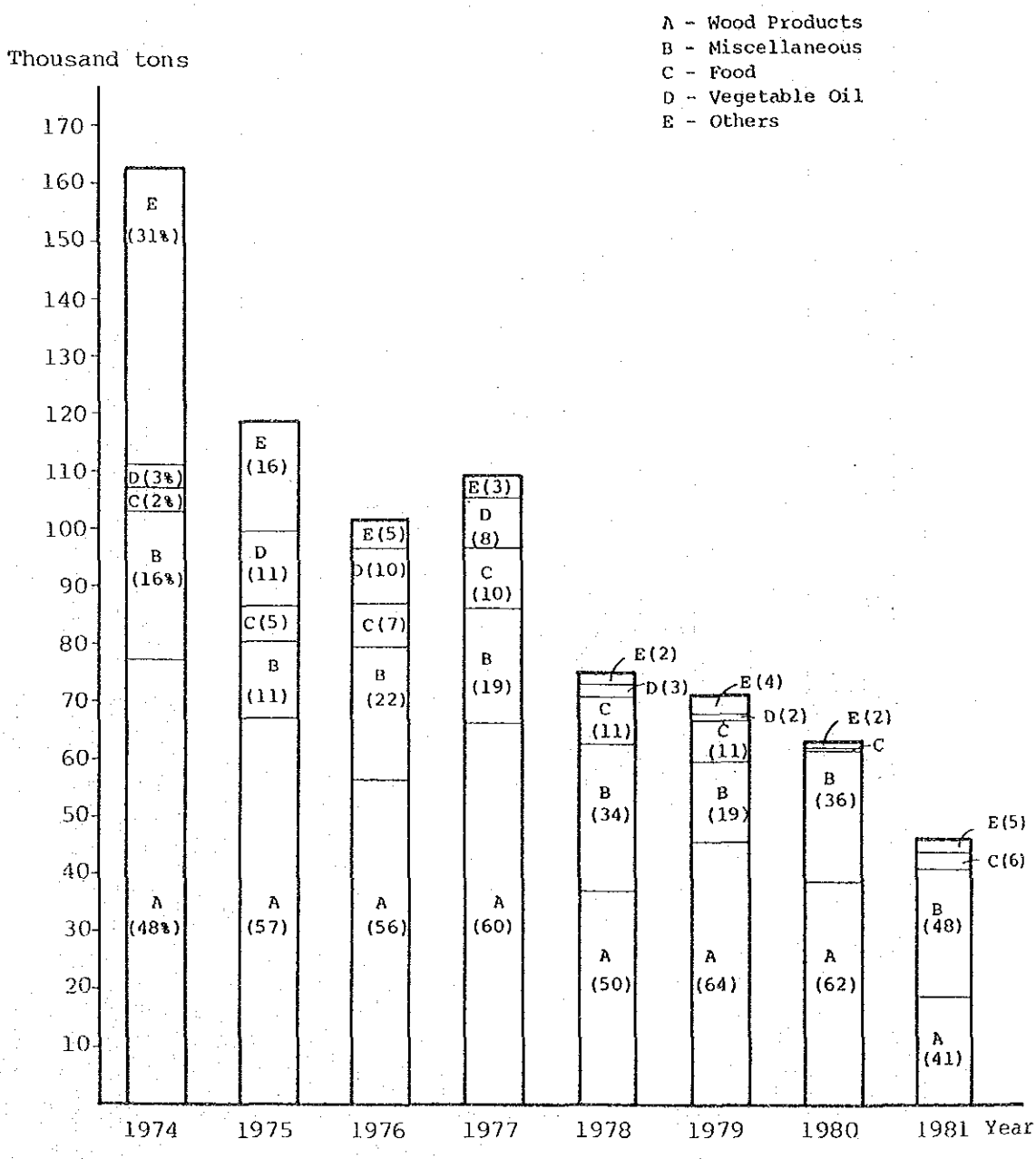
As discussed earlier, petroleum accounts for 79 percent of the total volume of cargo carried by ship in both directions and 83 percent of the southbound volume. A negligible amount is carried north.

Thailand imports 99 percent of its crude oil mainly from Saudi Arabia and Qatar, which is transported by ocean tankers to refineries located in Si Racha and Bangkok. From there, petroleum products are distributed throughout the country and those going to the South are transported mainly by ships owned or chartered by the oil companies themselves. This point will be elaborated on shortly.



Source: Appendix, Table A.5-2

Fig. 3.2-3 Coastal Shipping Cargo Flows - Major Commodity (Bangkok to The South)



Source: Appendix, Table A.5-2

Fig. 3.2-4 Coastal Shipping Cargo Flows - Major Commodities (The South to Bangkok)

a) Supply and Demand of Petroleum

Refineries are operated by three leading firms, Thai Oil (Sri Racha), Esso Oil (Si Racha), and Bang Chak Oil of the Defense Ministry (Bangkok). The field survey reveals the present conditions of their production capacities as follows:

Company	Barrels/Day
Thai Oil	65,000
Bang Chak Oil	70,000
Esso Oil	46,000
Others	1,000
Total	182,000

In addition, the survey also shows the actual outputs of petroleum products as mentioned below.

Unit: Thousand kilo liters

	1979	1980	1981
LPG	310	317	433
Gasoline	2,366	2,225	2,122
J.P.I.	852	942	1,003
Kerosene	312	291	362
Diesel	4,306	4,141	4,127
Fuel Oil	3,881	3,899	4,555
Total	12,027	11,815	12,602

On the other hand, the domestic consumption of petroleum products is estimated to be 230,000 Bls/Day in 1982, whose distribution ratio is given below. Up to 1985, the annual growth rate of consumption is forecasted to be 3 to 3.5 percent.

LPG	2 ∿3%
Gasoline	27%
J.P.I.	10%
Diesel	40%
Fuel Oil	20%

Accordingly, the gap (approx. 25 percent of consumption) between consumption and output is, at the present time, supplied by the importation of petroleum products.

b) Domestic Transportation

Of the domestic consumption, approx. 13 percent is consumed in southern Thailand, most of which is transported in domestic coastal tankers. Type of vessel by main destination and spot freight rate are as follows:

Destination	Standard type of vessel	Freight rate/Spot Oct., 1983
	DWT	Baht/K. Liter
Samut Songkhram	2,000	30
Bandon	1,000	139∿ 150
Pak Panang	500	160∿ 169
Songkhla	2,000	128∿ 170
Phuket	2,000	340∿ 350

Petroleum products are transported to other areas of the country by railway and trucks in most cases although a few cargoes are transported by barge on the Chao Phraya River.

In Thailand, 29 shipowners of coastal tankers own 66 tankers, totalling approx. 97,000 DWT. They vary from C.P. Co., Ltd., a leading self-operating owner, to owners of one ship only.

However, there are very few tankers whose vessel age is less than 10 years and, therefore, replacement of current tankers will become a pending problem from now on.

c) Points at Issue

Among the operators of coastal tankers, 3 leading oil firms transport 70 ∿ 80 percent of the annual volume of traffic by using their own vessels including those owned by subsidiaries, by time chartered vessels and the cargo guarantee based on COA (Contract of Affreightment).

For the transportation of 20 ∿ 30 percent of the annual volume, oil firms charter a vessel for each voyage on a spot basis (Voyage Charter). Currently, the excess of bottoms is seen reflecting the slump of demand for petroleum, so that they can charter coastal tankers at the lower charter rate. Under such circumstances, due to the nature of their cargoes, the transportation departments of oil firms are eager to charter tankers which are in good condition and contamination-free as well as to get lower charter rates.

Since a number of coastal tankers are laid up at the mouth of the Chao Phraya River, it is estimated that the excess of bottoms will last for the time being. As far as the domestic transportation of petroleum is concerned, the oil firms have incorporated the use of coastal tankers into their overall production/sales system of petroleum products. Thus, it is most recommendable that such a policy will be maintained unchanged on a private basis since a cost-based stable transport system has been established for the fixed percentage of the total volume of petroleum products carried by sea.

As for the replacement of current coastal tankers, however, this should be determined with the consideration of profitability whether they will order new tankers from domestic ship-yards or import tankers (new or second-hand) with the approval of BOI incentives.

2) Fertilizer

Almost all the fertilizer carried by ship or other modes of transportation goes from Bangkok to the South. Virtually no fertilizer is ever carried north.

As shown in Figure 3.2.3, the volume of fertilizer carried by ship increased significantly in 1979 and has continued to be large in 1980 and 1981 as well. This increase is due to the decision by Central Chemical Co. to charter two ships to transport their cargoes. Prior to 1979, fertilizer was carried by common carriers only.

a) Supply and Demand of Fertilizer

According to the Field Survey, the annual production of compound fertilizer in Thailand amounts to approx. 800 thousand tons (estimated for 1983), and consumption by region is indicated as follows:

North	6%
Central	63%
N. East	22%
South	8%

After a new fertilizer plant of the National Fertilizer Corp. Ltd. starts operation at the Mab Ta Phut District in 1987, an annual production of approx. 1 million tons will be expected. In proportion to the growth of agricultural production (rubber and rice) to be anticipated from now on, the demand for compound fertilizer will increase in southern Thailand.

b) Method of Transportation

At the present time, Thai Central Chemical Co., Ltd. supplies the compound fertilizer to southern Thailand. The fertilizer for rice cultivation is transported by trucks while for rubber plantations it is transported by 2 cargo vessels (1,500 DWT each) such as m.s. Marine Trader and m.s. Spring Horse based upon the annual contract

of approx. 60 thousand tons between Thai Central Chemical and the Office of the Rubber Replanting Aide Fund (ORRAF).

c) Operation of Ships

i) The contract of affreightment (COA) is concluded between Thai Central Chemical Co., Ltd., and the shipping company.

ii) The shipper charters 2 vessels mentioned above on a voyage-charter basis from each ship-owner and is engaged in transporting the fertilizer by shuttle service between Bangkok and Songkhla. The volume of cargoes is determined upon a quarterly basis, and each vessel is capable of trading in service for 30 voyages a year (Carrying capacity 45,000 x 2 = 90,000). At the end of each quarter, however, those vessels are forced to be assigned to other routes because of the shortage of cargoes to be loaded.

iii) As for the loading place, the private berth of Thai Central Chemical Co., Ltd., is utilized, and the private berth of Thai Navigation Co., Ltd., is used for the unloading place. The vessels go back to Bangkok unloaded.

d) Points at Issue

2 cargo vessels are chartered as industrial carriers by Thai Central Chemical Co., Ltd. to transport the fertilizer to southern Thailand. It is estimated that such a transportation system will be maintained for the time being by the private sector. For now, however, the controversial point is the fact that both m.s. Marine Trader and m.s. Spring Horse have ages of almost 20 years each as they were built in 1965. That is to say, now is the time to study the possibility of replacing them with other ships.

A decision must be made whether the current ships will be replaced by conventional cargo vessels or by barges after considering the volume of cargoes and the efficiency of the vessels. Since this problem is the matter to be discussed between the shipper and shipping company, the Study Team would like to refrain from going further into the problem.

National Fertilizer Corp. Ltd., plans to transport the fertilizer by barge from Mab Ta Phut to Southern Thailand after their factory starts operation.

As soon as the growth for the demand of fertilizer in southern Thailand from 1987 on is made clear and also the supplier of fertilizer is nominated, they will make a definite decision on the method of transportation. Nevertheless, the transportation of fertilizer by industrial carriers will remain unchanged.

3) Logs

Logs (wood products) are transported to Bangkok from southern Thailand by industrial carrier. This commodity is of vital importance to coastal shipping as it has represented the largest portion of the total volume carried by ship with the one exception of the year 1981 (See Appendix, Table A.5-5 (16).) The volume of wood products carried by ship, however, has steadily declined since 1974 from 77 thousand tons then to 18 thousand in 1981. Data that would reveal whether or not this decline is due to a loss of volume share to other modes of transportation is not available, but this possibility seems highly likely in light of the sharpness of the decline and the fact that in 1981, shipping's share of the volume was a mere 5.3 percent versus 81.1 percent for trucks and 13.6 percent for rail. The activities of Cho Vanakit Co. will explain clearly the situation of log transportation by ship.

This company is responsible for the shipping division of the conglomerate which owns from forest to sawmill, and owns and operates 2 cargo vessels such as m.s. Cho 9 (262.82 NT, 512.59 DWT) and m.s. Cho 11 (202.69 NT, 298.07 DWT). Those ships are assigned for the transportation of logs between Surat Thani and Bangkok and transport logs exclusively from timber storage in Surat Thani to the sawmill in Bangkok. Each ship spends approx. 7 days for one voyage and transports 18 thousand to 20 thousand tons of logs a year. The company has, reportedly, fixed the freight rate for the current year at 300 Baht/m^3 Free Out.

Neverthless, the time will come also when the owners must study the possibility of replacing these 2 ships in the same way as for petroleum and fertilizer.

4) General Cargoes

This category includes all dry cargoes except fertilizer from 1979 and logs. General cargoes are carried by common carriers while fertilizer and logs are carried by industrial carriers as discussed already.

This category has shown a sharp and steady decline over the period from 1974 to 1981 as can be seen in the table next. The balance between cargo going north and cargo going south, however, has remained fairly constant. Although the balance still is not a particularly healthy one, its predictability is nonetheless a stabilizing factor which can be coped with.

Year	Southbound			Northbound		
	Volume ( )	% Change	% of Total	Volume ( )	% Change	% of Total
1974				85,425		
1975	167,446		76.5	51,539	-39.7	23.5
1976	150,026	-10.4	77.0	44,927	-12.8	23.0
1977	144,818	-4.5	76.7	43,924	-2.2	23.3
1978	115,227	-20.5	75.4	37,662	-14.3	24.6
1979	100,994	-12.4	79.9	25,427	-32.5	20.1
1980	90,097	-10.8	79.1	23,841	-6.2	20.9
1981	87,541	-2.8	76.6	26,795	+12.4	23.4

According to the Field Survey, Harinsuit Transport Co., Ltd., Tharoe Chakrwad Co., Ltd., and Srithamaraj Transport Co., Ltd. are held out to the public as the major common carriers in the trade between Bangkok and the southern provinces. The outlines of those common carriers are as follows:

1. Harinsuit Transport Co., Ltd.

This company is one of a few principal shipping companies in Thailand that provide scheduled coastal shipping services. It provides services between Bangkok and Songkhla with departures from Bangkok on Tuesdays, Thursdays and Saturdays. Ten wooden vessels of 300 DWT to 450 DWT make 14 trips every month. A single trip is concluded in 15 days.

Maize and general cargo are loaded at the Bangkok port, but no goods of significance are loaded at Songkhla, leaving almost one half the passages empty. At the moment, service to Pattani is suspended, and all shipments between Bangkok and Pattani/Narathiwat are transshipped at Songkhla to trucks. The Group owns 18 vessels at present, of which 10 are operated by Harinsuit itself and the remaining 8 vessels are leased out to other companies belonging to the same group. It is generally admitted that this company survives under the severe conditions of domestic coastal shipping business in Thailand due to its ability to lower operating costs by means of wholly-owned facilities such as berths and dockyards.

2. Tharoe Chakrwad Co., Ltd.

Route : Bangkok - Songkhla (Ao Siam Wharf) - Bangkok
Frequency : 1 ∿2 trips/month
No. of Vessels in operation:
4 vessels of 200 ∿ 250 DWT tons each (under charter from Harinsuit)
Cargo : Bangkok - Songkhla; General Cargo
Songkhla - Bangkok; Log and Timber or empty return

3. Srithamaraj Transport Co., Ltd.

Route : Bangkok - Ko Samui - Pak Panang - Bangkok
Frequency : 4 trips/month (or one trip a week)
No. of Vessels in operation:
2 vessels of 250 ∿500 DWT tons each (under charter from Harinsuit)

Cargo : Bangkok - Ko Samui; General Cargo
Pak Panang - Bangkok; Coconut Oil, Fish Meal

Details on the vessels operated by these companies can be found in Appendix, Table 3.2-7 (3).

There are some carriers who have service in the same trade, but the Study Team found that most of them are tramp operators.

Regarding the freight rates in this trade, the operators maintain their own rates which are fixed between the shippers and the operators and cannot be disclosed to the public. The Study Team, however, observed that the prevailing rate for general cargoes from Bangkok to Sangkhla is around ฿200 FIO.

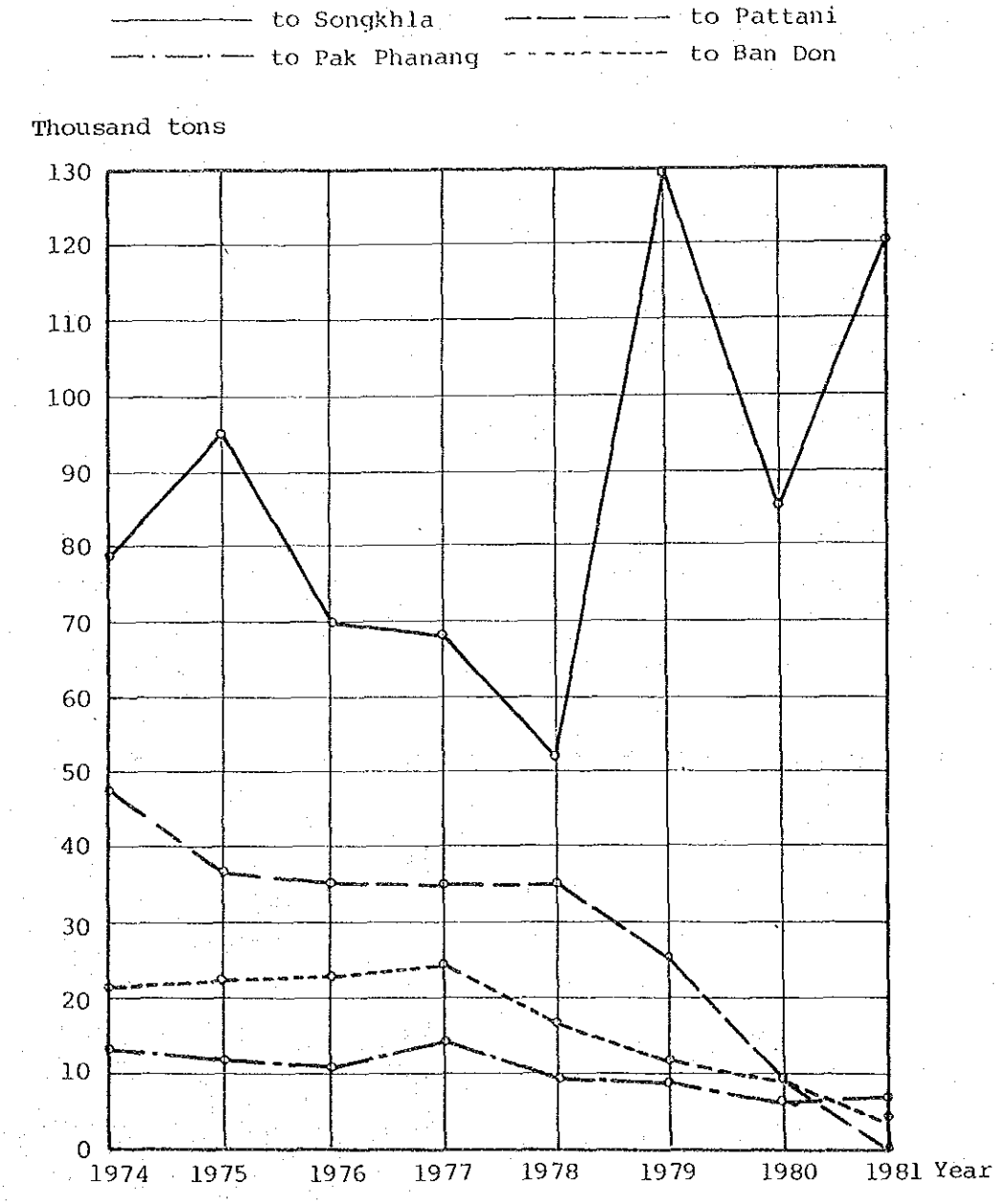
(3) Coastal Shipping Cargo Flow by Main Southern Port

In this section, we will examine the patterns of cargo flows in and out of the main ports of southern Thailand: Songkhla, Pak Phanang, Pattani, and Ban Don. Our study will concentrate on dry cargoes since petroleum is shipped only to the ports of Tha Thoug, Pak Phanang, Songkhla, Phuket, and Kantang where the oil companies maintain their oil tanks.

