

CHAPTER 1 INTRODUCTION

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1.1 Background

The Fifth National Economic and Social Development Plan, which is presently being followed by the Government of Thailand, includes goals of energy conservation and economic decentralization. The emphasis on energy conservation is a response to the recent changes in the nation's overall economic structure, in particular the sources and costs of its energy supplies. The decision to disperse economic activities throughout the provinces addresses the need to promote social justice and to alleviate the poverty of people living in backward rural areas. As a part of these efforts the Thai government has launched extensive infrastructure projects with the aim of replacing energy expensive transportation and shifting to more efficient modes while enhancing the links between the different modes.

In the old days most domestic cargo transportation in Thailand made use of the network of inland waterways woven by the Chao Phraya river. Over the years the development and expansion of the railways, and road network, have brought great and increasingly rapid changes to the transportation system. Today this system makes heavy use of the roads and railways to transport domestic cargo while the inland waterways and coastal shipping routes have been mostly deserted and their port facilities have suffered from a complete lack of government funding.

However this may soon change as the Government of Thailand recently requested technical assistance from the Government of Japan in order to carry out a feasibility study of coastal shipping. In response to this request the JICA Study Team was dispatched from Japan to hold discussions and conduct surveys that covered not only coastal shipping but also the serious problems that currently face the administrative system for local ports.

The information gained from these activities was compiled and studied further in Japan. The results have been presented in this report.

1.2 Objective of the Study

The study aims at formulating a comprehensive development plan for the coastal shipping and ports in Thailand in order to contribute to the implementation of the Fifth National Economic and Social Development Plan made by the Government of Thailand in such sectors, by identifying potential traffic in domestic coastal shipping between Bangkok and southeastern ports. In the meantime, eastern ports are to be added whenever the Eastern Seaboard Development Programme becomes reality and some cargo flow of fertilizers and chemicals can be expected to move to southern ports. In the fields of the sub-regional coastal shipping and the inland waterways, the study is limited to their possible linkage with the domestic coastal shipping.

1.3 Scope of the Study

In order to make the study comprehensive, the following points were reviewed and analysed.

- 1) To make preliminary review of the existing surface cargo traffic and identify potential commodities which are technically and economically suitable for coastal shipping.
- 2) To review the present state of the coastal shipping service including inland waterways transportation on the structure of fleet, forwarding system, freight pricing, cost to operators, maritime policy and the statutes and regulations.
- 3) To review the situation of the existing ports including the volume and value of cargoes moving to and from such ports and the conditions of facilities.
- 4) To analyze and study the present and future cargo traffic with particular emphasis on the potential for shifting cargoes to the coastal shipping from other modes of transportation.
- 5) To make a development and improvement plan for the Thai coastal shipping and coastal ports in accordance with the results of the above review and analysis.

- 6) The study for the coastal shipping and coastal ports also includes the analysis of operation system, cost analysis, management system and the economic and financial feasibility of the development plan.

1.4 Progress of the Study

Based on the above Scope of Work, the Study Team initiated the work in Thailand on August 1, 1983, in accordance with the Inception Report and the Summary of Discussion to the Inception Report which were subsequently confirmed on August 9, 1983. The Study Team conducted field surveys in the southern and eastern provinces and several provinces along the Chao Phraya River. Besides the field surveys, the Study Team had discussions with their counterparts in the Thai Government, and the Progress Report was submitted to the Government of Thailand with the Minutes of the Meeting on October 12, 1983.

After returning to Japan, the Study Team performed the analysis of the data obtained in Thailand, made cargo demand forecasts, and formulated some feasible plans for the development of domestic coastal shipping in Thailand including a financial evaluation. This data and the preliminary results of the analyses conducted by the Study Team were then set forth in the Interim Report and presented to the Government of Thailand in February 1984.

Thereafter, the Study Team continued its analyses of the data collected from Thailand, revising and expanding the findings it has presented in the Interim Report and then compiled the Draft Final Report and submitted to the Government of Thailand in August, 1984.

Upon having the Thai - Japanese meetings for the Draft Final Report on August 15th and 23rd, 1984, at the Ministry of Communications (MOC), the minutes of the meeting were signed on the 27th.

The Study Team, taking comments from the Thai Government into consideration, have finalized this Final Report.

1.5 General Observation

- (1) In Thailand the domestic coastal shipping plays a role to a certain extent, particularly in the long distance trade of some voluminous

cargoes in the Gulf of Thailand such as petroleum products, fertilizers and logs, and in the short distance trade of local passenger/car ferries and tramp service in the domestic and sub-regional coastal shipping.

(2) In the domestic coastal shipping in the Gulf of Thailand, however, common carrier service has become non-competitive with road transport and has not been attractive to shippers for the past several years, because highway systems in the southern provinces have been improved tremendously and trucking transport is now very common to shippers in the trade between Bangkok and the southern provinces, and coastal ports have not been developed to accommodate coastal vessels.

Notwithstanding these changes, a "Free Policy" has been maintained in the domestic coastal shipping by the Government of Thailand and the private sectors have carried out the services at their own risk and account for the exception of BOI's (Board of Investment) incentive in purchasing vessels from abroad. Therefore, comprehensive data needed for making a state shipping policy have not been compiled by the Government of Thailand.

Judging from the current circumstances, the Study Team considers that "Time has come" for the Government of Thailand to take proper actions at the earliest convenience in order to promote the domestic coastal common carrier service between Bangkok and the southern ports upon taking the recommendations and requests from private sectors into consideration.

(3) In the meantime, the situation is quite the same concerning the development of the coastal ports in Thailand. Apart from the development project of deep sea ports at Songkhla and Phuket, a comprehensive development programme has not become a reality regarding the coastal ports in the southern provinces, and every province is demanding the construction of at least one provincial port.

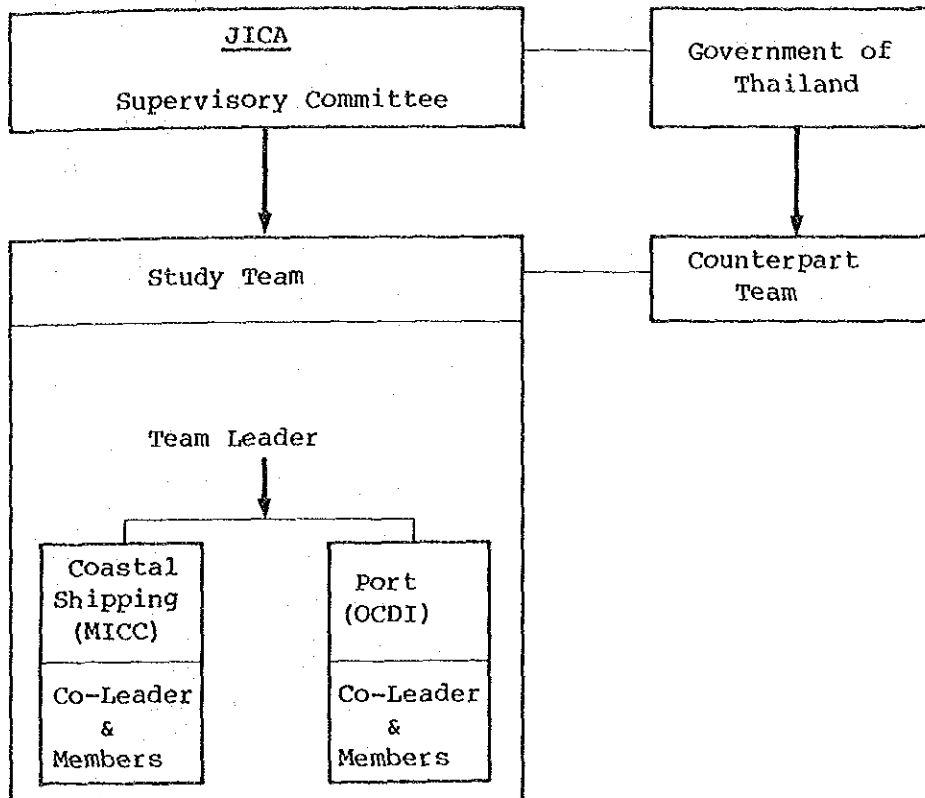
The Study Team can not make it clear which comes first, "Coastal Service" or "Coastal Port", but it can assure it inappropriate to promote a policy of one port in one province in the southern provinces judging from the economic activities in this area. Therefore, based on the cargo demand forecast, the project of the development of the pivotal coastal ports has been recommended in the southern provinces.

1.6 Members and Itinerary

1.6.1 Members

(1) Organization of the Study Team

A chart of the organization of the Study Team is shown below.



(2) Members of the Supervisory Committee

Name	Assignment	Position
Mr. Kooichi Yoshida	Chairman	Director Coastal Shipping Division Cargo Transport and Distribution Bureau Ministry of Transport (MOT)
Mr. Norio Mitsuya	Maritime Planning	Deputy Director Maritime Passenger Transport Division Regional Transport Bureau MOT
Mr. Heizo Kito	Port Planning	Deputy Director Planning Division Ports and Harbour Bureau MOT
Mr. Ikuo Nakazaki	Ship Design	Ship Inspector Inspection & Measurement Div. Maritime Technology and Safety Bureau MOT
Mr. Akira Murata	JICA	Deputy Head 1st Development Survey Division Social Development Cooperation Department JICA
Mr. Takao Kaibara	JICA	1st Development Survey Division Social Development Cooperation Department JICA

Note: Mr. K. Yoshida took over the Chairmanship of Mr. Katsuji Doi on July 1, 1984.

(3) Members of the Study Team

Position	Name	Assignment
Team Leader	Mr. Takashi Miura	Maritime policy (MICC)
Co-Leader	Mr. Kinji Nakazawa	Maritime Transport (MICC)
Maritime Economist	Mr. Koozoo Tanabe	Shipping Management and Financial Analysis (MICC)
Maritime Economist	Mr. Shuichi Wakayama	Maritime Demand Forecast (MICC)
Captain	Capt. Takeshi Mizuno	Navigation and Inland Waterways (MICC)
Naval Architect	Mr. Zenichi Ito	Ship Design and Pricing (MICC)
Co-Leader	Dr. Kazuo Kudo	Port Development Planning and Administration (OCDI)
Senior Port Engineer	Mr. Masataka Nagano	Port Development Planning and Financial Analysis (OCDI)
Senior Port Engineer	Mr. Masayuki Fujiki	Port Demand Forecast and Economic Analysis (OCDI)
Senior Port Engineer	Mr. Yukio Toyama	Port Structure Design, Construction and Cost Estimation (OCDI)
Transport Economist	Mr. Eiichi Matsuura	Economic Analysis (OCDI)

This report was compiled by the joint work of MICC and OCDI with the major assignment for MICC-chapters 3, 5, 6 and 8 and OCDI-chapters 4, 7, 9 and 10.

(4) Members of the Counterpart of the Government of Thailand

Name	Position
1. M.L. Jeongjan Kambhu	Permanent Secretary, Ministry of Communications (MOC)
2. Dr. Chitti Wacharasindhu	Deputy Permanent Secretary, MOC
3. Mrs. Krishnee Varanusupakul	Director, Transport and Communications Economic Division, MOC
4. Miss Tipsuda Charavejsarn	Transport and Communications Economic Division, MOC
5. Miss Sudanong Charuthus	Transport and Communications Economic Division, MOC
6. Miss Jatuporn Suwanpargpraek	Transport and Communications Economic Division, MOC
7. Miss Ladda Honghern	Transport and Communications Economic Division, MOC
8. Mrs. Amporn Chitranukroh	Transport and Communications Economic Division, MOC
9. Mrs. Pawasut Chunganuwat	Transport and Communications Economic Division, MOC
10. Mr. Preecha Chusub	Transport and Communications Economic Division, MOC
11. Mr. Suthat Pornputapong	Transport and Communications Economic Division, MOC
12. Miss Kalaya Srichaiya	Transport and Communications Economic Division, MOC
13. Miss Sumalee Muangphaisarn	Transport and Communications Economic Division, MOC
14. Miss Ladda Honghern	Transport and Communications Economic Division, MOC
15. Mr. Kovit Kuvanonda	Director, Planning Division, MOC
16. Mr. Kamrob Warachat	Planning Division, MOC
17. Miss Ampai Charoenpol	Planning Division, MOC
18. Mrs. Chusri Klincharoen	Planning Division, MOC
19. Miss Anong Sethanaunt	Planning Division, MOC
20. Miss Kannikar Pongthani	Planning Division, MOC
21. Mr. Winai Yoo-Sabai	Planning Division, MOC

Other members of Government of Thailand concerned, who have extended close cooperation to the Study Team, are listed in Appendix 1.

