8.3.4 Stage Construction

To ensure economical construction, facilities need to be designed in consideration of actual demands and effective investment. For this purpose, the project is constructed in two stages; Stage 1 to construct facilities which meet demands up to 1996, and Stage 2 which meet demands up to 2006.

1) Staging Concept

The total number of berths was divided into Stages 1 and 2 according to the ratio of inbound cargo volumes in 1996 to those in 2006, as follows. (See Table 8.3.11)

Table 8.3.11 Number of Berths in the Stages

(Unit: tons/year)

Terminal	Inbound Cargo		No. of Berths	
	1996	2006	Stage-1	Stage-2
Chiang Mai	288,020	456,719	27	18
Khon Kaen	414,468	676,799	30	20
Hat Yai/Songkhla	577,391	1,092,969	50	45

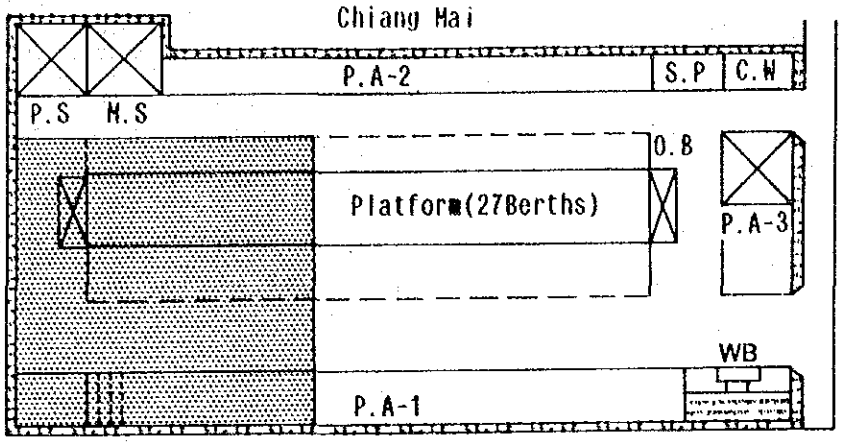
On account of content of Table shown above, it can be interpreted that Stage 2 construction should be completed up to the end of 1996. However, the Study Team recommended that Stage 2 construction would be completed at the end of 2000 because of too short period between Stage 1 and Stage 2 (Stage 1 will be completed at the end of 1992).

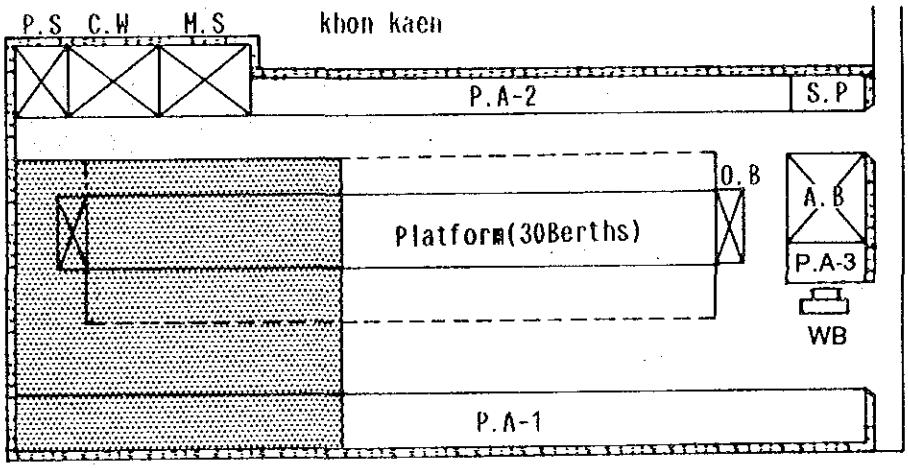
The numbers of berths for three truck terminals are enough for requirement of truck terminal functions on 2000. The functions of temporary storage yard should be considered on Stage 2 construction.

2) Scope of Stage Construction

In Stage 1, platforms and administration buildings corresponding to the number of berths will be constructed, and in Stage 2, the remaining portion will be completed. Two construction stages are illustrated in Fig. 8.3.12.

Fig. 8.3.12 Plans of Stage Construction





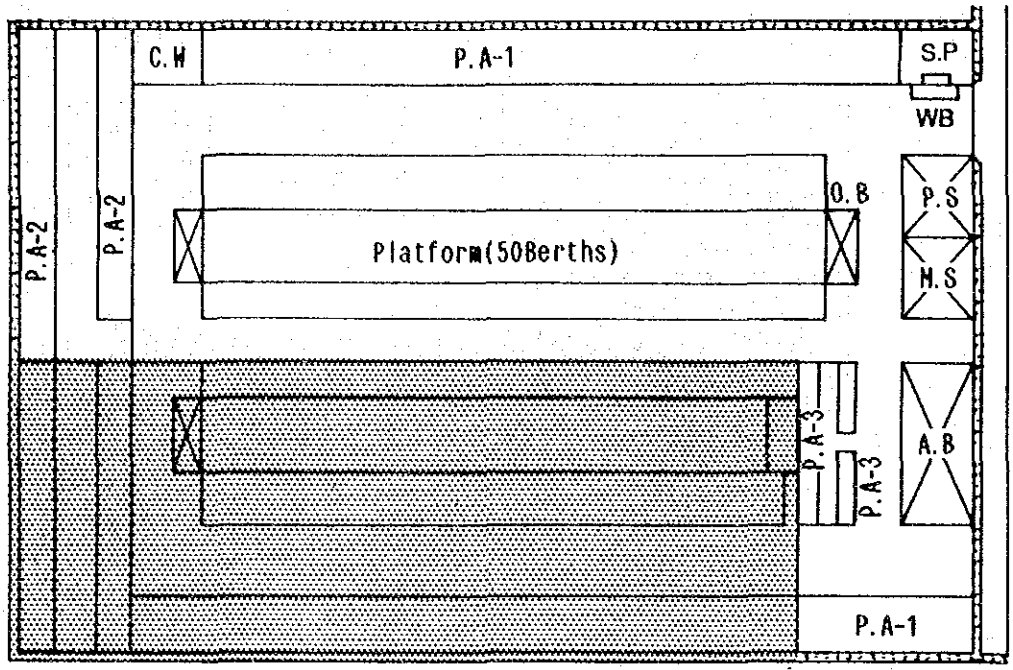
P.A-1 : Parking Area for Line-haul Trucks
P.A-2 : Parking Area for Pick-up/Delivery Trucks
P.A-3 : Parking Area for Private Cars
A.B : Administration Building
P.S : Petrol Station
M.S : Maintenance Shop
O.B : Office Building
S.P : Sewage Plant
C.W : Car Wash Area
WB : Weighbridge

Stage-1

Stage-2

Fig. 8.3.12 Plans of Stage Construction (Cont'd)

Hat Yai/Songkhla



P.A-1 : Parking Area for Line-haul Trucks
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WB : Weighbridge

Stage-1
Stage-2

8.4 Cost Estimate

8.4.1 General

Cost estimation was based on the following assumptions.

1) Unit prices are divided into foreign currency and local currency, both are indicated in Baht. Foreign currency portions include the following:

   - Equipment, materials, and supplies which depend entirely on import
   - Materials which are locally available but are entirely imported
   - Wages and salaries for expatriate workers
   - Costs, expenses and profits by foreign industries

   Local currency portions include the following:

   - Materials which are locally available and are exported
   - Costs, expenses and profits by foreign industries
   - Taxes

2) Percentage shares of foreign currency and local currency portions were determined on the basis of similar projects, including Bangkok Truck Terminal Project, Second Stage Expressway Project, and Eastern Seaboard Project.

3) Unit prices were determined on the basis of "The Price of Construction Materials in the Central Area (May 1987)", "LTD Data (1986)", "Bangkok Truck Terminal Project (1980)", "Map Ta Phut Industrial Complex (1986)", and "Second Stage Expressway Project (1983)".

4) Of these unit prices, those for "The Price of Construction Materials in the Central Area" were used without adjustments, and other unit prices were adjusted for inflation at 10% p.a.

5) Labor cost was assumed to account for 1/4 of each of unit prices, and it was adjusted according to regions by using the following indices:

Bangkok	North	Central	Northeast	South
1	0.649	0.735	0.646	0.775

6) Land acquisition cost was estimated on the basis of data obtained from the Governor Office at each Changwat

7) The unit prices include overhead cost.

8) Contingency cost as 10% of direct construction cost, land acquisition cost, compensation cost, design/engineering cost, and supervision cost was allowed for.

9) Design/engineering cost (detailed design) and supervision cost were estimated at 10% of direct construction cost.

8.4.2 Unit Prices

1) Major Materials

Unit prices for both imported and locally available materials were based on market prices in Bangkok, as shown in Table 8.4.1.

Table 8.4.1 Unit Prices for Major Materials

Major Material	Unit	Cost (Baht)
Fuel (diesel oil)	LIT	6.30
Fuel (gasoline)	LIT	7.84
Earth fill (imported)	CU.M	20
Selected aggregate	CU.M	50
Coarse aggregate	CU.M	255
Fine aggregate	CU.M	95
Asphalt material	LIT	20
Concrete	CU.M	1,100
Reinforcement steel (SD30)	Ton	12,000
Structural steel	Ton	21,000

2) Labor Cost

Unit prices for wages and salaries based on data available in Thailand are as follows:

Supervisor	38 bahts/hour	
Skilled worker	37 bahts/hour	(mechanic, welder, asphalt)
Assistant	28 bahts/hour	(mechanic, welder, asphalt)
General labor	15 bahts/hour	
Carpenter	25 bahts/hour	
Surveyor	46 bahts/hour	
Assistant surveyor	35 bahts/hour	

3) Equipment and Machinery

Unit prices for equipment and machinery were estimated on hourly lease charges, on the basis of data obtained from Map Ta Phut Industrial Complex Project. Depreciations for major equipment and machinery are listed in Table 8.4.2.

Table 8.4.2 Depreciations for Equipment and Machinery

(Unit: B/hr)

	Equipment/machinery	Cost
(1)	Bulldozer (Type Caterpillar D8)	1,200
(2)	Motor grader (100 HP)	670
(3)	3-wheel steel roller (12 tons)	400
(4)	Tyre roller (12 tons)	380
(5)	Dump truck (5 m^3)	250
(6)	Flat bed truck (9.5 tons)	200
(7)	Asphalt plant (100 tons/hour)	7,100
(8)	Asphalt distributor	830
(9)	Aggregate spreader (NS45B)	1,300

8.4.3 Unit Prices of Work Items

Based on material, labor and equipment costs estimated in the foregoing sections, standard unit prices for work items in Bangkok are estimated as follows. (See Table 8.4.3)

8.4.4 Construction Cost Estimates

The construction cost estimates were made for each section based on the quantities estimated in the preliminary design and on the unit prices for each work item. The costs are split into foreign and local currency components. The summary of construction cost is shown in Tables 8.4.4 through 8.4.7 and a summary of the calculation for cost of stage construction are shown in Table 8.4.8.

8.4.5 Operation Cost

Operation cost consists of all costs required for operation, maintenance and management of truck terminal facilities, and it is generally divided into the following elements:

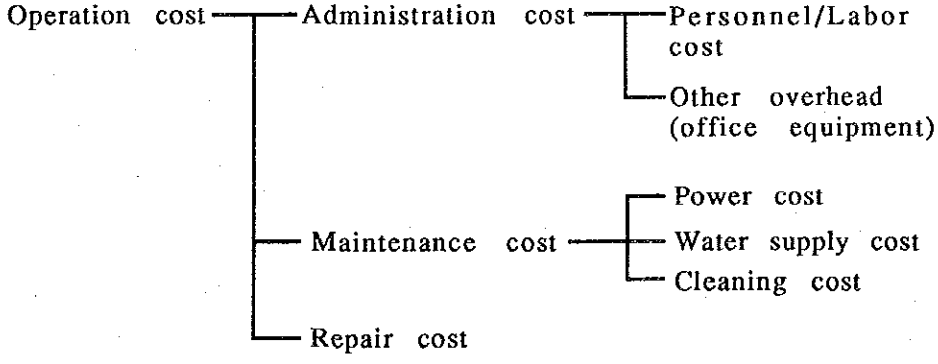


Table 8.4.3 Unit Prices by Work Items

(Unit: Baht)

	Work Item	Unit	Foreign Currency	Local Currency	Total Unit Price
(1)	Earth work	C.M	10	10	20
(2)	Shed skeleton for platform	L.M	14,000	14,000	28,000
(3)	RC pile	Each	4,000	4,000	8,000
(4)	Retaining wall	L.M	2,250	2,250	4,500
(5)	Asphaltic concrete pavement	S.M	150	150	300
(6)	Cement concrete pavement	S.M	210	210	420
(7)	Concrete pipe culvert				
	- ø 250	L.M	150	150	300
	- ø 500	L.M	300	300	600
	- ø 600	L.M	370	370	740
	- ø 700	L.M	450	450	900
	- ø 1000	L.M	1,550	1,550	3,100
(8)	U-ditch (300 x 500 mm)	L.M	300	300	600
(9)	Administration building	S.M	4,000	4,000	8,000
(10)	Office building	S.M	1,800	1,800	3,600
(11)	Petrol station	S.M	3,000	3,000	6,000
(12)	Maintenance shop	S.M	1,800	1,800	3,600
(13)	Car wash area	S.M	210	210	420
(14)	Fence	L.M	700	700	1,400
(15)	Turfing	S.M	15	15	30
(16)	Concrete curb	L.M	150	150	300
(17)	Sewage treatment plant	m^3/day	20,000	20,000	40,000
(18)	Substation	L.S	750,000	750,000	1,500,000
(19)	Water supply	L.M	800	800	1,600

Table 8.4.4 Summary of Construction Cost

(Unit: B 1,000)

Item	Terminal		
	Chiang Mai	Khon Kaen	Hat Yai/ Songkhla
Construction Cost	40,733.1	47,473.8	81,608.9
Land Acquisition and Compensation	4,190.0	10,941.1	806.9
Final Engineering and Supervision	4,073.3	4,747.4	8,160.9
Contingencies	4,899.6	6,316.2	9,057.7
TOTAL	53,896.1	69,478.5	99,634.4
Local Cost	29,043.0	40,209.8	50,220.6
Foreign Cost	24,853.0	29,268.7	49,413.7

Note: Land Acquisition and Compensation Cost consist of only Local currency portion and the remaining costs consist of 50% for local currency and 50% for foreign currency respectively.