As seen in Figures 3.2-5 and 3.2-6, the only port among these four which has shown an increase in the volume of cargo entering the port from Bangkok is Songkhla, the main center of economic activity in the South. It also handles by far the largest volume of cargo. The other three ports, particularly Pattani, have shown decreases. (See Appendix, Table A.5-3)

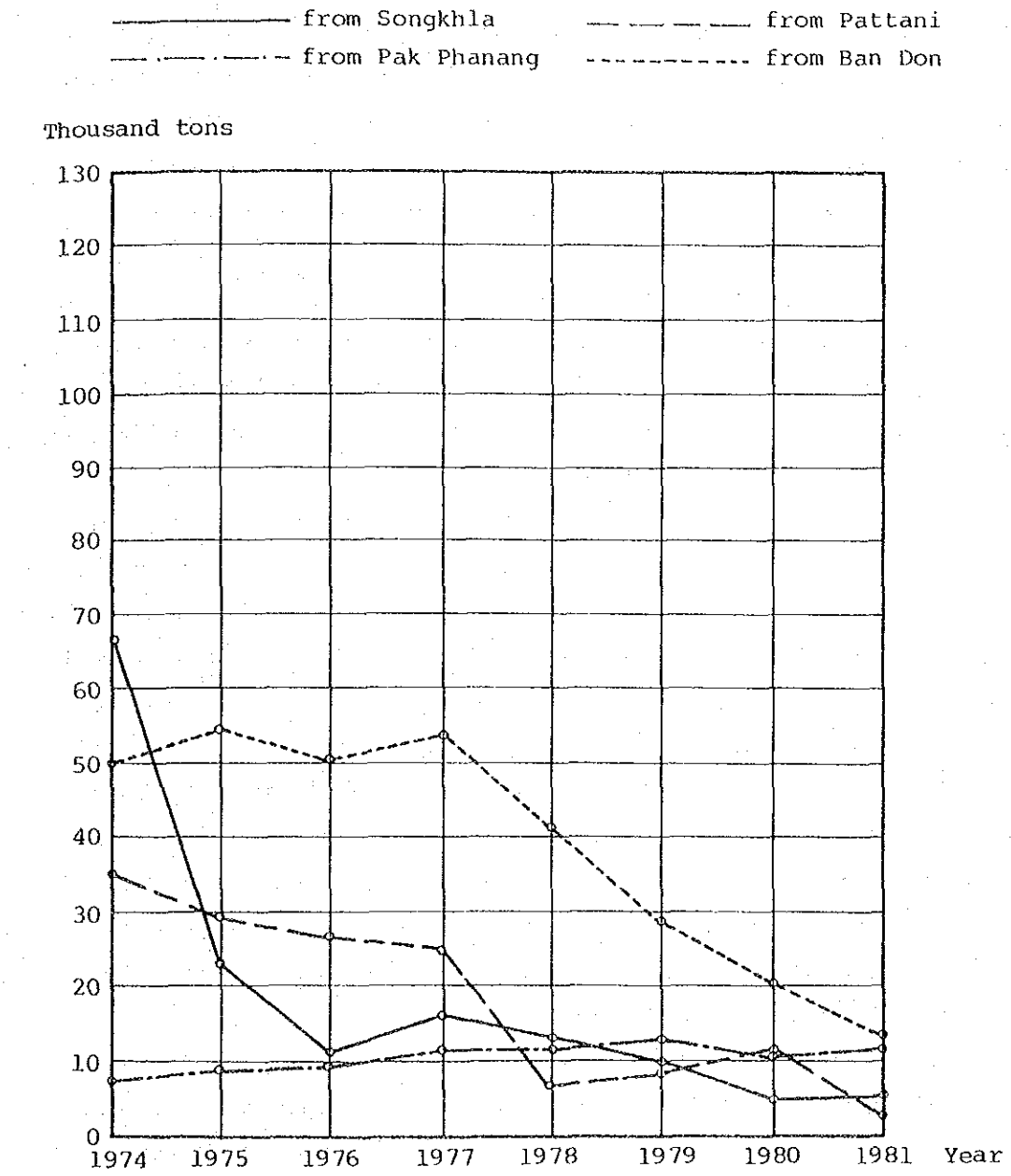
The volume of dry cargo leaving these ports for Bangkok also has shown an overall decrease, although one port, Pak Phanang, has shown a slight increase in cargo volume leaving the port. This is the only port among the four that has shown a relative balance in dry cargo entering and leaving the port.

A review of the situation of each port and the commodities they handle follows:



Source: Appendix, Table A.5-3

Fig. 3.2-5 Coastal Shipping Cargo Flows - Main Ports
- Dry Cargo Only (Bangkok to The South)



Source: Appendix, Table A.5-3

Fig. 3.2-6 Coastal Shipping Cargo Flows - Main Ports - Dry Cargo Only (The South to Bangkok)

1) Ban Don

Of the approximately 15 thousand tons of dry cargo which entered Ban Don and the approximately 36 thousand tons which left the port, 4 thousand tons (27%) arrived from Bangkok and 13 thousand tons (36%) went to Bangkok in 1981. The remainder of the cargo, that is the largest portion (74% and 64%, respectively), arrived from or left to other ports. Ban Don is the only one of these four where this type of Bangkok-versus-other-port dry cargo flow is present. (See Appendix, Table A.5-4 (8).)

The main commodity which leaves Ban Don for Bangkok is wood products (78%) and the second most important commodity is miscellaneous cargo (20%), based on 1981 data. (See Appendix, Table A.5-5 (16).) Other Commodities which sometimes leave Ban Don are agricultural products, food, vegetable oil, and so on.

Very little dry cargo enters Ban Don from Bangkok. Approximately 4 thousand tons of miscellaneous cargo arrived in 1981, or 99 percent of the total. Other commodities which sometimes enter Ban Don from Bangkok are fertilizer, construction materials, or food.

2) Pak Phanang

Of the approximately 8 thousand tons of dry cargo which entered Pak Phanang and the approximately 12 thousand tons which left the port, 7 thousand tons (88 percent) arrived from Bangkok and 11 thousand tons (97 percent) went to Bangkok in 1981. The remainder of the cargo went to or arrived from other ports, except for a mere 75 tons which went to Songkhla. (See Appendix, Table A.5-4 (8).)

All of the dry cargo which enters Pak Phanang from other ports in Thailand arrives from Bangkok. This cargo consists almost entirely (99%) of miscellaneous commodities. Other commodities which sometimes enter Pak Phanang are fertilizer, construction materials, food, and so on. (See Appendix, Table A.5-5 (1) ∿(8).)

The commodities which leave Pak Phanang for Bangkok, based on 1981 data, are mainly miscellaneous commodities (73%) and food (23%). Other commodities which usually leave for Bangkok are wood products (4%) and, less frequently, vegetable oil, animal feed, and rubber.

3) Songkhla

Of the approximately 128 thousand tons of dry cargo which entered Songkhla and the approximately 5,700 tons which left the port, 122 thousand tons (95%) arrived from Bangkok and 5,500 tons (97%) went to Bangkok in 1981. The remainder of the inbound cargo (5%) arrived from other ports, while the remainder of the outbound cargo went to Chumphon (3%). (See Appendix, Table A.5-4 (8).)

Songkhla is the primary destination of fertilizer in the south. In 1980 and 1981, this port received 100 percent of all fertilizer shipped to the South, and this commodity represented 45 percent of the total volume of dry cargo received. Miscellaneous commodities also accounted for 45 percent of the total while food and agricultural products accounted for the remainder at 3 percent and 7 percent, respectively. This pattern is fairly accurate for 1979 and 1980 also. Other commodities which sometimes enter Songkhla are construction materials and animal feed. (See Appendix, Table A.5-5 (1) ∿ (8).)

The primary commodity being shipped from Songkhla to Bangkok is miscellaneous cargo. In 1981, this category accounted for 90 percent of the total while wood products accounted for the remaining 10 percent. Other commodities which sometimes leave Songkhla for Bangkok are rubber, vegetable oil, or food.

4) Pattani

Of the 97 tons of dry cargo which entered Pattani and the approximately 3,400 tons which left the port, all of it arrived from Bangkok and 3,200 tons (93%) went to Bangkok in 1981. In 1980, about 9,500 tons of dry cargo (100% of the total) arrived from Bangkok and about 11,500 tons (87%) went to Bangkok. In both 1981 and 1980, the remainder of the dry cargo leaving Pattani (7% and 13% respectively,) went to other ports while no dry cargo at all arrived from any other port besides Bangkok. (See Appendix, Table A.5-4 (8).)

The primary dry cargo commodity entering Pattani from Bangkok is miscellaneous cargo. In 1981, this commodity accounted for 100 percent of the total volume (97 tons) while in 1980, it accounted for 92 percent,

the remaining 8 percent being construction materials. Other commodities which have entered Pattani prior to 1980 are fertilizer, animal feed, food, and rice. (See Appendix, Table A.5-5 (1),ら (8).)

The commodities which left for Bangkok in 1981 were wood products (55% of the total) and construction materials (45%). The latter commodity does not seem to have been shipped from Pattani between 1974 and 1980. During this period, vegetable oil, rubber, as well as very small amounts of food, agricultural products, and animal feed were shipped to Bangkok. Wood products have been and remain the primary commodity to leave Pattani for the capital.

From the above review of the four main ports on the east coast of southern Thailand, in terms of the volume and diversity of dry cargo handled, only Songkhla and Ban Don can reasonably be considered to serve as pivotal ports along this coast at present. The active volume of domestic trade at Songhkla and the potentiality which Ban Don plays in serving ports by the new facilities are the main considerations for choosing these two ports. Other aspects of these four ports, such as existing facilities and natural conditions, will be reviewed in a later section.

(4) Fleet of Thai Flag Vessels (Over 60 GT)

The statistics showing the total fleet engaged in domestic coastal shipping are not available, and from the data published by the Harbour Department, the total number of Thai Flag Vessels for commercial use is 266, consisting of cargo vessels, tankers, L.P.G. carriers, passenger vessels and tugs, out of which the breakdown by cargo vessel and tanker for domestic coastal service is given below. (See Appendix, Table A.5-6)

1) Cargo Vessels

	No. of Vessels	GT	DWT
International	77	322,200	451,300
Domestic	74	35,100	55,500
Total	151	357,300	506,800

The above figures in Domestic trade include vessels engaged in both Home Trade and Home Trade Limited. The average vessel size in the domestic fleet is 474 GT and 750 DWT respectively.

18 wooden vessels over 60 GT are included in the category of Home Trade Limited.

2) Tankers

	No. of Vessels	GT	DWT
International	24	126,200	215,800
Domestic	66	53,300	97,400
Total	90	179,500	313,200

The average tanker size in the domestic fleet is 807 GT and 1,475 DWT.

3) Age of Vessels

It is hard to say one way or the other, but the Study Team estimated that Thai Flag Vessels are rather old and obsolete.

From the limited data (See Appendix Table A.5-7 (1) ∿ (5)), the Study Team spotted the age of Thai Flag Vessels engaged in domestic coastal service as follows:

a) Cargo vessels

i) Steel vessels - 10 vessels

Less than 10 years	1
10 ∿ 20 years	6
20 ∿ 30 years	2
Over 30 years	1

ii) Wooden vessels - 18 vessels

Less than 10 years	4
10 ∿ 20 years	8
20 ∿ 30 years	6

b) Tankers - 26 vessels

Less than 10 years	0
10 ∿20 years	22
20 ∿30 years	4

Most of the Thai Flag Vessels are more than 10 years of age, Especially, there are no tankers with the age of less than 10 years. In other words, a fleet rejuvenation programme is one of the most vital issues of the merchant marine in domestic coastal shipping.

Also, at present, wooden vessels are very common in domestic coastal shipping service. However, it will become difficult to build this type of wooden ship to replace older ones due to the high cost and lack of skilled carpenters. Year after year, wooden vessels will be replaced by steel vessels.

(5) Coastal Shipowners

Coastal Shipowners in Thailand are classified by type of vessel, cargo vessel or tanker, and also by type of trade, foreign or home, bread down of which are as follows:

	Foreign Trade	Home Trade
Cargo Vessels	42	47
Tankers	21	29

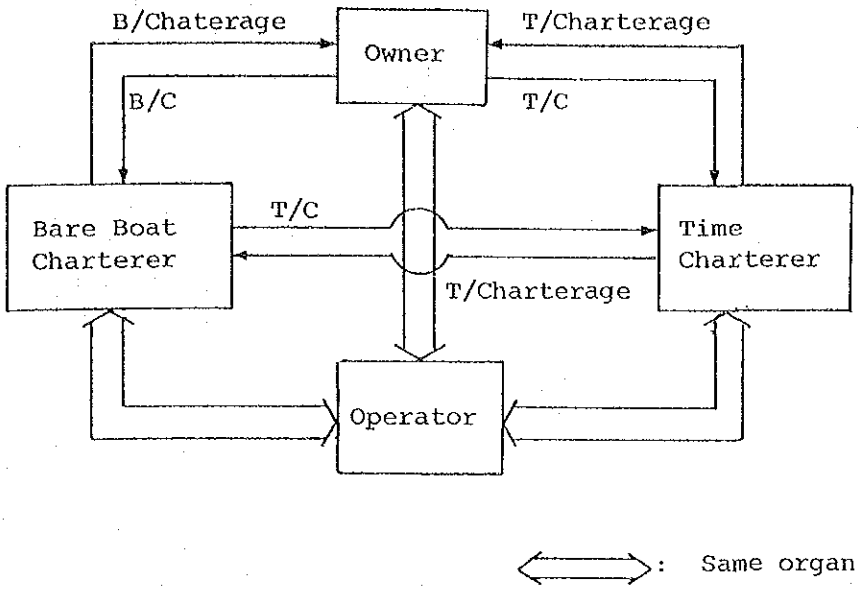
Source: Number of Seagoing Vessel, Size over 60 GT in 1980. Published by Habour Dept., Dec. 15, 1983

Note: Regarding trade area of Thai Flag Vessel, see Appendix Fig. A.5-1

Of course, there are some owners who own vessels engaged foreign trade, home trade, or both, but in this report, they are listed in both.

Whether in foreign trade, home trade or domestic trade, some shipowners who operate their own vessels also sometimes put some of their vessels in time charter service or bare-boat charter service, and operators charter such vessels from the owners.

This can be schematized as follows:



Operators who are engaged in foreign trade sometimes assign the vessels to home trade to adjust the schedule of the vessels, but they seldom assign them to domestic trade. Home trade operators run the vessels also for domestic trade in a flexible way based upon the balance between cargoes and bottoms. On the other hand, operators of domestic trade are small in scale, so they never assign the vessels for foreign trade. A few operators also remain for common carrier service in domestic coastal shipping.

3.2.2 Inland Waterways

(1) Present Cargo Flow of Inland Waterways Traffic

1) Types of Commodities

Most commodities inbound to Bangkok are agricultural products (maize, paddy or rice), sand, and others (mainly charcoal and wood). Total inbound cargo except sand amounted to approximately 563 thousand tons in 1976 and 642 thousand tons in 1982 as per the Table below.

Other commodities outbound from Bangkok are very few: in 1976 only 9,500 tons were recorded from the Bangkok area to the ports upstream of Chainat, which is hardly 2 percent of the inbound cargo. In fact, these consist mostly of a very small consignment of a couple of tons of various consumer products (chiefly food).

Inland Waterways Traffic to Bangkok from the North, 1976 and 1982 (Upstream of Singburi)

Unit: Thousand tons

Commodity / Origin	Rice		Paddy		Maize		Sand		Others		Total	
	1976	1982	1976	1982	1976	1982	1976	1982	1976	1982	1976	1982
Upper North	1	-	-	-	3	174.3	-	-	10	-	14	174.3
Phichit	10	8.0	2	-	27	34.0	-	-	3	-	42	42.0
Taphan Hin	11	44.3	5	103.0	107	132.8	-	-	2	-	125	280.1
Bang Mun Nak	39	27.2	2	-	7	-	-	-	4	-	52	27.2
Chumsaeng	27	4.7	2	-	8	-	-	-	6	-	43	4.6
Nakhon Sawan	5	0.1	8	7.3	16	7.5	-	-	58	-	87	14.9
Phayuha Khiri	8	-	114	86.3	21	-	-	-	6	-	149	86.3
Uthai Thani	1	10.6	5	-	2	-	4	-	6	-	18	10.6
Chai Nat	6	-	1	-	1	-	-	366.1	11	2.2	19	368.3
Sing Buri	10	-	-	-	-	-	3,985	-	8	-	4,003	0
Total	118	94.9	139	196.6	192	348.5	3,989	366.1	114	2.2	4,552	1,008.3

Source: Harbour Dept.
Data for Northbound traffic were not available.

2) Present Estimated Share of Cargo Volume by Commodity

According to the Feasibility Study of Inland Waterways Phase III, dated December, 1979, the present shares of cargo traffic in the area involved with Inland Waterways are as follows:

		Waterways	Railways	Roads
Commodities Southbound	Paddy	80%	-	20%
	Rice	10%	5%	85%
	Maize	15%	2%	83%
	Flourite	-	60%	40%
	Manganese	-	70%	30%
	Barite	-	* 20%	80%
	Lignite	-	100%	-
	Gypsum	-	10%	90%
Commodities Northbound	Petroleum Products	-	60%	40%
	Construction Materials	-	30%	70%

* Upnorth to Tha Reua by Railway and Tha Reua to Bangkok by Inland Waterways.

(2) Navigable Waterways

1) The inland waterway system in Thailand connects Bangkok and the Northern and the Upper Central Regions primarily by means of the Chao Phraya River. Its navigable waterways consist of the following routes:

a) The Chao Phraya River from the Gulf of Thailand up to Nakhon Sawan, length 380 kms.

b) The Nan River from Nakhon Sawan to Uttaradit, length 370 kms.

c) The Pasak River from Ayuttaya to Tha Reua, length 45 kms.

d) The regulated Noi and Suphan Rivers which, together with interconnecting canals, provide alternative routes between the North and Bangkok.

2) The upper section of the Chao Phraya River from Nakhon Sawan to the Chainat Dam is at present navigable almost throughout the year. However, during the low water season (December through June), navigation is hindered at some shallow reaches upstream of Phayua Khiri where the average minimum water depth is 1.5 m. During the low water season, the depth of the lower section of the Chao Phraya River between the Chainat Dam and Anthong becomes less than 0.9 m, and it is passable only for empty barges and log rafts. The section between Angthong and Bangkok maintains an adequate depth and is navigable for fully-laden barges.

(3) Inland Waterways Vessel Fleet

1) The composition of the river vessel fleet in Thailand in 1981

Source: Harbour Dept.

a) 10,100 self-propelled units, of which 90 percent were small river crafts of no economic significance to the inland navigation industry.

b) 5,500 wooden barges with the total fleet tonnage of about 144,500 tons, broken down to:

4,700 units/88,000 tons, less than 40 tons capacity
540 units/25,000 tons, more than 40 tons capacity
260 units/31,500 tons, more than 60 tons capacity

c) 1,510 steel barges with total fleet of around 122,100 tons, broken down to:

610 units/14,900 tons, less than 40 tons capacity
80 units/ 4,300 tons, more than 40 tons capacity
760 units/85,300 tons, more than 60 tons capacity
60 units/17,600 tons, more than 200 tons capacity

Note: There were 611 units with the total fleet of around 150 thousand tons of seagoing lighters other than the above river barges in 1981, broken down to:

3 units/ 72 tons, 10 ∿40 tons capacity
nil / nil , 40 ∿60 tons capacity
238 units/ 32,668 tons, 60 ∿200 tons capacity
370 units/116,928 tons, 200 ∿3,000 tons capacity

A few bigger barges of up to 1,500 tons have been introduced, and are in use on the lower Chao Phraya River up to Ayuttaya where no depth limit exists.

d) 1,037 tow boats, of which more than 90 percent are small tow boats under 6 GT. Tow boats are equipped with various types of marine diesel engines with a horsepower range of 50 HP to 250 HP, but the trend is toward bigger engines. More powerful engines of about 450 HP are used for barge towing in the Gulf of Thailand. The trailing method (pull-towing astern) is the most commonly used barge technique in Thailand today.