1.6.2 Itinerary

(1) Itinerary of the Study Team in Thailand

1ST TRIP: From Aug. 1st to Oct. 14th, 1983

Date	Itinerary/Activities
Aug. 1	Tokyo - Bangkok
Aug. 2	Courtesy visit to the Government of Thailand (DTEC), Embassy of Japan and JICA Bangkok Office
Aug. 3	Courtesy visit to the Government of Thailand (MOC) and explanation on Inception Report
Aug. 4	Collection of data and field survey
Aug. 5	Meeting with the Counterpart
Aug. 6 ~ 8	Collection of data and field survey
Aug. 9	Meeting with the Counterpart
Aug. 10	Khlong Toey New Port, Observation of port area by boats
Aug. 11	Visit to RTN Dockyard and Bangkok Dockyard Co., Ltd.
Aug. 12 ~ 14	Collection of data and field survey

(Field surveys in Southern Thailand from Aug. 15 to Aug. 28)

Aug. 15	Bangkok - Songkhla
Aug. 16	Songkhla
Aug. 17	Songkhla
Aug. 18	Songkhla - Pattani
Aug. 19	Pattani - Narathiwat - Hatyai
Aug. 20	Hatyai - Nakhon Si Thammarat
Aug. 21	Nakhon Si Thammarat (Pak Phanang)
Aug. 22	Nakhon Si Thammarat - Tha Sala - Sichon - Khanom - Surat Thani
Aug. 23	Surat Thani (Bandon, Tha Thong)
Aug. 24	(A. Team) Surat Thani (B. Team) Surat Thani-Ko Samui
Aug. 25	(A. Team) Surat Thani-Phuket (B. Team) Ko Samui-Surat Thani
Aug. 26	(A. Team) Phuket (B. Team) Surat Thani
Aug. 27	(A. Team) Phuket-Bangkok (B. Team) Surat Thani-Phuket
Aug. 28	(B. Team) Phuket-Bangkok

Aug. 29 Collection and Analysis of data
 Sep. 5 Discussion with the Counterpart, etc.
 Sep. 6~10 Field surveys along the Chao Phraya River covering those area, Bang Pa In, Ayuttaya, Sing Buri, Nakhon Sawan and Phichit and Eastern Seaboard area covering Laem Chabang, Sri Racha, Sattahip and Rayong.
 Sep. 11~29 Collection of data in Bangkok area, Analysis of data
 Sep. 30~ A. Team: Collection and Analysis of data
 Oct. 3 B. Team: Field survey of Andaman Sea Side Ports
 Sep. 30: Bangkok - Prachuap Khiri Khan - Chumphon
 Oct. 1 : Chumphon - Ranong - Phuket
 Oct. 2 : Phuket - Krabi - Trang - Kantang -
 Hat Yai
 Oct. 3 : Hat Yai - Bangkok
 Oct. 4~9 Collection and Analysis of data
 Oct. 10~11 Discussion with the Counterpart on Progress Report
 Oct. 12 Meeting with the Counterpart on Progress Report
 Oct. 13 Courtesy visit to the Government of Thailand (MOC, DTEC), Embassy of Japan and JICA Bangkok Office
 Oct. 14 Bangkok - Tokyo
2ND TRIP: From Feb. 13th 1984 to Mar. 3rd 1984
 Feb. 13 Tokyo - Bangkok
 Feb. 14 Courtesy visit to the Government of Thailand (MOC), Embassy of Japan and JICA Bangkok Office
 Discussion with the Counterpart on Interim Report
 Feb. 15 Explanation Interim Report to the Counterpart
 Feb. 16~23 Collection of supplemental data Analysis of data and Field surveys in Bangkok
 Feb. 24 Discussion with the Counterpart on Interim Report and Meeting with MMPC on Interim Report
 Feb. 25~29 Collection of supplemental data and Analysis of data
 Mar. 1 Rediscussion with MMPC for Interim Report
 Mar. 2 Courtesy visit to the Government of Thailand (MOC), Embassy of Japan and JICA Bangkok Office.
 Mar. 3 Bangkok - Tokyo

3RD TRIP: From Aug. 13th to Aug. 29th, 1984.

Aug. 13 Tokyo - Bangkok (Advance Party)

Aug. 14 Courtesy visit to the Government of Thailand (MOC),
Embassy of Japan and JICA Bangkok Office

Aug. 15 Preliminary meeting at MOC
Explanation on Draft Final Report to the Counterpart

Aug. 16 ~ 19 Discussion with the Counterpart on Draft Final Report

Aug. 20 Tokyo - Bangkok (Main Party)

Aug. 21 Courtesy visit to MOC, Embassy of Japan and JICA Bangkok
Office

Aug. 22 Meeting by the JICA Study Team

Aug. 23 Thai/Japanese Joint Meeting at MOC

Aug. 24 ~ 26 Explanation on data of Draft Final Report

Aug. 27 Signature of Minutes of Meeting

Aug. 28 Courtesy visit to MOC

Aug. 29 Bangkok - Tokyo

Following Government Agencies, Private companies and sites were visited by the Study Team for interview and/or data collection.

BANGKOK

1. Ministry of Communications (MOC)
 - Transport and Communications Economic Division (TCED)
 - Habour Department (HD)
 - Port Authority of Thailand (PAT)
 - State Railways of Thailand
 - Department of Highways (DH)
 - Department of Land Transports (DLT)
 - Office of Mercantile Marine Promotion Commission (MMPC)
 - Merchant Marine Training Center (MMTC)
 - National Statistic Office
2. National Economic and Social Development Board (NESDB)

3. Ministry of Finance (MOF)
Custom Department
Revenue Department
4. Office of the Board of Investment (BOI)
5. Cold Storage Organization
6. Thai Royal Navy Dockyard
7. Royal Thai Survey Department
8. Department of Technical Economic Cooperation (DTEC)

Bangkok Dockyard

Bangkok Chamber of Commerce of Japan

Captain Co., Ltd.

Crown Line Co., Ltd.

Harinsuit Transport Co., Ltd.

Ital-Thai Marine Limited

Japanese Chamber of Commerce, Bangkok

Kallawis Auto Parts Industry Co., Ltd.

Leam Thong Sahakarn Co.

Narai Transport Co., Ltd. (U.N. Sahakarn Co., Ltd.)

Shell Company

Sant Thai Navigation (1977) Co., Ltd.

Thai Central Chemical Co., Ltd.

Thai Shipowner's Association

Thai Maritime Navigation Co., Ltd.

The Siam Cement Co., Ltd.

Thai Bulk Service Co., Ltd.

Thai Bridgestone Co., Ltd.

NARATHIWAT

Governor Office

Custom Office

State Railway (Tamyongmat Railway Station)

Teck Bee Hang Co., Ltd.

PHUKET

Governor Office

Custom Office, Phuket

Department of Highways, Field District Office

Chinteik Brother Co., Ltd. (Rubber Co.)

South Thailand Shipping Service Co., Ltd.

Teck Bee Hang Co., Ltd.

Thai Oil Palm Industry Estado Co.,

THAISARCO

United Rubber Co., Ltd.

SURAT THANI

Governor Office

Custom Office, Bandon

Dept. of Land Transport

Department of Highways, Mechanical & Construction Center

Thathong Port Office

Custom office, Ko Samui

Cho Vanakit Co., Ltd. (Shipping Co.)

Pan Asia (1981) Co., Ltd.

Surat Thani Fishmeal Co.,

Nam Sarat Co., (Trucking Co.,)

Surat Sahasin Co., Ltd.

United Surat Rubber Co., Ltd.

NAKHON SI THAMMARAT

Governor Office

Custom Office, Pak Phanang

Department of Highways, Field Division Office

Cold Stowage Warehouse Co., Pak Phanang

Saui-Khanon Ferry Co., Ltd.

Sumpan Mines Co., Ltd. Khanom (Gypsun)

SONGKHLA

Governor Office

Custom Office, Songkhla

Department of Highways, Mechanical & Construction Center

Harbour Dept. Songkhla Dredging Center

Mineral Resource Office, Zone 1

Rubber Research Center, Economic Div.

State Railway

Harinsuit Transport Co., Ltd.

Prateep Sealand Construction Co., Ltd. (Shipping Agents)

Teck Bee Hang Co., Ltd. (Rubber)

PATTANI

Governor Office

Custom Office

Huay Chun Rubber Industry Co., Ltd.

Niyon & Son Ltd., Co.

Tanibay Limited Partnership, Pattani

INLAND WATERWAYS AREA

Dept. of Agriculture, Phitsanulok Project

Office of Phitsanulok Dam

Site of Nakhon Sawan Port

Site of Taphan Hin Port

Agriculture Distribution Center

Italthai Development Co., Ltd.

Laemthong Agri-product Co., Ltd.

EASTERN SEABOARD DEVELOPMENT AREA

Sattahip Commercial Port, P.A.T

Site of Rayong Port

Site of Laem Chabang Port

Mah Boon Krong Drying and Silo Co., Ltd.

ANDAMAN SEA SIDE AREA

Custom Office, Ranong

CHAPTER 2 GENERAL BACKGROUND

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2.1 Natural Conditions

This section presents an outline of the physical conditions in the Southern Region, particularly the Malay Peninsular East Coast on the Gulf of Thailand where the plan for the development of coastal shipping is being considered.

(1) Topography

The Gulf of Thailand is very shallow, its average depth 30 km from the shore line being less than 20 m. Even in the center of the Gulf the depth reaches only 80 m.

There are many river mouths along the Malay Peninsular's East Coast, and many transitional sand bars and highly developed sand spits at the river mouths.

The seashore is mostly flat sand beach with shrubbery.

(2) Climate

In the Southern Region, the climatic characteristics are as follows.

Temperature

The annual average temperature is from 26°C to 28°C showing the influence of the adjacent seas.

Rainfall

The annual rainfall is between 1,400 and 2,400 millimeters depending on the north-east and south-west monsoon.

Humidity

The mean relative humidity is more than 80 percent due to the surrounding seas and year round rainfall.

Monsoon

The predominant directions and average wind speeds are as follows.

Table 2.1-1 Prevailing Wind and Wind Speed

Month	Wind direction	Wind speed (Knots)	
Nov. ~Jan.	N to NE	mean 3 ~ 7	max. 40 ~ 70
Feb. ~March	E to S	3 ~ 9	30 ~ 50
April	transition	3 ~ 6	40
May ~Sep.	S to W	3 ~ 6	40 ~ 60
Oct.	transition	2 ~ 5	40 ~ 50

(3) Marine Phenomena

Waves

The maximum significant wave heights in the Gulf of Thailand during the NE or SW monsoons are summarized as follows.

Along the exposed coast line in the southern part of the Gulf rough, $H_s = 2 \sim 4.5$ (m)

At the port of Ban Don which is sheltered by groups of islands slight, $H_s =$ around 0.5 (m)

In the upper part of the Gulf including the eastern seaboard moderate to rough, $H_s = 1.25 \sim 3$ (m)

The statistical relationship between the expected maximum individual wave height (H_{max}) and the significant wave height (H_s) is as follows:

$$H_{max}/H_s = 1.53 \sim 1.86 \quad (N = 100 \sim 1,000)$$

In addition, the significant wave period and the wave length, including swells, have been observed as:-

$$T_s = 4.5 \sim 10.5 \text{ (sec.)}$$

$$L_s = 40 \sim 150 \text{ (m)}$$

In spite of the severe conditions mentioned above, the normal wave height corresponding to normal operating circumstances is less than 3 m. According to the wave observation records, the average occurrence of significant wave heights are as follows.

Observation Point A (65 m CD)

Significant Wave Height (m)	0 ~ 0.5	0.6 ~ 1.2	1.3 ~ 1.8	1.9 ~ 2.4	2.5 ~ 3.0	3.1 ~
Percentage	24.8	34.2	22.5	11.7	4.7	2.1

Observation Point B (35 m CD)

Significant Wave Height (m)	0 ~ 0.5	0.6 ~ 1.2	1.3 ~ 1.8	1.9 ~ 2.4	2.5 ~ 3.0	3.1 ~
Percentage	30.0	34.9	20.7	9.8	3.4	1.2

Tides

Tidal conditions in the Southern region are generally as follows:

HWS + 1.0 ~ + 2.5 (m)

MSL + 0.5 ~ + 1.0 (m)

LWS + 0.0 ~ + 0.5 (m)

Currents

Tidal currents in the Gulf have a speed of 0.25 m/s to 0.65 m/s, while the direction changes clockwise.

The maximum current velocity along the shore is in the 2 ~ 3 knots range during the flood and ebb tides.

(4) Geography

As the map shows, the Southern Thailand is located in the centre of the Malay Peninsula which runs southward from Indochina.