Table 8.4.5 (a) Construction Cost (Chiang Mai)

Item	Unit	Unit Price (Baht)	Quantity	Amount (1,000 B)
Preparatory Work	ha	26,713	2.45	**65.5**
Earth Work	m^3	18	49,000	**882.0**
Platform				**7,113.2**
- Shed Skeleton	m	25,543	157.5	4,023.0
- R.C. Pile (22 x 22 x 10m)	each	7,298	128	934.0
- Retaining Wall	m	4,105	315	1,293.1
- Asphaltic Concrete Pavement	m^2	274	3,150	863.1
Pavement				**5,654.9**
- Concrete	m^2	383	7,762.5	2,973.0
- Asphalt Concrete	m^2	274	9,778	2,681.9
Drainage Facilities				**1,077.5**
- ø 500	m	547	325	177.8
- ø 600	m	675	95	64.1
- ø 250 (sewage)	m	274	214	58.6
- Man Hole	each	3,193	15	47.9
- Lateral Sewer (ø150)	m	183	880	161.0
- U-ditch (300 x 500mm)	m	547	881	481.9
- Catch Basin	each	1,916	45	86.2
Crosspoint & Approach Road				**292.0**
- Earth Work	m^3	18	1,455	26.2
- Asphaltic Concrete Pavement	m^2	274	970	265.8
Buildings				**15,761.9**
- Administration Building	m^2	7,298	1,376	10,042.0
- Office Building	m^2	3,284	640	2,101.8
- Petrol Station	m^2	5,474	400	2,189.6
- Maintenance Shop	m^2	3,284	400	1,313.6
- Car Wash Area	m^2	383	300	114.9
Others				**6,183.1**
- Fence	m	1,277	666	850.5
- Concrete Curb	m	274	748	205.0
- Turfing	m^2	27	1,835	49.5
- Sewage Plant	L.S	2,412,000	1	2,412.0
- Electric Station	L.S	1,500,000	1	1,500.0
- Water Supply (ø100)	m	1,460	285	416.1
-.Weighbridge	L.S	750,000	1	750.0
Sub Total				**37,030.1**
Mobilization (10%)	LS		1	**3,703.0**
Total				**40,733.1**

Table 8.4.5 (b) Land Acquisition Cost (Chiang Mai)

Distance from Roadside	Area (m^2)	Unit Price (Baht/m^2)	Amount (1,000 Baht)
0 - 40 m	1,600	375	600.0
40 - 80 m	9,180	100	918.0
80m -	19,737	100	1,973.7
Total	30,517		3,491.7

Table 8.4.6 (a) Construction Cost (Khon Kaen)

Item	Unit	Unit Price (Baht)	Quantity	Amount (1,000 B)
Preparatory Work	ha	26,690	2.72	**72.9**
Earth Work	m^3	18	54,000	**972.0**
Platform				**7,850.4**
- Shed Skeleton	m	25,522	175	4,466.4
- R.C. Pile (22 x 22 x 10m)	each	7,292	136	991.7
- Retaining Wall	m	4,105	350	1,436.8
- Asphaltic Concrete Pavement	m^2	273	3,500	955.5
Pavement				**6,437.8**
- Concrete	m^2	383	9,430	3,611.7
- Asphalt Concrete	m^2	273	10,352	2,826.1
Drainage Facilities				**1,157.7**
- ø 500	m	547	376	205.7
- ø 600	m	675	82	55.4
- ø 250 (sewage)	m	273	244	66.6
- Man Hole	each	3,190	17	54.2
- Lateral Sewer (ø150)	m	182	940	171.1
- U-ditch (300 x 500mm)	m	547	941	514.7
- Catch Basin	each	1,914	47	90.0
Crosspoint & Approach Road				**290.9**
- Earth Work	m^3	18	1,450	26.1
- Asphaltic Concrete Pavement	m^2	273	970	264.8
Buildings				**18,527.7**
- Administration Building	m^2	7,292	1,696	12,367.2
- Office Building	m^2	3,281	640	2,099.8
- Petrol Station	m^2	5,469	374	2,045.4
- Maintenance Shop	m^2	3,281	550	1,804.6
- Car Wash Area	m^2	383	550	210.7
Others				**7,848.6**
- Fence	m	1,276	717	914.9
- Concrete Curb	m	273	648	176.9
- Turfing	m^2	27	1,420	38.3
- Sewage Plant	L.S	4,104,000	1	4,104.0
- Electric Station	L.S	1,500,000	1	1,500.0
- Water Supply (ø100)	m	1,458	250	364.5
-.Weighbridge	L.S	750,000	1	750.0
Sub Total				**43,158.0**
Mobilization (10%)	L.S		1	**4,315.8**
Total				**47,473.8**

Table 8.4.6 (b) Land Acquisition Cost (Khon Kaen)

Distance from Roadside	Area (m^2)	Unit Price (Baht/m^2)	Amount (1,000 Baht)
0 - 40 m	1,600	750	1,200.0
40 - 80 m	10,040	375	3,765.0
80m -	22,088	188	4,152.5
Total	33,728		9,117.5

Table 8.4.7 (a) Construction Cost (Hat Yai / Songkhla)

Item	Unit	Unit Price (Baht)	Quantity	Amount (1,000 B)
Preparatory Work	ha	27,635	4.91	**135.7**
Earth Work	m^3	19	98,000	**1,862.0**
Platform				**15,485.8**
- Shed Skeleton	m	26,425	332.5	8,786.3
- R.C. Pile (22 x 22 x 10m)	each	7,550	264	1,993.2
- Retaining Wall	m	4,247	665	2,824.3
- Asphaltic Concrete Pavement	m^2	283	6,650	1,882.0
Pavement				**12,728.2**
- Concrete	m^2	396	19,666.5	7,787.9
- Asphalt Concrete	m^2	283	17,457	4,940.3
Drainage Facilities				**2,542.6**
- ø 700	m	849	700	594.3
- ø 1,000	m	2,926	152	444.8
- ø 250 (sewage)	m	283	348	98.5
- Man Hole	each	3,303	28	92.5
- Lateral Sewer (ø150)	m	189	1,540	291.1
- U-ditch (300 x 500mm)	m	566	1,535	868.8
- Catch Basin	each	1,982	77	152.6
Crosspoint & Approach Road				**256.2**
- Earth Work	m^3	19	485	8.7
- Asphaltic Concrete Pavement	m^2	283	970	247.5
Buildings				**31,014.5**
- Administration Building	m^2	7,550	2,976	22,468.8
- Office Building	m^2	3,398	1,280	4,349.4
- Petrol Station	m^2	5,663	450	2,548.4
- Maintenance Shop	m^2	3,398	450	1,529.1
- Car Wash Area	m^2	396	300	118.8
Others				**10,164.9**
- Fence	m	1,321	894	1,181.0
- Concrete Curb	m	283	1,132	320.4
- Turfing	m^2	28	2,290	64.1
- Sewage Plant	L.S	5,688,000	1	5,688.0
- Electric Station	L.S	1,500,000	1	1,500.0
- Water Supply (ø100)	m	1,510	438	661.4
-.Weighbridge	L.S	750,000	1	750.0
Sub Total				**74,189.9**
Mobilization (10%)	L.S		1	**7,419.0**
Total				**81,608.9**

Table 8.4.7 (b) Land Acquisition Cost (Hat Yai / Songkhla)

Distance from Roadside	Area (m^2)	Unit Price (Baht/m^2)	Amount (1,000 Baht)
0 - 40 m	1,600	50	80.0
40 - 80 m	11,560	33	381.5
80m -	42,194	5	211.0
Total	55,354		672.5

Table 8.4.8 Construction Costs for Stages

CHIANG MAI (unit:1,000 Baht)

Item	Total	Stage 1	Stage 2
Construction	**40,733.1**	**34,325.0**	**6,408.2**
-Mobilization	3,703.0	3,120.5	582.6
-Preparatory work	65.5	47.0	18.5
-Earth work	882.0	882.0	0.0
-Platform	7,113.2	4,267.9	2,845.3
-Pavement	5,654.9	4,032.2	1,622.7
-Drainage facilities	1,077.5	842.9	234.6
-Crosspoint & approach road	292.0	292.0	0.0
-Building	15,761.9	14,711.0	1,050.9
-Others	6,183.1	6,129.5	53.6
Land Acquisition	**4,190.0**	**4,190.0**	**0.0**
Final Engeering & Supervision	**4,073.3**	**2,851.3**	**1,222.0**
Contigencies	**4,899.6**	**2,939.8**	**1,959.9**
Total	**53,896.1**	**44,306.1**	**9,590.0**

KHON KAEN (unit:1,000 Baht)

Item	Total	Stage 1	Stage 2
Construction	**47,473.8**	**40,342.9**	**7,130.9**
-Mobilization	4,315.8	3,667.5	648.3
-Preparatory work	72.9	52.6	20.3
-Earth work	972.0	972.0	0.0
-Platform	7,850.4	4,710.2	3,140.2
-Pavement	6,437.8	4,557.1	1,880.7
-Drainage facilities	1,157.7	821.8	335.9
-Crosspoint & approach road	290.9	290.9	0.0
-Building	18,527.7	17,477.8	1,049.9
-Others	7,848.6	7,793.0	55.6
Land Acquisition	**10,941.1**	**10,941.1**	**0.0**
Final Engeering & Supervision	**4,747.4**	**3,323.2**	**1,424.2**
Contigencies	**6,316.2**	**3,789.7**	**2,526.5**
Total	**69,478.5**	**58,396.9**	**11,081.6**

HAT YAI/SONGKHLA (unit:1,000 Baht)

Item	Total	Stage 1	Stage 2
Construction	**81,608.9**	**64,802.2**	**16,806.7**
-Mobilization	7,419.0	5,891.1	1,527.9
-Preparatory work	135.7	86.0	49.7
-Earth work	1,862.0	1,862.0	0.0
-Platform	15,485.8	8,150.4	7,335.4
-Pavement	12,728.2	7,902.3	4,825.9
-Drainage facilities	2,542.6	1,763.7	778.9
-Crosspoint & approach road	256.2	256.2	0.0
-Building	31,014.5	28,839.8	2,174.7
-Others	10,164.9	10,050.7	114.2
Land Acquisition	**806.9**	**806.9**	**0.0**
Final Engeering & Supervision	**8,160.9**	**5,712.6**	**2,448.3**
Contigencies	**9,057.7**	**5,434.6**	**3,623.1**
Total	**99,634.3**	**76,756.3**	**22,878.0**

1) Administration Cost

a) Personnel/Labor cost

From Section 9.3 of this Report, staffing requirements and annual personnel/labor costs in proposed truck terminal areas were estimated as follows: (See Table 8.4.9)

Table 8.4.9 Annual Personnel/Labor Cost

Job Classification	persons	Unit wage	Chiang Mai	Khon Kaen	Hat Yai/ Songkhla
Director General	1	200,000	129,800	129,200	155,000
Secretery	1	128,250	83,200	82,800	99,400
Manager	2	128,250	166,500	165,700	198,800
Chief of Section	5	101,250	328,600	327,000	392,300
Janitor/guard	3	33,750	65,700	65,400	78,500
Total	12		773,800	770,200	924,000

Note: Personnel cost lfor each truck terminal was calculated from the basic data with adjusted by using the following indices:

Bangkok	Chiang Mai	Khon Kaen	Hat Yai/Songkhla
1	0.649	0.646	0.775

b) Other Overhead Costs (Annual Sum)

Annual cost of 100,000 bahts were allocated for rental charges for office equipment and telephone charges for each of the terminal facilities.

2) Maintenance Cost

a) Electric Charges

Electric charges for operations of buildings, platforms, sewage treatment plants and other facilities were estimated on the basis of a unit charge of B 1.82/kWh as shown in Table 8.4.10. (Furnished by the Economic Division of Provincial Electricity Authority)

Table 8.4.10 Electric Charges

Terminal	Power Requirement	Annual Consumption	Unit Cost (B/kW.H)	Annual Electric Charges(B)
(1) Chiang Mai				
Site boundary	25	$330^{kW} \times 10^{hr/day} \times 0.8$	1.82	1,441
Platform	63	$\times 25^{day} \times 12^{month}$		$\times 10^3$
Building	242 = 330 kW	= 792,000 (kW.H)		
(2) Khon Kaen				
Site boundary	27	$391^{kW} \times 10^{hr/day} \times 0.8$	1.82	1,708
Platform	70	$\times 25^{day} \times 12^{month}$		$\times 10^3$
Building	294 = 391 kW	= 938,000 (kW.H)		
(3) Hat Yai/ Songkhla				
Site boundary	49	$634^{kW} \times 10^{hr/day} \times 0.8$	1.82	2,769
Platform	133	$\times 25^{day} \times 12^{month}$		$\times 10^3$
Building	452 = 634 kW	= 1,521,600 (kW.H)		

Note: Site boundary: Exterior lighting
Building: Administration building, field office, repair shop, water supply facilities, and sewage treatment plant

b) Water Charges

Annual water charges were estimated on the basis of water requirements determined in 8.3.3, as follows: (See Table 8.4.11)

Table 8.4.11 Water Charges

Terminal	Daily Water Requirement (m^3/day)	Annual Consumption (m^3/year)	Unit Cost (B/m^3)	Total (B1,000)
Chiang Mai	111	33,300	8	266
Khon Kaen	188	56,400	8	451
Hat Yai/Songkhla	266	79,800	8	638

Note: The unit cost was based on 100 m^3/day - 300 m^3/day charged by Provincial Waterworks Authority (PWA).

c) Cleaning Cost

Cleaning cost includes those for offices, roads, platforms and other facilities as well as waste disposal charges. Annual cleaning cost of ฿36,000 was allocated for each of the terminal facilities.

3) Repair Cost

Repair costs covering road and platform repair, painting and inspection were assumed to be 5% of the construction cost. As a result, annual operation and administration costs for each area are summarized in Table 8.4.12.