Note: There were 75 units with the total fleet of 2,224 GT of seagoing tow boats of which range were 6 to 80 GT in 1981 other than river tow boats.

2) Numbers of steel barges in operation in Bangkok area, obtained by the field survey in September 1983 are as follows:

* 520 units of seagoing steel barges of 200 ∿1,700 tons capacity with the aggregate total tonnage of 294,000 tons.
* 200 units of river steel barges of 200 ∿ 400 tons capacity with the aggregate total tonnage of 60,000 tons.

Some steel barges fitted with spray-tight tarpaulines of 400 ∿500 tons capacity are being used in the Gulf of Thailand to supply seagoing vessels at Ko Si Chang which cannot negotiate the waterway to the Bangkok port. A few steel barges are used to transport agricultural products (maize) from Bangkok to Songkhla.

3) Future Prospects

A further increase in the size will take place for barges used for transhipment at Ko Si Chang, probably in the range of 1,000 DWT. It is planned to introduce the push towing system of tug boats and barges in the waters of the Chao Phraya River by 1985 when the deepening of the Chao Phraya River (minimum depth 1.7 m) and the construction of the Nakhon Sawan port will be completed. The introduction of the push towing system is expected to have a considerable effect on the desired shift of cargo from highways to inland waterways.

(4) Inland Waterways-Linkage with Domestic Coastal Shipping

From the field survey, it is understood that at present there is no direct linkage between the inland waterways and domestic coastal shipping, but some cargoes are carried by barges to coastal ports from ports on the Chao Phraya River, on which details are given below.

1) Traffic to Ko Si Chang

At present, mainly tapioca products are transported from Bang Pa In on the Chao Phraya River and Phraphradeang in Bangkok by lighters (400∿500 DW) to Ko Si Chang, where they are transhipped to seagoing vessels off-shore.

Quality checks and Custom's stamping operations are carried out at the time of loading on the lighters.

When the Nakhon Sawan port (Chao Phraya River) and the Taphan Hin Port will be completed in the future, the following export items will be directly transported from these river ports without being transhipped at Bangkok:

Maize: Maize produced in the north and the central regions will be accumulated in silos and godowns at th river ports, and will then be transported by lighters in accordance with the schedules of seagoing vessels. Due to the long transport distance, lighters may occasionally have to wait for the arrival of sea-going vessels at Ko Si Chang off-shore.

It is desirable to carry out the quality checks and stamping operations at the river ports, depending on the cargo volume and operating costs.

Rice: Procedures similar to those for maize will be followed. The blending of rice by quality and class complying with the requirements of importing countries will have to be carried out in the silos and godowns at the river ports.

2) Traffic to Surat Thani/Songkhla

At present some unscheduled barges transport maize to Songkhla from Tha Reua on the Pasak River. Maize and rice are the items of cargo to be considered on this route in the future. The viability of this service will be analyzed from the viewpoints of economy and barge navigation in the Gulf of Thailand.

3) Traffic to Rayon (Eastern Seaboard Development Area)

Industries in this area are expected to start operation by the end of this decade, among which the National Fertilizer Complex is scheduled to start its production in 1988.

It can be expected that the transportation of mineral ore (potash, etc.) as raw materials from the North and of fertilizer to the north and central regions will take place.

4) Traffic to Laem Chabang

The Laem Chabang port as a commercial port is expected to be completed, at least partially, towards the end of this decade. After its completion, most ships with deep draft which cannot pass the Bangkok Bar and have to call at Ko Si Chang will use this port as well as some of the ships currently using the Bangkok port. For coastal shipping, the transport of export products from the North and the Central regions (agricultural products and minerals) to silos and godowns or stockyards in this port may be carried out by barges.

3.2.3 Sub-Regional Coastal Shipping

(1) Outline

Sub-regional coastal shipping is classified into two groups. The first one is feeder between the Southern Thailand and Singapore/ Malaysian ports (Penang and Port Kalang). The main cargoes are products of the Southern Thailand, such as rubber and tin, for export and petroleum from Singapore to Phuket, for import. Approximately, 95 percent of export are destined to Japan, North America and Europe. All the rubber export to Japan now is carried in containers (8'× 8'× 20') via Singapore or Penang. Feeder vessels as well as lighters are used for transhipment and Regional Container Lines provide services of 7 ∿ 8 trips per month by small container vessels.

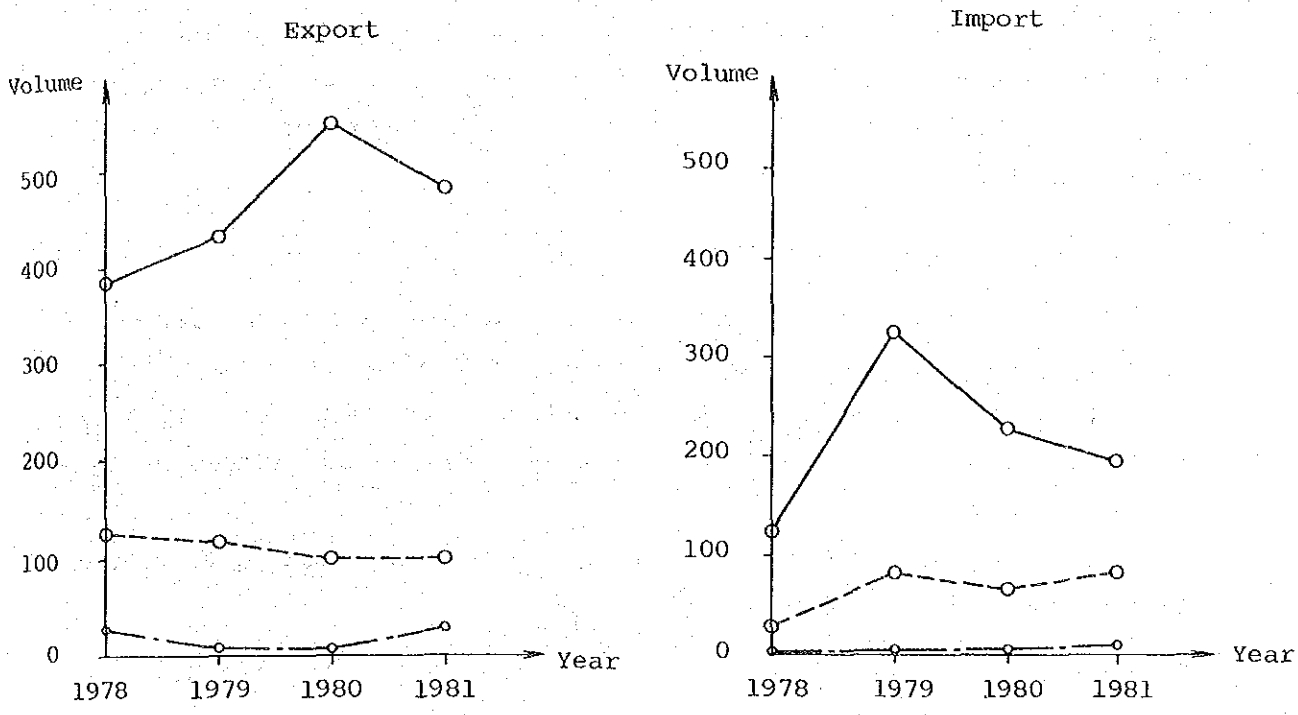
From the field survey, however, the Study Team predict that, sometime in 1987, when Songkhla and Phuket deep sea ports are completed, the feeder service may be not needed because ocean-going vessels will call at those two ports direct.

The other one is traditional coastal service trading between Malaysia, Singapore and Indonesia. In this section, therefore, the Study Team commented the activity of the sub-regional coastal shipping to and from the Southern Thailand.

(2) Cargo Flow (1978 ∿ 1981)

Following figures show the cargo flows in those areas during 1978 to 1981.

Unit: Thousand tons



Source MOC Statistics (See Appendix Table A.5-8 (1) ∿ (6))

Fig. 3.2-7 Sub-Regional Cargo Flows

1) South Thailand/Indonesia Trade

Cargo flow is too small, 39 thousand tons of general cargo export and 15 thousand tons of petroleum import in 1981, and an independent common carrier service is unfeasible. Those cargoes are to be carried by trampers and tankers mainly.

2) South Thailand/Malaysia

More than 400 thousand tons of export and 200 thousand tons of import are carried every year. Malaysia is the biggest trade partner for the South.

From the field survey, it is observed that about 95 percent of export and almost all import are carried by land (railways and trucks) and that origin and destination are major cities in western Malaysia.

The cargo by sea is logs carried by tramp vessels, which will remain the same in the future.

3) South Thailand/Singapore

Out of nearly 100 thousand tons of annual export, 80 percent is carried by sea and rubber, wood and general cargo are major items.

About 60 thousand ∿ 70 thousand tons of petroleum is only import cargo from Singapore to the South, Phucket, by sea and almost no cargo moves by land.

From the above, Singapore is considered as key trading port by sea for the South.

4) Main Port in the South

Apart from Indonesia, in South Thailand/Malaysia and Singapore trades, Songkhla is main port of trade except petroleum import from Singapore, which is shown in the table below.

Songkhla Share (%)	Malaysia		Singapore	
	Export	Import	Export	Import
Songkhla	88 ∿91	46 ∿87	47 ∿67	1 ∿4
Others	12 ∿ 9	54 ∿13	53 ∿33	99 ∿96

(3) Cargo Demand Forecast

In order to explore any linkage between domestic coastal shipping and sub-regional coastal shipping, the Study Team estimated cargo demand forecast on the following basis.

A. Indonesia is excluded because this area is considered to have no direct linkage with the domestic coastal shipping to and from the South Thailand.

B. Songkhla is selected as a pivotal port because the share of Songkhla is dominant for export and import except petroleum and is considered as only a port having some linkage.

C. Preconditions for estimation

Commodity	Export	Import
Rice	Growth of Production 2.8%	Growth of GRP 1981 ∿ 1987 6.6% 1987 ∿ 2000 5.0%
Wood	No Growth 0%	Growth of GRP Construction Dept. 15.3%
Rubber	Growth of Production 1981 ∿ 1987 10.5% 1987 ∿ 1992 5.75% 1992 ∿ 2000 4.5%	Nil
Others	Growth of GRP 1981 ∿ 1987 6.5% 1987 ∿ 2000 5.0%	Growth of GRP 1981 ∿ 1987 6.6% 1987 ∿ 2000 5.0%

Note: Cargo demand forecast is worked out based on the figure of 1981. Growth of GRP low estimation is applied.

1) Songkhla/Malaysia Trade

The next table shows cargo demand forecast in 1987, 1992 and 2000.

Unit: Thousand tons

Commodity \ Year	Export				Import			
	1981	1987	1992	2000	1981	1987	1992	2000
Rice	142	168	192	241	-	-	-	-
Wood	20	20	20	20	-	-	-	-
Rubber	2	4	5	7	-	-	-	-
Others	277	406	519	766	93	136	182	270
Total	441	598	736	1,034	93	136	182	270

In Malaysia, west-coast of the peninsula is main market, which can be accessed by land from Songkhla at best and possibility of conversion of transportation method from land to sea can not be considered, therefore, no direct linkage will exist with domestic coastal shipping to the west-coast.

Meantime, in east-coast of Malaysia, there being no commercial ports other than lumber and ore export, service by tramp vessels is appropriate whenever it is requested.

2) Songkhla/Singapore Trade

As the table shows, import from Singapore is almost nothing to Songkhla.

Unit: Thousand tons

Commodity \ Year	Export				Import			
	1981	1987	1992	2000	1981	1987	1992	2000
Rice	-	-	-	-	-	-	-	-
Wood	-	-	-	-	-	-	-	-
Rubber	21	38	51	72	-	-	-	-
Others	27	40	51	75	1	2	2	3
Total	48	78	102	147	1	2	2	3

Main export cargoes of rubber and general cargo are to be lifted by ocean-going vessels from Songkhla deep sea port after 1987 as mentioned previously. Here, again there will be no linkage with domestic coastal shipping anticipated in future in this trade.

3.2.4 Seafarers

(1) The number of seafarers for sea-going vessels of over 60 GT in Thailand

1) The Study Team estimates that the number of seafarers in Thailand excluding persons on board fishing vessels, river vessels, and lighters or barges is about 5,800, details of which are shown below in Table 3.2-1.

Table 3.2-1 Number of Seafarers in Thailand, 1980

Actual Major Trade	International		Domestic		Total
Registered Trade Area	Foreign	F. Limited	Home	H. Limited	
	Nr of crew (officers)				
Cargo vessel	2,087 (567)	334 (103)	453 (140)	462 (160)	3,336 (970)
Tanker included LPG	222 (54)	442 (162)	654 (208)	402 (108)	1,720 (532)
Other commercial use	-	-	108 (49)	67 (24)	175 (73)
Sub total	2,309 (621)	776 (265)	1,215 (397)	931 (292)	5,231 (1,575)
Spare	231 (62)	78 (27)	122 (40)	93 (29)	524 (158)
Total	2,540 (683)	854 (292)	1,337 (437)	1,024 (321)	5,755 (1,733)
Fishing vessel	-	-	-	4,010 (800)	

Note: Another source indicates the number of seafarers is 6,144 as of April 1984. This figure was taken from the number of Discharging books that were issued by the Harbour Department.

Any crew member who desires to be employed by a sea going vessel of over 60 GT should be over 18 years of age and must obtain this book from the Habour Department. Its validity is 6 months.

2) Number of Crew Members on board per Vessel

The number of the crew members on a Thai vessel for trading in Thai waters shall not be less than the number fixed by the Habour Master. (Thai Vessel Act B.E. 2481 Section 50)

The actual number of crew members on board a Thai Flag Vessel is shown in Appendix Figure A.5-2 (1)∿ (2) and a summary is as follows:

River Barge/Lighter			3∿4
Tug boat			4∿5
Wooden coastal cargo vessel, range of	150∿	250 GT :	8∿11
Steel vessel (Cargo and Tanker),	80∿	150 GT :	6∿12
ranges of	150∿	500 GT :	7∿18
	500∿	1,500 GT :	10∿26
	1,500∿	3,000 GT :	17∿30
	3,000∿	7,000 GT :	18∿40
	7,000∿	10,000 GT :	33∿44
	over	10,000 GT :	35∿47

3) Supply and Demand of Seafarers

According to the present manning situation obtained at the field survey interview, for the Engineers and Rating, it is very hard to get a job on board vessel due to a surplus of seafarers. However, the Study Team opines that the number of Deck Officers is in short at present, and the demand would not be met in the 10 years to come as mentioned in the table below.

Table 3.2-2 Forecast of Supply and Demand of Licensed Officers

Certificate	Demand (Minimum) *(2)						Supply			
	1983 *(1)			1987	1992	1997	1984	1987, Oct.	1992, Oct.	1997, Oct.
	Nr. of on board	Spare	Total	Total	Total	Total	Feb.			
Foreign Master	107	11	118	128	141	156	179	327+46 *(3) +80=453 *(4)	453+105 *(3) +100=658 *(4)	658+125 *(3) +100=883 *(4)
1st class Navigator	205	21	226 695	245 753	270 830	298 917	104 327			
2nd class Navigator	319	32	351	380	419	463	44			
Local Master	206	21	227	246	271	300	268			
Total (Navigator)	837	85	922	999	1,101	1,217	595			
1st class Engineer	86	9	95	103	114	125	147	949+43 *(3) = 992	992+105 *(3) = 1,097	1,097+125 *(3) = 1,222
2nd class Engineer	114	12	126 437	136 473	151 523	166 576	81 949			
3rd class Engineer	196	20	216	234	258	285	721			
Special 1st class Eng-driver	311	31	342	370	409	451	705			
1st class Eng-driver	70	7	77	83	92	102	16,269			
2nd class Eng-driver										
Total (Engineer)	777	79	856	926	1,024	1,129				

*(1) Total demand in 1983 came from Appendix Table A.5-9 plus estimated spare officers. 10% of spares available means that every officer can take one month vacation per year.

*(2) Forecasting of demand is estimated as fleet expansion is 2% per year.

*(3) Supply from MMTC

*(4) Supply from other fields such as ex-Navy and/or promotion of lower grade licence holder. These figures do not take into consideration possibilities of retirement.

(2) Certificate

1) The following classifications are observed:

	Title of Certificate	Qualification
	(Deck Dept.)	
(1)	Foreign trade Master	No limitation
(2)	1st class Navigator	C/O for FRGN VSL Master for Home VSL/Local VSL
(3)	2nd class Navigator	2/O for FRGN VSL C/O for Home VSL Master for Local VSL up to 5,000 GT
(4)	Local trade Master	Master for Local VSL up to 2,000 GT C/O for Local VSL up to 5,000 GT 2/O for Home VSL/Local VSL
(5)	Border area Skipper	Skipper for Border VSL, range 5 ∿60 GT
(6)	1st class Helm's man	Skipper for Local VSL, range 30 ∿60 GT
(7)	2nd class Helm's man	Skipper for Local VSL, range 3 ∿30 GT
(8)	River 1st class Skipper	Skipper for River VSL up to 500 GT
(9)	River 2nd class Skipper	Skipper for River VSL up to 250 GT
(10)	River 1st class Helm's man	Skipper for River VSL up to 60 GT
(11)	River 2nd class Helm's man	Skipper for River VSL up to 30 GT
(12)	Local sailing Junk Skipper	Skipper for Local Junk range 60 ∿250 GT
(13)	Boatswain for Lighter	Skipper for Lighter over 60 tons
(14)	Steer's man for Lighter	Skipper for lighter up to 60 tons Steer's man for Lighter over 60 GT
	Deep sea fishing boat	
(15)	1st class Master	Master for deep sea fishing boat up to 500 GT
(16)	2nd class Master	Master for deep sea fishing boat up to 150 GT

Local fishing boat

(17)	1st class Helm's man	Skipper for Local fishing boat up to 60 GT
(18)	2nd class Helm's man	Skipper for Local fishing boat up to 30 GT

(Engine Dept.)

(1)	1st class Engineer	No limitation
(2)	2nd class Engineer	2/E for FRGN VSL C/E for LTD FRGN VSL up to 1,500 BHP C/E for Home VSL/Local VSL
(3)	3rd class Engineer	3/E for FRGN VSL 2/E for LTD FRGN VSL C/E for Home VSL up to 1,500 BHP
(4)	Special 1st class Eng-driver	4/E for FRGN VSL 3/E for LTD FRGN VSL 2/E for Home VSL up to 1,500 BHP C/E for Local VSL up to 550 BHP
(5)	1st class Eng-driver	2/E for Local VSL up to 550 BHP C/E for Local VSL up to 330 BHP
(6)	2nd class Eng-driver	C/E for Local VSL up to 120 BHP

Deep sea fishing boat

(7)	1st class Eng-driver	C/E for deep sea fishing boat up to 500 GT
(8)	2nd class Eng-driver	C/E for deep sea fishing boat up to 150 GT 2/E for deep sea fishing boat up to 500 GT

Abbreviations

FRGN VSL	:	Foreign trade vessel
LTD FRGN VSL	:	Foreign trade limited area vessel
Home VSL	:	Home trade vessel
LTD Home VSL	:	Home trade limited area vessel
Border VSL	:	Border area trade vessel
Local VSL	:	Local trade (Domestic) trade vessel

C/O : Chief Mate (Officer)

2/O : 2nd Mate

3/O : 3rd Mate

C/E : Chief Engineer

2/E : 2nd Engineer

3/E : 3rd Engineer

Note: New rules adapted for International Convention (STCW, 1978) are under preparation and will come into force in 1984.

2) Number of Ship's Officers and their qualification required per Trade and Size of vessel

See Appendix Table A.5-10 (1) ∿ (3)

List was made based on Ship's Survey Rules, which included qualification of ship's officers.

3) Kind and Grade of Existing Certificates

See Appendix, Chart A.5-1 (1) ∿ (2)

4) Trade Areas

Vessels should be registered for one of the following trade areas.

a. Foreign Trade Area ..... (vessel over 1,500 GT)
b. Foreign Trade Limited Area .... (vessel over 500 GT)
c. Home Trade Area ..... (vessel over 150 GT)
d. Home Trade Limited Area ..... (vessel over 60 GT)
e. Local Trade Area ..... (vessel over 60 GT)
f. Border Trade Area ..... (vessel 5 ∿ 60 GT)

Map of Trade Areas: See Appendix Fig. A.5-1

(3) Contract of Employment

1) The standard form issued by the Harbour Department should be used.