Southern's land area is about 70,200 km², ranking third among Thailand's six regions.

Administratively, this region comprises fourteen provinces (Changwat).

It is adjoined by Malaysia in the South and Burma in the north-west. The most prosperous city is Hat Yai in Songkhla Province which is located at the waist of the Malay Peninsula, at 100° 30" east longitude (on a line with Bangkok) and 7° north latitude. The Malay Peninsula which separates the Andaman Sea and the Gulf of Thailand, is a giant isthmus and a very

important part of Thailand. As the southern provinces are located at its narrowest point, such giant projects as the Khla-Canal or the Land Bridge were proposed in the past.

The table below presents the distances between the major southern cities and the major cities in neighboring regions.

Table 2.1-2 Distances between Major Cities (Straight Line Distance)

Unit: km

	Surat Thani	Phuket	Nakhon Si Thammarat	Hat Yai	Narathiwat
Bangkok	520	670	560	700	780
Singapore	920	890	840	690	570
K. Lumpu	640	590	560	410	540
Penang	390	320	320	170	200

Except in the southern provinces distances are too small to consider coastal shipping in Thailand. (The Eastern Seaboard is too short to consider regular coastal shipping.)

(5) Geology

The main geological features of the Malay Peninsular East Coast are:-

The Surat Thani area is part of the Phu Kradun Formation

ie: micaceous shale with some siltstone
or micaceous sandstone

The Khanom area is part of the Ratchaburi Formation

ie: massive limestone interbedded with shale,
sandstone, mudstone and so on

The coastal area from Pak Phanang to Narathiwat was formed by Alluvium, eluvium, valleyfill and river gravels.

The soil conditions in terms of geotechnique and civil engineering are in general:-

Clayey or silty fine to medium sand.

The offshore bottom materials are:-

The same

(6) Earthquakes

The Southern Region is an area of low seismic activity.

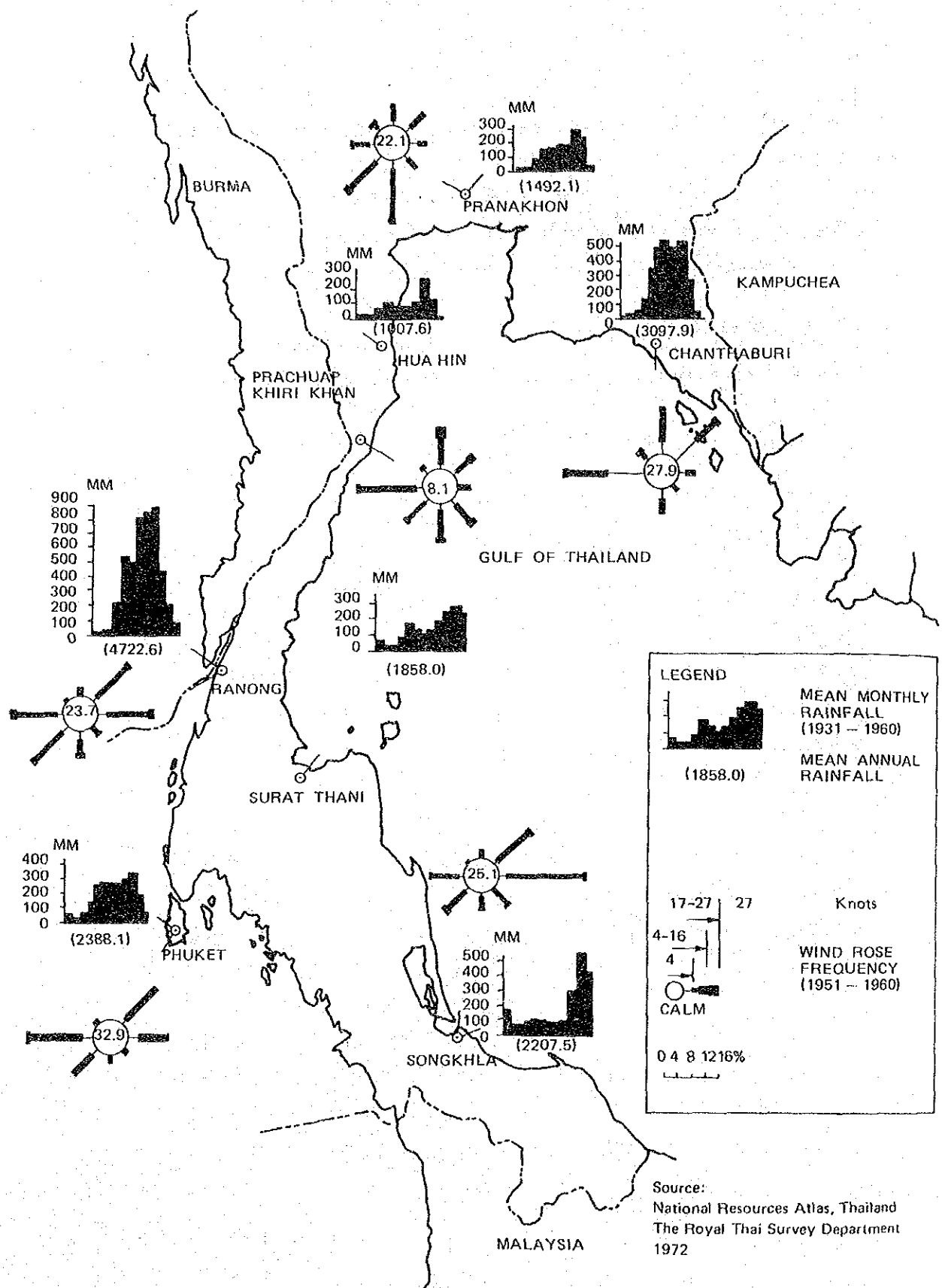


Fig. 2.1-1 Climate Map

2.2 Socio-Economic Indicators

2.2.1 Population

(1) Introduction

In 1981 the Southern Region had a population of 5.93 million which ranks it fourth among the six regions of Thailand. During the last two decades its population continued to amount to 12.4 percent of the national total. However, this population is concentrated along the eastern coast which is mostly flat plains where the transportation network is highly developed.

Nakhon Si Thammarat is the biggest province with a population of 1.28 million, followed by Songkhla, Surat Thani, Pattani and Narathiwat respectively.

The above five provinces account for 62 percent (3.67 million) of the whole region.

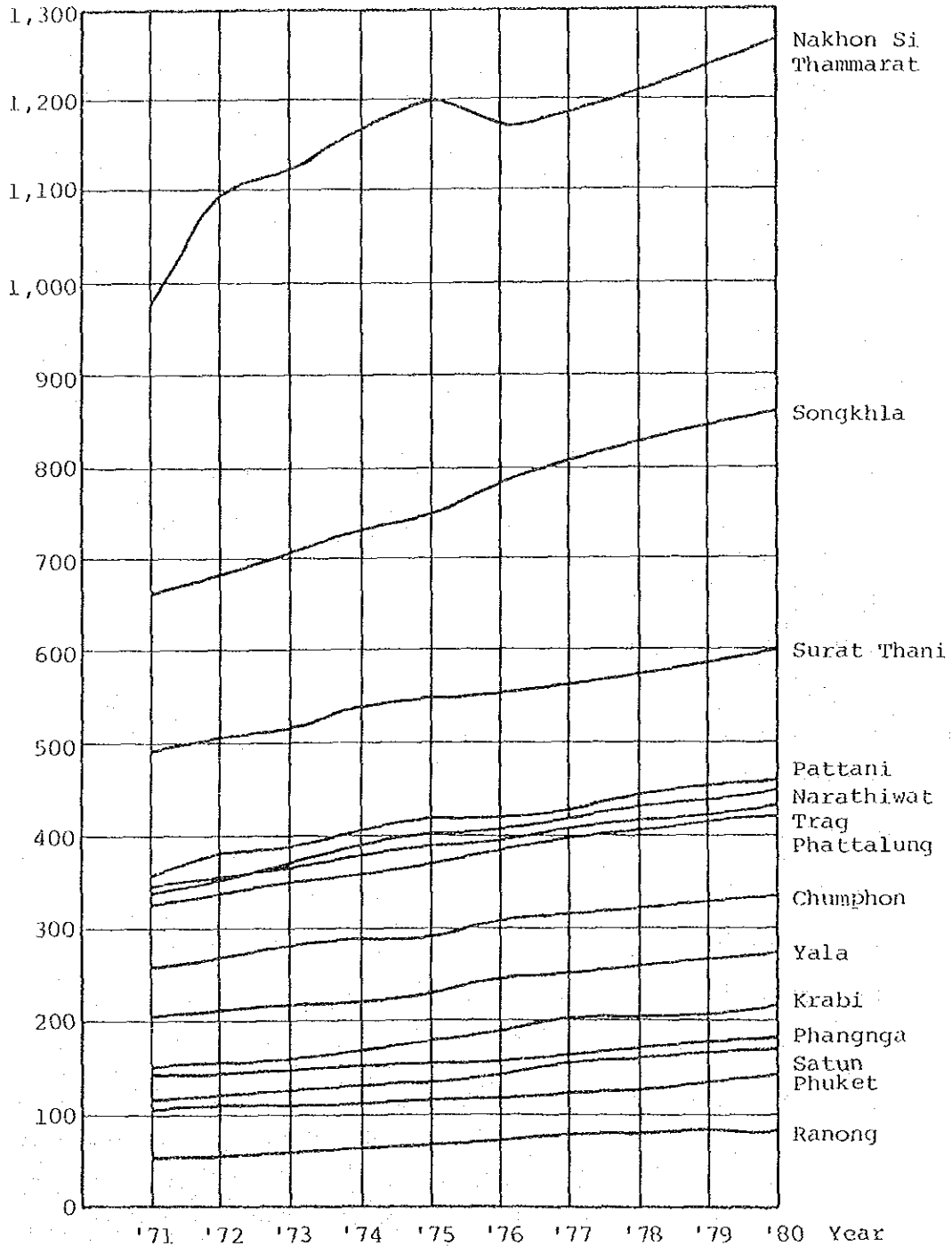
(2) Growth of Population

In looking at the population growth rate during the last decade (1971 ~ 1981) it is worth noting that the growth rate during the second half of this period (1976 ~ 1981) was substantially lower than that of the first half. (See Appendix Table A.2-1 Population by Province)

The reasons assumed for this are:

- 1) The declining birth rate
- 2) The rapid development of transportation facilities during the last five years has led to much migration from rural villages to the more modernized cities like Bangkok.
- 3) The margin of error: The yearly population statistics are not reliable enough to analyze these phenomenon. It is also noted that Surat Thani, Nakhon Si Thammarat and Songkhla which are located on the coast of the Gulf of Thailand have a low population growth rate despite their present large populations. On the contrary, Ranong, Phangnga, Phuket, and Krabi have continued to experience a rapid increase of population. This is because;

Thousand persons



Source: Registration Div., Local Administration
Dep., Ministry of Interior

Fig. 2.2-1 Population of the Southern Provinces

- a) The tin mining on the Andaman Sea in recent years has encouraged immigration. This areas are mountainous and originally all its provinces had small populations. So even though the migration statistics are small, relative to the present population this area has the highest growth in the South.
- b) On the contrary, the eastern coast is largely an agricultural basin where GPP was considerably lower than on the west coast although development was far more advanced. Therefore, people probably migrate to Bangkok and the result is a low population growth rate.