The operation cost of each terminal according to stages of construction is summarized in Table 8.4.13. Division of operation costs into Stages 1 and 2 was made on the basis of the number of berths to be constructed in each stage as determined in Sub-Section 8.3.4 "Stage Construction".

Table 8.4.12 Operation and Administration Costs

(Unit: 1,000B)

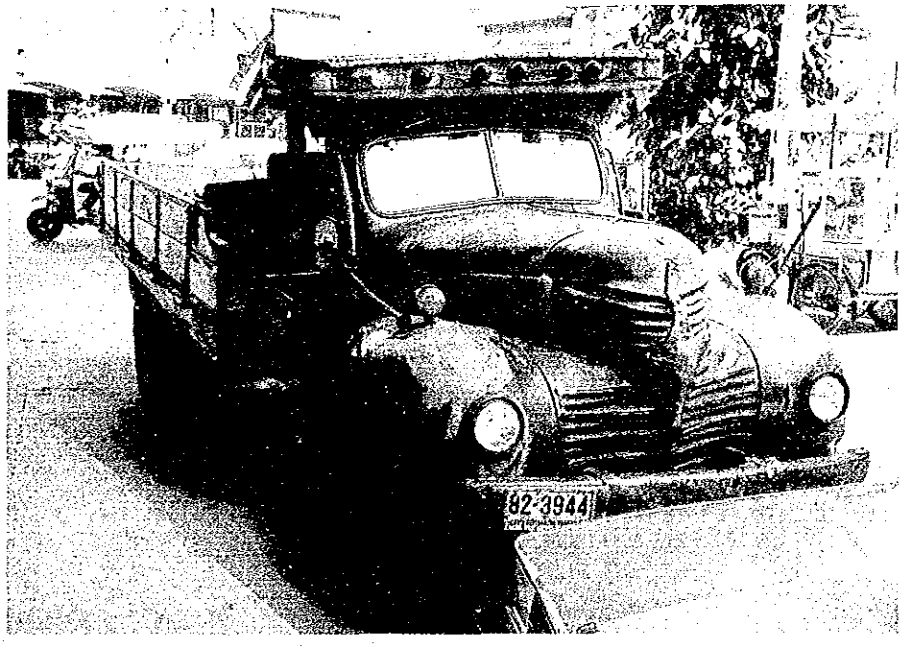
Item	Chiang Mai	Khon Kaen	Hat Yai/Songkhla
(1) Administration Cost			
Personnel/Labor	774	770	924
Other overhead	100	100	100
Sub-Total	874	870	1,024
(2) Maintenance Cost			
Electric charges	1,441	1,708	2,769
Water charges	267	451	638
Cleaning cost	36	36	36
Sub-Total	1,744	2,195	3,444
(3) Repair Cost	2,037	2,374	4,080
(4) Grand Total	4,655	5,439	8,548

Table 8.4.13 Breakdown of Operation Costs by Stages

Terminal	Operation Cost at each stage of Construction	
	1993 - 2000 (฿ 1,000)	2001 - (฿1,000)
Chiang Mai	4,334	4,655
Khon Kaen	5,082	5,439
Hat Yai/ Songkhla	7,708	8,548

CHAPTER 9

ECONOMIC AND FINANCIAL ANALYSES



CHAPTER 9 ECONOMIC AND FINANCIAL ANALYSES

9.1 General

Based on the study results of demand for regional truck terminals and preliminary design presented in Chapters 6 and 8, the following analysis were carried out for the feasibility study of the selected three truck terminals.

1) Economic Evaluation

The effect accruing from the construction and operation of truck terminals was measured qualitatively. Tangible and intangible effects to be assessed were analysed. In addition, the sensitivity analysis was made for the factors which were considered most influential to the project feasibility.

2) Organization and Administration of Regional Truck Terminal

Planning of organization and administration for terminals is crucial in the feasibility study. Planning of these was made based on actual circumstances of Thailand.

3) Financial Evaluation

For the financial evaluation of the project, the following were taken into consideration:

a) Terminal charges and revenue projection

b) Cash flow analysis (Statement of profit and loss, Sources and application of funds) assuming gearing ratio (equity vis-a-vis long-term debt), loan conditions, possibility of Government's support, financial aid from abroad.

c) Calculation of financial indicators such as financial internal rate of return (FIRR for Return on Investment and Return on Equity calculations), Profit-revenue ratio and Debt Service Coverage Ratio (DSCR).

Considering the results of financial analyses the optimum charges on the terminal users are determined and several financial countermeasures are proposed to realize the sound financial operation of truck terminals.

4) Promotion to Users of Truck Terminal and Governmental Contribution

The measures to promote the usage of truck terminals and governmental contribution were studied and recommendations were made.

9.2 Economic Evaluation for Three Truck Terminals

9.2.1 Effects of Delivery System of Truck Terminal

In Section 7.4.1, the effects of the truck terminal have been discussed for the pre-feasibility analysis and only the savings in the line-haul truck operation and material handling costs were quantified as the most likely to realize benefits of the truck terminal.

The effects of the delivery system (collection and distribution of general cargoes to and from the terminal) should be elaborated in this feasibility analysis of the selected three terminals.

The apparent benefits, other than those counted in the pre-feasibility analysis, can be enumerated as follows:

Loading/Unloading:	These works "without" truck terminal situation require a long time parking of line-haul/delivery trucks along the roadside of the forwarder's* shophouse. This is an impediment to general traffic and may cause serious traffic congestions in the area. Mishandling of cargoes will take place more often in the "without" situation than in the "with" situation, and this will cause relatively extensive damage to the cargoes.
Restriction of line-haul truck operation in the city areas:	Idle time will accrue to line-haul trucks under the "without" terminal situation and this limits the operating time of delivery trucks as well as line-haul trucks.

The effects of the truck terminal mentioned above will be of positive benefits. However, the terminal can also bring about negative benefits unless counter measures are taken. A major factor which can cause the negative benefits is the longer distance between consignors/consignees and the terminal located on the outskirts of the city area.

The increase in travel distance of delivery trucks entails additional truck operating costs, but it is not certain whether or not this can be offset by the benefits mentioned previously.

In order to overcome the negative effects of the terminal it is imperative to operate the delivery trucks as efficiently as possible. Measures to be taken for this can be conceived as follows:

Note * : This means a trucking company which maintains the function of forwarding agents.

Collecting cargoes: The existing cargo collecting system is mostly to send the cargo to a forwarder's shophouse by the consignor himself. This system is not economical as the demand for forwarders will increase. Therefore, the system should be changed to enhance the efficiency of collecting cargoes from consignors to the terminal as follows:

- to despatch a delivery truck to consignors from the terminal and collect cargo up to its carrying capacity.
- to consolidate small-scale forwarders to effect a scale benefit and to reduce the idle capacity of delivery trucks.
- to allocate a service area to each group of the consolidated forwarders so as to raise the density of customers for each group and to reduce the collecting distance and costs, eventually.

Distributing cargoes: The existing cargo distribution system is generally to transfer the cargo from a line-haul truck to delivery trucks in front of the forwarder's shophouse. The line-haul truck is also involved in the distribution service with the delivery trucks.

In the new system, the line-haul truck should not be used for delivery services but specified for terminal to terminal transport. In order to recover the loss derived from the outlying terminal, efficient use of delivery trucks for cargo distribution is indispensable as required also for cargo collection. Therefore, the terminal system should incorporate the following improvements:

- to consolidate small-scale forwarders so as to increase the efficiency of truck operations
- to collaborate on distribution services with the consolidated forwarder groups and assign service areas to them.

A key issue to realize the recovery of losses entailed from the terminal system is how to consolidate small-scale forwarders. If only one forwarder utilizes the truck terminal in one extreme, it will most effectively use delivery trucks. Nevertheless, the consolidation of forwarders is not an easy task, because they have their own customers and the consolidation means to give their business opportunities to their collaborating forwarders. Despite the terminal operator's efforts in Japan, for example, the consolidation has been hardly realized among the forwarders using the same truck terminal.

In order to expedite the consolidation of small-scale forwarders in Thailand, a carrot-and-stick policy should be taken not only to encourage the efficient truck operation as a whole but to stabilize and improve the trucking industry in Thailand.

The counter-measures to offset longer delivery distances with the terminal system has been discussed so far and it was found that the key is to consolidate member forwarders of the terminal to the maximum extent possible. Therefore, it depends largely on the extent of consolidation whether the net benefit in the delivery services, when compared "with" and "without" terminal situations, turns out to be positive or negative.

It should be noted, however, that the assumption made for "without" terminal situation is that the existing forwarders, mostly located in the center of city area, are allowed to expand their handling capacity at the same place. This is not likely to happen in the future. As the demand for general cargo transport increases it will, even in the "without" terminal situation, become indispensable for the forwarders to move partially or totally to the outside of the city area. This will lower the difference in the total delivery distances when compared "with" and "without" terminal situations.

Consequently, it can be said that the terminal system will produce positive effects on loading and unloading works and on the restricted line-haul truck operation in the city area. The delivery (both collection and distribution) service by the terminal may incur either positive or negative effects depending on the extent of forwarders' consolidation, allowance for the expansion of the existing facility, and so on.

It is, therefore, envisaged that if any measures are taken to realize the collaboration of member forwarders of the terminal a net benefit (positive effect) can be expected from the delivery service provided by the truck terminal system.

A study was undertaken to ensure the above consequence, and it was intended to quantify cargo delivery costs under "with" and "without" truck terminal situations. Because of the lack of data and information a simplification was made by using some geometric models and assumptions.

Eventually, to be more conservative in the benefit calculation of this feasibility analysis, the effects of the delivery system was not taken as the benefit attributable to the truck terminal. This is also true that the quantification of this benefit entails the difficulty to collect more detail data on traffic and urban conditions in the future, as well as, at present.

9.2.2 Economic Benefits

The quantification of economic benefits was discussed previously in Section 7.4.2 and further in Section 9.2.1. As a consequence, the economic benefits quantified for the cost/benefit analysis are defined as follows:

a) Effective use of line-haul trucks:

   i) The reduction of turn-around times of line-haul trucks will produce an extensive operation of line-haul trucks per year and save the fixed cost of the truck operations per kilometer.

   ii) The increase in the demand for such return-haul cargoes as agricultural products from the project cities to Bangkok will eventually reduce, in minimum, the overall running cost of transporting agricultural products in the country.

b) Effective cargo throughput at loading/unloading and sorting general cargoes by direction.

In the previous pre-feasibility stage the benefit calculation derived from the above item a) dealt with the total cargo volumes handled at the terminals, regardless of either origin or destination of cargoes. Considering the extent of accuracy in estimating the demand for truck terminals, it will be safer to take the benefit only from the cargo related to Bangkok but to calculate the facility cost based on the estimated total cargo throughput for all directions.

To be more strict and safe for cost-benefit analysis in this feasibility stage, the handling cost saving is only taken from the cargo related to Bangkok as also applied for the operating cost saving of line-haul trucks in the above item a).

Consequently, the economic benefits in 1996 and 2006 are estimated as shown in Table 9.2.1.

Table 9.2.1 Economic Benefits in 1996 and 2006 for Selected Three Truck Terminals

(Unit: 1,000 Baht/year)

Terminals	Year	
	1996	2006
1) Chiang Mai:		
Opening Cost Savings in Line-haul Trucks	22,970	37,920
Cost Savings in Cargo Throughput	700	1,100
Total Cost Savings	23,670	39,020
2) Khon Kaen:		
Operating Cost Savings in Line-haul Trucks	13,141	20,731
Cost Savings in Cargo Throughput	809	1,357
Total Cost Savings	13,950	22,088
3) Hat Yai/Songkhla:		
Operating Cost Savings in Line-haul Trucks	37,098	68,571
Cost Savings in Cargo Throughput	908	1,726
Total Cost Savings	38,006	70,297

9.2.3 Cost-Benefit Analysis

1) Economic Cost and Benefit Flows

The implementation schedule of the projects was assumed to begin with the final engineering in 1989 and the first stage terminal operation in 1993. Subsequently, the second stage construction was assumed to start in 1999 and end in 2000.

The economic costs of the project were estimated in the same manner as applied to the pre-feasibility analysis. Based on the implementation schedule the economic costs of the project investment are estimated as shown in Table 9.2.2, and the details are presented in Appendix 9.1. The administration and maintenance costs were estimated in Section 8.4.5 as presented in Table 9.2.3.

Table 9.2.2 Economic Costs of Investments

(Unit: 1000B)

	Terminal	1st Stage				2nd Stage		Total
		1989	1990	1991	1992	1999	2000	
1)	Chiang Mai	494.9	4,684.9	10,191.5	21,312.8	2,845.8	4,922.0	44,451.9
2)	Khon Kaen	576.8	11,517.9	12,107.2	25,178.3	3,332.8	5,643.3	58,356.4
3)	Hat Yai/ Songkhla	991.5	1,798.4	19,270.0	40,265.9	6,542.9	11,988.3	80,857.1

Table 9.2.3 Administration and Maintenance Costs of Projects

(Unit: 1000B)

	Terminal	1st Stage Operation	2nd Stage Operation
		1993 - 200	2001 -
1)	Chiang Mai	4,334	4,655
2)	Khon Kaen	5,082	5,439
3)	Hat Yai/Songkhla	7,708	8,548

The economic benefits of the selected three terminals have been estimated for the target years of 1996 and 2006 in Table 9.2.1. The intermediate year benefits were interpolated exponentially between the two target years.

After the year 2006, the rate of benefit growth was assumed to decline to half the rate applied before 2006 and to continue up to the terminating year of the project life of 20 years.

2) Comparison of Cost and Benefit Flows

The economic cost and benefit flows are compared by using such methods as the Net Present Value (NPV), Benefit/Cost Ratio (B/C) and Internal Rate of Return (IRR) for the respective terminals.
A discount rate of 12% was applied to calculate the NPV and B/C. The results of this comparison are summarized in Table 9.2.4, and the detailed cost and benefit flows are presented in Table 9.2.5.