2) Minimum ages of Employees

Master/Skipper for ocean going vessels: 20 years
Master/Skipper for other vessels : 18 years
Crew member other than Master : 16 years

3) There is few Labour Regulations for the seamen regarding working conditions such as working hours, holidays, wages and accident compensation, etc. Each shipping company seemingly maintains its own house rules and conditions for employment and at present in Thailand, there is no seamen's union as yet.

(4) Training of Crew

Since there was no training agency up to 1971, most of the officers and engineers on the merchant marine are ex-officers of the Royal Thai Navy.

1) The Merchant Marine Training Center (MMTC)

In 1971, it was established in the Habour Department office with the curricula consisting of the first two years on shore, the third year at sea, the fourth year on shore, and the final (fifth) year again at sea with a terminal course prior to the competency examination.

The following number of cadets have graduated up to the present:

Year	Navigation	Engineering	Total
1977	11	8	19
1982	10	10	20
1983	11	11	22
Totals	32	29	61

(There were no graduates in the years 1978 to 1981)

The following numbers of cadets are in training at MMTC as of September 1983, and are expected to graduate as follows:

Expected year of Graudation	Navigation	Engineering	Total
1984	10	8	18
1985	10	10	20
1986	10	10	20
1987	16	15	31
1988	20	20	40

MMTC also conducts a 4-month training course for ratings:

March to July, 1979 30 enrolled

May to August, 1980 11 enrolled

January to March 1983 27 enrolled

2) New Training Center

A new MMTC is under construction in Bang Naugkrong District, Samutprakarn Province, 30 km down the Chao Praya River from Bangkok.

Since the current MMTC has only limited facilities and land, expansion there is not feasible.

The MMTC will be transferred to the new location by 1986 with modern facilities and adequate equipments including a training vessel in which 50 cadets can be accommodated.

The number of graduates of both marine officers and engineers can be expected to increase significantly after completion. However, as Table 3.2-2 has shown, the estimated supply even then will not yet match the estimated demand, there being a possible shortage of 172 officers (21%) in 1992 and 34 officers (4%) in 1997.

3.3 Railways

3.3.1 Transport Activities

Of the State Railway of Thailand's (SRT) network the route between Bangkok and the South is one of the most important routes for the national economy and security.

In comparison to SRT's total trackage of 3,735 km and the total of 444 stations the southern line represents 1,337 km (36%) and 106 stations (24%). This route also connects with the Malayan Railway at the border stations of Padan Besar and Sungai Kolok, and an international express runs regularly from Bangkok to Malaysia.

The total tonnage of cargo transported by SRT was recorded as some 6 million tons in 1981 F.Y., while that carried to and from the South, including that transported within the South itself, was recorded as 1.68 million tons, which is 28 percent of the year's total tonnage.

The freight rates between Bangkok and the South are considerably cheaper than those for truck transportation.

Furthermore, these rates are usually negotiable, in the case customers with large volume shipments. Special rates were also granted for certain freight movements.

However, in recent years the volume of cargo not only going to the South but also those going to the rest of the country have not been growing, due to the development of road transportation.

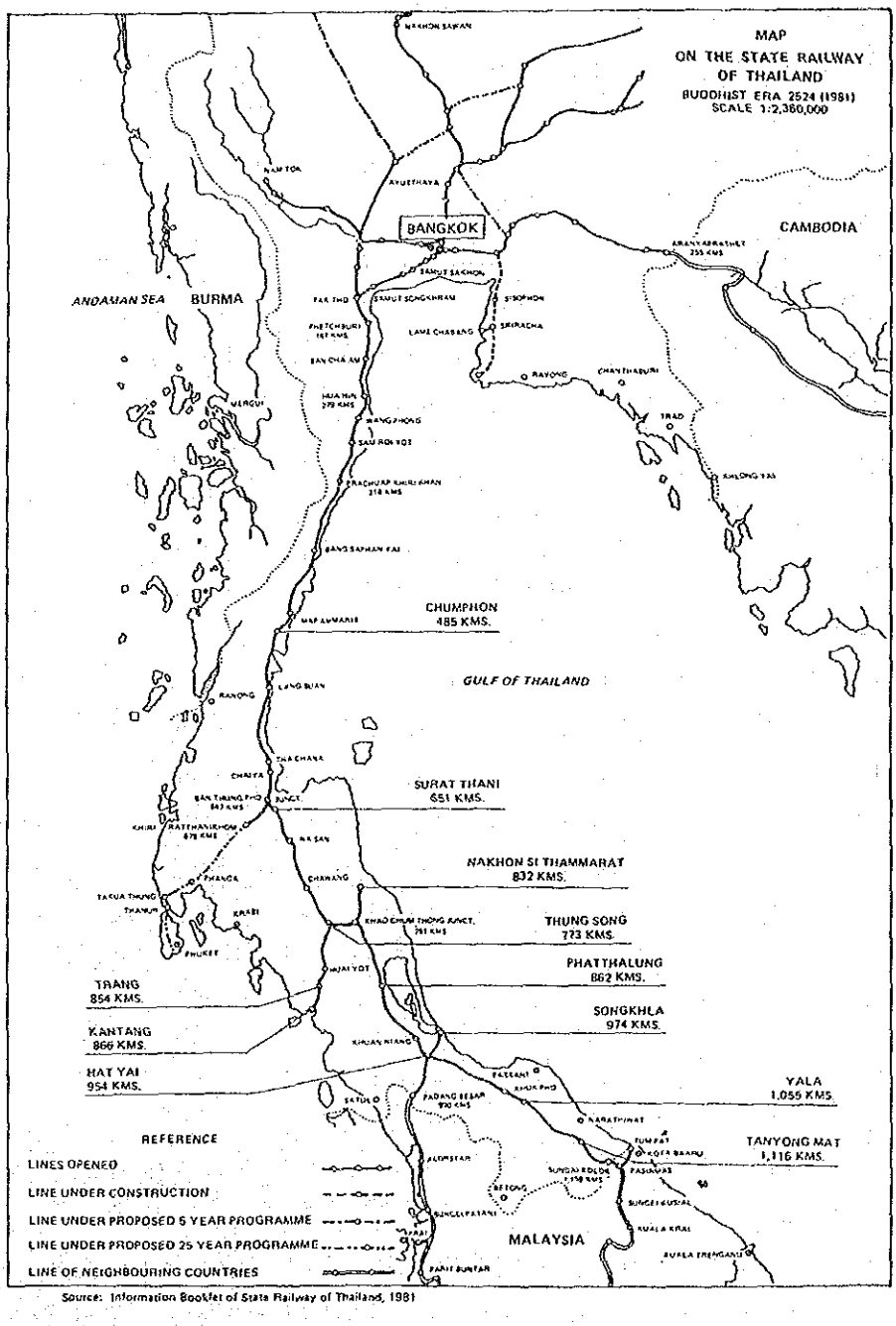
SRT's most crucial problems concerning freight train transportation are the lack of freight car's loading capacity and the unpunctuality of arrival times, resulting from single truck operations, the limitation of the curvature, the clearances over the rail road and furthermore the number of obsolete wooden bridges.

3.3.2 Cargo Flow

The cargo flow between Bangkok and the South has been going down since 1977 F.Y. as follows;

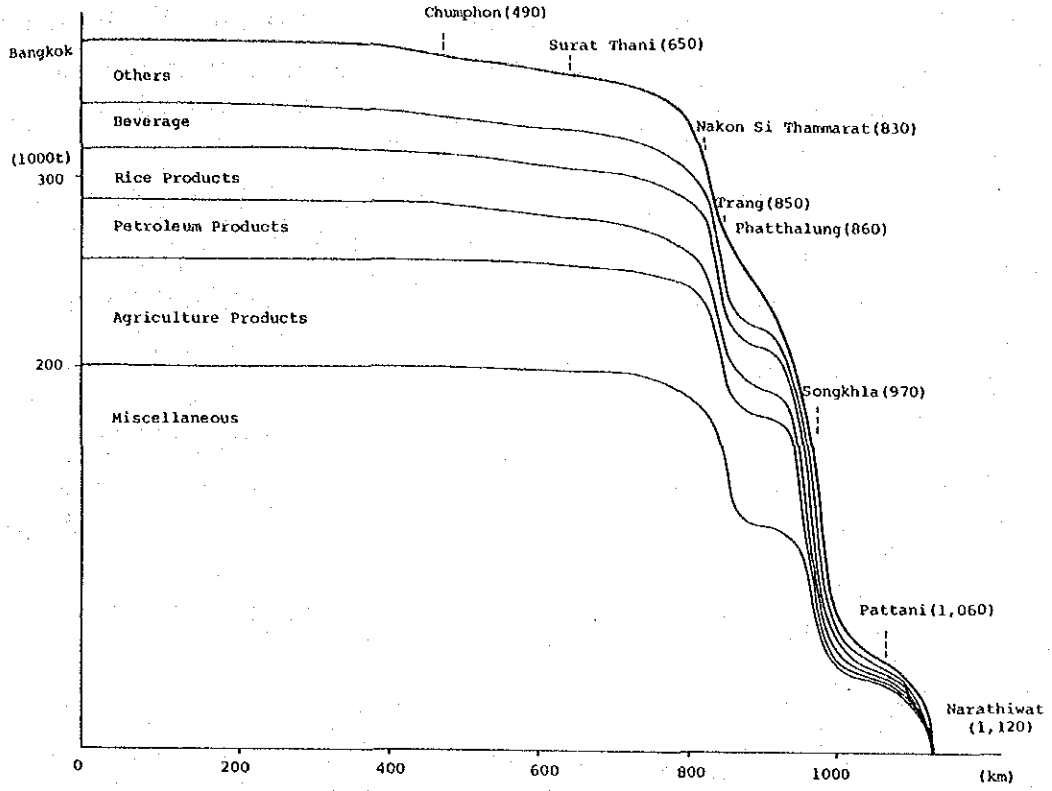
The major commodities transported from Bangkok to the South are miscellaneous, fuel oil, rice, beans, and beverages, and from the South to Bangkok they are rice, rubber, forestry products, miscellaneous, and

construction materials. In both cases these five major commodities represent 92 percent and 85 percent of total cargo flow respectively (1981 F.Y.). Major origins and destinations in the southern provinces are Songkhla, Nakhon Si Thammarat and Trang.



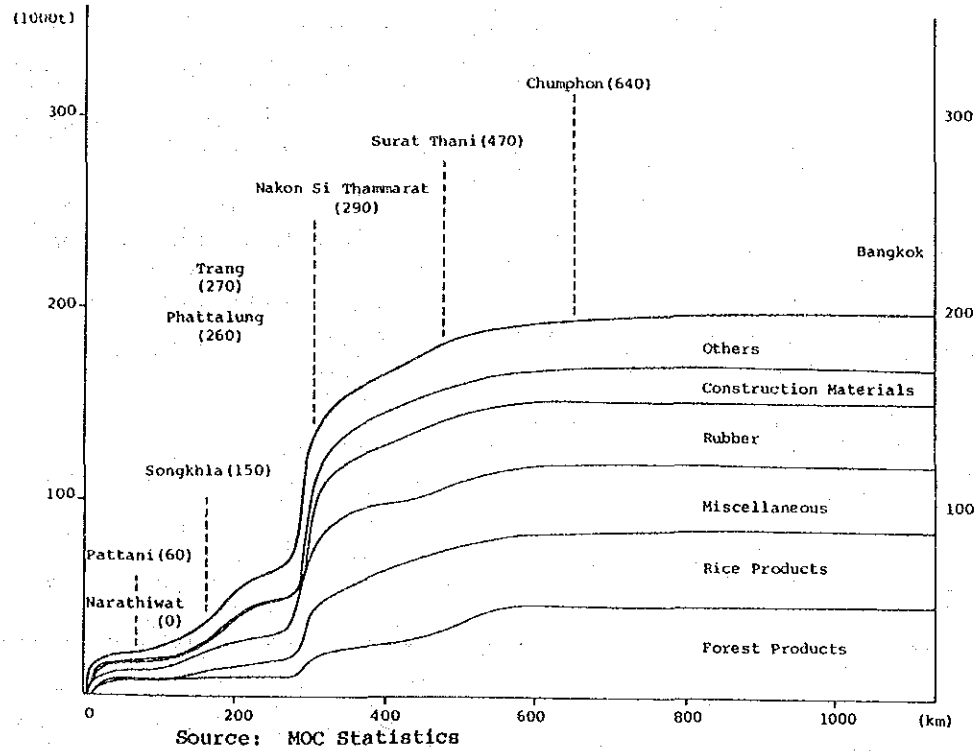
Source: Information Booklet of State Railway of Thailand, 1981

Fig. 3.3-1 Map of Railway of South



Source: MOC Statistics

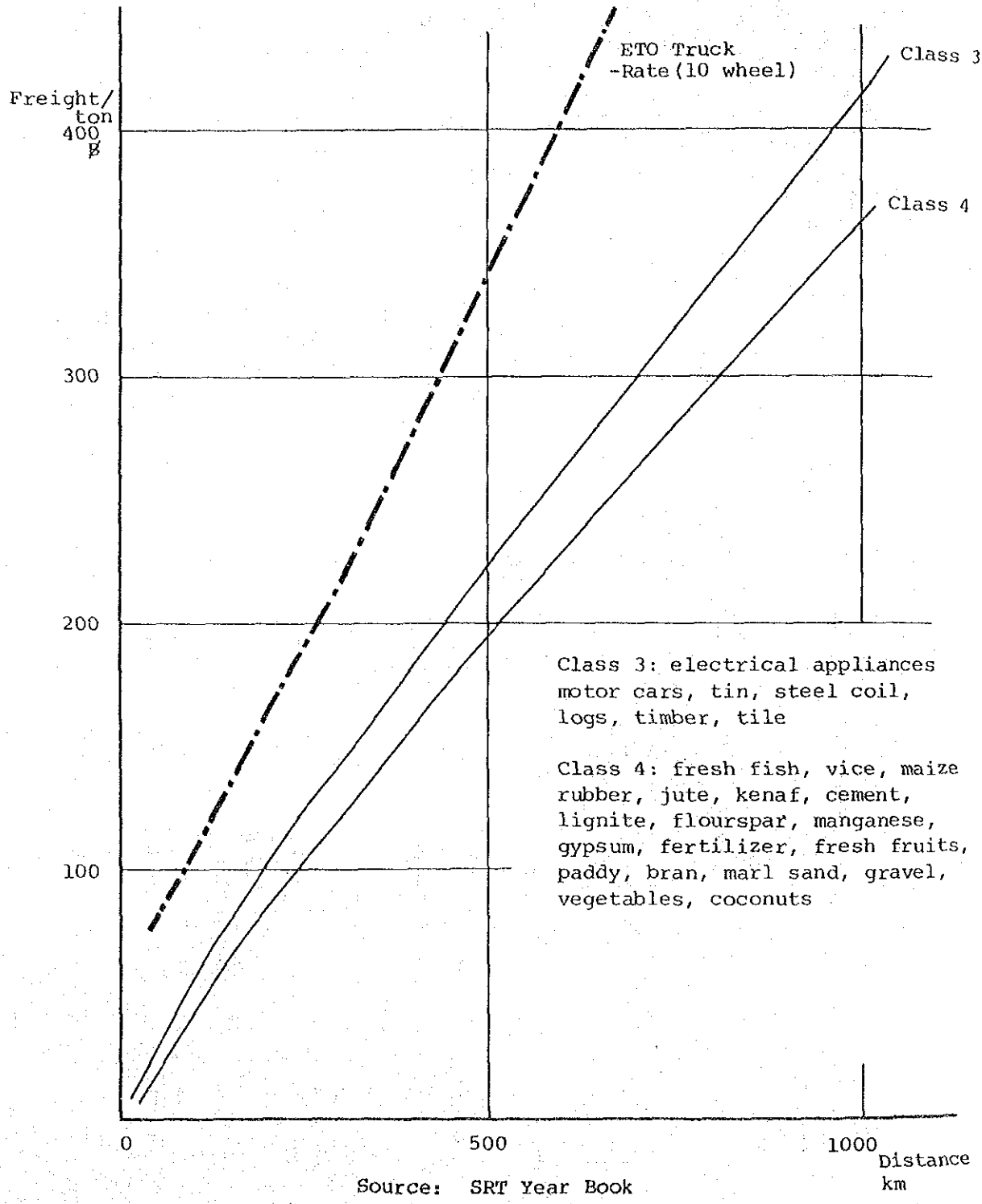
Fig. 3.3-2 (1) Distribution of Railway Cargo Volume (Southbound) 1981



Source: MOC Statistics

Fig. 3.3-2 (2) Distribution of Railway Cargo Volume (Northbound) 1981

The most remarkable characteristics of the cargo flow between Bangkok and the South recorded in 1981 FY was the inbalance of the cargo movements; the southbound cargo volume was almost double of the northbound.



Source: SRT Year Book

Fig. 3.3-3 Relationship between Different Classes of the Present Carload

3.4 Road Transport

3.4.1 Trucking Company's Activities

With the development of the road network system, truck transport services have made rapid progress.

In 1978, total truck transportation amounted to 46.2 million tons were carried an average of some 310 km from origin to destination, representing 14.2 billion ton km.

In comparison to these results, the cargo flow from Bangkok to South Thailand accounted for 2.6 percent of the total tonnage and 17.5 percent of the total ton-kms. So the average distance from Bangkok to South Thailand destinations by truck was about 920 980 km.

Table 3.4-1 Road Transport Flow, 1978

Unit: Thousand tons

	Southern	Bangkok	Northern	North-Eastern	Central	Total
Southern	77	641	9	10	42	779
Bangkok	538	8	2,442	2,900	2,728	8,616
Northern	11	3,598	614	22	617	4,862
N.E.	6	5,796	19	607	3,061	9,489
Central	96	17,846	726	1,294	2,455	22,417
Total	728	27,889	3,810	4,833	8,903	46,163

Source: O-D Road Transport Survey, Land Transport Department

According to the "Study of Trucking Industry" carried out by Kampsax International, the total demand for transport of freight was conservatively estimated to be 181 million tons in 1981, of which an estimated 157 million tons (87%) were transported by trucks.

The paved road network expanded from 909 km in 1946 to approximately 22,000 km in 1978. From 1972 to 1978 the length of the road network increased at an annual rate of 5.0 percent.

Correspondingly, the truck fleet from 134,400 in 1978 to 176,000 in 1981 an annual growth rate of 9.4 percent.

According to the field survey, there are about one hundred major private companies providing long distance trucking service in Thailand. At present, eight major companies have opened routes to the Southern Region.