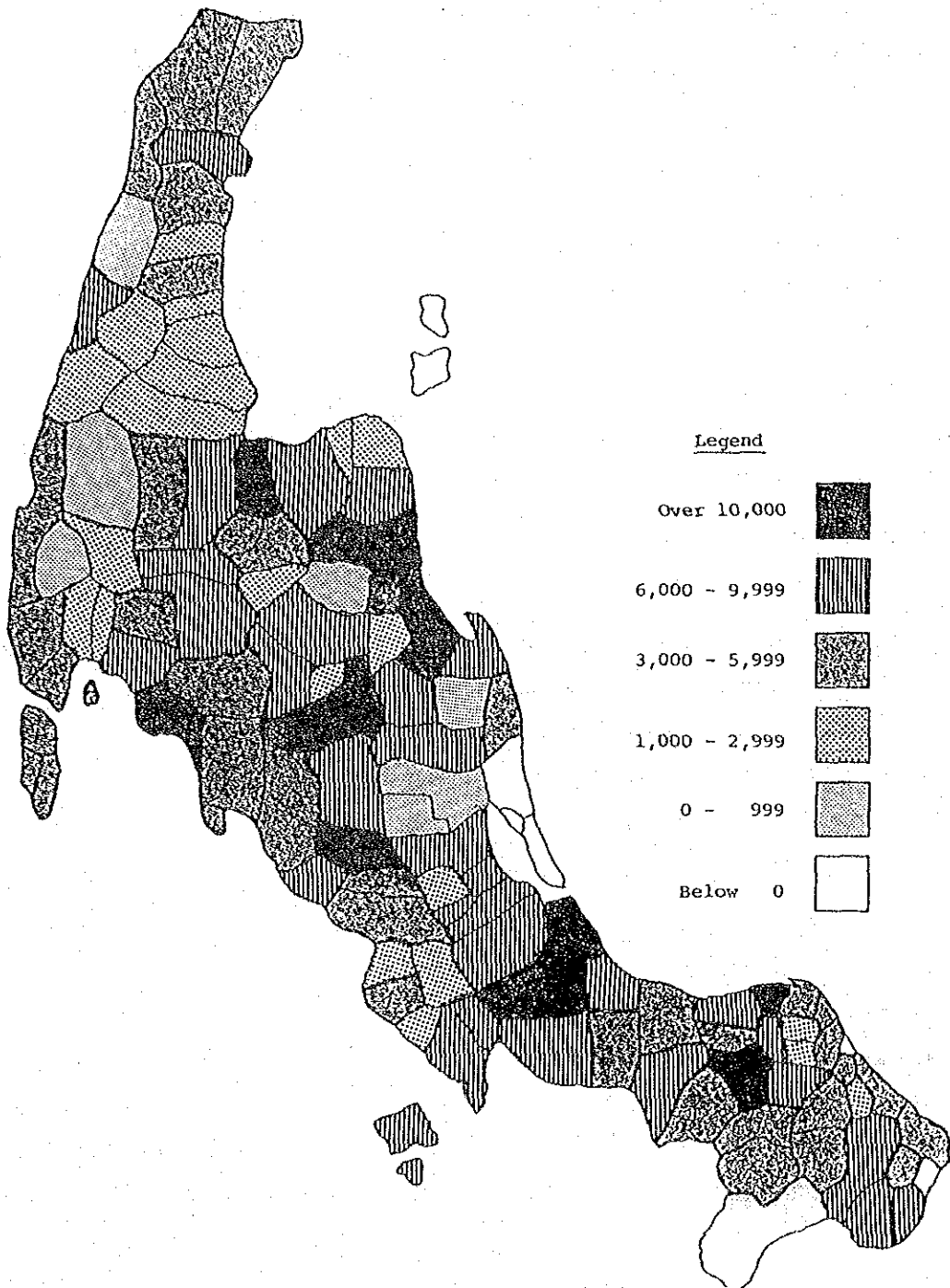
To illustrate the socio-economic background, including the movement of population, the population growth (by Amphoe) during the latest five years (1976 1981) is shown as follows:

Roughly speaking, this figure shows that the increases are primarily concentrated in these zones:

- 1st: Upper south zone: The area encircled with Muang Surat Thani, Muang Nakhon Si Thammarat (including Tha Sala), Thung Son and Muang Krabi (clockwise connection)
- 2nd: Central zone: Muang Songkhla and Hat Yai
- 3rd: Lower south zone: Pattani and Yala

It is evident that people are more likely to settle in Amphoe (District) where there is access to the road network, the upper south zone is at a quick glance seen to lie along Highways 401 and 403.

The central zone is the centre of the Southern Region in all aspects e.g., economy, policy, transport, etc. In the Southern most provinces of Yala and Pattani, the population increase is relatively high. However, this increase may not come from migration but be due to the traditional Muslim way of life that allows polygamy or to the slow spread of family planning.



Source: Our calculation Based on the Data of
the Ministry of Interior

Fig. 2.2-2 Population Increase by Amphoe (1976~ 81)

(3) Population Forecast

Rough estimations of population by province for 1985 and 1990 can be done by interpolating between the present figures and the projected total population. The figures of the forecast are shown in Appendix Table A.2-2 Estimation of Population by Province in 1985 and 1990.

2.2.2 Economic Development

(1) Introduction

The Economy of Thailand has grown rapidly since World War II, particularly during the end of the 1960's supported by the following dominant points;

- 1) According to the Recommendation of the World Bank in 1959, and with the co-operative efforts of advanced countries, and international organizations, the various infrastructures have been consolidated to form a solid base for the nations social structure.
- 2) Thailand's agricultural structure has made a transition from monoculture, depending on rice products, to diversified farming which has incorporated new farm products such as maize, cassava, hemp, sugar cane and rubber. These new farm products have contributed to the obtaining of foreign currency.
- 3) Industrialization has made steady progress following government policy.

The economy of Thailand, although it had been supported by these dominant points, began to decline under the influence of the uncertainties of the international economy such as the fluctuation of foreign currency, the rise of energy prices and the periodic decline of international agricultural market prices.

But now the promise of a new method for development has opened up due to the exploitation of new domestic energy resources discovered in the Gulf of Thailand in and the Central Region.

The new industrial project at Mup Ta Phut now being planned will tap the Natural Gas in the Gulf, to produce chemicals, processed metals, soda ash, and fertilizer, and will create a new industrialized society on the

Eastern Seaboard, helping the development of the national economy even under the present gloomy economical circumstances.

Turning out attention to the Southern Region, its GRP is one-tenth (10.4 %) of the national GNP, and its average growth is (6.7%) higher than that (6.2 %) of the whole kingdom (excluding the Bangkok-Metropolis).

This steady economic growth in the South has been mainly supported by the diverse production of raw materials; tin, rubber, fishery, and wood products. (See Appendix Tables A.2-3 & A.2-4)

The expansion of the road network in the south has shortened the distance between Bangkok and the Southern Region, enabling the farmer, the fisherman, and the woodman in the upper south provinces such as Chumphon, Surat Thani and Nakhon Si Thammarat, to gain easy access to the Bangkok market.

Within a day fruits, vegetables, and fish from the upper south can arrive in Bangkok supplying the Metropolitan demand for fresh food which has in turn spurred the rapid rise of agricultural productivity.

Besides this, the anti-government forces which haunted the boarder regions are losing their position due to the reduction in their support resulting from improved international relationships and to the promotion of policies aiming at boarder land development.

Out of fourteen provinces, the rapidly developing ones are Songkhla, Nakhon Si Thammarat, Surat Thani and Phangnga, which represent almost 50 percent of the South's GRP and Songkhla, located at the center of the transportation network, served by air, road, rail, and shipping, has become the heart of the southern economy.

Nakhon Si Thammarat is the biggest province in the South, the only province out of the fourteen that has a population over one million and the largest agricultural province in the South.

Surat Thani has greatly benefited from the road construction and is making rapid progress due to the greatly improved access to the Bangkok market for its agricultural products.

Phangnga is one of the famous tin mining provinces and is the most rapidly developing province in the South today.

(2) The Fifth National Economic and Social Development Plan

This plan which started on October 1981 is regarded as a policy guideline for more specific executive plannings.

The characteristic aspects of the plan are shown as follows.

It stresses the adjustment of economic structure rather than economic growth. The target of economic growth is set at the considerably lower level of 6.6 percent, below 7 percent which was the lowest target in any of the past three national plans.

It stresses "Equality" in national economic and social development efforts by aiming to disperse income and economic activities to the provincial areas. Thus the industrial sector is to be decentralized into the provincial areas.

At the same time, it also stresses on a more balanced development among production sectors.

The agricultural sector is given a target higher than the usual trend.

Targets for production expansion in the major economic sectors are as follows.

Table 2.2-1 Major Targets of the Fifth Plan

GDP	6.6%
Agriculture	4.5%
Manufacture	7.6%
Mining	16.4%
Reduction of Oil Import	-3.0%

(3) Future Prospects

The economic circumstances in Thailand when the Fifth National Development Plan got underway were not the same as those today. Moving now into an age of lower priced oil, the international market price has almost dropped below 30 \$/B.

In response to this fact, the economics of advanced countries, United States, Japan and West Europe are gradually improving, and looking at these economic circumstances the prospects for the Thai economy are becoming brighter.

Especially in the southern region the outlook is brightening, as the new development plan for the upper-southern area has been included as a main project, following the Eastern Seaboard, in the next National Development Plan.

So the Study Team decided to make two scenarios for this study.

The first, presents a pessimistic scenario, as mentioned in the Fifth Plan.

Second, presents an optimistic scenario as indicated by the events of recent years.

The detail economic frame of the Southern Region by sector is shown in Appendix Table A.2-5.

The outline of scenarios are as follows.

Table 2.2-2 Scenarios for Economic Growth in the South

Year	Scenario 1 (Low Level Estimate)		Scenario 2 (High Level Estimate)	
	1981 ~ 1987	1987 ~ 2000	1981 ~ 1987	1987 ~ 2000
GRP Growth	6.6%	5.0%	7.1%	7.5%
Remarks	The Same Rate as that of the Fifth Plan (Whole Kingdom)	The Lowest Estimation based on the Upper South Study	From Present Trends	The Highest Estimation based on the Upper South Study

2.2.3 Production Section

(1) General

The southern economy has been based on agriculture forestry and mining. At present agriculture and mining contribute 40 percent and 6 percent respectively to the Southern's GRP. Agriculture has traditionally been the major productive sector in Thailand, and its importance in the

South is almost the same as is found anywhere in the country, except for the Bangkok Metropolitan area. However, the mining percentage is twice the national value. The most important products in the South are rubber, timber and fish. And in connection with coastal shipping, these agricultural products and mining and forestry are discussed as follows:

(2) Rubber Production

1) Planting Area

Together with the expansion of the road transport network, rubber cultivation is expanding rapidly in the southern provinces where 91 percent of Thai rubber is produced. (See Appendix Table A.2-6)

In particular Songkhla, Nakhon Si Thammarat, Trang, Yala and Narathiwat are major rubber plantation provinces. These provinces include 65 percent of the total national rubber plantation area.

2) Future Rubber Production

With the introduction of replanting and fertilizer, production has been increasing at the rate of 4.4 percent per year during the last decade (1971-1981).

In 1981, rubber production amounted to about 530 thousand tons, of which 90 percent was exported, including all of the south's production. The international demand for natural rubber has increased at a very low rate in recent years due to the decrease in demand in the industrialized nations. However, Malaysia, the world's largest producer has turned her attention toward palm oil plantations and vegetable oil industries which offer higher returns.

Therefore, there is a slack in the international supply which Thailand is in a good position to make up and the future of rubber production is favourable, in spite of the reduced overall demand. According to some rubber production forecasts, rubber planting areas are presently expanding to the north, and in the near future or at least by the end of this century the percentage of production in the south will likely have declined from 90 percent to 80 percent with the increase of production on Eastern Seaboard.

3) Economic Finding

Being influenced directly by the international market, the price of rubber fluctuates a great deal. The introduction of fertilizer now allows farmers to control production. Today about 10 percent of rubber growers use fertilizer not only for the purpose of getting more rubber but also to cope with the fluctuations of the market price.

On the average today's (1983) rubber price is about 0.5\$ (12B)/kg and farmers can get 180 kg/year/rai. The fluctuation of the price is not a crucial problem in Thailand as yet, since almost all plantations are small and farmers are able to grow another crops such as rice, and coconuts if the market price for rubber is low.

The expansion of the road network and rubber plantations has promoted monetary currency in the South, but the local villages still maintain self-sufficient economies.