Table 9.2.4 Comparison of Economic Cost and Benefit Flows for Three Truck Terminals

	Terminal Locations	Discounted at 12% p.a.		IRR (%)
		NPV (B1,000)	B/C	
1)	Chiang Mai	95,470	2.77	40.36
2)	Khon Kaen	17,853	1.26	16.89
3)	Hat Yai/Songkhla	157,059	2.66	39.63

3) Sensitivity Test and Conclusion

The sensitivity test was undertaken to secure the feasibility of the three truck terminals in a range of ±15% and ±30% of the base case cost and benefit.

The results are expressed by IRRs corresponding to the above changes in costs and benefits as shown in Table 9.2.6.

According to this table it can be said that:

i) Chiang Mai and Hat Yai/Songkhla terminals show a similar tendency to changes in cost and benefit values.

ii) These two terminals maintain the economic feasibility under the most severe condition that the cost is added 30% to and the benefit is reduced 30% from the base case simultaneously.

iii) These two terminals are a bit more sensitive to change in the benefit than change in the cost.

iv) Since the annual growth of the benefit of Hat Yai/Songkhla terminal is steeper than that of Chiang Mai terminal a change in the benefit flow of Hat Yai/Songkhla influences on IRR more sensitive than that of Chiang Mai terminal.

v) Khon Kaen terminal can tolerate such a condition as to reduce the benefit solely by 15%, and to increase the cost solely by 15%, and is almost tolerable for the simultaneous changes in the cost by plus 15% and in the benefit by minus 15%.

Based on these results of the sensitivity test, it can be concluded that the truck terminal projects in Chiang Mai, Khon Kaen and Hat Yai/Songkhla are economically feasible and justifiable for the immediate implementation.

Table 9.2.5 Cost and Benefit Flows for Economic Evaluation

CHIANG MAI

(unit: Thousand Baht)

Year	Costs		Benefit	Discounted (12%) Costs		Benefit
	Investment	Operation Cost		Investment	Operation Cost	
1989	495	0	0	495	0	0
1990	4,685	0	0	4,183	0	0
1991	10,192	0	0	8,125	0	0
1992	21,313	0	0	15,170	0	0
1993	0	4,334	20,374	0	2,755	12,948
1994	0	4,334	21,418	0	2,459	12,153
1995	0	4,334	22,516	0	2,196	11,407
1996	0	4,334	23,670	0	1,961	10,707
1997	0	4,334	24,883	0	1,751	10,050
1998	0	4,334	26,159	0	1,563	9,433
1999	2,846	4,334	27,500	916	1,396	8,854
2000	4,922	4,334	28,909	1,415	1,246	8,311
2001	0	4,655	30,391	0	1,195	7,801
2002	0	4,655	31,949	0	1,067	7,322
2003	0	4,655	33,586	0	952	6,872
2004	0	4,655	35,308	0	850	6,451
2005	0	4,655	37,117	0	759	6,055
2006	0	4,655	39,020	0	678	5,683
2007	0	4,655	40,020	0	605	5,204
2008	0	4,655	41,046	0	540	4,766
2009	0	4,655	42,098	0	483	4,364
2010	0	4,655	43,177	0	431	3,996
2011	0	4,655	44,283	0	385	3,660
2012	0	4,655	45,418	0	343	3,351

NPV = 95,470
B/C ratio = 2.7707
IRR = 40.36%

KHON KAEN

(unit: Thousand Baht)

Year	Costs		Benefit	Discounted (12%) Costs		Benefit
	Investment	Operation Cost		Investment	Operation Cost	
1989	577	0	0	577	0	0
1990	11,518	0	0	10,284	0	0
1991	12,107	0	0	9,652	0	0
1992	25,178	0	0	17,921	0	0
1993	0	5,082	12,153	0	3,230	7,723
1994	0	5,082	12,725	0	2,884	7,221
1995	0	5,082	13,323	0	2,575	6,750
1996	0	5,082	13,950	0	2,299	6,310
1997	0	5,082	14,606	0	2,053	5,899
1998	0	5,082	15,293	0	1,833	5,515
1999	3,333	5,082	16,012	1,073	1,636	5,155
2000	5,643	5,082	16,765	1,622	1,461	4,820
2001	0	5,439	17,554	0	1,396	4,506
2002	0	5,439	18,379	0	1,246	4,212
2003	0	5,439	19,243	0	1,113	3,937
2004	0	5,439	20,148	0	994	3,681
2005	0	5,439	21,096	0	887	3,441
2006	0	5,439	22,088	0	792	3,217
2007	0	5,439	22,607	0	707	2,940
2008	0	5,439	23,139	0	631	2,687
2009	0	5,439	23,683	0	564	2,455
2010	0	5,439	24,240	0	503	2,244
2011	0	5,439	24,810	0	449	2,050
2012	0	5,439	25,393	0	401	1,874

NPV = 17,853
B/C ratio = 1.2596
IRR = 16.89%

HAT YAI / SONGKHLA

(unit: Thousand Baht)

Year	Costs		Benefit	Discounted (12%) Costs		Benefit
	Investment	Operation Cost		Investment	Operation Cost	
1989	992	0	0	992	0	0
1990	1,798	0	0	1,606	0	0
1991	19,270	0	0	15,362	0	0
1992	40,266	0	0	28,660	0	0
1993	0	7,708	31,603	0	4,899	20,084
1994	0	7,708	33,607	0	4,374	19,070
1995	0	7,708	35,739	0	3,905	18,106
1996	0	7,708	38,006	0	3,487	17,192
1997	0	7,708	40,417	0	3,113	16,324
1998	0	7,708	42,980	0	2,780	15,499
1999	6,543	7,708	45,706	2,107	2,482	14,716
2000	11,988	7,708	48,606	3,446	2,216	13,973
2001	0	8,548	51,689	0	2,194	13,267
2002	0	8,548	54,967	0	1,959	12,597
2003	0	8,548	58,454	0	1,749	11,961
2004	0	8,548	62,161	0	1,562	11,357
2005	0	8,548	66,104	0	1,394	10,783
2006	0	8,548	70,297	0	1,245	10,238
2007	0	8,548	72,526	0	1,112	9,431
2008	0	8,548	74,827	0	993	8,688
2009	0	8,548	77,200	0	886	8,003
2010	0	8,548	79,648	0	791	7,372
2011	0	8,548	82,174	0	706	6,791
2012	0	8,548	84,780	0	631	6,256

NPV = 157,059
B/C ratio = 2.6594
IRR = 39.63%

Table 9.2.6 Sensitivity Test for Economic Evaluation of Three Truck Terminals

CHIANG MAI

	Benefit		
Cost	Base case	-15%	-30%
Base case	40.36%	34.67%	28.57%
+15%	35.44%	30.21%	24.59%
+30%	31.44%	26.59%	21.35%

KHON KAEN

	Benefit		
Cost	Base case	-15%	-30%
Base case	16.89%	13.41%	9.47%
+15%	13.88%	10.55%	6.71%
+30%	11.36%	8.12%	4.31%

HAT YAI/SONGKHLA

	Benefit		
Cost	Base case	-15%	-30%
Base case	39.63%	33.79%	27.61%
+15%	34.57%	29.26%	23.62%
+30%	30.51%	25.62%	20.39%

9.3 Operation and Administration of Regional Truck Terminals

The basic role expected of regional truck terminals is to handle incoming and outgoing cargoes efficiently to increase transport efficiency. In order to facilitate this cargo-handling methods need to be standardized at each truck terminal and its operation must be controlled by nationwide standards.

This section, from the viewpoint of management through adjusting different conditions, considers the most desirable administration, organization and its operation.

Regional truck terminals, under the guidance of the Sub-Control Board on Truck Terminals and the Land Transport Department, being advised by the Sub-Policy Committee on Truck Terminals, should be financed by both government and private sectors as a government and private corporation in order to achieve nationwide implementation of a standard system. Each terminal should be managed and operated as an independent limited company. It will draw revenue from rent of berths, aiming at independent enterprises.

9.3.1 Installation of Sub-Policy Committee and Sub-Control Board on Truck Terminals

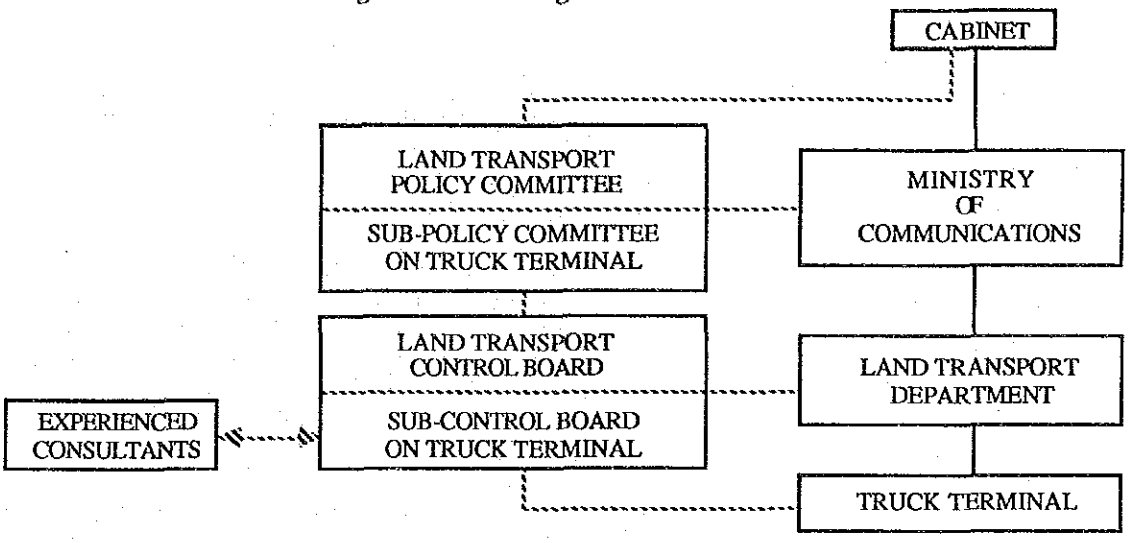
Under provision of the Land Transport Act/B.E. 2722 (1979), for smooth operation of truck terminals, the Sub-Policy Committee on Truck Terminals (SPCT) should be installed as an organization which helps in organizing the structure for policy and management in order to achieve nationwide implementation of a standard system. Subsequently, the Sub-Control Board on Truck Terminals (SCTB) should be installed as SPCT's sub-agency to set forth a guideline on practical management and operation and on modernization of the trucking industry.

SPCT, which is closely related to the Cabinet and Ministry of Communications, under the guidance of related organizations, has the responsibility of developing the master plan and basic management policies for the nationwide truck terminal network. On the other hand, SCBT, in close relationship with the Land Transport Department, under the advice and guidance of SPCT, has the responsibility of giving guidance in practical management and administration of each truck terminal, and of planning and guidance measures for modernization of trucking and its related industries.

Thus, truck terminals under the guidance and advice of SCBT, may look after their own management.

The above relationships are shown in the following chart (Fig. 9.3.1):

Fig. 9.3.1 Organization Chart



9.3.2 Roles of the Sub-Policy Committee and Sub-Control Board on Truck Terminals

The principal roles of SPCT are as follows:

1) Development of a Master Plan and necessary policies for the Truck Terminal Network System.

2) Description on basic guidelines, planning of necessary assistance measures, and coordination of related agencies for truck terminal management and operation.

3) Planning of financial program and of subsidy system.

4) Compiling of guidelines for modernization of trucking companies and related industries.

5) Coordination of various problems existing among government agencies involved and related industries.

The principal role of SCBT is to give practical guidance to truck terminals for efficient operation under standard conditions according to basic items provided by SPCT. Some of the principal roles are as follows:

1) Guidance in the construction of truck terminals following the plans of SPCT.

2) Drawing standard layout plans of truck terminals such as design standards, types of facilities, management and operating methods, etc. Guiding and giving instructions about the standard layout plans. Permission and authorization for constructing and operating truck terminals.

3) Not just considering profits of truck terminals, but also coordinating profits of various areas in relation to regional development and urban redevelopment.

4) Planning for modernization of the trucking industry and of related industries, and taking leadership for its realization and coordination.

5) Coordination of interests between related industries and local concession hunters.

While SCBT in cooperation with LTD has the responsibility of realizing plans and policies of SPCT, and of giving specific and concrete guidance and assistance until the completion of the truck terminal, it also has the responsibility to supervise and guide management and operation of the truck terminal when it is established. For realization of the Truck Terminal Network System, SCBT is an especially important organization. It is desirable, therefore, that SCBT be composed of leaders and representatives of various sectors of the regional economy; and supplemented by participation of scholars, men of experience and professional consultants who are specialized in regional development and management.

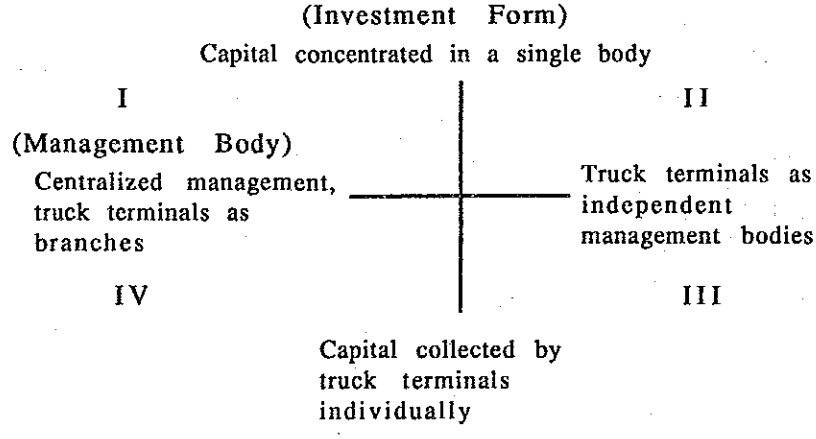
9.3.3 Analysis of Management System: From the Standpoint of Management Body and Investment Form

There are several forms of management system for regional truck terminals.

1) Two forms of management body can be considered: One is the centralized management in which truck terminals of various regions are managed as branches of a single management body, while in the other system respective terminals are managed as independent bodies according to their own policies.

2) Also, there are two forms of investment: One is the centralized system in which capital is concentrated in a single body to be shared by respective truck terminals according to their needs, while in the other system respective truck terminals collect capital individually. (See Fig. 9.3.2.)