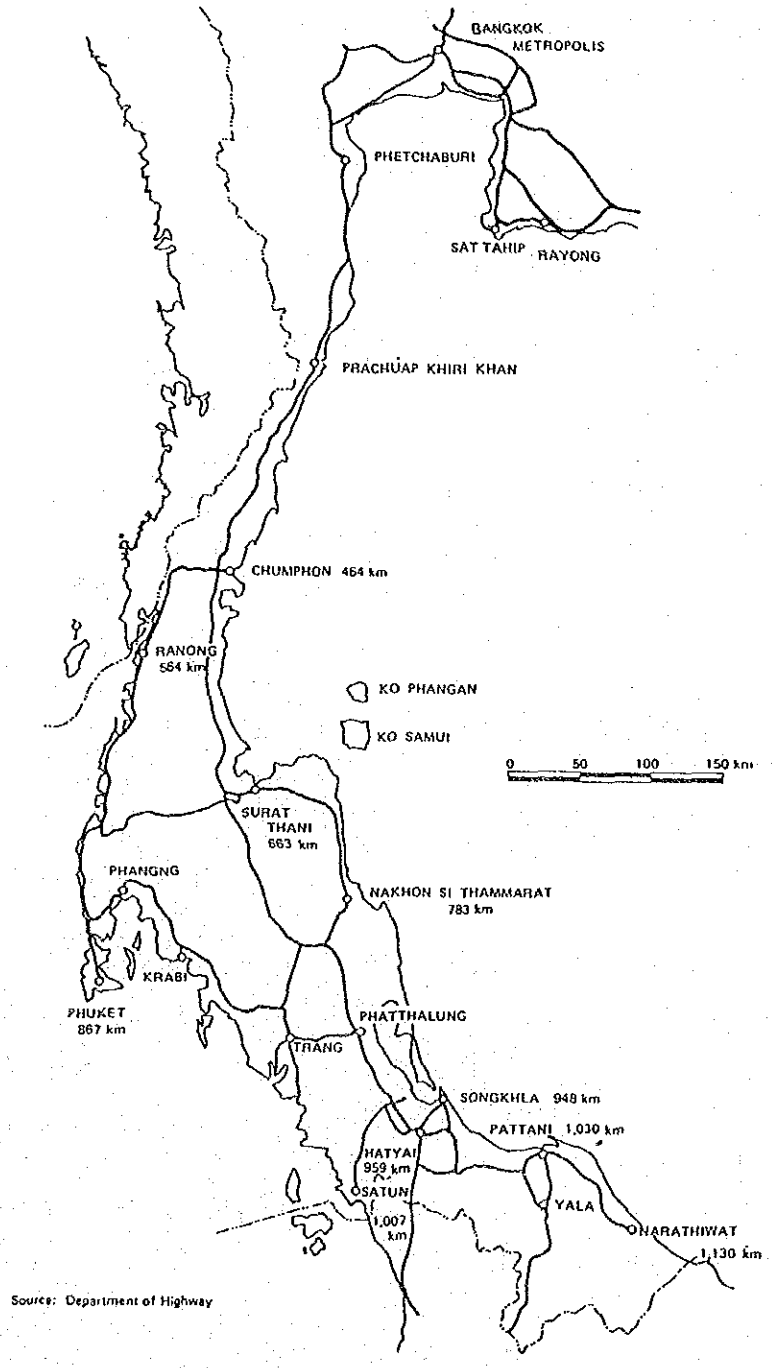
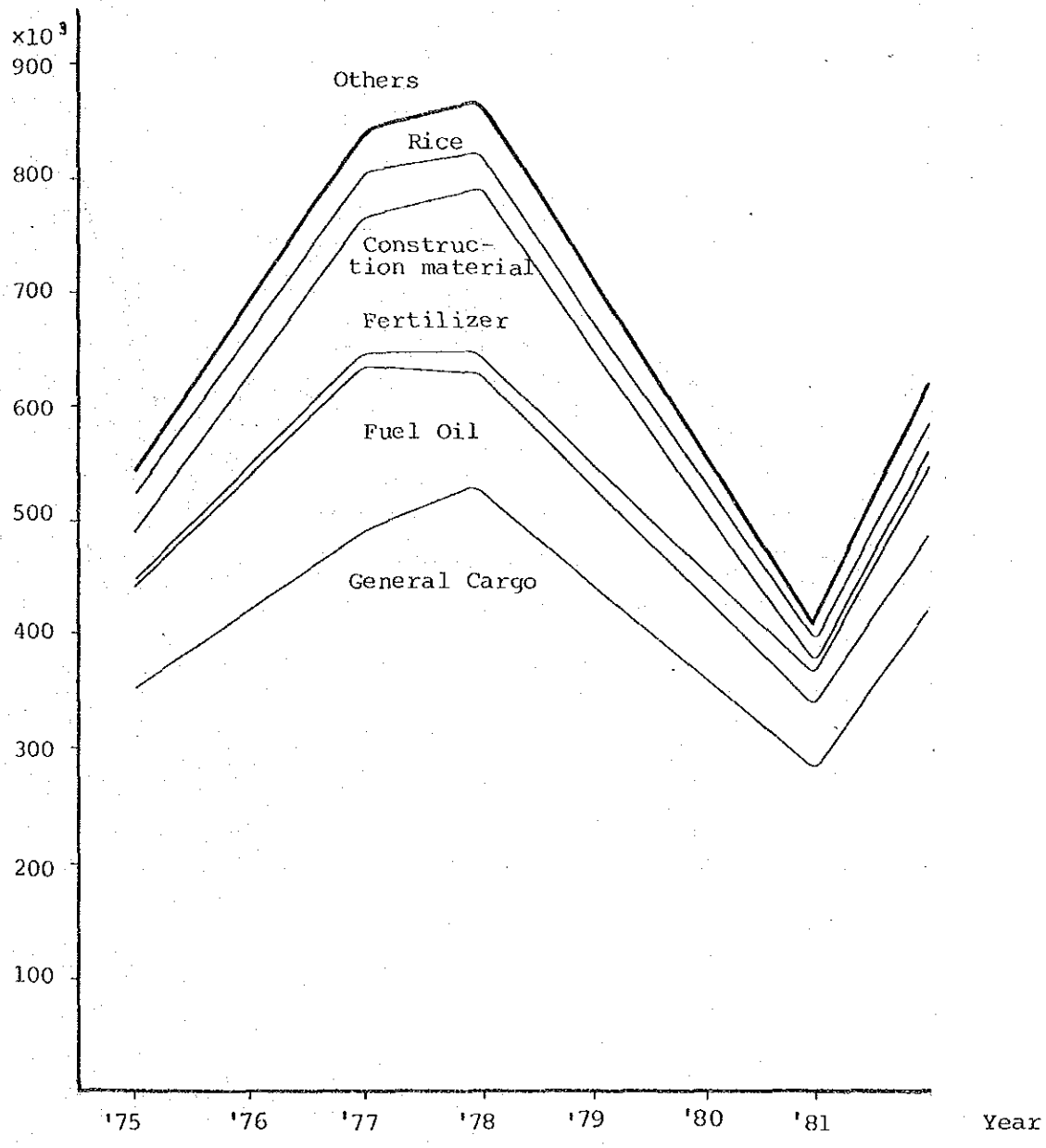
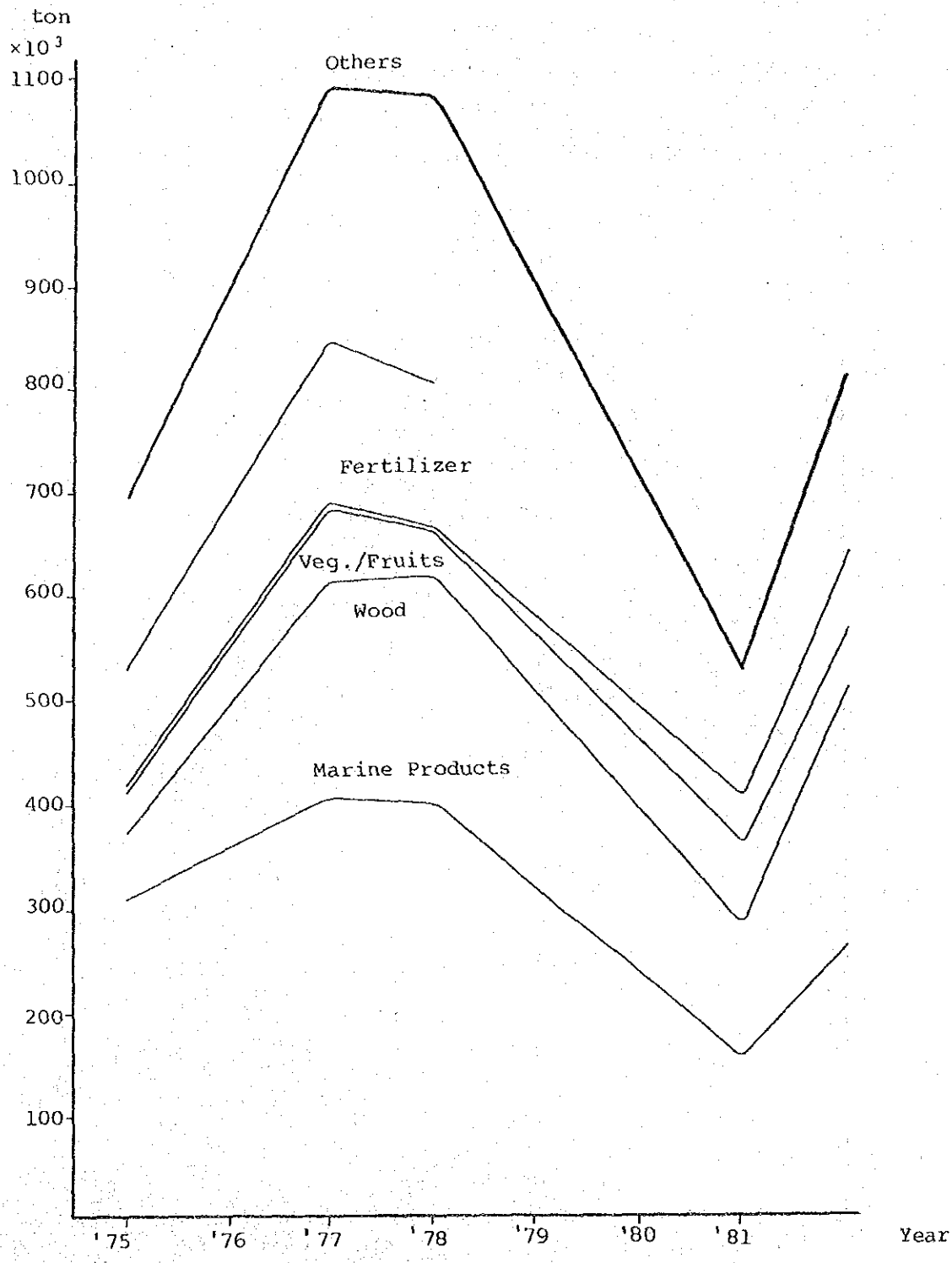


Fig. 3.4-1 Highway Map of the South



Source: MOC Statistics

Fig. 3.4-2 (1) Truck Cargo Volume between Bangkok and the South (Southbound)



Source: MOC Statistics

Fig. 3.4-2 (2) Truck Cargo Volume between Bangkok and the South (Northbound)

These southern trucking companies ordinary make a long term contract with major customers such as fish meal companies, sugar mills and rubber processing plants, and small truck owners do business under sub-contracts with the majors.

But in Thailand demand is strongly seasonal due to the transport demand for agricultural production.

In general on this routes, between Bangkok and the South, southbound cargo flows are not influenced by seasonal affects, but northbound flows are strongly depend on the season.

3.4.2 Cargo Flow

According to MOC's statistics, the characteristics of cargo flow between the South and Bangkok are as follows;

The figures show trucking transport gradually increasing up to 1978. But the Study Team has some doubts on the accuracy of the 1981 data.

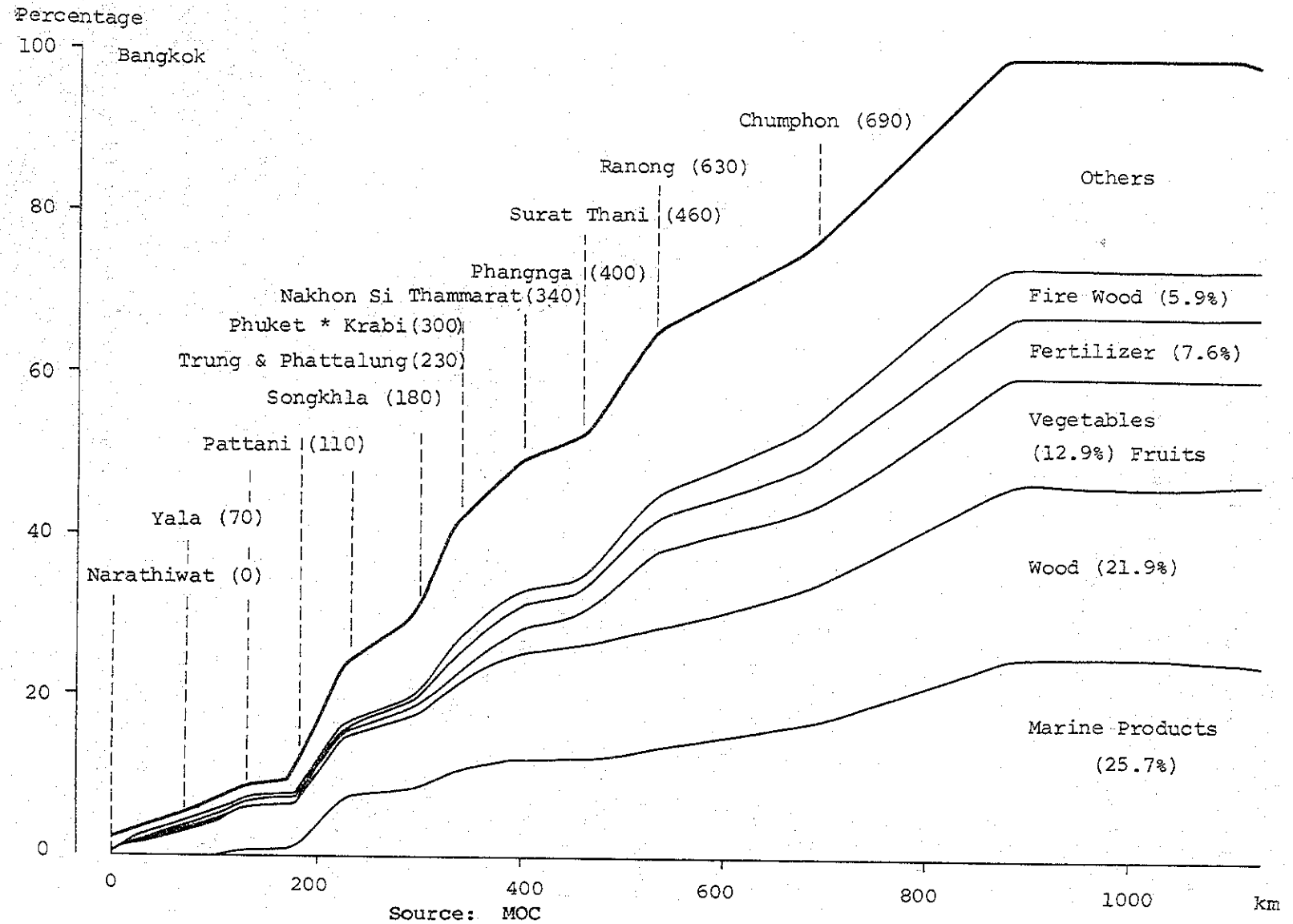
Probably this comes from the inadequacy of the sampling systems; the figure for 1981 is almost half that for 1978.

Southbound cargoes are not shipped over great distance for the following reasons. The first reason is that low priced cargo, such as forestry and agricultural products which cannot bear a high transport cost are not shipped by truck over long distances. This kind of cargo is mainly shipped on freight trains and/or by sea.

The second reason is that at the prevailing prices road transport cannot compete over long distances. Commodities affected by this are fuel oil, fertilizer and rice. Almost all of these cargoes are destinated for Chumphon, Surat Thani and Nakon Si Thammarat.

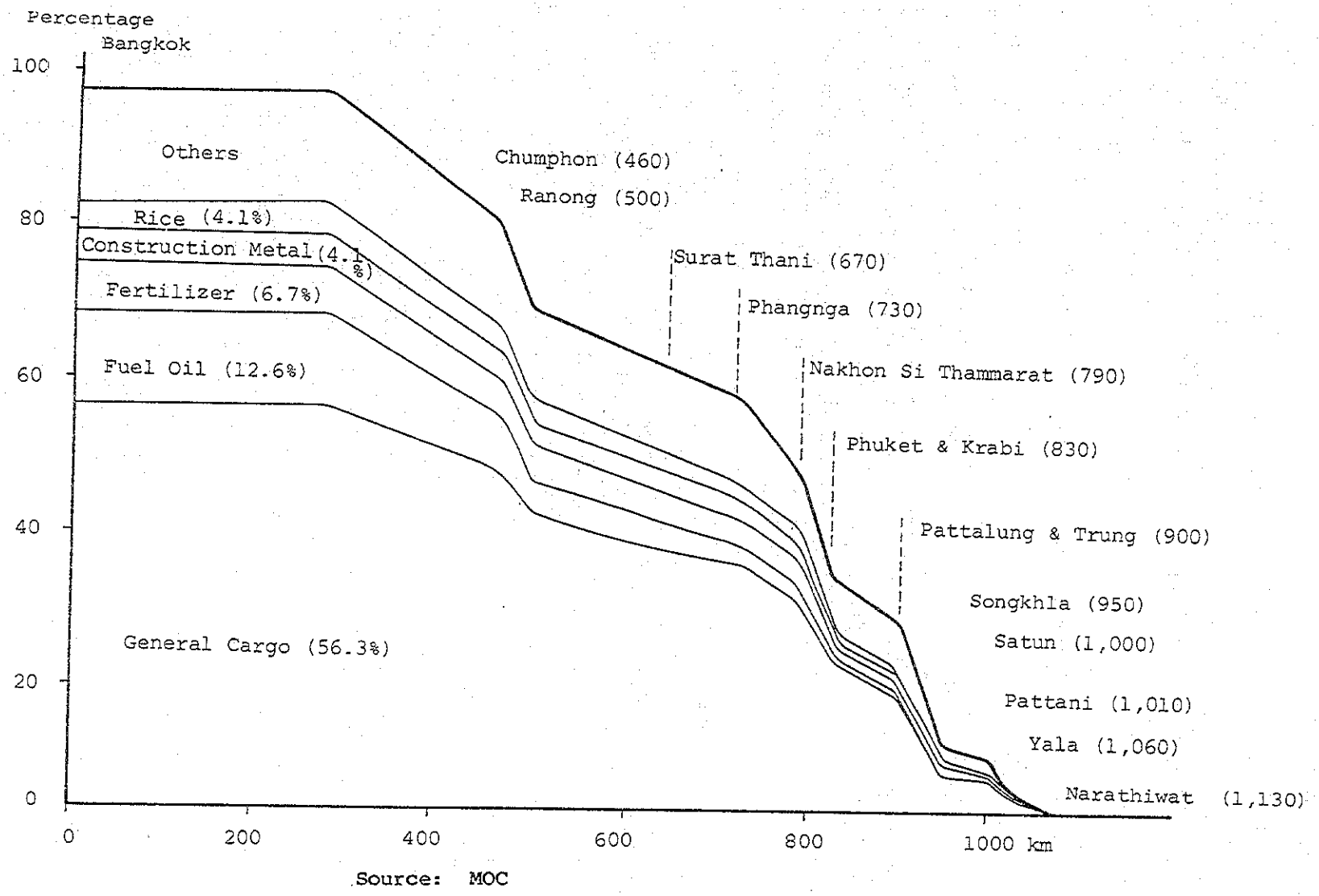
The third reason is that as mentioned before a van truck transportation system has not been developed. So major cargoes originating in the South, fresh fruits/vegetables and raw fish are not long distance cargoes. Most of these come from Chumphon, Ranong and Surat Thani the area nearest to Bangkok.

Only general cargo and construction materials are carried a longway to the South.



Source: MOC

Fig. 3.4-3 (1) Cargo Distribution Flow (Northbound) 1981



Source: MOC

Fig. 3.4-3 (2) Cargo Distribution Flow (Southbound) 1981

3.4.3 Cost and Freight

(1) Cost

According to the field survey, the expense cost composition of truck transport between the South and Bangkok is shown, summarized and in Table 3.4-2.

Table 3.4-2 Expenses per One Round Trip

Unit: Bahts/Truck

	Expense		Remarks
Depreciation of Truck	720	1,670	A truck (new vehicle) is worth 6 700,000 ฿ and its durable for 5∿10 years. It can make 7 trips/month
Driver's Salary	430	860	2 drivers work for 7 trips, they switch at Thap Sa Kae (Prachup Khiri Khan) Salary/month/driver is 1,500 ฿∿3,000 ฿
Fuel	2,550	4,840	3.5∿4.0 km/lit. Diesel oil price is 7.5 ฿/lit. Narathiwat = 1,130 km, Surat Thani 680 km.
Allowance	600	2,000	Food, accommodation and relaxation for the drivers 300∿1,000 ฿
Total	4,300	9,370	Maintenance and Management cost are not included

Source: Field Survey of our Study

In general local trucking companies can cut some of their expenditures substantially and operate at lower cost. For example, driver's wages of local trucking companies are said to be almost half of those in Bangkok.

From the "Study of Trucking Industry", the estimated data of the cost per round trip can be obtained as follows.