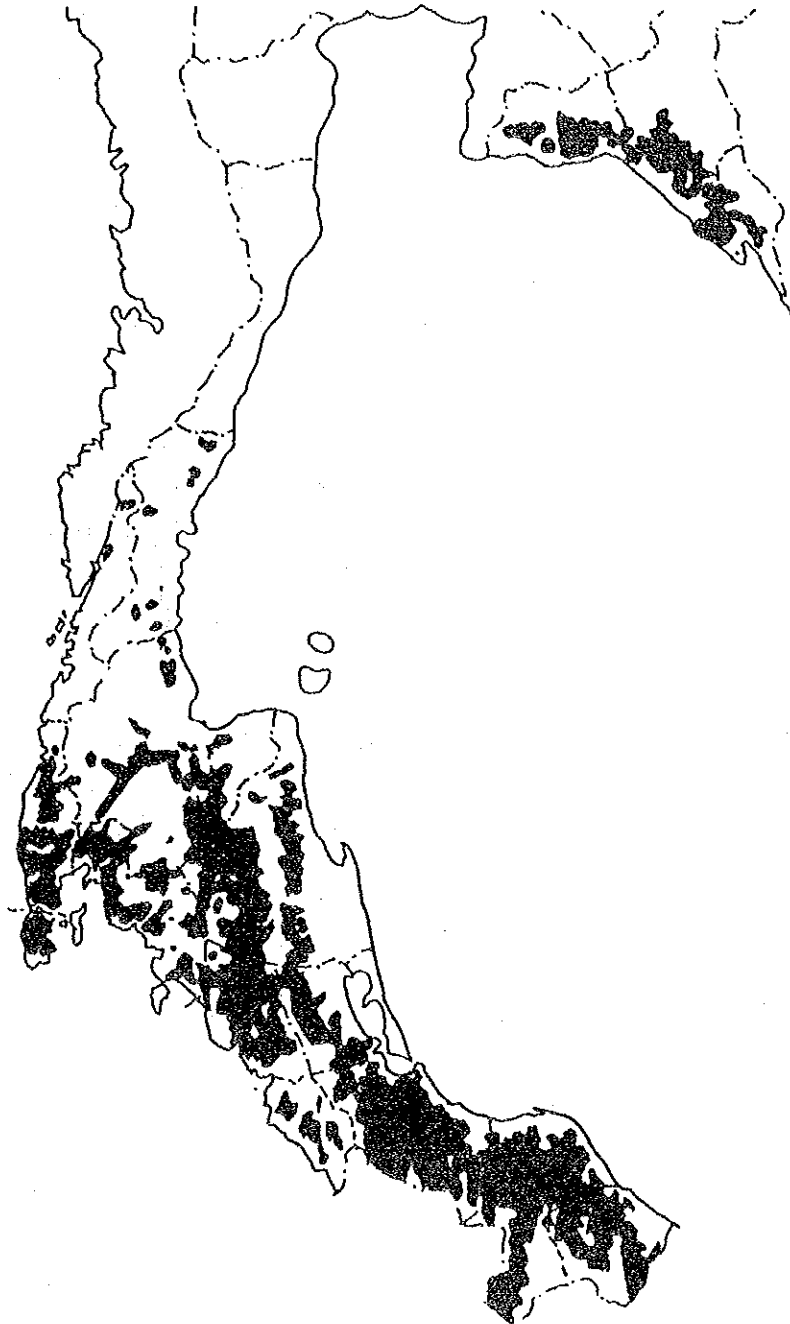
4) Transport Sectors/Rubber

Raw rubber is usually collected by processing/smoking factories which also play the role of exporters. There are about one hundred factories in the south (92% of the Thai total).

Usually rubber export cargoes are carried to the loading port, or other place designated by the customer, at the factories expense and responsibility. So most factories are located conveniently for transportation by road, rail and ship.

The most serious problem they are facing is how to minimize the overall transportation cost from the factory to the appointed place.

Furthermore in the case of C & F contracts (including shipping freight to the foreign port), they have to choose the best route. At present the South sends 70 percent of its exports to Japan, by the following routes: (See Fig. 2.2-5)



Source: Rubber Research Center, Hat Yai

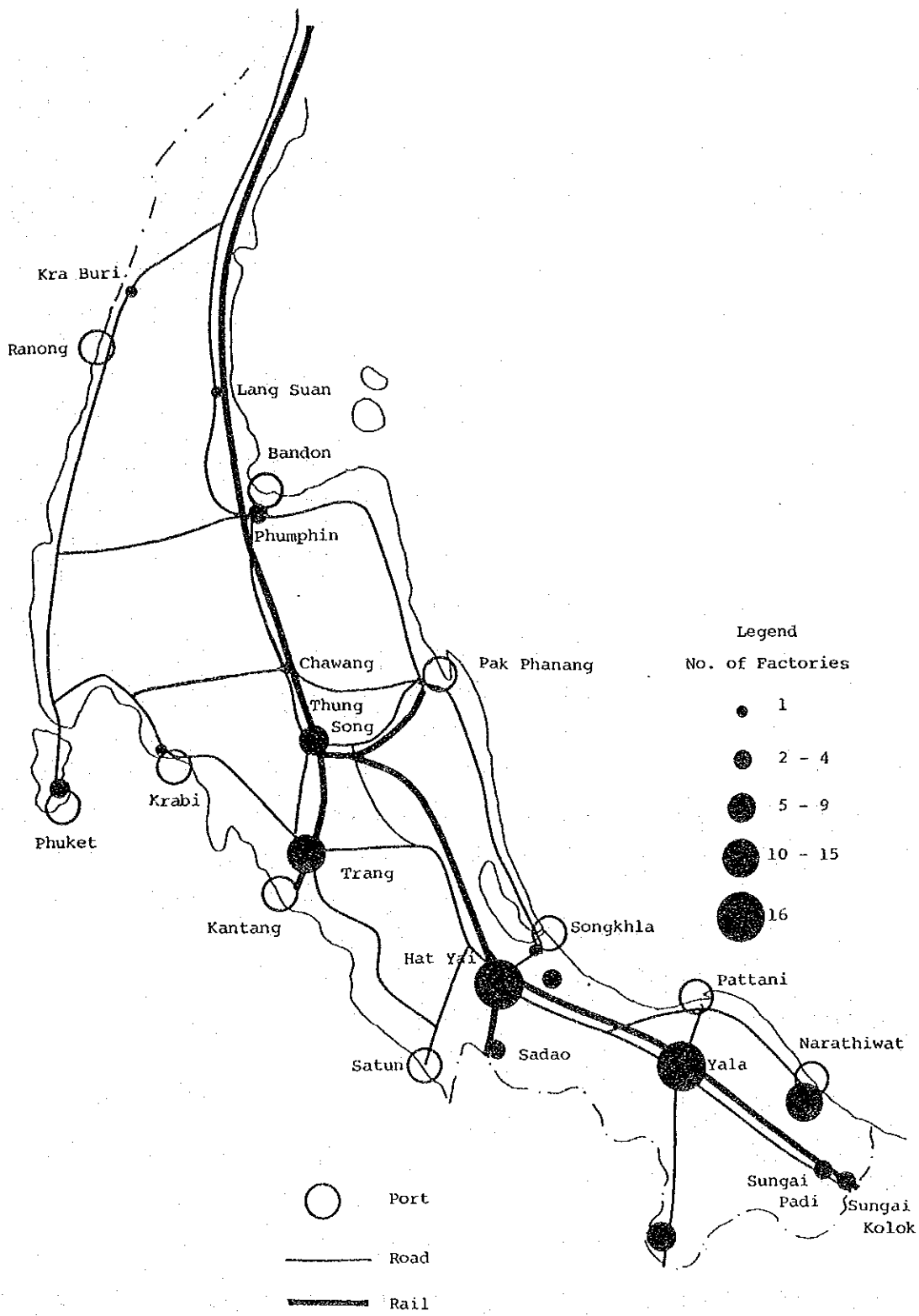
Fig. 2.2-3 Map of Rubber Growing Areas

Table 2.2-3 Forecast of Rubber Productions

Unit : Thousand tons

Source	1981	82	83	84	85	86	90	96	200	Remarks (View Point)
The Target of the Fifth Plan		600	600	700	800	900	-	-	-	Target of Policy
Projections of Rubber Productions (Rubber Research Center)		528	550	595	679	742	1000	-	-	By considering the Growth of Planted Area and Area of re-Planting
	530	688	750	813	907	979	1289	1679	1845	"
Projections of Export and Consumption of Rubber 1986		-	636	724	829	899	-	-	-	Economic Analysis in Normal Situation
		576	600	640	690	752	-	-	-	Economic Analysis of Market Price on Resession

Source: The Fifth National Plan, Rubber Research Center and Rubber Research Institute



Source: Based on the Data of Field Survey
 Fig. 2.2-4 Location of Rubber Processing/Smoking Factories

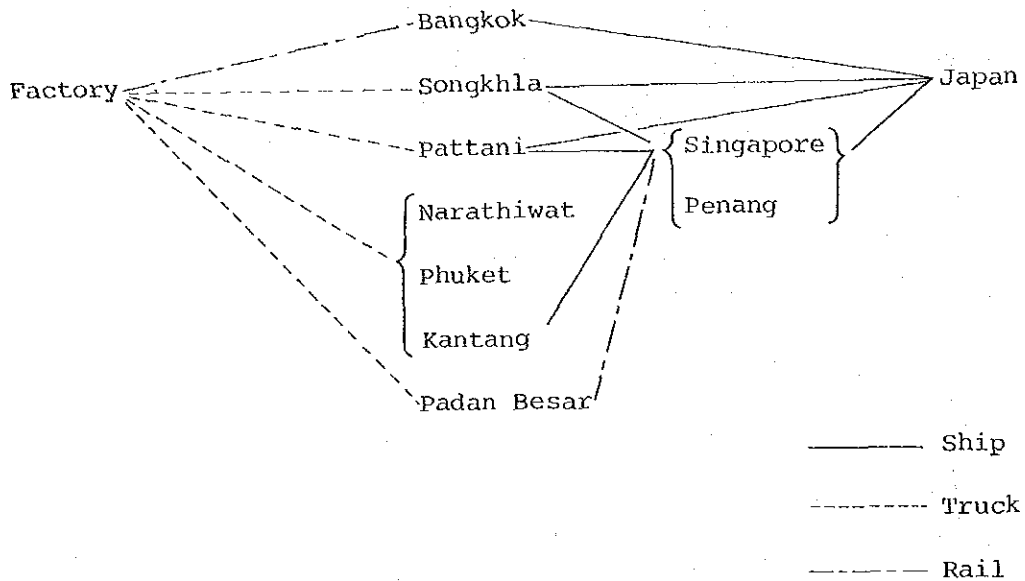


Fig. 2.2-5 Rubber Flow

So far as studied, the factories in upper south send almost all their goods to Bangkok by train. On the other hand, in the South, there being many ports and a well located border station, they can choose their own optimum route. That rubber goods are sent to Singapore or Penang through the border station requiring expensive transshipment can be explained by the fact that shipping freight and port charges in Thailand are fairly expensive in comparison with those in Singapore and Penang.

But now with the opening of the regular containershipping service "JBCC" between Japan and Bangkok, many shippers are sustaining their loading port from the south to Bangkok.

5) The Future Prospects for Rubber Transport

As mentioned before, in the future, rubber production will surely go up. With respect to future cargo flow, the following points can be made;

- i) By the end of the 1980's, deep sea ports will be in operation at Songkhla and Phuket, so these ports will be designated as the conferences' calling ports.
- ii) Rubber cargoes will generally be shipped through Songkhla and Phuket. But as in the last decade there was no drastic change in the division of the total flow between the Gulf of Siam side and the Andaman Sea side, no drastic change is likely occur in the future.
- iii) The percentage of products loaded at Bangkok will increase with the expansion of the plantations on the Eastern Seaboard.
- iv) The cargo volumes going down to Singapore or Penang depend on the shipping freight at Songkhla Port.
- v) Feeder services may be considered from Narathiwat, Pattani and some other ports located on the western coast.