Fig. 9.3.2 Management Body and Investment Form



Case I: A combination of centralized management with truck terminals as branches with capital concentrated in a single body: The centralized system with a single management embracing all regional terminals is favorable in terms of unified line report system. On the other hand, capital concentration requires a huge amount and it will be difficult to collect enough investors. The master plan and implementation schedule also needs to be completed. There is a great possibility that a centralized system will bring centralization of management power, and capital concentration will inevitably bring power centralization. Regional truck terminals should be run in close contact with the region, adopting regional characteristics, and responding to the needs and demands of the region.

Case II: A combination of truck terminals as independent management bodies with capital concentrated in a single body: As management bodies are independent according to each truck terminal, it is very natural that each terminal may operate with priority over others, which may detract from the basic objective of truck terminals as a unified and standardized operation.

Capital concentration may allow for checking each truck terminal in order to protect the interests of investors, but each terminal may operate on a self-centered management basis to secure its interests. Consequently, the basic target of the program is in danger of impediment.

Case III: A combination of truck terminals as independent management bodies with capital collected by truck terminals individually: Each truck terminal is run independently, both management and capital-wise. Thus even more self-centered management is expected than in Case II. However, this management system can be effective if those in management have thorough understanding of the basic targets of the truck terminals, and if they follow the guidance of SBCT in nationwide network of unified and standardized management and operation.

Case IV: A combination of the centralized system with capital collected by truck terminals individually: The advantage of a centralized system is a unified and standardized management throughout the land as mentioned previously. In the case of individual investment by each terminal will be constructed according to the regional needs and demands, and because capital will be collected individually.

Therefore, the study team recommends Case III Management System, that is, the combination of the standardized system supervised by SCBT with capital collected individually, in which truck terminals will be operated by an independent management system, and on a self-paying basis.

9.3.4 Desirable Management Body for Truck Terminals

For the management body several combinations are considered. They are as follows:

1) Management as government organizations,
2) Management as private enterprises, and
3) Management as government and private corporate organizations.

Generally speaking, government organizations are handicapped by lack of incentives for profit making but are better-equipped with effective line report system and capital mobilization ability. The following is preliminary attempt to evaluate characteristics of the above three types of management. (See Table 9.3.1.)

Table 9.3.1 Evaluation of Management Characteristics

	Capital (Mobiliza-bility)	Effective Mgm'nt	Effective Operation	(Note) Charge Level	User Promotion	Gov't Relations	Total Point
Gov't Organizations (including Local Government)	3	2	2	3	2	3	15
Private Organizations	1	3	3	1	3	1	12
Government & Private Corporate Organizations	3	3	3	2	3	3	17

Point 3: Higher feasibility or higher rate of efficient operation.
2: With some feasibilty or considered to be of average standard.
1: Unfeasible or below average standard. This category includes those which may improve with impact or impetus of some factors.

NOTE: As for charge levels, government organizatins may decide on the level which may not satisfy cost calculation, but private organizations have to center around profit making.

According to the above evaluation, the most desirable management body seems to be a government and private corporate organization. Incidentally, two types of management system for private sector under concession from the government have been offered in Thailand. The "Build, Operate and Transfer System" is suggested in the Concession Highway Project, and the other is the "Entrusted Operation System" adopted by the State Railways of Thailand.

9.3.5 Desirable Investment Form

This study so far has examined the desirability that management of truck terminals should be carried out by a unified and standardized nationwide system and that each truck terminal will be specialized in operation as an independent organization. It has also been discussed that if the management body should consist of a government and private corporate organization, the most effective management will be carried out for the advantages of both organizations. Thus joint investment by government bodies to keep close contact with SCBT and LTD in order to develop unified and standardized management and operation for all the country. At the same time, it will make it possible for management bodies to

conduct management in cooperation with private investors in the interests of truck terminals.

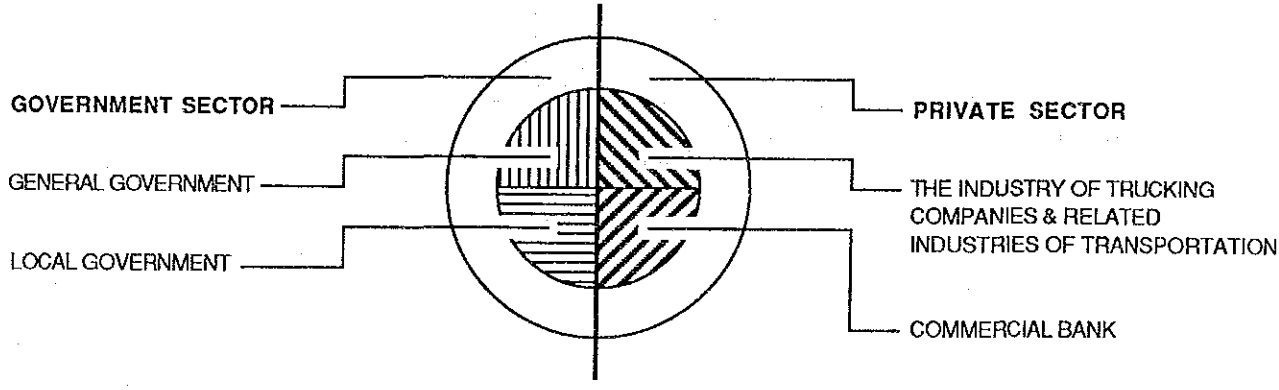
It is desirable to receive not only the central government's investment, but also regional government's investment as well. This is because regional government's participation helps in the coordination of benefits in the region.

Private investment makes it possible to utilize practical 'know-how' and the experience of private enterprises. Therefore, investment from truck transport industry and related industries should be given priority. In addition, it is needless to say that it will be easier to collect capital by encouraging financial enterprises and investment enterprises.

Possibility for investment only by private sectors depends on whether or not unified and standardized management and operation throughout the country will be possible, and whether there are enough private enterprises interested in investment. If these points are clarified, this investment form can be adopted. But at present, it is advisable to start with government and private cooperative organizations at first, and to aid management only by private investment, as nationwide truck terminal network will expand through effective advertisement of government and private cooperative organizations.

A model of joint construction investment for government and private cooperative organization is shown in Fig. 9.3.3.

Fig. 9.3.3 Model of Construction Investment for Government & Private Cooperative Organization



9.3.6 Outlook for Investment Situations

The Investment Incentives Law in force today in Thailand hardly provides incentives for medium and smaller scale new enterprises, and for new enterprises oriented to the domestic market. This law is aimed mainly at larger enterprises or foreign enterprises.

The content of incentives provided by the law, as seen in provisions such as "exemption from import tax in importation of raw materials and machinery, and corporate tax" is not relevant to promoting industries and enterprises located in

the provinces with the aim of expanding the domestic market.

For modernization and promotion of service sector in the provinces, it is necessary to provide not only tax privileges but also more government measures to aid new regional enterprises beset by a shortage of funds for facilitating equipment investment and financing operating capital.

Small scale enterprises in Thailand suffer a lack of internal reserve of capital. On setting up a new enterprise and business expansion, they have to resort to external financing. Some possibilities for raising capital are as follows:

1) Commercial Banks

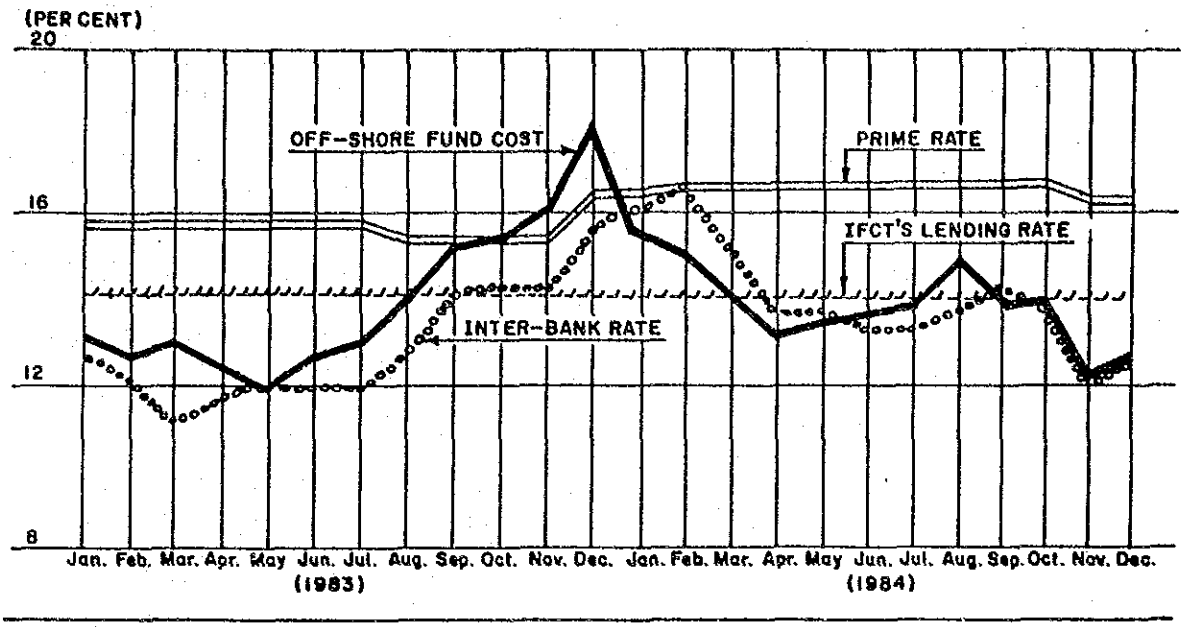
There are many commercial banks in Thailand, the bulk of their loans being in the form of short term commercial promissory notes with higher interest rates. The Bank of Thailand started a special low rate loan program through commercial banks, but the service has not been utilized extensively by commercial banks due to insufficient bookkeeping and collateral shortage on the part of enterprises. When accounting systems of enterprises are modernized, there will be greater utilization of the service by commercial banks.

2) The Industrial Finance Corporation of Thailand (IFCT)

The Industrial Finance Corporation of Thailand was established under the Industrial Finance Corporation of Thailand Act in 1959. The aims of IFCT are two-fold. They are: (a) to help private enterprises in Thailand in their establishment, expansion, and modernization; and (b) to promote participation of domestic as well as overseas private capital in Thai private investment. IFCT extends intermediate and long-term loans mainly on equipment investment. Loans for operating capital are not as a rule extended.

IFCT extends loans to private enterprises only. Enterprises of which more than one third of the stocks are held by the government or governmental agencies directly or indirectly, are not eligible as the recipients of loans. The minimum amount per loan is fixed at 1 million Baht and the payback period is 3 to 15 years with interest rate of around 13%. Land, buildings, machinery equipments, and bank securities, etc. are used as mortgages. IFCT is allowed to invest in private enterprises, but the amount must not exceed 10% of the total capital of the enterprise (refer to Fig. 9.3.4).

Fig. 9.3.4 Interest Rate Structure 1983 ~ 1984



SOURCE : ANNUAL REPORT 1984 OF IFCT

3) The Government and Government Related Agencies

There are three kinds of investment for investment through government and government related agencies. They are: (a) investment of the government's own funds, (b) capital investment of government loans from an international organization, and (c) investment in kind such as land, converted in current values, etc.

In case (a) the government may invest funds directly. It may also issue bonds, and by guaranteeing bonds, it can collect open market money. Government subsidies and loans (with no interest) may be included in case (a).

Case (b) is widely adopted. In Japan, the Overseas Economic Cooperation Fund (OECF) has a program which responds to requests at low interest. In case (c) the government and government related agencies draw their land in current prices into the capital. Sometimes they lease land on low rent, and sometimes offer it without cost. Investment in kind may be adopted by the private sector as well.

(Reference No. 1) Outline of Yen Loan of OECF

OECF loan is implemented by the request of the Thai government according to the listing of the Finance Ministry of the Thai government upon mutual consent. The request must be made to the National Economic Social Development Board at the same time. The Ministry of Finance receives the OECF loan and loans it to MOC or LTD.

At present the payback period is 30 years with interest rate at around 3% and a grace period of 10 years. Economic analysis and financial analysis need to be established for loan implementation and management planning material, advised by a professional management consultant, will be needed.

9.3.7 Desirable Investment Constituents for Truck Terminals

So far, the Study Team has reviewed investment situations in Thailand and now the Study Team will analyze the constituents of this investment.

First, on the assumption that IFCT loan constitutes a part of the investment: IFCT loan is extended only for private enterprises, and investment from government sources is limited to within one-third of total stocks. If private capital is not collected adequately, the investment capital will not be sufficient. Moreover, if interest rates continue to be around 13%, repayment will be difficult. If IFCT participates as an investor, it should be remembered that the amount is limited to only 10% of the total capital.

Second, on the assumption that private investment constitutes the entire investment: It might be said that under the present investment climate in Thailand, this case has very little possibility. While this case presupposes securing of investors' interests, it will be questionable if unified and standardized management for the country is possible. In order to develop a nationwide system, while taking into consideration the security of private investors' interests, SPCT and SCBT must exercise considerably strong supervision and leadership. When a definite outlook is acquired for formulation of nationwide unification and standardization, management utilizing private forces should be considered.

Third, on the assumption that the government and government-related agencies constitute the main part of the investment: In this case, the government invests its own funds or it invests on the security of foreign funds, and it may offer land depending on the locations of truck terminals. In addition to this investment, private investors such as the truck transport industry, related industries and open market financial agencies may participate in the investment. Furthermore, if makers and wholesalers participate in the investment and if they use truck terminal facilities, investment effectiveness will increase. Also capital investment from IFCT, limited to within 10% of the total capital will be possible.

Partial participation of government and government-related agencies will keep truck terminals in close relationship to SPCT, which originally formed the Master Plan, and to SBCT, which originally led the project. This, in turn, will facilitate formulation of a unified and standardized, nationwide Truck Terminal Network System. In addition, each truck terminal will be managed by the government and government-related agencies, and by private capital investors, thus the management will not seek only the interest of individual investors, but it will coordinate mutual interests. At the same time, each truck terminal will be able to maintain its own independency.

It may be said that the third assumption satisfies the desirable constituents of investment sources discussed so far.