Table 3.4-3 The Cost per One Round Trip between Bangkok/The South

Unit: Bahts

To and From Bangkok	Surat Thani (672 km × 2)	Nakhon Si Thammarat (789 km × 2)	Hat Yai (976 km × 2)	Pattani (1,076 km × 2)
No. of Trip/Year	80	75	70	68
Operation Cost				
Fuel	3,012	3,536	4,374	4,823
Oil	124	145	180	198
M. and S.	1,464	1,718	2,126	2,344
Tyre	945	1,109	1,372	1,513
Driver's Allowance	840	986	1,220	1,345
Sub-total	6,385	7,494	9,272	10,223
Fixed Cost				
Driver's Salary	585	624	669	688
Regist. Fee	54	58	62	64
Insurance	63	67	71	74
Depreciation	1,320	1,408	1,509	1,553
Canvas	50	53	57	59
Sub-Total	2,072	2,210	2,368	2,438
Total	8,457	9,704	11,640	12,661
Office Expense (15% Total)	1,269	1,456	1,746	1,899
Grand Total	9,726	11,160	13,386	14,560

Source: Calculated Data based on "Study of Trucking Industry".

This estimation was based on the ETO's per vehicle operation cost for 10 wheel Trucks in 1983.

Itemwise comparison of the above two set of data are prepared and shown in Table 3.4-4, for depreciation, drivers salary, fuel and allowance for which the field survey could have produced independent estimate. The results show fairly good agreements.

Table 3.4-4 Comparison of the Data

Unit: Bahts

	ETO's Estimation	Field Survey Hearing (average)
Depreciation	1,320	1,200
Salary	590	650
Allowance	840	1,300
Fuel	3,010	2,720
	5,760	5,870

Note: This comparison is done for the route between Bangkok and Surat Thani (672 km)

Accordingly the costs estimated using "ETO's data are considered reliable for this study. Hereafter the Study Team uses this data.

The major expenditures of truck transport are for fuel, maintenance/spares, tires and depreciation. These four items account for some 70 percent of total cost. Fuel in particular amounts to 33 percent of the total cost.

This was caused by the oil crisis. According to past data which was gathered about ten years ago, the values were quite different as is shown below;

Table 3.4-5 Cost Comparison of Present and Past

Unit: Bahts/km

	1971	1982*
Fuel	0.284 (13)	2.241 (33)
Engine Oil	0.037 (2)	0.092 (1)
Tyre	0.375 (17)	0.703 (10)
Depreciation	0.413 (19)	0.802 (12)
Tax	0.072 (3)	0.032 (-)
Insurance	0.048 (2)	0.036 (1)
Administration	0.151 (7)	0.894 (13)
Wage	0.541 (25)	0.968 (14)
Maintenance	0.205 (10)	1.089 (16)
	2.126 (100)	6.857 (100)

* Estimated at Hat Yai (ETO Data)

(2) Freight

In the trucking industry the freight rates fluctuate due to many factors; the major contributing factors are the seasonal fluctuation of demand caused by the harvests of agricultural products, the practice of overloading and the companies' effort to pick up back-haul cargo.

1) Seasonal Fluctuation

According to the study mentioned before, demand is strongly seasonal following agricultural crop production:

The freight goes up in harvest season, directly reflecting the demand.

From the field survey, the freight rates for agricultural products depends on the market; roughly speaking these rates are in the range of 7,000 ∿ 4,000 ฿/truck, in case of fruits/vegetable hauled from Surat Thani to Bangkok.

But in comparison with other areas, the seasonal fluctuation in the South is not very remarkable as the amount of Agricultural products is comparatively lower than in other areas. The major cargoes from the South are marine products, wood and firewood; these cargoes are not seasonal.

2) Overloading

Overloading of trucks is generally observed in Thailand, with the exception of ETO.

Truck operators are aware that the practice of overload is welcomed by customers.

According to the survey entitled the "Study of Trucking Industry" in case of Cassava and Sugar-cane, 10-wheel trucks are overloaded by an average 67 percent and 60 percent, respectively, over the legal weight.

The most important issue about overloading is that when trucks are overloaded the operation cost per km rises, however fuel use per ton hauled declines as overload increases.

The overload costs for 10-wheel trucks based on the data from the survey executed by DOH were obtained as follows:

Table 3.4-6 Distribution of Gross Vehicle Weight for 10-Wheel Trucks

Unit: Tons

GVW (ton)	Commodity Type					Total %
	No. 1	No. 2	No. 3	No. 4		
4 8	-	3	3	3	9	.2
8 12	25	36	76	75	212	5.1
12 16	53	100	249	178	580	15.1
16 20	101	532	913	317	1,863	45.2
20 24	27	271	583	80	961	23.3
24 28	-	105	267	9	381	9.2
28 32	-	23	75	7	105	2.5
32 36	-	5	5	2	12	.3
Total	206	1,075	2,171	671	4,123	100

Commodity Type

No. 1 : Vegetables, Fruits and Animals

No. 2 : Construction Materials

No. 3 : Rice, Fertilizer and Other Major Crops

No. 4 : All Others

Source: the Consultants from DOH data

This Sample includes only fully loaded trucks.

Table 3.4-7 Financial Costs of 10-wheel Truck Costs at 60,000 km/year, Level Tangent Paved Road, 70 kph

Running Costs at Legal Load (13.4 tons) ฿ per km		Load Factor 70% (22.8 tons) Factor	Costs at Overload ฿ per km	Perceived Cost ฿ per km
Fuel	2.31	1.21	2.80	2.60
Oil	0.09	-	0.09	0.09
Tyres	0.69	2.57	1.77	1.77
R & M	1.68	1.90	3.19	1.68
Total	4.77	1.42	7.85	6.34
Fixed Cost per km, at 57,000 km/year	3.59	3.59	3.59	3.59
Total cost	8.36	5.01	11.44	9.93

Overloading depends on the commodity. According to the "Feasibility Study and Detailed Engineering Design for Provincial Road Improvement", a comparison of the average of gross vehicle weight by commodity type can be obtained as follows:

DOH's truck weight data were classified into following four commodity types;

1) vegetables, fruits and animals
2) construction materials
3) rice, fertilizer and other major crops
4) others

The Study Team assume that in one round trip overloading is done only on the main haul and that the back haul is a less than legal load.

(3) Back-haul Cargo

According to DOH's report the average rate of unused capacity on return trips is 61 percent. This figure seems too high for long haul trucks, and may include data for short-haul transport. For long haul trucks, such as those running from Bangkok to the South, operators are doomed to carry back haul cargoes even if the freights are set very low during negotiations or the lots are too small for the truck size.

According to the field survey, all operators said that there were no trucks unable to pick back-haul cargo up, and that one round trip to the South takes about 3∿4 days overloaded one way, and using severe discounts really full on the return. At present, a rate war is going on among the companies. Some of them reduce the ceiling rate considerably to win the competition.

(4) Conclusion of Rate System

Through this study the Study Team come to understand that the freight rates vary because of the operator's circumstances.

Some operators have long term contracts with big customers at the minimum rates and other operators are eager to pick up spot cargoes with discount rates especially on back haul trips.

According to the field survey of some trucking companies, the average actual freight rates between Bangkok and the southern major provinces are as follows.

Table 3.4-8 Average Actual Freight Rate (10-wheel Truck) Bangkok/Southern provinces

	Surat Thani	Nakhon Si Thammarat	Songkhla
Distance km	654	789	950
Freight Rate ฿	6,500	7,000	8,000

ETO's tariff for 10-wheel trucks is cited as the Table 3.4-9.

Table 3.4-9 ETO's Freight Rate between Bangkok and Southern (10-wheel Truck)

Surat Thani	Nakhon Si Thammarat (Muang)	Songkhla (Hat Yai)	Pattani (Muang)
km. 672	789	976	1,076
฿ 5,800	6,830	8,200	9,000

The rates in the above tariff are not so different from the actual freights of private operators for one way hauling.

But with the competition among the operators, they are eager to give more service to their customers such as; on the main haul some truck operators carry substantial overloads at almost the same freight as ETO's tariff, and on the back haul truck operators make the rates negotiable. On the average the discounted rates are said to be 60 $\sim$ 80 percent of normal rates for the back haul.

According to the cargo estimates and overload data, the average discounted rates in 1987 for customers are estimate as follows:

Bangkok to Songkhla	88%	(excluding fertilizer)
Bangkok from Songkhla	88%	(excluding wood products)
Bangkok to Nakhon Si Thammarat	90%	(excluding fertilizer)
Bangkok from Nakhon Si Thammarat	81%	(excluding wood products)
Bangkok to Surat Thani	90%	(excluding fertilizer)
Bangkok from Surat Thani	100%	

From these results the study team assumes that the average overall discount rate to overload is about 10 percent.

According to the field survey the back haul discounted rate between Bangkok and Surat Thani is about 3,000 ∿ 5,000 ฿ depending on the situation. This is almost 50 ∿ 70 percent of ETO's standard tariff.

Also truck operators said they can pick up rearly full loads of back haul cargo when the discount rate become substantial.

From the results of the above analysis on overload and back haul discounts, The Study Team concluded this issue as the following Table.

	ETO Tariff	Actual Discount Rate
Main haul overload	100%	90%
Back haul discount	100%	70%
One round	100%	80%

CHAPTER 4 REVIEW OF PORTS AND HARBOURS

CHAPTER 4 REVIEW OF PORTS AND HARBOURS

4.1 Outline of Ports and Harbours in Thailand

4.1.1 Classification of Ports in Thailand

All ports in Thailand are presently classified to following three categories in terms of its managing agency and structural form.

(1) Deep-water Ports

1) Outline

There are two deep-water ports; the Port of Bangkok consisting of the Klong Toei wharves on the Chao Phraya River, and the Sattahip Commercial Port on the Eastern Sea-board.

And Thai Government is planning to develop:-

A. Bangplakok Midstream Dolphins.

B. Laem Chabang Deep-sea Port. (an extension scheme of Bangkok Port)

B. Rayong (Map Ta Phut) Deep-sea Port.

In addition to the above, the Songkhla and Phuket deep-sea ports will be operated by the Port Authority of Thailand (PAT) after the completion.

2) Port Characteristics

The Port of Bangkok has two main looks, that is Klong Toei port for foreign trade situated on the left side at the lower reaches of the Chao Phraya River, which is under the direct control of PAT, and numerous private wharves for domestic and foreign trade. See Figure 4.1-1.

The private wharves along the river is summarized and shown in Figure 4.1-2.

After the completion of the Laem Chabang Deep-sea Port project the port is expected to be operated as a complementary port of Bangkok for handling of containers and agricultural bulk cargoes.

(2) Coastal Ports (Local Ports)

1) Outline

Thailand has an estimated 30 shallow draft coastal ports. Major coastal ports are:-

A. Trat on the Eastern sea-board.

B. Surat Thani and Pattani on the Peninsula East Coast.

C. Krabi and Kantang on the Andaman Sea Coast.

New Ports of Krabi and Pattani have been just completed by the Harbour Department (HD).

With the exception of the above, most of the coastal ports are small in size and their throughput are limited, and some of them are exclusively used by local fishing boats.

2) Technical Aspects

Most of the coastal ports in Thailand are river ports closely located to river mouths, therefore, the severe draft restriction at the channel entrance is an inevitable problem.

Because of the shallow entrance as mentioned above, transferring cargo at outside anchorage area by lighterage operation is required for the export and some of the domestic trade, and the movements of small cargo vessels and larger fishing boats in and out of ports are generally limited to high tide.

Further, the required approach channels are considerably long due to the shoaling beach of the Gulf.

Consequently, the maintenance dredging by HD is of primarily importance for coastal ports and details are given in Appendix 6.

The port facilities including the cargo handling equipment are generally inadequate, but the coastal ports itself is not considered the critical factor for the coastal shipping because of the poor cargo volume at present.

For details, see Appendix 7 Profiles and Drawings of Major Ports, and Appendix 19 List of Coastal Ports.

The locations of coastal ports are shown on Figure 4.1-3.

(3) Inland Waterways Ports

1) Outline

Inland waterways system in Thailand has been developed along the basin of the Chao Phraya River from old days.

The principal navigational rivers and river ports are:-

A. The Chao Phraya River with ports of Ayutthaya, Nakhon Sawan Taphan Hin, Phitsanulok and Uttaradit.
B. The Pasak River with ports of Sara Buri and Phetchabun.
C. Some excavated canals/rivers in and around the Chao Phraya River area.

At present, the improvement work along the Chao Phraya River is progressing by HD in accordance with the proposals of the feasibility study financed by the World Bank (IBRD).

2) Technical Aspects

Thailand has a comprehensive inland waterways system which length reaches to more than 2,000 km of navigable waterways. Most of this length is in the Northern Corridor between Bangkok and Uttaradit along the Chao Phraya River and the Nan River, and the remaining lengthes are along the Pasak River, the Noi River and so on.

The size of vessels passing through waterways, especially in developed canals, is restricted due to shallow waters. The characteristic of inland waterways and ports in general is that the navigation is influenced by the depth dropping during dry season.

Most of the berthing facilities in inland waterways ports are small timber wharves.

For details of navigable waterways, see Chapter 3.

3) Future Development

The improvement of the waterways is progressing by HD under the financial assistances of IBRD.

The project outline and present status are as follows.

The project aims at the improvement of the waterways, that is, deepening of critical sections up to Taphan Hin to the depth of -1.7 m and fixing the route of river flow.(*) Sections are in the range of the Ang Thong Province of Lower Chao Phraya and the Nakhon Sawan Province of Upper Chao Phraya by way of the Sing Buri Province.

In addition, HD is planning to construct the Nakhon Sawan Port and the Taphan Hin Port as the larger loading points on the Chao Phraya River and the Nan River.

This project will be advanced to cope with the expected traffic increases resulting from the above-mentioned improvement works.

The location map of inland waterways is shown on Figure 4.1-4.

(*) The depth of -1.7 m shows the minimum and the target depth of dredging is -2.2 m involving the allowance for dredging and siltations.

4.1.2 Profiles of Coastal Ports

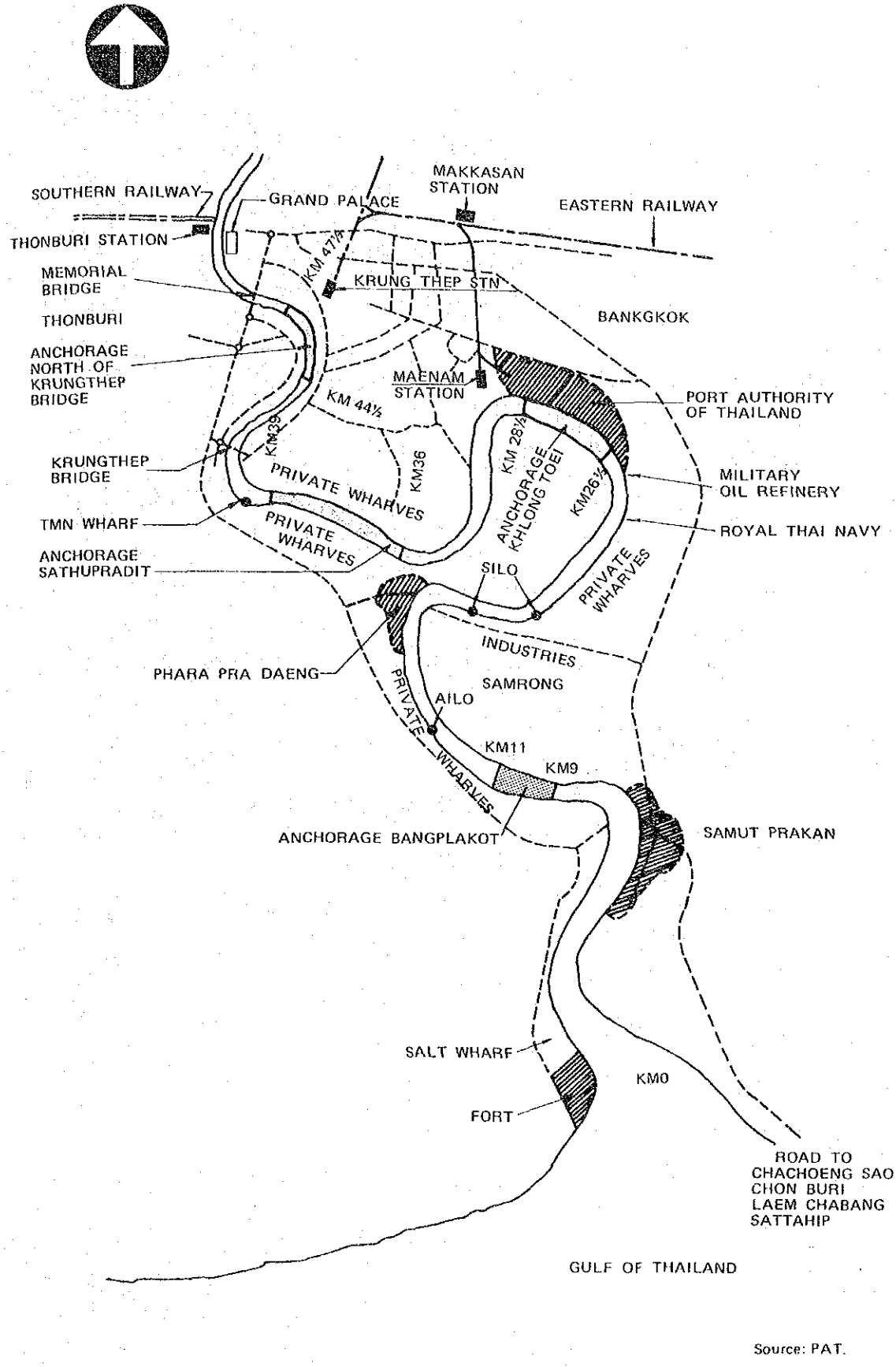
Present situations of port and harbour facilities are shown in Appendix 7.

Following coastal ports are selected as major ports in the South Region.

A. Ban Don
B. Ko Samui
C. Khanom
D. Pak Phanang
E. Songkhla
F. Pattani
G. Narathiwat
H. Kantang
I. Krabi

The description is composed of four items, that is, Location, Physical Profiles, Development Proposal and Consideration for Future Development respectively.

In addition to the above, the list showing port activities and dredging operations are attached on Appendix 19.



Source: PAT.