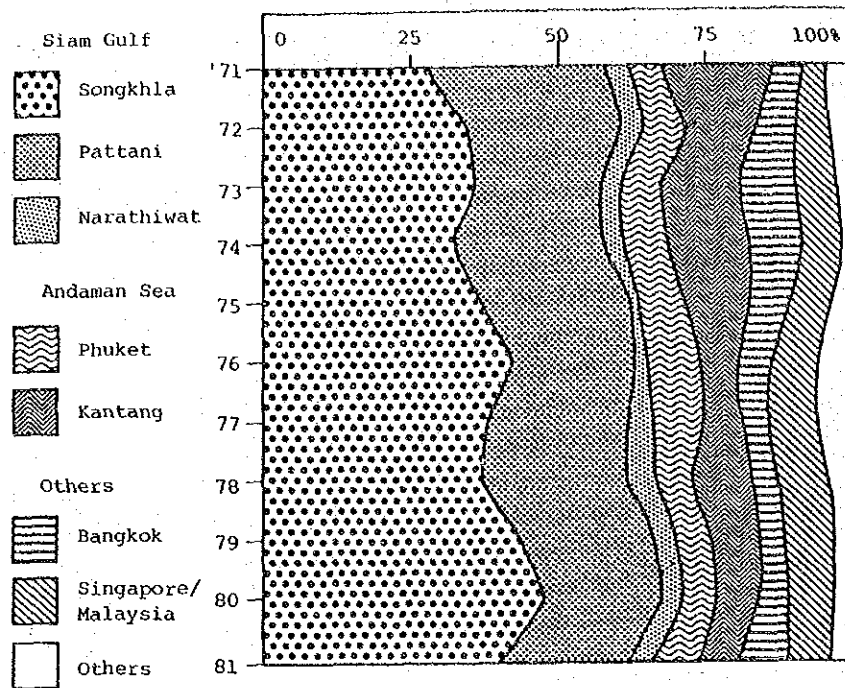


Fig. 2.2-6 Loading Port Trends

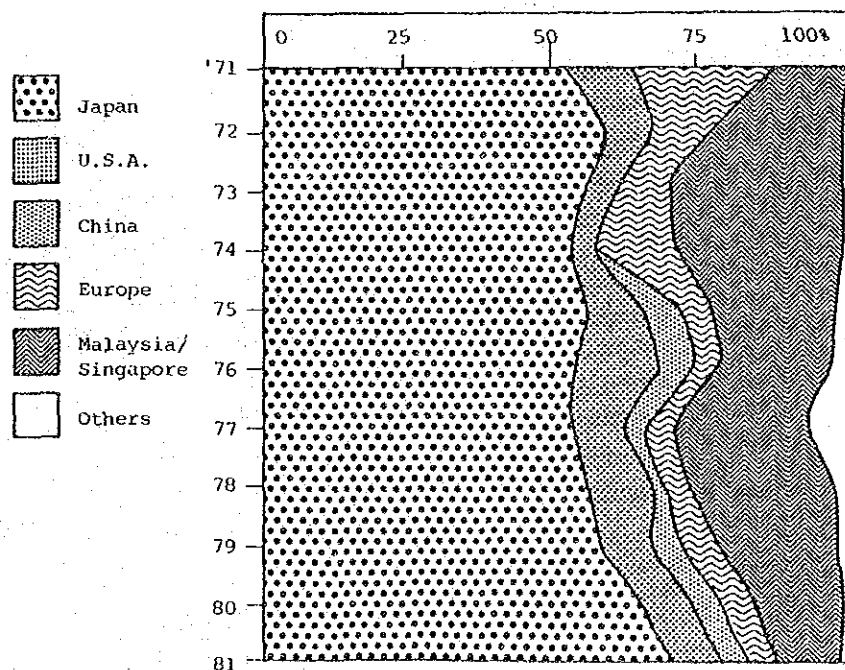


Fig. 2.2-7 Countries Importing from Thailand

(3) Fishery Products

1) General

Fishing activities have greatly contributed to the regional economy of the South. At present, the South's fishery sector occupies 7 percent of the GRP, and a rapidly increasing 52 percent of the national fish landings (1980). This is not due to the growth of fish landing in the South but to the fact that the national landings are rapidly going down due to the resource depletion and the rise in fuel prices for the fishing boats.

The annual catches of marine fish are given in Figure 2.2-8.

2) The Future Prospects for the Fishery Industry

With the expansion of the road network, bringing the market in Bangkok closer, fishery factories are steadily increasing year by year. At present 52 percent of the fish meal factories and 56 percent of the ice plants are located in the South. (See Appendix Table A.2-7) According to the "Coastal Port Study" (Maunsell Consultant Ltd.), estimates of future changes in fish landings in the Gulf of Thailand and on Andaman Sea coast are given as follows:

Table 2.2-4 Future Changes in Fish Landings

Unit: Thousand tons

	1977 landings	Potential yield
Siam Gulf	1,016 ~ 1,068	1,220
Andaman Sea	226 ~ 231	260

This data shows that an increase in landings is hopeless without considering regulation of fishing method and finding more distant fishing grounds. This report also says that a further increase (on the order of 30 ~ 50 thousand tonnes per year) is expected in landings from more distant fishing grounds principally Brunei/Sarawak and the Bay of Bengal. This is equal to 2 ~ 3 percent of the national catch. But the expansion of fishing grounds will give an important role to the southern

fishery ports which have the advantage of the best geographical location. This will make the southern fishery industry flourish, and so when forecasting transport to Bangkok we prepared two separate scenarios.

Scenario - 1 Lower estimate

Cargo flows from the South to Bangkok are estimated to increase at an average 2 percent per year considering resource limitations.

Scenario - 2 Higher estimate

This estimate is that the growth rate will be the same as that of fishmeal production. The trends of fishmeal production are shown in Appendix Table A.2-8, and the relation between the products and transport is shown in Fig. 2.2-9.

(4) Forestry Products

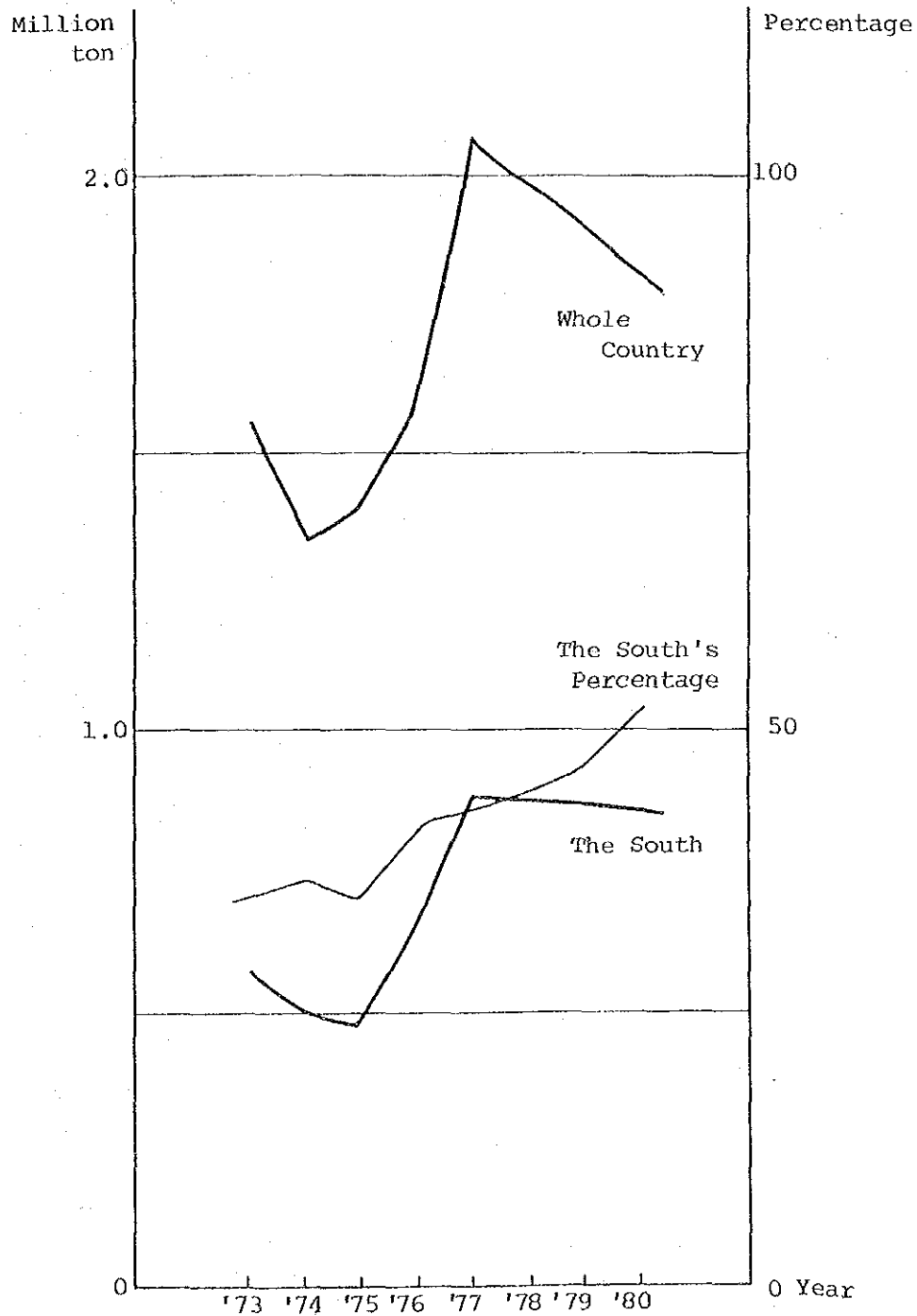
1) Forestry Products in Thailand

According to the survey by the forest Department, forests in Thailand made up 34 percent of the Kingdom in 1978, 175 million ha. In 1973, they were 43 percent of the Kingdom so the forested area has gone down rapidly.

It seems that in these five years almost 50 percent of the forests disappeared.

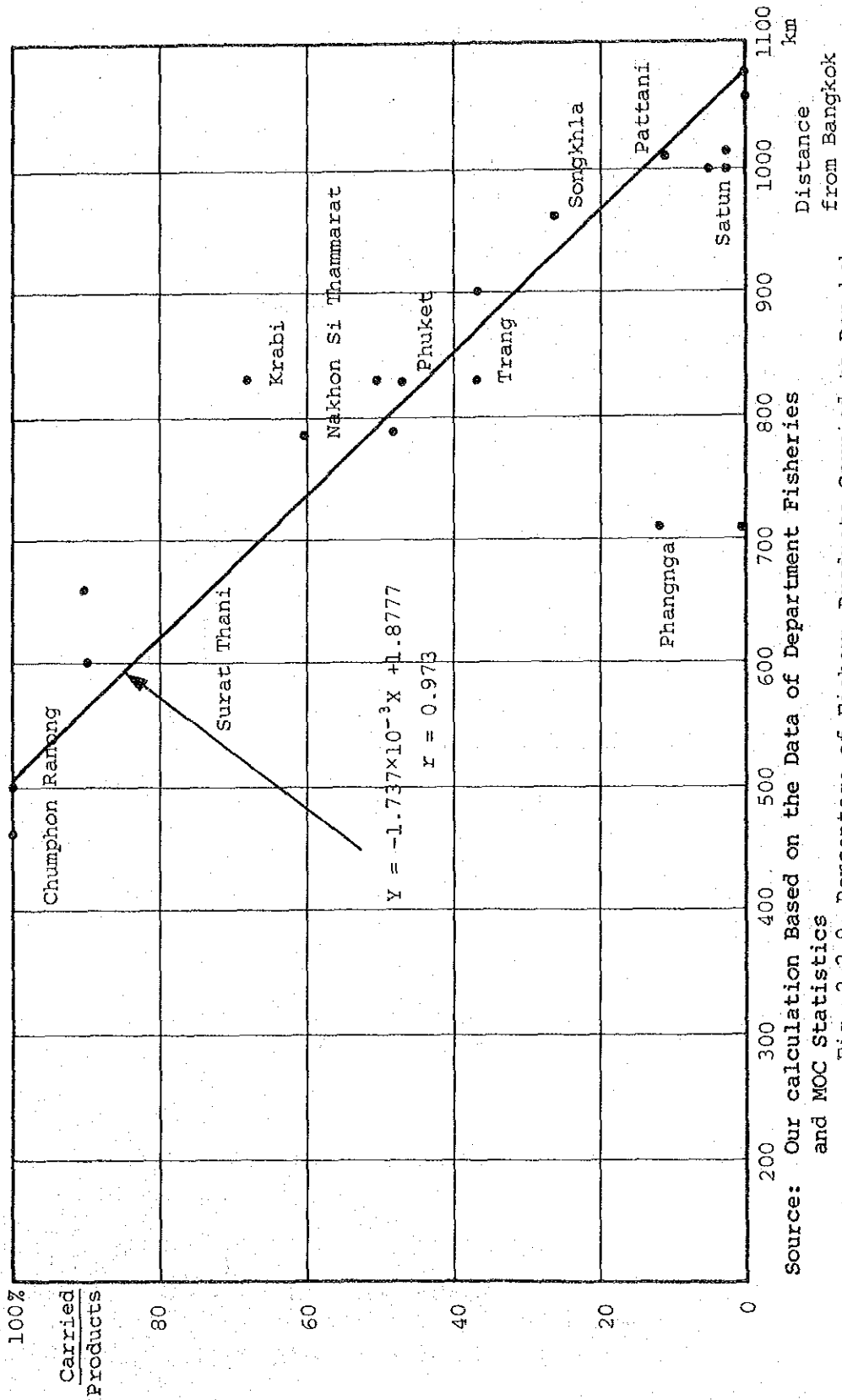
This was caused by:

- i) The expansion of the road network which promoted the development of agriculture in rural areas.
- ii) Due to the growth of the population the demand for fuel wood has increased.
- iii) The investment for replanting was very low.
- iv) Forest areas are mainly located along the borders with Burma and Laos, so the authorities' directives to preserve the forest are not heeded.



Source: Department of Fisheries, Ministry of Agriculture and Cooperative

Fig. 2.2-8 Annual Catch of Marine Fish



Source: Our calculation Based on the Data of Department Fisheries and MOC Statistics

Fig. 2.2-9 Percentage of Fishery Products Carried to Bangkok

At present, Thailand has become a wood-importing country in both value and quantity.

According to the Fifth National Economic and Social Development Plan, they planned replanting of three hundred thousand rai and a preserved forest of forty million rai for water resources.