Fig. 9.3.5 shows a model of the investors constituents, Tables 9.3.2 and 9.3.3 show investment constituents of Thailand and Japanese case.

Fig. 9.3.5 A Model of Investment

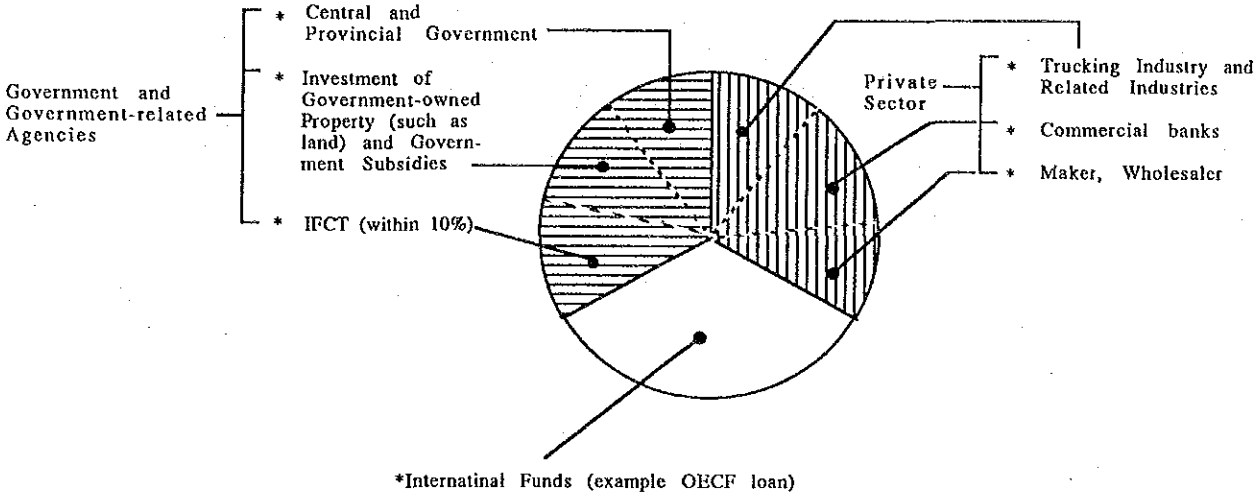


Table 9.3.2 Investment Constituents of the Feasibility Study on the 1st Stage Expressway System in the Greater Bangkok

(%)

Routes \ Investors	Government	Commercial Bank	OECF Loan
Dien Daen-Krontoi	42 (Note 1)	8	42
Ban Na-Krontoi	30 (Note 2)	20	50
CaoKanon-Krontoi			
Bridge Section	30 (Note 2)	8	62
Other sections	30 (Note 2)	17	53

Source: Data from Japanese Chamber of Commerce and Industry in Bangkok

Note 1: Government Subsidy
Note 2: Government Loan (no interest)

Table 9.3.3 Investment Constituents of Truck Terminal in Japan

(%, m^2)

	Small-size Truck Terminal	Medium-size Truck Terminal Note 2)	Large-size Truck Terminal Note 3)
Government	-	-	7.3 Note 4)
Local Government	70.0	32.2	47.1 Note 4)
Government-related Agencies	-	21.5	24.1
Group of Local Enterprises	-	2.1	-
Commercial Banks	18.0	17.9	2.0
Financial Agencies Note 1)	12.0	5.3	1.5
Transport Industries	-	13.6	11.5
Warehouse Industries	-	1.0	-
Petroleum Industries	-	6.4	6.5
For Reference: Size of Land	40,605	135,516	637,046
For Reference: Number of Berths	96	110	1,553

Source: Guidebook of Each Truck Terminal

Note 1: Except commercial banks
Note 2: Number of Terminals is 2.
Note 3: Number of Terminals is 4.
Note 4: Loan from the Government.

(Reference No. 1) Operation of Bus Terminals

Out of bus terminals spread throughout the Kingdom, 47 terminals, which account for about 80% are under direct control of LTD. 25% of revenue from the terminals are earmarked for the national revenue, while 75% are operation cost, of which 25% is re-distributed as maintenance expenses for bus terminals. Salaries of LTD personnel are paid by the national treasury, with only direct personnel expenses included in the operation cost.

A large number of bus terminals are erected by the government on a plot of land offered free by the landowner. That is to say, by offering the site as a terminal where many passengers come and go, the landowner can develop the adjacent land as well and obtains full benefits. The government also obtains benefit by not paying for the use of the land. Both gain benefits. Generally, the landowners run parking facilities, restaurants, souvenir shops, leasing of plotted land, and other businesses in neighboring areas.

(Reference No. 2) Land for Truck Terminals

Land prices are high in the city areas of the project Changwat as well as in Bangkok. The terminal sites selected for the project are, however, on the fringes and prices are still low. In other words, collateral value in investment is low. On top of this, most of the sites are owned by small scale farmers, except for a few exceptions. This means skyrocketing increase of adjacent plots and immediate selling for unplanned land utilization. In view of this, SPCT and SCBT should prepare development plans of adjacent areas in advance.

9.3.8 Corporate Organization of Truck Terminals

In Thailand there are corporate organizations based on the Civil and Commercial Law, such as Ordinary Partnership, Limited Partnership, and Limited Companies.

It has been considered that each truck terminal should be run by an independent management organization under the leadership of the Sub-Control Board on Truck Terminals and the Land Transport Department with investment from the government and private sector. Accordingly, the management should aim at profit-making, and a limited company is desirable for truck terminals.

Below is an outline of ways to set up a limited company:

1) Not less than 7 persons as founders (in the case of a public limited company, not less than 15 persons as founder).

2) Not more than 100 persons as shareholders (a shareholder's responsibility is limited to the face value of stocks in one's possession), and

3) The Board of Directors.

A company acquires a privilege of 5% tax discount by exposing its stocks to the public at the Securities Exchange of Thailand. As prerequisites for entry into the Security Exchange, the following are stipulated:

1) More than 20 million Baht of ordinary shareholders' paid capital,

2) More than 300 floating shareholders,

3) An amount of floating stocks accounting for more than 30% of paid-up capital, and

4) Business content of the company contributing to economic and social needs of the society.

The first step for setting up a new company is to register the articles of the company prepared by the founder at the Bangkok Registry of Partnership and Companies in the Ministry of Commerce, or at the provincial registries. The next step is to hold a general meeting of shareholders for establishment of the company and to register establishment of the company at the Ministry of commerce. At the time of registration a minimum of 25% of the registered capital must be paid. The registration at the Ministry of Commerce must be done within three months after the general meeting of shareholders. For factories, application for permit for construction must be made to the Department of Industrial Works, Ministry of Industry. Also, within thirty days after the completion of the construction permit for starting operation must be applied for and authorized. After the establishment of the company, registration of the payment of business tax must be carried out within thirty days, either from the time of establishment of the company or from the time of starting operation, whichever is the latest. Likewise, registration of the payment of corporate income tax must be filed within sixty days. Then a Taxpayer's Identification Number will be awarded.

There are the open stocks of the company and limited company. The latter can be established consisting of not less than 7 founders and less than 100 shareholders. Not considering expenses involved in actual opening of the enterprise, it must be operated in such a way that it can pay 35% of the net profit as corporate income tax and 2.5 - 3% business tax for operation as a property rental business (considering management of truck terminals as a leasing enterprise of facilities by the unit of berth as will be discussed later), and that it can distribute profit as dividend to investors, and also be able to pay back the loans.

If the truck terminal is operated as a non-profit-making company, it is exempt from corporate income tax payment. In such a case, however, investment from private sectors can hardly be mobilized.

9.3.9 Outlines of Taxes Relevant to Business Operation

Taxes related to business operation in Thailand are personal income tax, corporate income tax, business tax, municipality tax (business tax x 10%), revenue tax and others. The following outlines taxes principally related to the field:

1) Corporate Income Tax

A corporation is responsible for payment of corporate income tax for the net profit made by the business during a given fiscal year. In order to foster the local stock exchange market, those corporations which are listed on the Securities Exchange of Thailand pay 30%, while nonlisted corporations pay 35% as tax. Corporate tax is levied only on profit-making corporations. Non-profit-making corporations such as corporations for welfare of the general public are exempt from such duties.

2) Business Tax

Irrespective of whether individual or corporation, all entrepreneurs of businesses listed in Business Tax Ratio Table are responsible for payment of tax in accordance with the total sale, which is the total revenue, of the business.

Taxpayers shall be liable to register as business entrepreneurs, and to keep the books of all income and also keep complete records.

Tax payment should be completed each month by the fifteenth of the following month. Business Tax Ratio is shown in Table 9.3.4.

Table 9.3.4 Business Tax Ratio

Business Categories	Tax Payer	Tax Rate (%)
1. Sale & Retail of Commodities	Importer, Manufacturer, Wholesaler, Exporter	15.0 - 50.0
2. Rice Mills & Timber	Rice-mill owner	3.5 - 4.0
3. Stock exchange	Saw mill operator Seller	0.1
4. Construction	Construction bidder, Manager	3.0 - 10.0
5. Property rental	Proprietor, Owner	2.5 - 3.0
6. Warehousing	Manager	2.5
7. Hotel & Restaurant	Manager	2.0 - 15.0
8. Transport	Manager	0.5 - 2.0
9. Pawn Shop	Manager	2.5
10. Broker & Agent	Broker, Agent, Auctioneer	5.5
11. Real Estate Transaction	Seller	3.5
12. Banking	Manager	3.0 - 15.0
13. Insurance	Insurance dealer	2.5 - 3.0
14. Show Business	Business Proprietor	15.0 - 20.0

Source: Revenue Code

3) Stamp Tax

Thirty different kinds of documents listed in the Table of Stamp Tax Rates are liable for taxation. Related documents are listed as follows:

a) Receipts from Transfer of Rights related to Real Estate and vehicles.

b) Lease contracts, loan contracts, other contracts, checks, commissions, etc.

9.3.10 Outlines of Terms and Conditions of Labor Relations

The conditions and terms of labor relations are prescribed in "the Ministry of Interior Order concerning Protection of Laborers" in accordance with "the Revolutionary Council's Proclamation No. 103". According to the Order working hours should not exceed 48 hours per week. In the commercial retailing business sector, however, working hours are 54 hours. In respect of labor associated with possible danger and hazard, labor is restricted to within 42 hours. Holidays are not less than once a week, while more than 13 days of annual holidays including May Day and other national holidays are to be extended exclusive of weekly holidays. For those who have worked consecutively for more than one year, annual leave of 6 days and over, as well as sick leave of not more than 30 days are extended.

According to "The Basic Report on Wage Income" (samples: 307,312 laborers in 4,348 enterprises with more than 5 workers, excluding agriculture, surveyed by the Department of Labor, Ministry of Interior in 1985), 60% of laborers receive a monthly salary, while 36% are on daily wage basis. The average wage for all sectors throughout the Kingdom was 3,376 Baht/month, while the average salary inclusive of overtime allowance and others amounted to 4,102 Baht/month. In Transport, Warehousing & Communications sectors, average wage was 3,668 Baht/month, while average monthly salary was 3,827 Baht/month.

In terms of average salaries by regions, Bangkok ranked the highest, while outer regions registered lower figures. Taking the figure shown for Bangkok as 1, five provinces around Bangkok showed 0.975, the Central Region 0.735, the North 0.649, the Northeast 0.646, and the South 0.775 respectively.

As for compensation for industrial accidents, "the Industrial Accidents Compensation Fund" was established on the basis of "the Labor Act B.E. 2515". Compensation is paid to laborers involved in accidents while on duty out of the compensation fund set up with insurance premium collected from entrepreneurs by the government.

The program covers business enterprises (excluding those in agriculture and fisheries), hiring more than 20 laborers, throughout the Kingdom.

9.3.11 Rental Charges of Berths as a Principal Revenue Source of Truck Terminals

For good management of truck terminals, revenue from leasing and expenditures for the management and operation need to be well-balanced. Possible ways for revenue sources are as follows:

1) Ownership of Facilities Belongs to Trucking Companies

One way is to recover all the costs by selling in lots to users after completion of all facilities: Ownership belongs to GPCO until the completion of construction, when the ownership will be transferred to trucking companies. Trucking companies will inevitably operate the facilities for their own profit. Consequently, possibility increases for terminals not to be operated under the nationwide, unified and standardized system. Truck operators are considered to have little internal accumulation of capital. Since purchase of truck terminal facilities requires a great amount of cost, small trucking enterprises will not be able to afford to use truck terminals. Modernization of the trucking industry will not be expected.

In this case, truck terminal companies will have no reason to exist, and in the long run it may only offer maintenance service as its main area of service.

2) Truck Terminal Companies Engage in Whole Terminal Operation Activities

One way is for truck terminal companies to operate all the work of terminals and management of all related facilities themselves: if truck terminal companies conduct cargo handling in terminals, trucking companies' main business will be trucking only between terminals, eliminating present delivery services. It means decrease of revenue income. It also means that trucking companies cannot be responsible for complete transport from arrival to departure of trucks. On the other hand, truck terminal companies will have to employ many workers and staff members for its managing business, and expenditures will be subject to fluctuations.

3) Leasing Facilities According to the Amount Needed by Trucking Companies

One way is to lease terminal facilities based on a unit: Leasing facilities, such as cargo handling facilities, according to the amount needed by trucking companies, will make it possible for them to do business according to their capacities. Monthly (or yearly) rent will be much less than the cost of buying in lots. On the other hand, the terminal companies will be able to establish a long-range plan for paying dividends to investors and of repayment of loans. Also the number of management staff will not be influenced by the fluctuation of cargo flow, and it will lead to stabilized management.

Therefore, from the viewpoint of revenue, it is most desirable for regional truck terminals to be managed by lease contract, based on the number of units. The leasing system of each facility may be outlined as follows:

1) Rental charge for cargo handling facilities should be based on the number of berths used. Trucking companies, who will use truck terminals, will pay rent on the number of berths used. The rent includes office costs, roads of terminal ground which serve commonly benefit all users, minimum lots for vehicle parking, sanitary facilities, security guard, and costs for maintenance and operation of applicable facilities. On top of this, costs of the facility's operating office which is used by the truck terminal companies, are also included. However, costs for electricity, water, etc., which are used solely by individual trucking company should be borne by the beneficiaries.