Fig. 4.1-1 Port of Bangkok

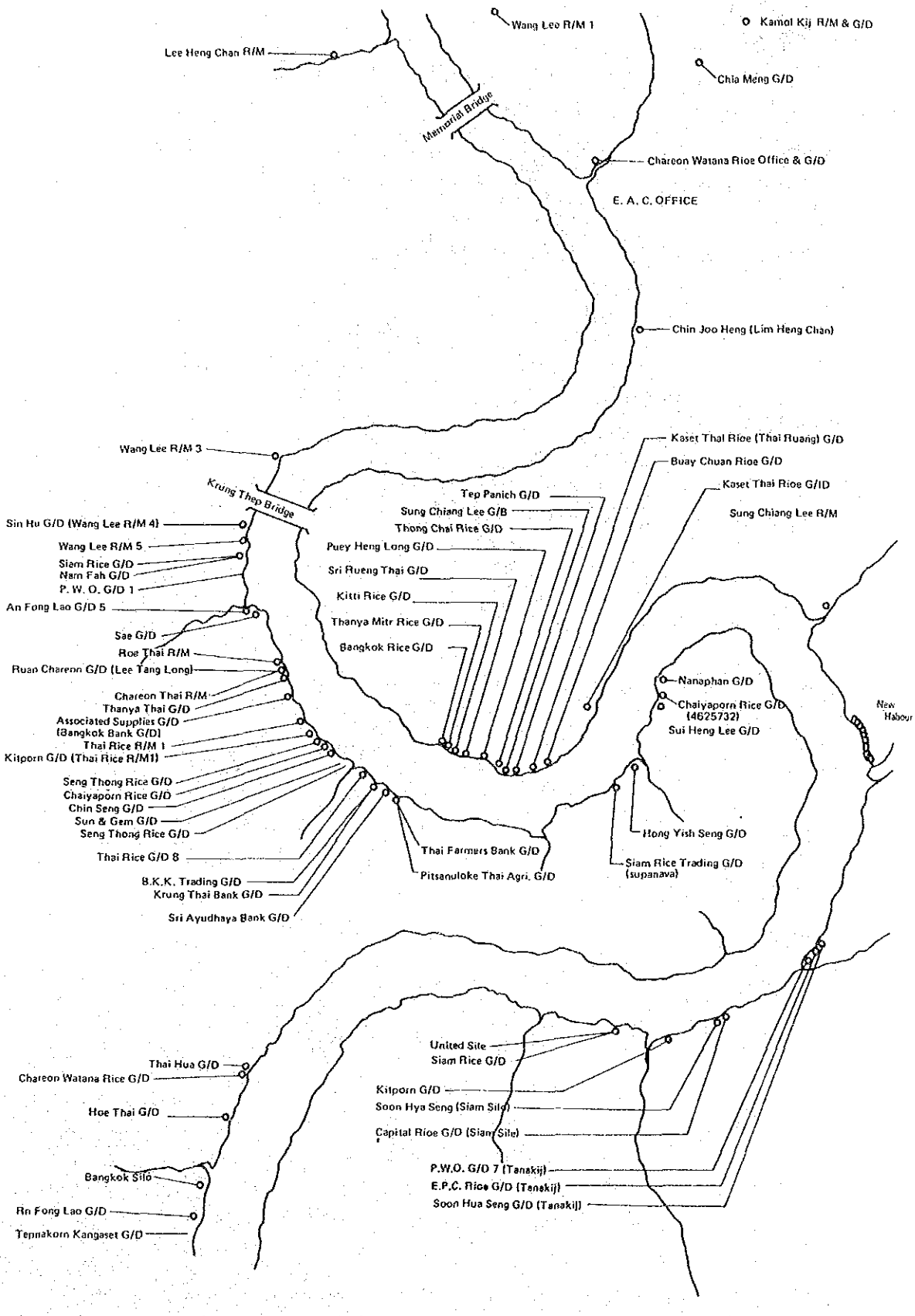


Fig. 4.1-2 Private Wharves of Bangkok Port

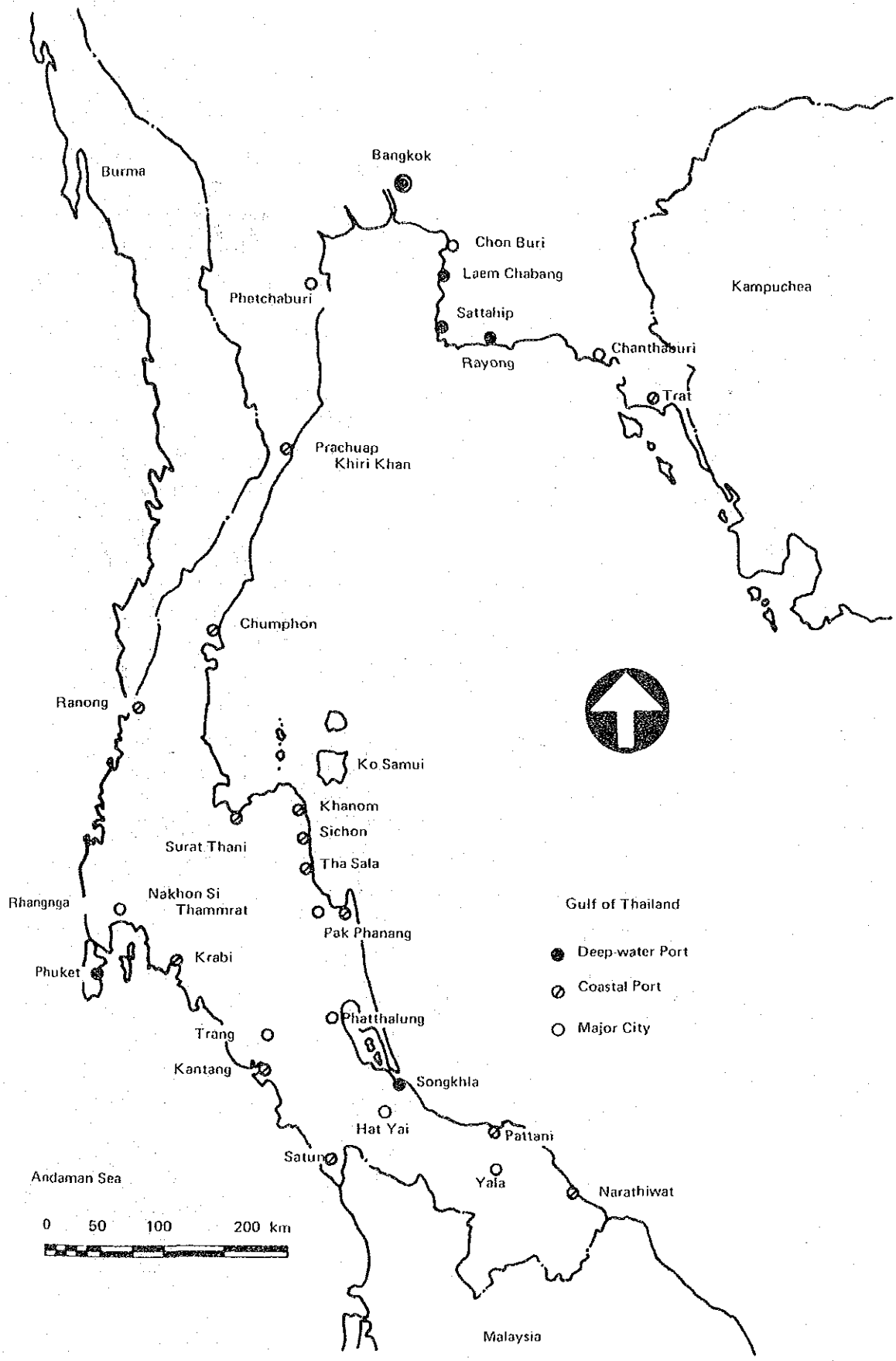
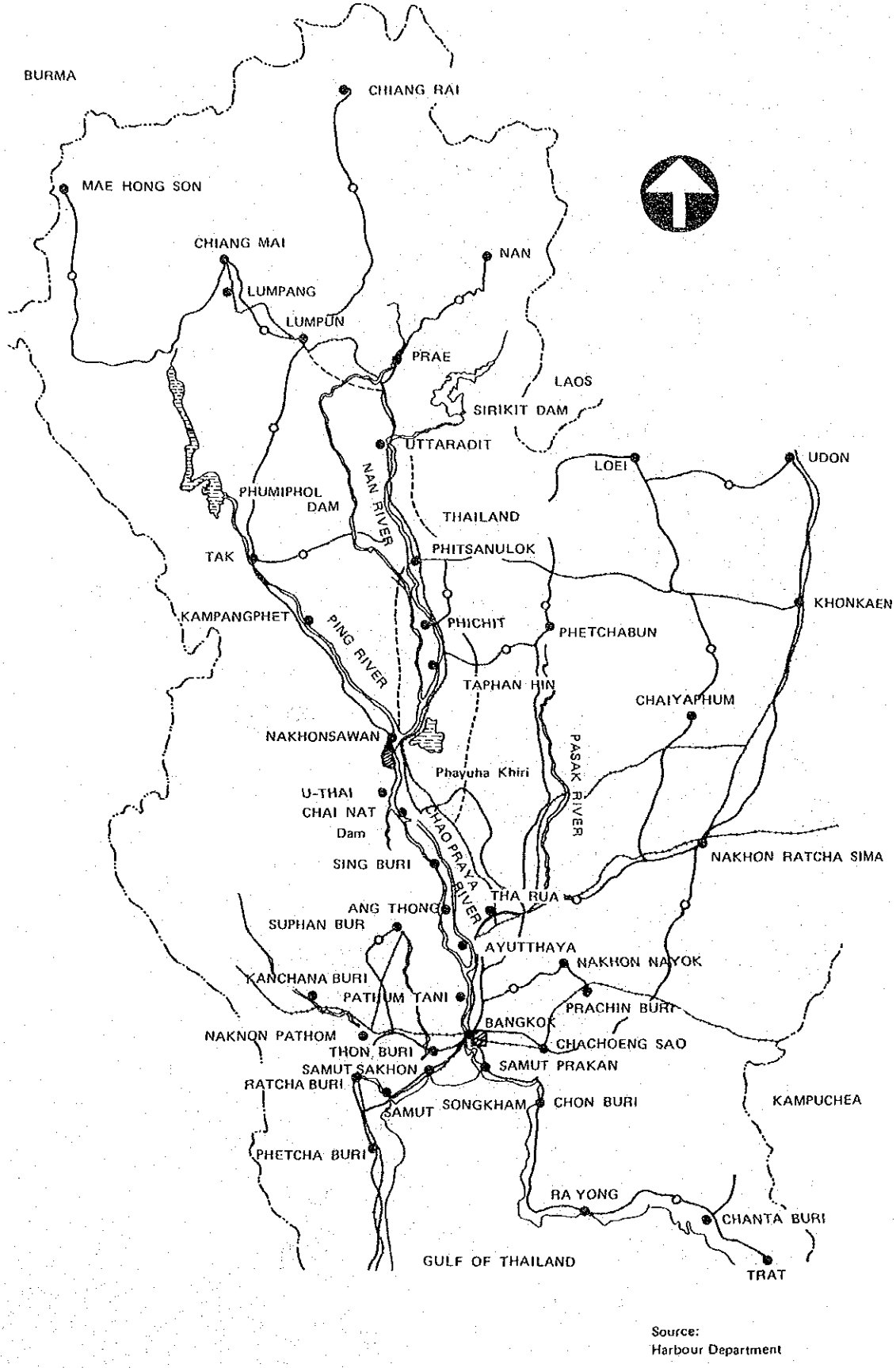


Fig. 4.1-3 Location Map of Coastal Ports



Source:
Harbour Department

Fig. 4.1-4 Location Map of Inland Waterways

4.2 Administration of Ports and Harbours in Thailand

4.2.1 General Overview of the Administration at Present

The ports in Thailand are basically managed by the PAT and HD. The deep-water ports are under the responsibility of PAT. In contrast, the coastal ports and the inland waterways ports are under HD as well.

The function and the organization of these bodies are as follows.

(1) PAT's Role

PAT established in 1951 is the public utility state enterprise under the general supervision of the Ministry of Communication (MOC).

At present, PAT is organized in the followings.

(i) Board of Port Commissioners Bureau

(ii) Administration Bureau

ii-1 Office of the Director General

ii-2 Central Sector

ii-3 Port Operation Bureau

The organization chart is shown in Appendix 9. PAT's powers and duties are as follows:

A) To construct, purchase, acquire, dispose of, hire, let and operate port equipments, service facilities and properties;

B) To determine charges for the services and facilities;

C) To issue regulations regarding safety, and use of its ports services and facilities;

D) To borrow money;

E) To dredge and maintain the channels in PAT's port areas;

F) To control, develop and provide facilities and to assure safety in port undertakings and navigation in PAT's area;

G) To fix the rates of various dues and charges;

H) To issue bonds or any other instruments for the purpose of investment.

Concerning the Port of Bangkok, the PAT manages the port facilities and the navigation area of the Chao Phraya River as extending from the Memorial Bridge down to the river mouth, including the supervision of stevedoring, the assistance of navigation and the maintenance dredging ranging from the Memorial Bridge to the entrance of the Bar Channel. But its direct cargo operation is limited to the facilities of Klong Toei.

(2) Harbour Department's Role

HD is composed of nine divisions in the Bangkok head office and local harbour master offices.

The organization chart is shown in Appendix 9.

The powers and duties of HD are mainly:

A) To make the budgets for these ports;
B) To make development plans for these ports;
C) To survey and register shipping activities;
D) To construct facilities for these ports;
E) To dredge and maintain the channels of these ports;
F) To furnish up-to-date charts for these ports.

The Technical Division and the Dredging & Maintenance Division are the nucleus of HD with respect to the development and the maintenance of coastal ports and inland waterways.

The Technical Division is responsible for planning and undertaking namely:

A. Decision and Approval of Government Projects including capital dredgings as the contract work.
B. Execution of above (ie. Construction & Improvement).
C. Procurement of new Dredgers.

The Dredging & Maintenance Division is in charge of the maintenance namely:

A. Dredging of navigation channels for maintenance and improvement.

1) Management of Coastal and Inland Waterways Ports

a) Coastal Ports

HD is responsible for the development and the construction (including the improvement) of public wharves, and these are taken over to the port management body after the completion.

Fishing wharves have been constructed by the Fish Marketing Organization (FMO) as well as cold storage plants by the Cold Storage Organization (CSO).

The capital and maintenance dredging of navigation channels are carried out by the HD.

Coastal ports are generally operated as in the following manner.

A. Port facilities in the municipal area are managed and operated by the municipality.

B. Port facilities in the provincial area, other than municipal area, are managed and operated by the province.

In those cases, the proprietary belongs to the Ministry of Finance (MOF).

And the rental of the port is paid according to the agreement between the port management body and MOF.

If the local public body refuses to be handed over the port when the negotiation is unsuccessful, HD will manage wharves and jetties.

C. Other facilities, for example company's jetties, are privately owned and operated.

b) Inland Waterways Ports

Inland waterways ports are mostly operated by private companies. HD is charged with the administration of inland waterways. The management, construction including improvement and maintenance of navigation channel is carried out by HD in the same way as coastal ports.

2) Records Concerning the Development

The budget for recent 4 years with the intention of the development are shown on Appendix Table A.6-1.

As per the record above, the Technical Division of HD has the budget for the development purposes in the range of five to ten percent against the whole budget.

3) Records Concerning the Dredging

The capital and maintenance dredging of coastal ports were started in 1967 and the dredging operations became the major part of HD's operations.

The budget for the dredging has been generally more than 50 percent of the total budget of HD. See Appendix Table A.6-1.

Still more, it is considered that the direct cost such as operation cost for dredging would be substantially around the half of the budget as above. And this is converted in the form of unit costs for the typical dredging operation.

7.5 ฿/m^3 for Cutter Dredgers

10.0 ฿/m^3 for Hopper Dredgers

The past records of dredging are shown in Appendix Table A.6-2.

This table indicates the scale of annual dredging operation from 1980 to 1982, where the total cost means the direct cost.

The dredgers list showing their technical details is also attached for reference Appendix Table A.6-3.

4) Some Discussions on Dredging Operation

The dredging operation should be thoroughly studied in order to avoid burdening the HD's dredging cost for maintenance and constraining its development potential.

For example, following actions are of special importance.

A. Trial construction of breakwaters or river training walls to prevent littoral drift.

B. Providing sand trap by test dredging for the purpose of observation to seise the exact rate of siltation or sedimentation affecting navigation channels.

C. Study of the relationship between river discharges and shoalings.

D. Examination of improvement for dredging method including dredger operation.

E. Continuous wave & wind observation to estimate littoral transportation (ie. predominant direction and its volume) in the Gulf of Thailand.

In any case, the best location of navigation channels in future should be taken into account to minimize the required dredging volume under the participation of port specialists and the assistance of technical organizations (ex. AIT).

(3) Problems in Thailand's ports

In spite of the efforts which have so far been made by these two organizations, there still remain many crucial problems in Thailand's ports.

From the viewpoint of the Japanese experts the following three basic problems emerge:

1) Lack of the comprehensive and consistent institutional framework covering all ports including private wharves

In fact, almost export cargoes in Thailand have been carried through numerous private wharves along the Chao Phraya River. These private wharves have been so far kept themselves separate from any institutions. It should be made clear that the Government should legislate laws and regulations covering all the ports and harbours in Thailand.

2) Lack of the firm and unified policy on port development

There has been no consistent rules and regulations covering general operations from planning to budgeting applicable to the local ports.

The final decision on the development of a local port is formulated by MOC or MOF, and there has been no channel for the local governments to officially express their views.

From the viewpoint of efficiency the operations and management of local ports must be handed over to the local autonomous bodies.

3) Lack of Government's engineering forces (investigations and research activities)

Because of uncertainties in decision making process the engineering issues are sometimes neglected even when they are of great importance. This will be safely covered by the strong in-house engineering unit.

4.2.2 Role of Local Ports in Thailand

In general, port authorities engaging in international trading such as PAT are organized as comprehensive management and administrative systems, and theoretically they are able to provide all services required in connection with port activities.

As autonomous bodies, these organizations finance themselves from the revenues earned by their own activities. This makes them independent of the Government budgeting and permits them to manage freely without any annual appropriation request.

In developing countries, these authorities, because of their monopolitic status, are able to decide charges on their own without considering competition with other minor ports. On the other hand, the local ports the Study Team are now considering have relatively small scale hinterland and are often in severe conflict with neighboring ports and other transportation modes.

The problem of the local port authority is the weakness of its financial status, furthermore a newly established authority must cover not only its operating, maintenance and administrative expenses but also the funds for construction and interest.

This makes them dependent on government budgeting for initial investment and so the smaller the organization is, the more this dependence will be. The mission of a local port authority is basically as follows;

1) To help local enterprise thrive through port activities,
2) To minimize the shipping transport costs between its jurisdictional area and the Bangkok area,

3) To be entrusted with the Government port facilities, and

4) To supervise the private sectors' activities.

(1) To help local enterprises

The most pressing problem that the Thai local governments are facing today is to make their jurisdictional areas prosperous by inviting enterprises or plants to set up operations.

As elsewhere in the world, the existing smallest ports in the South Thailand can provide convenient locations for many enterprises such as fish meal plants, saw mills, petro-distribution centers and other processing factories. In this connection a local port authority as an autonomous body should make plans to promote the set up of industrial enterprises in its hinterland under the instructions of the local government.

At present, this kind of industrialization is going on behind the Pattani port site, keeping pace with the wharf construction by the Pattani Provincial Government. Local governments should promote plans to establish industrial and distribution centers behind the local ports after thorough feasibility studies. By promoting such a plan revenues (tax and land sale) of the concerned local government would increase substantialy and the benefits well compensate subsidies for port costs made by the local government.

(2) To minimize the shipping transport cost

The amount of cargoes handled at a local port is fatally small in comparison with the one at an international trading port, and most cargoes are very inexpensive ones.

What is worse, the domestic trade shipping companies must compete with the freight charges offered by trucking companies. In case of overseas shipping companies, if the port authority raises its charges, shipping conference can easily pass on the raise by increasing their freight charges to the traders.

From the viewpoint of the national economy this only makes the price of commodities in the country high at the same rate like the custom duties do. However, in case of coastal shipping doomed to compete with other

transportation modes, a rise in port charges may negate the existence of coastal shipping enterprises themselves.

From this viewpoint, in Japan's large trading ports such as Kobe and Yokohama, vessels under 700 GT port charges are made free under the tariff provisions which aims at protecting domestic coastal shipping (most Japanese vessels under 700 GT being engaged in domestic coastal transport).

(3) As a trustee of the Government owned port facilities

The scope of an authority's obligations ought to be limited within its abilities, depending on the local port situation.

An authority's major business to be carried out as the routine management of port activities, is to repair the cargo handling equipments, buildings, yards and warehouses and to maintain the cleanliness of the port site. But the maintenance dredging of a channel or basin for navigation is a crucial problem for Thai coastal ports since most of them are located in estuaries.

To make one thing clear no local port authority will be able to pay for this from its own treasury. Today the maintenance dredging of local ports is carried out by HD. Even after a local authority has been established in near future this work will have to be done by HD.

The most remarkable point of a local port development is that not only the authority but also neighboring private enterprises such as fish meal factories or petro-distribution centers share the benefits from enabling large vessels to call at the port.

For this reason the Study Team have come to the conclusion that the Central Government should not turn the maintenance and depreciation cost over only the local port authorities.

In the United States this kind of navigation work is carried out by the Army Corps of Engineers. Although in Japan the development of commercial port facilities and their administration are in the hands of regional-level public authorities or an autonomous bureau of the local government, MOT as a parent body participates in the construction of major facilities such as wharves, breakwaters and channels.

The Study Team thinks that these investments will return to the Government's treasury in the taxes paid by the prosperity of related enterprises. Instead of expenditures for the facilities, however, the authorities ought to keep their eyes on channels and basins which have been turned over to them by the Central Government. So the Study Team proposed that MOC staff ought to be assigned to the local authorities to do proper routine engineering work of surveying (not only channels and basins but other facilities as well).

If a channel becomes shallow on account of a flood or for some other reasons, such an engineer would request the Central Government to carry out maintenance dredging, presenting detailed documents as soon as possible.