Thus with this policy, the government has a target to preserve forty percent of the Kingdom's forests.

So far as the South is concerned, forestry products used for construction and fuel are mainly produced in the upper south provinces facing the border with Burma.

The statistical data for forestry products in the South is shown in Appendix Table A.2-9 and the relation between the products and transport is shown in Fig. 2.2-10 and Appendix Table A.2-10.

2) The Future forecasting of transport

The rate of growth is defined as follows, because of the restriction of wood resources.

a) High estimate

In this case, the demand for fuel wood is diminished by the diffusion of petroleum.

The growth rate in future is fixed at 0.

b) Low estimate

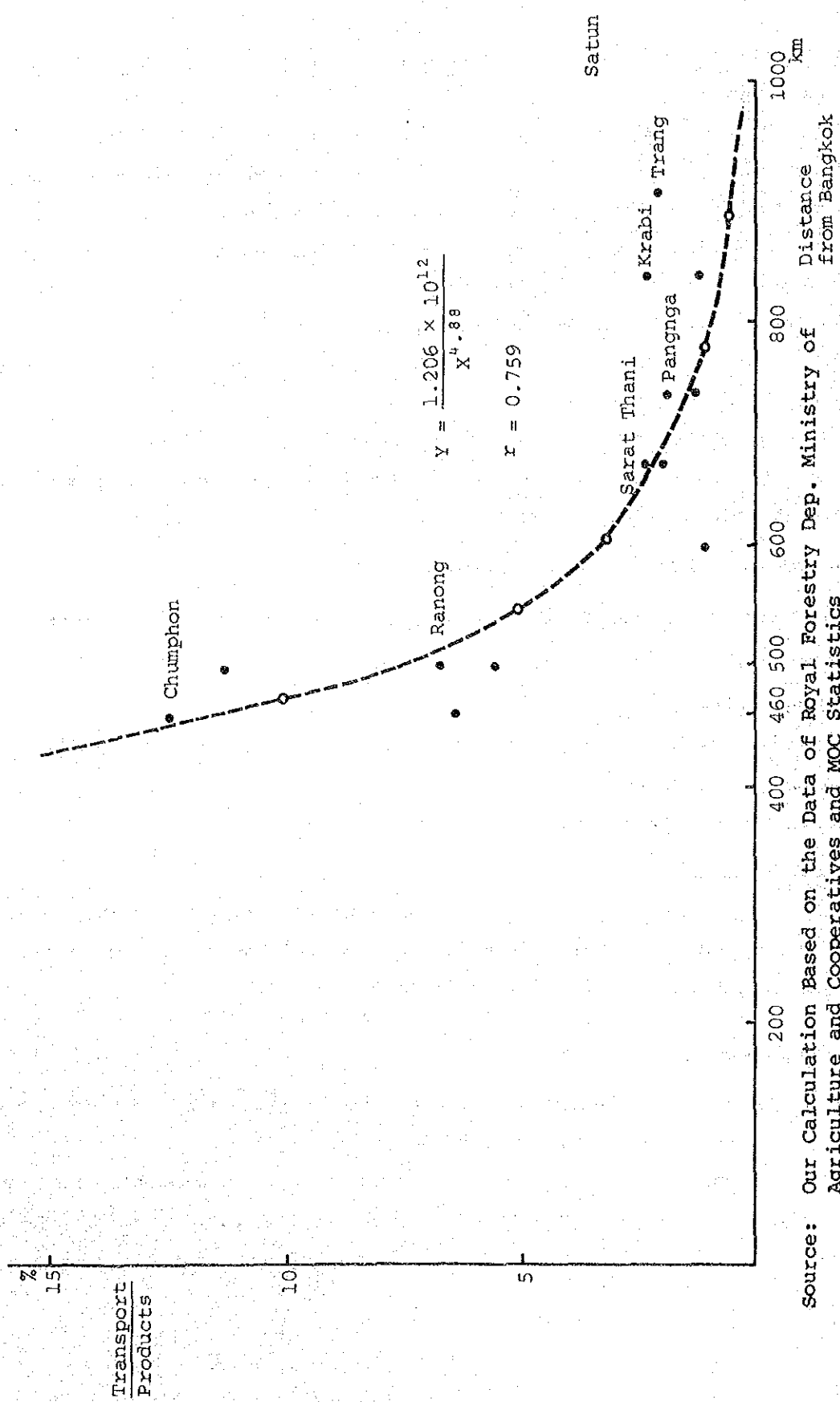
This case the conservation of petroleum will go on, so the demand for fuel wood will be increasing instead of that for petroleum.

The growth rate is fixed at 2 percent.

(5) Mining Products

The production of mineral resources, tin in particular, has greatly contributed to the regional economy of the South.

In the South, in addition to tin, many kinds of minerals such as tungsten, wolfram, lignite, tantalum, barite, gypsum, and limestone have been mined.



Source: Our Calculation Based on the Data of Royal Forestry Dep. Ministry of Agriculture and Cooperatives and MOC Statistics

Fig. 2.2-10 Relation between Transport and Forestry Products

From the view point of transportation, among the many minerals few are considered as suitable bulk cargo for coastal shipping. The minerals mined in each province in the last few years are shown in Appendix Table A.2-11.

Tin Ore: 4 or 5 thousand tons of tin ore is mined in the south every year and carried by truck to Phuket where a smelting factory is located.

Limestone and Shale: 0.61 or 1.0 million tons of these resources have been mined yearly in Nakhon Si Thammarat. These materials are used by a cement factory located in Amphoe Thung Song, Nakhon Si Thammarat. All are carried by truck and the cement products are consumed in the south or exported to Malaysia.

Barite: Barite is exported from Khanom.

Gypsum: There are four gypsum mining companies, a big one located in Amphoe Don Sak, Surat Thani and three small companies located in Amphoe Tung Yai, Nakhon Si Thammarat. The company at Don Sak trucks gypsum to Khanom port where it has a private wharf. The three other small companies have no port facilities of their own, so when they have to export, they use the above port facility.

Most of these resources (except gypsum) are carried by truck within the Southern Region.

In conclusion no mineral cargoes can be considered for coastal shipping.

CHAPTER 3 REVIEW OF TRANSPORT SECTORS

CHAPTER 3 REVIEW OF TRANSPORT SECTORS

3.1 Overall Review of Cargo Flow

The following tables show domestic cargo movements carried in 1978 and 1981 by each mode of transport, road, rail, shipping, inland water and air with ton kilometers.

1978

(F/T: Thousand ton T/K: Million T/K)

	Freight Ton (%)	Ton Kilometers
Road	46,163 (70)	14,157
Rail	5,905 (9)	2,628
Shipping	988 (2)	NA
Inland Water (1977)	12,333 (19)	1,809
Air	2 (0)	NA
Total	65,391 (100)	NA

1981

Road	NA	NA
Rail	5,758	2,490
Shipping	965	NA
Inland Water	NA	NA
Air	2	NA
Total	NA	NA

Source: MOC Statistics NA: Not available

Coastal shipping accounts for 988 thousand tons or 2 percent of overall domestic cargo transport in 1978. Regarding traffic distance, it seems that share of shipping is over 2 percent because average distance of one trip by shipping is longer than other mode of transport.

In domestic cargo transport, share of shipping is relatively minor but its role can not be neglected. Particularly, in the trade between Bangkok and the Southern Thailand, shipping is one of the key modes of transport in the same way as road and rail.

Transportation of goods between Bangkok and the Southern Thailand is borne by road, railway, and sea (coastal shipping). In 1981, the total amount of goods transported between Bangkok and the South was approximately 3,477 thousand tons, of which 58 percent were on road, 16 percent on railway, and 26 percent by coastal shipping. (See Appendix A.4-1)

The amount transported by road has shown an increase in recent years. Major commodities transported from Bangkok to the South are fertilizer, fuel oil, construction materials, and agricultural products, and from the South to Bangkok, wood, fish, shrimp, vegetables and fruits.

The amount transported by railway has shown a decrease in recent years. From Bangkok to the South it was 433 thousand tons in 1980, but was 271 thousand tons in 1982. From the South to Bangkok, the corresponding figures were 228 thousand tons in 1980 and 181 thousand tons in 1982. Principal commodities in 1981 were rice, fuel oil, maize, cassava, beans, and beverages for the direction from Bangkok to the South, and rice, rubber, logs and lumber, cement, and minerals for the direction from the South to Bangkok.

In coastal shipping, although the total amount transported has been increasing year by year, it should be noted that the dry cargo such as general goods and wood products, has been decreasing as opposed to the increase in the transport of petrol and petroleum products. Various causes can be attributed to this decrease, but the principal one is the recent improvements in the highway network which has made it possible for 10-wheeled trucks to provide speedy door-to-door services to all parts of the country.

The main cargo from Bangkok to the South is petroleum products, which occupies more than 80 percent of the total.

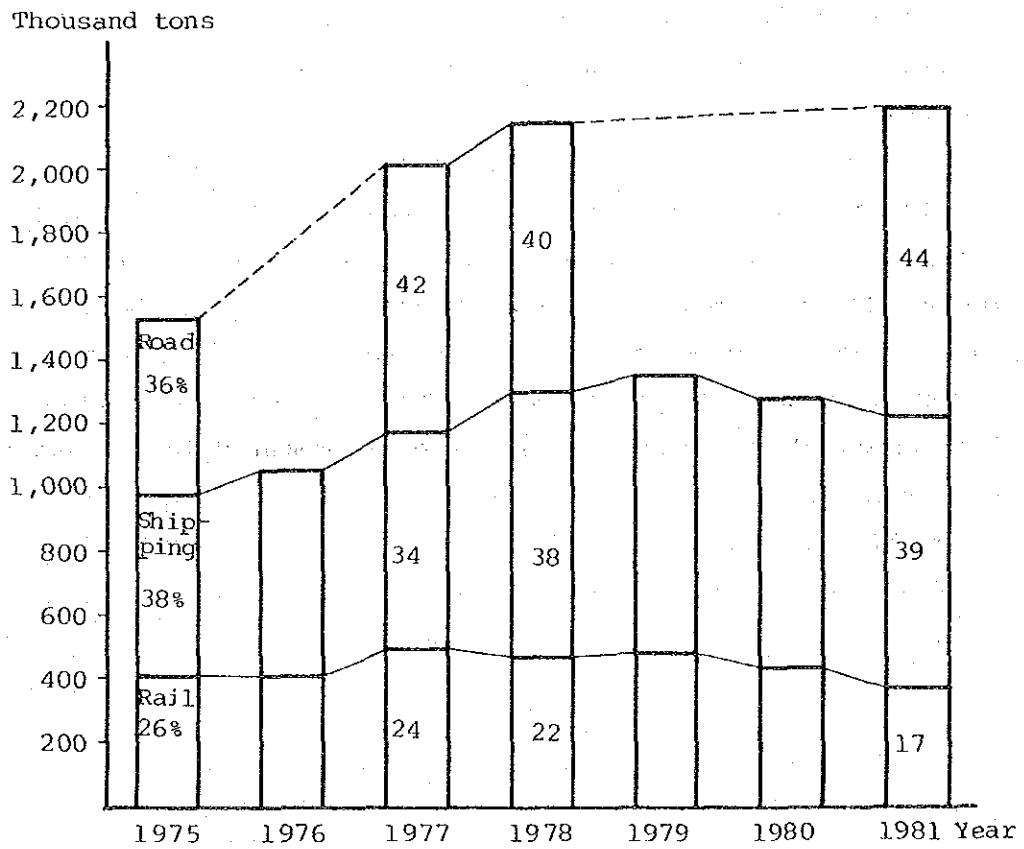
As for dry cargo, fertilizers are transported to Songkhla totalling 50 thousand tons per year, and general goods for all provinces totalling 70 thousand tons per year. As return cargo from the South to Bangkok, 20 thousand tons per year of wood products and 20 thousand tons of general goods are transported from the Ban Don-Pattani area annually, but both types of commodities have shown a declining trend in quantity transported.

The total volume of domestic cargo transportation between Bangkok and the Southern provinces in 1981 amounted to 2,180 thousand tons southbound and 1,297 thousand tons northbound. The breakdown of these figures by three modes of transportation, namely coastal ships, trucks, and railways, is shown below in Figures 3.1-1 and 3.1-2.

The shares in volume by these three modes of transportation are 44 percent by truck, 39 percent by ship, and 17 percent by rail southbound while northbound they are 81 percent by truck, 3 percent by ship, and 16 percent by rail.