2) Other attached facilities should be leased and charged by each facility. Facilities such as lodging facilities, fuel stations, vehicle washing facilities, repair shops, dining rooms, etc., are not directly related to the amount of cargo transport. Degree of usage of these facilities will vary with the management policy of each trucking company. Accordingly terminal companies desirably should have contracts with the third party for each of these facilities and should entrust the operation to them. Costs directly related to the operation should be borne by beneficiaries, but public expenses should be included in the rent.

Problems rest with how to group small scale trucking companies which can not afford a berth. They need to be grouped together in cooperation to form a large enough group to fit into this plan. SCBT and LTD should take the leadership in this matter, and once it is achieved it will contribute to modernization of the trucking industry.

Larger trucking companies may not like the leasing system. They may wish to buy a part of the terminal. From the viewpoint of financing, it may seem to be better, but in terms of management and operation of the terminal, such purchases may cause problems in the future. This is the point to which SPCT and SCBT should give careful consideration in the development of future construction and management.

As for handling of perishable fresh foods and cold storage items and those commodities which need warehouse facilities, new facilities should be installed. Distribution of these commodities requires additional functions on top of basic functions of terminals.

9.3.12 Basic System for Management and Operation of Truck Terminals

In summary, the following system is required under the Board of Directors for the operation of truck terminals.

1) Management and Planning Department

Four sections are necessary within the department.

a) General Administration Section in which recruitment of personnel, job placement, decision of salary, industrial accidents and other businesses are administered.

b) Accounting Section: Accounting centering around the control of income and expenditures.

c) Planning Section: Liaison and coordination with SCBT and intermediate and long-term planning of terminals.

d) Public Relations & Advertisement Section: In charge of advertisement relating to usage and public service of the terminals. This may seem unnecessary but is actually an important section that promulgates needs and significance of the truck terminals to the local community and solicits the use of trucking companies who have not utilized the facilities.

2) Instruction and Training Department

For efficient use of the terminals by trucking companies, it is required that gradual mechanization including that in cargo handling and loading and unloading will be implemented. The department will give instructions in such mechanization and train truck operators in rational business management. This is a sector indispensable for rational management of the terminals and its sophisticated development in the future. This department, however, does not yield profit by itself, like the General Management and Planning Department. Therefore, care should be taken so that maximum result is attained by a minimum number of staff. This unit can be run as a sub-division of General Management and Planning Department.

3) Service Department

The Service Department, besides repair and maintenance of facilities, controls and manages the facilities and equipments owned by the terminals for use by the trucking companies. Basic activities of the department cover the following: facilities operating office, sanitary facilities, dining rooms, stores and lodging facilities, fuel stations, vehicle service and maintenance facilities, vehicle washing facilities, vehicle parking lot and security guard for the facilities.

These activities should be entrusted to a third party as much as possible. The number of staff for the organization should be kept to a minimum. Repair and maintenance of the facilities need to be well-planned. Efforts should be made to constantly check the situation and the plans to keep the facilities in good condition to facilitate daily operation.

4) Information Department

Joint arrangement for terminal transport, arrangement for return-haul cargo, and truckage calculation and adjustment can be done promptly on the basis of accurate and quick information exchange.

By relieving trucking companies of these activities, the services will allow them to concentrate on transport itself, thus receiving more benefit from the business.

Such exchange of information can be done by utilizing the nationwide network, based on a standardized system of truck terminals. These activities can be considered as an income for the terminal which sells information.

9.3.13 Management Structure, Staff Required and Operation Cost

To sum up the preceding discussions, the structure indispensable for management of the truck terminal as a business enterprise is shown in Fig. 9.3.6.

As truck terminals are to be independent organizations according to the basic policy of the management, at least one Managing Director and a secretary will be required. Since the basic revenue source lies on berth lease and accompanying facilities lease basis the number of staff required for management and operation will not change even if some changes arise in the size of the terminal. Therefore, a manager, a chief staff member and an assistant staff member for each department will be needed to ensure smooth operation. If service facilities

are going to be entrusted and run as separate specialized business by outsiders, staff will not be required. In view of the above points, a generous staff placement in addition to a Managing Director and his secretary, will consist of 4 section managers, 9 chief staff members, 7 assistant staff members, and several security guards (possibly 3) and a janitor.

However, under tighter circumstances, to cut down operation costs, a situation where one person carries out the jobs of two may be considered. That is, a manager holds all the work in the Administration of Guidance Departments, and the chief of staff and the assistant staff also carry out jobs for two departments. If the remaining two departments follow likewise, 2 managers and 5 chief staff members will be able to operate all departments. In addition, since the terminal is on a 24 hour operation basis causing guards to work in shifts, 3 regular security guards are needed, requiring a minimum of 12 staff workers (Fig. 9.3.6).

The basic and standard organization and personnel should be applied commonly to all three regions of this study. Hat Yai/Songkhla Truck Terminal at present mainly handles exports of perishable fresh foods to Malaysia and Singapore. However, it also handles some imports. Therefore for smooth customs procedures and banking for money exchange, local agencies of related Ministries should be added to terminal operations. They may not be carried out by the Truck Terminal Company itself, but rather related local agencies could set up these offices in the terminal.

The estimated operation costs are given in Table 9.3.5. Personnel cost accounts for the bulk of operation cost. In this calculation, the case where one person carries out the jobs of two can be compared with the case of standard organization. This calculation shows that operation costs for the case in which one person carries out the jobs of two, is about half of the standard case. This will affect greatly the pay back period of the loan.

The basic data for calculation of operation costs is based on surveys made with the cooperation of the LTD Staff, and is taken from the top cost figure data. For a wide range of wages by regions, average wage index of regions, as given in the section of Terms and Conditions of Labor is used. For direct operation costs, the same data is used without giving consideration to regional variations.

Personnel costs and direct operational costs for three truck terminals are given as follows: (See Table 9.3.5 for details.)

(unit: Baht)

	Standard organization	Minimum Organization
Chiang Mai	1,531,600	773,800
Khon Kaen	1,524,600	770,200
Hat Yai/Songkhla	1,829,000	924,000

Operation costs of truck terminals also include repair and maintenance costs, common expenses, a corporation tax, a business tax, dividend, repayment, etc., which will be examined in the following section (9.3.14).

Table 9.3.5 Annual Operation Costs of Each Truck Terminal

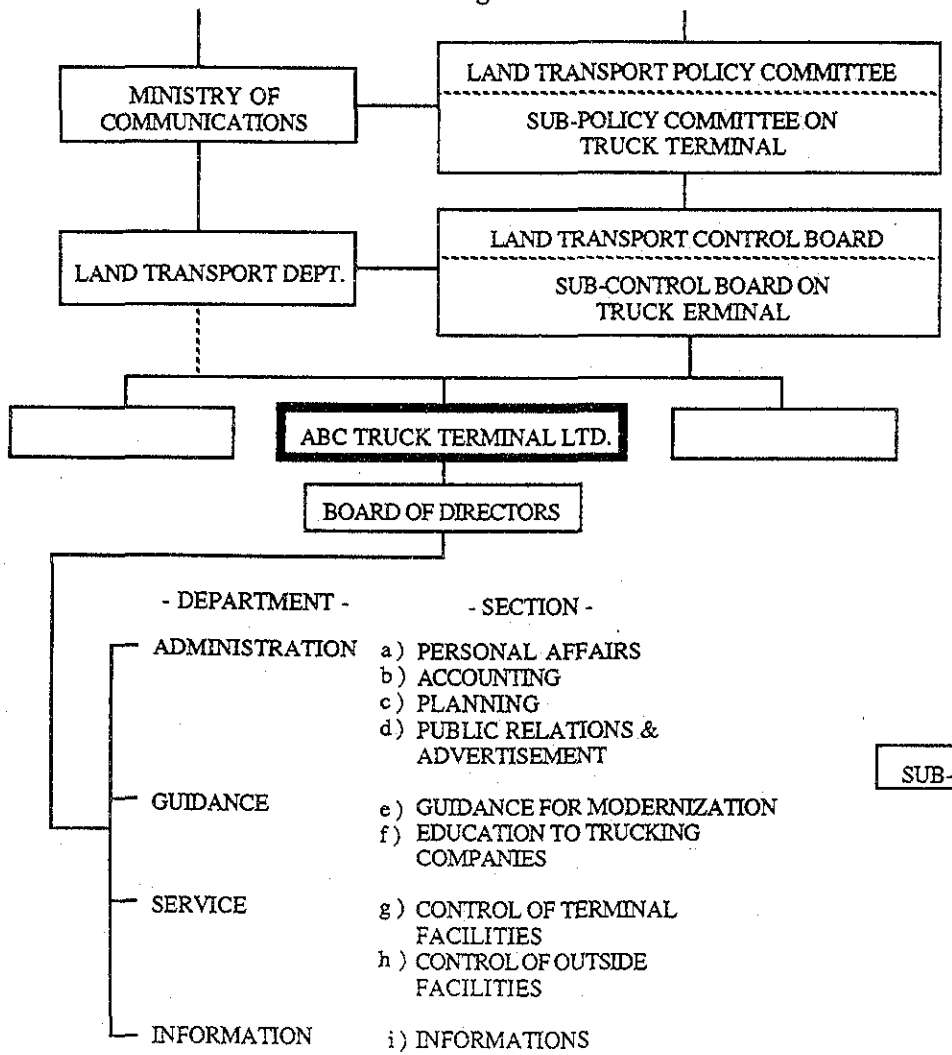
(unit : Baht/year)

Item	Model Wage	Parsonnel (persons) Standard	Minimum	Chiang Mai Standard	Minimum	Khon Kaen Standard	Minimum	Hat Yai/Songkhla Standard	Minimum
Wage:									
-Director General	200,000	1	1	129,800	129,800	129,200	129,200	155,000	155,000
-Secretery	128,250	1	1	83,200	83,200	82,800	82,800	99,400	99,400
-Manager	128,250	4	2	332,900	166,500	331,400	165,700	397,600	198,800
-Chief of Section	101,250	9	5	591,400	328,600	588,700	327,000	706,200	392,300
-Staff	67,500	7	0	306,700	---	305,200	---	366,200	---
-Janitor/guard	33,750	4	3	87,600	65,700	87,200	65,400	104,600	78,500
Sub-total	---	26	12	1,531,600	773,800	1,524,600	770,200	1,829,000	924,000
Overhead	100,000			100,000	100,000	100,000	100,000	100,000	100,000
Total				1,631,600	873,800	1,624,600	870,200	1,929,000	1,024,000

Note : The model wage figures, which were wages in Bangkok, were collected by LTD, and include one and half months of bonus

Fig. 9.3.6 Model of Organization and Members

- Model of Organization -



- Number of Member -

DIRECTOR GENERAL 1
SECRETARY 1

	Standard Model			Combined Model		
	Manager	Chief Staff	Staff	Manager	Chief Staff	Staff
a)	1	1	1	1	1	0
b)		1	1			0
c)		1	1		1	0
d)		1	1			0
e)	1	1	1		1	0
f)		1	1			0
g)	1	1	0	1	1	0
h)		1	0			0
i)	1	1	1		1	0
SUB-TOTAL	4	9	7	2	5	0

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9.3.14 Case Study for Truck Terminals for Trucking Companies

The management system of truck terminals has been discussed. A trucking company will not obtain any merit unless its management improves by the use of the truck terminal. It was noted how profit varies by the use of terminals.

The head office of the trucking company in this case study is located in a regional city about 700 km away from Bangkok. The premises for the case study are as follows:

- The number of owned vehicles is 5 and the number of hired vehicles is 15. All are 10-wheel trucks. A small car is owned for collecting and delivery in the area.

- Office building is 150 m^2 and 3 regular office clerks are employed.

- Work days are 300 days a year. Drivers make a trip in 4 days. When the transport efficiency rises after moving into the terminal, a trip will take only 3 days.

- Truck drivers receive a fixed salary of 2,300 Baht per month plus 150 Baht per one way trip. Office workers receive a salary of 7,500 Baht per month. For loading and unloading cargo by piece, the wage is 10 Baht per ton.

- Revenues from freight rates are 4,500 Baht per trip for general cargo, and 3,600 Baht per trip for other cargo. Charge for chartered truck is 80% of freight rate revenue.

- Running cost for fuel is 6.4 Baht/lit. and average running distance is 3.5 km/lit.

- Oil cost is 30 Baht/lit. with oil change at each 500 km and a tank capacity of 20 lit.

- Depreciation cost is 152,915 Baht per year.

- Cost for repair is 10% of annual depreciation value of vehicles.

- Tire cost is 4,060 Baht per set, tire life 55,000 km.

- Insurance cost is 14,000 Baht per year.

- Collection and delivery in the region:

  . The price of local vehicles for collection and delivery is one third the price of vehicles used on the main highway.

  . Running distance for local vehicles is 150 km per day, running cost for fuel is 8 Baht/lit. for a distance of 7 km/lit. Oil costs 10 Baht/lit. Tire costs is 1/6 that of main highway vehicles. Likewise, insurance cost is 2/5.

- Operation costs of the facilities:

  . 120,000 Baht per year including electrical expenses, water supply, and wages for 2 janitors.

- Facility rent: An ordinary shophouse of trucking company handles about 15,000 tons (please refer to Progress Report I, page 3-12) and the rent of shophouse is about 5,000 Baht/month.

- Proprietor tax: 35% of the recurring profit.

- Business tax and municipal tax: 2.75% of revenue income.

- Terminal charges is 130,000 Baht per year, maximal cargo handling is 53 ton/berth per day.

Estimates of fuel cost, oil, tires and of insurance are taken from data of "STUDY OF TRUCKING INDUSTRY; PHASE II", and other costs are derived from LTD data and the results of interviews.

The results of the following cases are compared as shown in Table 9.3.6.

Case I: No increase in freight volume is expected but the transport efficiency is fully enhanced.

Case II: Freight volume is increased by 20% but the transport efficiency is enhanced only 90% of Case I.

In Case I, net profit is expected to increase by 12.8% compared with "before" the use of a truck terminal.

In Case II, a profitability is improved from 7.7% to 8.1% and the net profit increases by 33.4%. Therefore, the use of a truck terminal is conceived to produce more profit to the trucking company.