(4) To supervise private activities

A local port authority should not interfere in the internal affairs of private enterprises such as shipping and stevedoring companies. But a authority has the responsibility to mediate the conflicts among the interests of private companies. This ought to be done by an authority's committee.

Not only in Thailand but elsewhere in the world, the problems of pilferage and stealing annoy a port authority or its clients. It is needless to say that a shipping company is responsible for keeping its eye on its own cargo, but one of the important issues that a local port authority should have the responsibility to do is not to allow suspicious persons or groups to enter the site. So the Study Team suggested that an authority should employ guards and ask a police office to help so as not to incur such problems.

4.2.3 Necessity of Simplification of Port Authority's Organization

Due to the reason of cost-saving, a small and simple organization must be planned.

It is suggested that the Central Government should establish an authority in each major local port and the main staff of less than 10 persons should be put under the supervision of its committee.

The Study Team recommended that a port authority's organization is consist of as follows:

(1) General/Personnel Section;
(2) Accounting/Revenue Section;
(3) Port Service/Stevedoring Section;
(4) Technical/Engineering Section.

But in the case of a local port authority its business should be limited as mentioned before. Therefore, the Study Team suggested that the business of a local port authority should be divided as follows:

(1) Committee;

To provide laws, acts, and regulations;
To make a budget for the coming year
To render account to the local government and MOC as the parent Government
To mediate and adjust interests of various clients
To set tariffs/port charges

(2) General/Personnel Section

To carry on general affairs
To employ the staff
To guard the port site
To prepare statistics and plans

(3) Accounting/Revenue Section

To manage the budget
To collect the port charges and rental fees

(4) Port Service Section

To rent the facilities (wharves, transit sheds and field)
To supply water
To maintain the cleanliness of the port site

(5) Engineering Expert

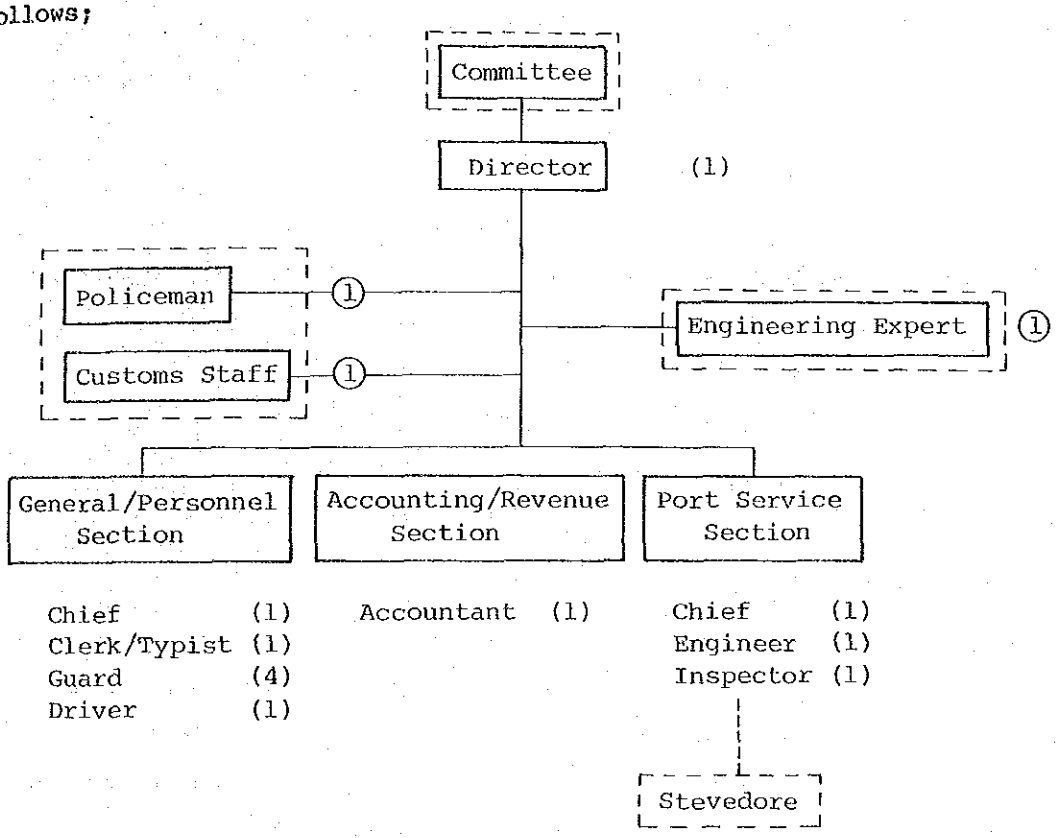
To maintain equipments

To keep the wharves and channels in good condition

To make expansion plans

Even in a small local port, sometimes limited amount of import/export cargo is expected and in order to prevent smuggling, custom house staff ought to be assigned in the local authority.

The most recommendable organization of a local authority is as follows;



Total Number of Staff: 15

ordinary staff: Director 1
Chief 2
Clerk, etc. 4
Guard Driver 5
12

on loan from another office: 3 (Police, Custom House and MOC)

* Officials and workers other than ordinary staff are indicated with doted lines.

Fig. 4.2-1 Recommendable Organization of the Local Port Authority

4.2.4 Diversification of the Revenue

For the port authority the revenues are expected to come mainly from the wharf rate and the rent for the warehouses and open storage yards. As is often the case with international trade ports, forklift/pallet rental, and vehicle admission cannot be expected because of a scale of economy. But the local authority may be in the position of obtaining revenue coming from the rent for the land behind the port which are used as the site of warehouses and factories. Further, part of the port charges, such as channel due, could be levied for industrial carriers.

In any way, an effort will have to be made to minimize the port charges to the domestic coastal vessels as a whole, and to diversify the source of revenue from the other sectors.

Port Tariffs

In general the port charges for a coastal port are suggested as follows;

1. Wharf dues
2. Warehouse charges
3. Storage yard charges
4. Water supply fees
5. Rental fees for industrial sites

There are some other port charges such as channel dues, pilotage and stevedore and lighter fees. The Study Team believes that these complicate charges should not be applied to coastal ships. As for the coastal ports, Tha Thong, Pattani and Krabi which are in operation or under construction are not deep enough to allow large ocean going vessels to moor alongside the piers. (The depth is 5.5 m).

However, occasionally ocean going tramps will call the port to pick up lumber, rubber or other agricultural products and to unload large machinery or plants needed for construction work. In this case these large ships will remain in the anchorage and the cargo will be carried in and out of the port by barges.

So, in the Study Team's opinion, the port authorities should consider simple lumpsum tariffs, and we would like to propose that channel dues ought to be imposed only on export/import and industrial carrier cargo that pass through the dredged channel.

The study team recommended that the tariff rates should be restricted to a low level covering only the authorities direct expenditures, excluding those for maintenance and new construction.

If the port services were free of charge, the authority would have reason to fear that the shipping companies would be likely to use the facilities for a long time, as there would be no incentive to efficient operation, so that ports' efficiency would drop.

4.3 Development and Planning of Local Ports

Needless to say, the development of a local port promotes the development of the area behind it as well. So the local government should take interest in the future development of the port and should invite the staff of the private companies and the Central Government who are related to the port to the port authorities' committee to discuss the matter with them.

The authority must work out a plan for the development, utilization and preservation of the port following the Central Government ordinances. This plan should include the following items.

The future cargo demand forecast in the target year;
The layout and design of port facilities;
Land use plan;
The budget.

The port facilities themselves are the estate of the Central Government but it is preferable that they are taken over by a local port authority as an autonomous body of the local government. Having the power to freely make the most of this estate, the authority in the place of the Central Government has not only the responsibility to maintain it in good condition but also the duty to prepare a feasible and appropriate port plan.

After careful considerations of all aspects, the plan is to be passed on to the Central government, mainly MOC and MOF. MOC should have respect for these plans as proposed by the local authorities, and the Minister of Communications must seek the opinion of the Council for Ports and Harbours.

On the other hand MOC has to develop a longterm national port development plan, including PAT's ports, on the basis of these local port development plans. National plan has to obtain the concensus of all related government sections. This national plan should be the guideline for budgeting, the adjustment of conflicting interests, and other port-related divisions.

As a first step, in order to make clear the role of the respective local ports, the Study Team recommends that MOC should have ardent discussions with the local governments, promote a policy to develop local ports in the South and investigate what the needs were in each locality and how to develop to cope with them.

4.4 Cargo-handling Operation in Local Ports

4.4.1 Who Should Operate Cargo-handling Business?

The stevedoring or port cargo handling is the most attractive business for a port authority, and the tendency in most ports of the developing countries is to include the stevedoring section within its organization.

However, for the following two reasons the Study Team concludes that the local port authority should not include the stevedoring section. The first reason which was mentioned before is that the small cargo volume will not necessitate the authority to keep regular labors and to pay fixed salaries in the off-season or when there is no work. (The authority would also have to consider a suitable plan for staff retirement pensions and schemes for various type of insurance.)

The second reason is labor problems. If the authority decides to employ casual labor for stevedoring, instead of regular staff, each time a ship calls, this would seem to be an appropriate solution, but there will certainly be trouble.

In most parts of the world, ports are not free from the problems with their workers, such as pilferage, damage, drunkerness, failure to obey orders and safety precautions, and a general lack of discipline or ethics.

The most crucial problem that PAT Bangkok is facing today is this sort of labor problem. But PAT is able to charge the damage to the shipping companies and the shipping companies are obliged to claim it against the insurance company or include it in the freight charge.

On the other hand a local authority is not able to pass these damages on to the shipping company, because the shipping company is not able to absorb it into its charges due to the competition with other transportation modes.

In case of Thai local ports, it is necessary that more convenient, safer, and cheaper stevedoring services are available to the shipping companies or subcontractors. The shipping company has to bear the responsibility to the shippers and consignees for door to door transportation.

In Japan for both ocean-going and coastal vessels, a port autonomous bureau has no direct relation with cargo handling business, and private sectors designated by shipping companies or to shippers perform these services. So the Study Team recommends that the local port authorities should not be engaged in this kind of business, but it is better to provide key facilities such as the cargo handling equipments and water supply.

4.4.2 Appropriate Port Cargo Handling Business at Local Ports

In general the cargo handling business in international trading ports such as Bangkok is divided between two organizations following the differences in the nature of the responsibilities.

A stevedoring agent who is engaged by a shipping company has the responsibility and the power to load or unload cargoes between a ship's holds and the wharves. On the other hand between wharves and the shippers' or consignees' warehouses or factories, various agents designated by the shippers or consignees are responsible for cargo transportation.

The wharf side operations of these assorted agents, delivering or picking up many cargoes simultaneously, are so complicated and confused that in many ports, including Bangkok, the port authority has the power to

transport all cargoes from shipside to the port yards where the shippers' or consignees agents can pick them up. However, these public services, as mentioned before, are not always efficient.

For example at Bangkok even through they have paid the legal tariff for this service, shippers or consignees have to make up their own work gangs or to pay commissions step by step in order to pick up their cargoes safely and promptly.

As a matter of fact, this public service has a tendency to cause trouble. In the case of domestic freight, shipping companies are destined to compete with trucking companies. They need to insure strict price control over their door-to-door transport. Thus the domestic coastal shipping companies should have the power to supervise and manage these loading and unloading operations, or to undertake the business themselves.

Fortunately in Thailand this cargo handling business has not grown up or developed enough to block new operations or new ideas.

So the Study Team recommends that the Government should make rules and regulations for cargo handling business for the coastal ports. One of the most important problems the coastal shippers are facing is to organize a safer, the faster and cheaper system in the overall door-to-door transportation. Thus the Government should hand over the stevedoring business to private sectors as practicably as possible.

As for the cargo handling charge this should be made as low as is practice by doing it to the efficient management of the private sector. According to the statistics and the data of field survey the costs, include some double handling, at the warehouses or storage yards, stevedoring and yard operation charge are as 26.9 B/ton and 7.5 B/ton respectively. The details figures are shown in Appendix 8.

CHAPTER 5 REVIEW OF SHIPBUILDING AND REPAIRING

CHAPTER 5 REVIEW OF SHIPBUILDING AND REPAIRING

5.1 General

At present there are about a hundred (100) shipbuilding and repair yards in Thailand, most of which are small scale yards for wooden fishing boats.

As for shipyards which are capable of supporting the work of building and maintenance of the fleet for Coastal Shipping Service (more than 100 Gross Tons), their number is limited to only four or five shipyards around Bangkok.

Further, as for the maintenance and repair of vessels of more than 1,000 GT class, only two (2) Dry Docks of Bangkok Dock Co., Ltd. and also one (1) Floating Dock which is now out of operation, of Bangkok Shipbuilding & Engineering Co., Ltd. are available.

Accordingly, it is judged that the facilities of shipbuilding/repairing and the development of capabilities for supporting the development of future coastal shipping and international shipping require further expansion and improvement.

Note: In June 1984, a new repair yard was established named Asia Marine Service Co., Ltd. with one floating dock and one slipway.

5.2 Shipbuilding and Ship Repair Yards

(1) Number of Shipyards

The table below shows the total number of shipyards by region. Figures include shipyards for steel ships and barges as well as small shipyards constructing wooden ships and barges. The latest statistics are available only for 1979, but, according to the comment by the Mercantile Maritime Promotion Commission, little has changed to date.

Region	Shipbuilding	Shipbuilding and ship repairing	Ship repairing	Total
Central	11	25	15	51
East	5	5	2	12
South	5	16	23	44
Total	21	46	40	107

Source: Bank of Thailand

Of the total of 107 yards, about 50 percent are located in the Central Region, i.e., along the Chao Phraya River.

Shipyards in this region build and repair sea-going steel ships as well as barges which play the central role in the inland waterway transportation.

An increasing number of yards do steel work by welding, albeit small scale, following the transition from wooden barge to steel barge in recent years. This may have contributed to the training of skilled workers needed in the future for the development of the shipbuilding and repair industry.

In other regions, almost all shipyards are small scale ones doing shipbuilding and repairing of wooden fishing boats (10 to 20 m), of which 2 or 3 are found in each of the coastal fishing bases in Thailand. Their locations are Chonburi, Pattaya and Laem Chabang in the Eastern Region, Narathiwat, Pattani, Songkhla, Nakhon Si Thammarat, Pak Pannang, Surat Thani in the Southern Region, and Phuket and other fishing ports on the West Coast.

Thanin Shipyard in Songkhla is among the largest and is capable of repairing steel ferry boats. When the Study Team visited there, ship carpenters were doing repair work on more than ten wooden fishing boats in a slipway. Sin Wun Dee Dockyard in Pak Pannang is also a big one in its class and they have a new shipbuilding capacity of 2 wooden fishing boats per year and a repair work capacity of about 8 ships per year with 3 sets of slipways.

At present, shipyards in the Southern and the Eastern Regions do not have the capacity to expand their ship-building or repair facilities to be operated for coastal shipping services. However, since it is expected that the number of shipyards capable of steel works will increase as the transition from wooden to steel fishing boats takes place, the repair of ships for coastal shipping will be possible in the near future by means of off-shore repair.

(2) Steel Shipbuilding and Repair Yards

The table below shows the number of shipyards capable of steel shipbuilding and repair of vessels of over 100 gross tons.

Number Gross Tons	101 ∿500	501 ∿1,000	1,001 ∿3,000	Total
Shipyard	15	2	3(*1)	20
Slipway	21	2	5(*2)	28
Gross Tons	5,820	1,600	12,100	19,520

Source: Office of Mercantile Marine Promotion commission 1982

*1: One is under construction and another is about to discontinue operations.

*2: Includes two (2) drydocks and one (1) floating dock.

As mentioned before, shipyards with the capacity to handle more than 100 GT are concentrated around Bangkok, and only 4 companies are in existence that are capable of handling ships of more than 500 GT.

The Table below shows the estimated shipbuilding capacity for 1979. This statistical table indicates the capacity of 8 vessels per year of 500 1,000 GT.

Shipbuilding Capacity (1979)

Size of Ship		Production Capacity (Ships/Yr.)
Length (m)	Gross Tonage	
12 ∿14	8 ∿10	288
16 ∿18	10 ∿ 25	435
20 ∿ 24	25 ∿ 80	144
26 ∿ 30	80 ∿ 150	50
Over 30	150 ∿ 500	12
	500 ∿ 800	4
	800 ∿ 1,000	2
	1,000 ∿ 2,000	2
Total		937

Source: Bank of Thailand

In 1978 and 1979, numbers of vessels newly built and repaired in Thailand are shown in the Tables below.

Size of Ship		Quantity of Ships Built	
Length (m)	Size (Gross tons)	1978	1979
12 ∿ 14	8 ∿ 10	80	48
16 ∿ 18	10 ∿ 25	145	87
20 ∿ 24	25 ∿ 80	62	33
26 ∿ 30	80 ∿ 150	18	8
Over 30	150 ∿ 500	6	2
	500 ∿ 800	3	1
	800 ∿ 1,000	1	-
	1,000 ∿ 2,000	1	-
Total	-	316	179

Size of Ship (gross tons)	Volume of Repairs (vessels)	
	1978	1979
8 ∿ 80	15,281	12,954
80 ∿ 150	1,351	1,081
150 ∿ 500	334	286
500 ∿ 800	41	36
800 ∿ 1,000	12	9
Over 1,000	9	7
Total	17,028	14,373

Source: Bank of Thailand

The decrease in volume in 1979 is considered due to the poor performance of the fisheries industry, high interest rates, and production cost increases, according to the MMPC officials. No statistics are available showing the trend after 1979. However, the results of the interviews with shipyard (officers) during the survey suggest that the repairing business is on the up-swing as opposed to new shipbuilding which hovers at the bottom.

The capacities of major shipyards in Thailand are summarized as Table below.

Name	Capacity max. GT		Remark
	Building	Repairing	
1. Bangkok Dock Co., Ltd.	1,500	4,000	Dry Dock: 4000GT 1 3000GT 1
2. Bangkok Shipbuilding & Eng. Co., Ltd. (Operation Suspended since 1982)	1,000	3,000	Floating Dock: 3000GT 1
3. Harin Shipbuilding Co., Ltd.	* 2,000	* 2,000	
4. Thavessin Eng. & Ship-building Co., Ltd.	* 2,000	* 2,000	
5. Captain Co., Ltd. (Specialty:	600	600	
6. Ital Thai Marine Co., Ltd.	* 3,500	* 3,500	Ship Lift: 3500GT 1
7. Banglumpoo Lang Co., Ltd.	600	600	
8. Sahaisant Shipbuilding Co., Ltd.	500	500	

* Planned Capacity

Source: MOC, JETRO and other, compiled by the Study Team

The above Figures include planned capacity beyond the existing facility's capacity and those of a currently inactive company. If the size of the ship to be used in the coastal shipping program is assumed to be between 350 and 1,000 GT, at present, Bangkok Dock Co., Ltd. and Ital Thai Marine Co., Ltd., are considered capable of building and repairing such a ship. To do such work, however, these companies will have to substantially improve the level of design and production engineering, and to import the majority of raw materials and principal machinery and equipment.

As for small vessels, Captain Co., Ltd., has already worked on steel boats, aluminum-alloy patrol boats, and F.R.P. boats. Future development in this field is promising.

5.3 Shipbuilding and Ship Repair in Thailand - Prospects

In the preceding sections, the fact has been repeatedly pointed out that the number and capacity of shipyards that satisfy the requirements for building and repairing ships used in coastal and international shipping are severely limited. This issue is stated in the Fifth National Economic and Social Development Plan.

Studies are underway by the Marcantile Maritime Promotion commission, the Board of Investment, and other concerned organizations from their respective view points. It is hoped that some of the findings would be implemented in the near future.

During the survey of August and September 1983 by the Study Team, plans were reported in the newspapers concerning the establishment of a new shipyard at some place in the eastern seaboard. Although still in the planning stage, this news suggests a hopeful direction.

5.4 Study Assumption on Prices

It should be clear from the preceding sections that the present conditions of the shipbuilding industry in Thailand do not allow for the Study Team to estimate the cost of new ships for the proposed coastal shipping program based on domestic prices. To do so would result in arbitrary differences in the costs of the several types of ship to be compared. Therefore, in order to equalize the conditions of comparison, all prices to be quoted in this study will be based international prices for ships, and the financial terms and conditions of the Organization for Economic Cooperation and Development (OECD).