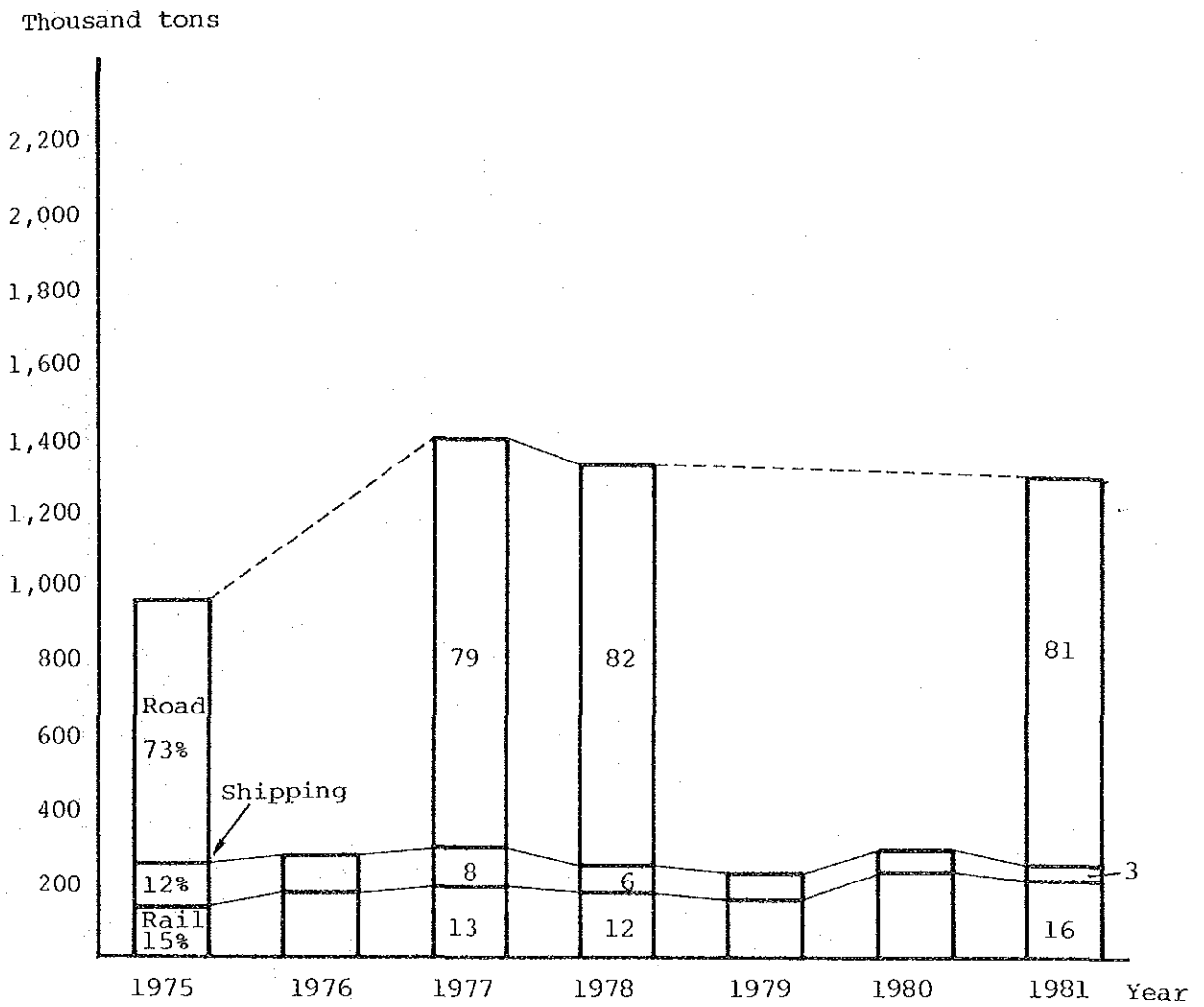
The shares in volume of dry cargo only by the three modes of transportation are shown below in Figures 3.1-3 and 3.1-4. These figures have been calculated by subtracting the volume of petroleum from the volume of all cargoes.

As can be observed in these figures, the share of dry cargo volume transported to the south by truck has increased while the volume by rail and ship have shown a decrease. Northbound, the shares of dry cargo volume by all three modes of transportation are almost the same as those for all cargoes. This is due to the fact that a negligible amount of petroleum is transported northbound. However, when the southbound share of dry cargo volume transported by ship is compared to its share of all cargoes, shown in Figure 3.1-1, it can be seen that ships are carrying an increasingly large share of petroleum. (See also Appendix Tables A.4-1, A.5-1) This point will be discussed further in Section 3.2.



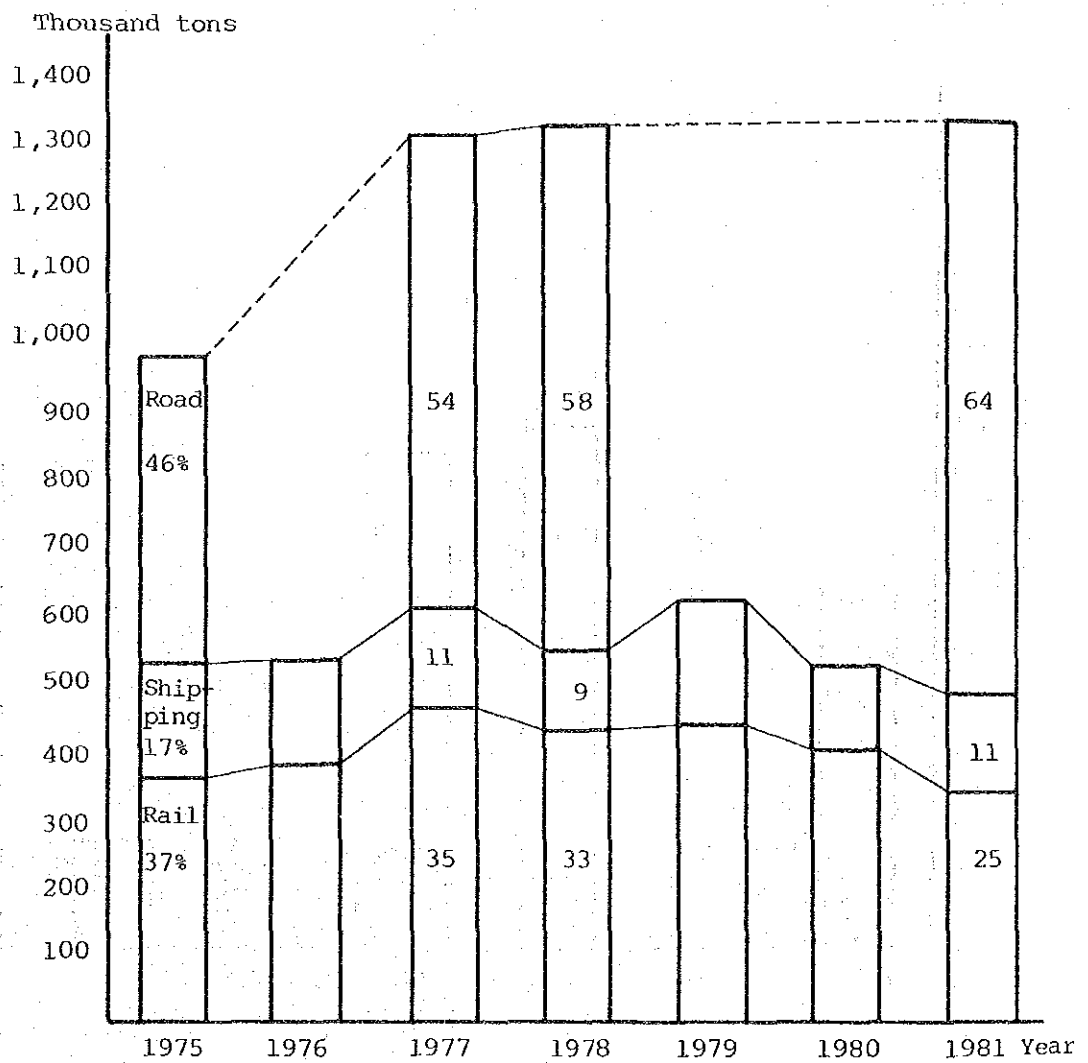
Source: Appendix, Table A.4-1

Fig. 3.1-1 Cargo Flows by Road, Rail and Shipping, 1975~1981
(All Cargoes - Bangkok to The South)



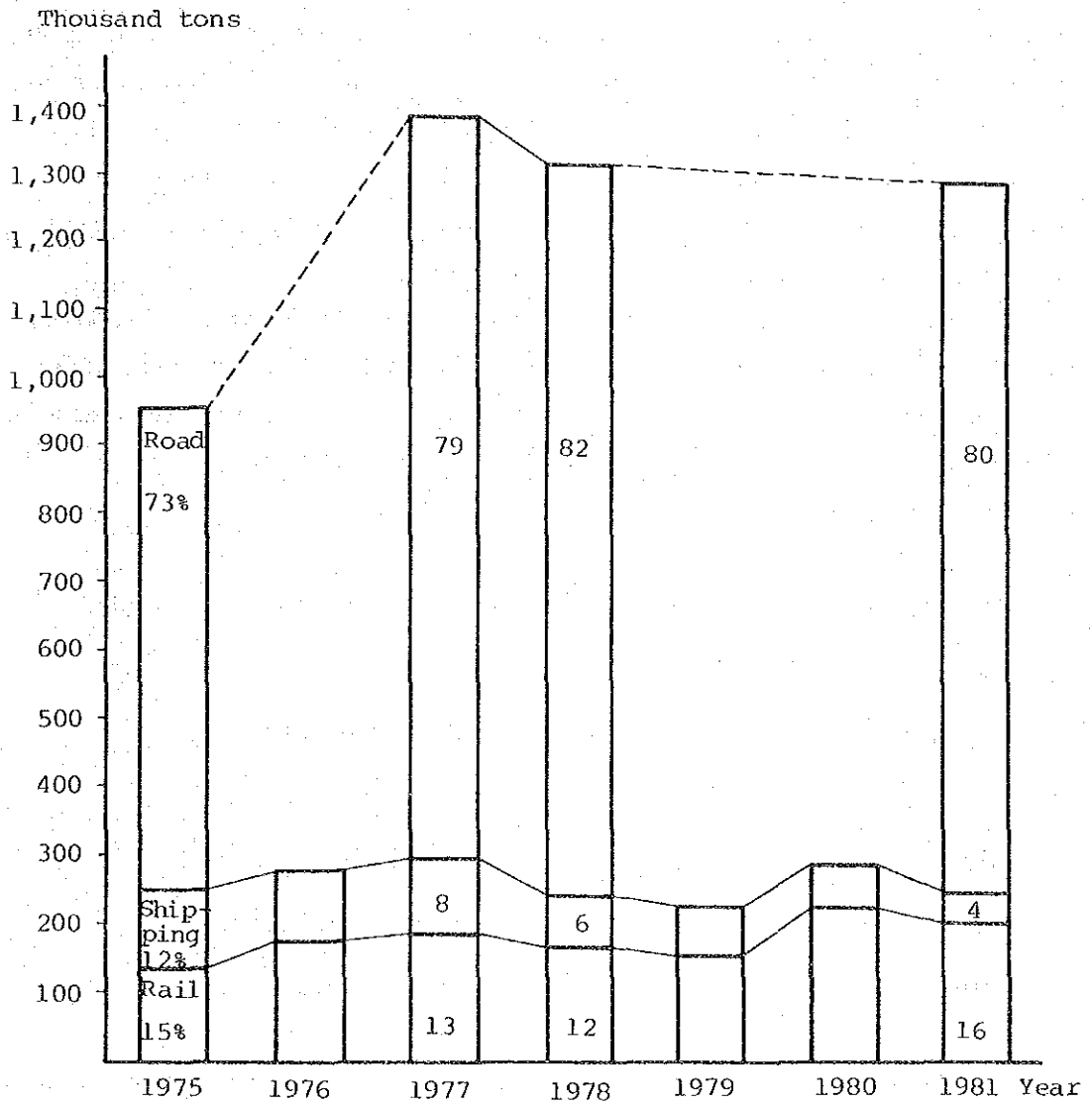
Source: Appendix, Table A.4-1

Fig. 3.1-2 Cargo Flows by Road, Rail and Shipping, 1975-1981
(All Cargoes - The South to Bangkok)



Source: Appendix, Table A.4-1

Fig. 3.1-3 Cargo Flows by Road, Rail and Shipping (1975~1981)
(Dry Cargoes only - Bangkok to The South)



Source: Appendix, Table A.4-1

Fig. 3.1-4 Cargo Flows by Road, Rail and Shipping (1975 ~ 1981)
(Dry Cargoes only - The South to Bangkok)