9.3.15 Points to be Considered for Modernization of the Trucking Industry

SPCT, SCBT and truck terminal companies must execute necessary policies and measures for modernization of the trucking industry. Under present circumstances the trucking industry in Thailand has not established a nationwide information network. Therefore trucking demands are not immediately met with the present trucking supply system. Most of trucking suppliers are not organized and industrialized, and this may be a cause for delayed modernization of the trucking industry. To correct these problems the following schemes need to be enforced.

1) Systematization of Information on Trucking Demands

There are roughly two kinds of trucking demands: that is, large volume trucking demands on the main highway and small volume trucking demands within a region. If the demand arises regularly in a fixed quantity, trucking demand and supply will be balanced, but in reality this is not true of the present situation. This is due to the fact that the demand is not measured accurately. SCBT and truck terminal companies should more accurately grasp trucking demands in the region, collect information into

Table 9.3.6 Case Study of Cost-Benefit Analysis of the Trucking Company

		Present (A)		Case I: After the use of the Terminal (B)			Case II: After the use of the Terminal (C)		
Cargo Handled Volume (ton)		30,000		30,000		(B)/(A)	36,000		(C)/(A)
Revenue	Freight Revenue	12,150,000	(%)	12,150,000	(%)	(%)	14,400,000	(%)	(%)
	Chartered Truckage	7,020,000		6,120,000			7,920,000		
	Net revenue	5,130,000	100.0	6,030,000	100.0	117.5	6,480,000	100.0	126.3
Variable Expense	Fuel and Oil	1,023,000		1,364,000			1,364,000		
	Repair Charges	76,458		101,944			101,689		
	Tires	38,755		51,673			51,670		
	Other Expenses	10,000		10,000			15,000		
	Total Variable Expenses	1,148,213	22.4	1,527,617	25.3	133.0	1,532,359	23.6	133.5
Direct Fixed Expenses	Salaries & Wages	250,500		288,000			288,000		
	Depreciation Cost	764,575		764,575			764,575		
	Insurance for Trucks	70,000		70,000			70,000		
	Distribution Charges	861,220		861,220			990,403		
	Registration Tax	18,000		18,000			18,000		
	Other Expenses	6,000		6,000			10,000		
	Total Direct Expenses	1,970,295	38.4	2,007,795	33.3	101.9	2,140,978	33.0	108.7
Fixed Expenses (General Administrative Cost)	Salaries & Wages	131,400		131,400			131,400		
	Office Expenses	215,160		215,160			215,160		
	Facility-Operation Expenses	240,000		240,000			240,000		
	Terminal Charges (for local)	120,000		247,000			293,800		
	Terminal Charges (for Bangkok)	240,000		494,000			587,600		
	Social Expenses	300,000		300,000			330,000		
	Other Expenses	20,000		20,000			25,000		
	Total Fixed Expenses	1,266,560	24.7	1,647,560	27.3	130.1	1,822,960	28.1	143.9
Business Tax and Municipal Tax		141,075		165,825			178,200		
Grand Total Expenses		4,526,143	88.2	5,348,798	88.7	118.2	5,674,497	87.6	125.4
Receiving Profit (Operating Profit)		603,857	11.8	681,203	11.2	112.8	805,503	12.4	133.4
Income Tax		211,350		238,421			281,926		
Net Profit		392,507	7.7	442,782	7.3	112.8	523,577	8.1	133.4

one place, and thus study the most appropriate way to supply the demand. This will eliminate "one way" operation for trucking companies and thus in turn, from the national standpoint, reduce waste of transport resources. In other words, SCBT and truck terminal companies need to establish a system to furnish trucking companies with "information to assist with return cargo".

For small volume trucking demands within a region, demand and supply can be well-balanced by establishing a trucking system in which each truck terminal collects information and organizes a collection and delivery system along routes according to frequency and to the trucking demands. A collection and delivery system can be realized by selecting a small scale regional trucking company, not by the terminal company itself. A problem which may occur, that of increase in the trucking volume, may be solved by suggesting that trucking companies cooperate with each other.

2) Cooperation of Small Scale Trucking Companies

Terminal companies will adopt the lease system on the berth basis. This means that small scale trucking companies with inadequate cargo handling volume for a berth are unable to use the terminals. Therefore SCBT and truck terminal companies should facilitate cooperative work among these small companies. Cooperative work among multiple trucking companies makes it possible to meet local small volume demands with quick response. Cooperative collection and delivery will increase loading efficiency of vehicles and reduce the transport cost per unit. Consequently, income will increase. For this cooperative work, however, some preferential treatment and financial aid by the Government should be considered.

3) Positive Sales Promotion to Wholesalers and Makers

For wholesalers and makers who aim at strengthening the nationwide sales network, an important strategy for sales expansion is to shorten the required time between purchase demand and delivery of goods. Therefore it is desirable to locate a storehouse near an expected consumer city to deliver goods faster. If a truck terminal accommodates a Distribution Center to meet these needs, and if wholesalers and makers utilize the delivery network of trucking companies in a terminal, both will benefit. Furthermore, if trucking companies are entrusted to collect payment of goods as the agents of wholesalers and makers, the range of business for trucking companies will be expanded and more stable management will be expected.

9.4 Financial Analysis of Three Truck Terminals

Major elements to have effects on the financial situation of terminal operator are Terminal Charges, Investment and Operation/Maintenance Costs, Financing Plan and Loan Conditions and Government's Contribution to the terminal operation.

The criteria to evaluate the financial feasibility are ROI (Return on Investment) in a general aspect of the project feasibility and ROE (Return on Equity) in a specific aspect of the profitability to the invested share capital.

The DSCR (Debt Service Coverage Ratio) is another aspect to disclose the stability of the terminal management. The Break-even analysis also indicates a speed to recover the accumulated deficit and to turn surplus in cash flows.

The financial analysis on the selected three truck terminals are carried out following the flow diagram presented in Fig. 9.4.1.

9.4.1 Terminal Charges

1) Sources of Revenue

The terminal operating company basically provides direct and indirect services to terminal users. The former is those derived from such main facilities as platform and parking area. The latter comprises those from such affiliated facilities as cafeteria, lounge, petrol station and repair shop.

These two categories of terminal service can be major revenue sources of the terminal operation. The use of main facility is intimately related with the matter of cargo transport business, while that of affiliated facilities is concerned with welfare and convenience to drivers and other workers at the terminal, and trucking companies as well.

The function performed at a shophouse of trucking company at present is to be provided by the terminal's main facility. The function of the affiliated facilities proposed in the premises of the terminal is scattered around the existing shophouse or do not exist at all.

The terminal charge, therefore, should be divided into two. One is the charge owed by a terminal user company in terms of berth rental. The other is the charge owed by a beneficiary of the affiliated facilities, no matter who pays it individually or at company's cost as operation and welfare expenses.

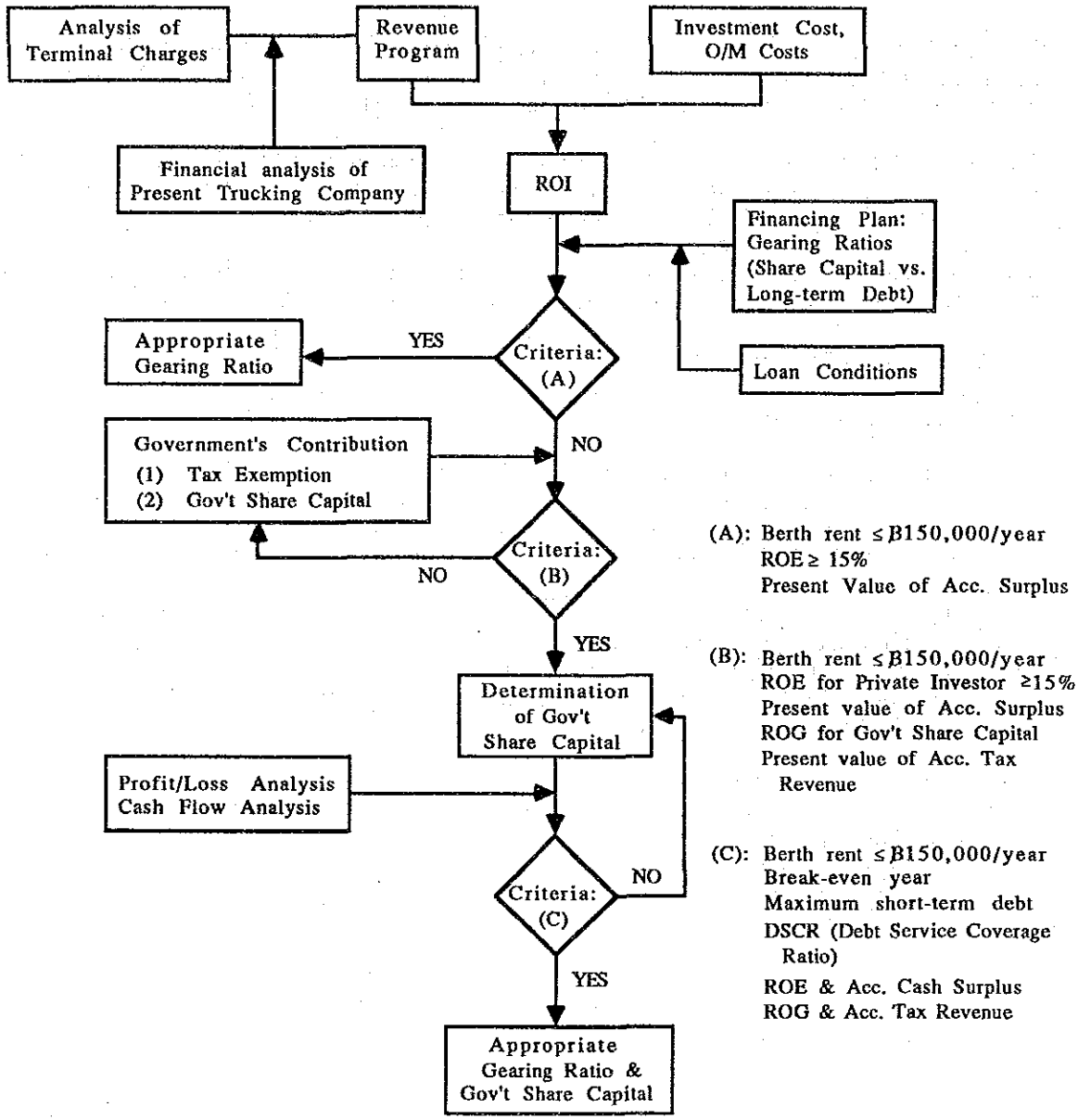
To simplify the terminal operation and management, it is assumed that the affiliated facilities will be leased to the third party at a minimal cost to compensate the investment for the affiliated facilities. The third party can, therefore, run a business with these facilities.

2) Rental Fees

a) Affiliated Facilities

Rental fees of the affiliated facilities are defined to make up for the facility construction and maintenance costs with a lower rate of return on investment (IRR) of 10% p.a.

Fig. 9.4.1 Methodological Flow Diagram of Financial Analysis



Notes: ROI = Return on Investment
ROE = Return on Equity
ROG = Return (tax revenue) on Government Share Capital

The lease demand for the facility is assumed to rise proportional to the number of line-haul trucks and an average rental fee represents various facility charges per square meter.

Consequently, the rental fees of the respective terminals are obtained as shown in Table 9.4.1

Table 9.4.1 Average Rental Fees for Affiliated Facilities

Terminal Name	Rental Fee in 1987 (Baht/M^2)
Chiang Mai	2,440
Khon Kaen	2,650
Hat Yai/Songkhla	3,120

b) Main Facility

The main facility consists of a platfort to be leased per berth and such facilities commonly used by berth lessees as parking areas, road and service path, green zone, access road and office space.

Therefore, the berth rental fee covers not only costs of platform construction and maintenance but also those of common facilities mentioned above.

In order to determine the berth rental fee it is imperative to investigate the allowable financial burden to a trucking company comparing the case that he leases some berths at the terminal with the case where he continues operation at a shophouse in the city.

As analyzed in section 9.3.14, the berth rent of ฿130,000/year barely retains the existing profitability (profit after tax/revenue), assuming that the existing shophouse handles 15,000 tons per year.

According to the interview survey conducted by the Study Team, an ordinary shophouse of trucking company handles about 12,000 tons to 18,000 tons per year (please refer to Progress Report I, page 3-12) and the rent of shophouse is about ฿5,000/month.

Therefore, when the average cargo handling volume of 15,000 tons/year per shophouse is taken for the financial analysis, the profitability becomes 7.7%. If the company uses the terminal at a berth rent of ฿130,000/year the profitability declines a little to 7.3%, but the net profit increases by 13%.

Provided that the amount of net profit, as a minimum requirement, should not be lowered from the present maximum allowable charge on berth usage is found not to exceed ฿150,000/year.

Consequently, it is determined that the berth rent should not exceed more than ฿150,000/berth per year and preferably it should be less than ฿130,00/berth per year.

3) Revenue Program and Operating Expenses

a) Revenue Program

Rental fees for both main facility and affiliated facilities are analyzed in terms of 1987 prices. The rise in these rental fees is assumed not because of price escalation but because of the improvement of productivity in transport services provided by the terminal. The increasing rate is considered to be 10% per every 3-year period and the rental fees also rise at the same rate and are to be revised every 3 years from 1987.

b) Operating Expenses

The operating expenses consist of administration, maintenance and repair costs. These costs are estimated previously in section 8.4.4 Table 8.4.13.

Depreciation costs are calculated by a straight line method with nil salvage value. The depreciable life of major buildings and facilities are defined according to the "Revenue Code" as shown below:

Land	Nil
Earth Work	Nil
Buildings	20 years
Consulting Fees	5 years

Taxes are levied on the sales revenue and on the net profit. The former is called sales or business tax with varying rates depending on business categories. The truck terminal operation is thought to belong to the property rental business of which business tax is 2.5% ~ 3.0%. The tax on a warehousing business is 2.5%, so that the business tax rate for the terminal operation is assumed to be 2.5% also.

In addition to the above business tax, a local tax is collected at a rate of 10% on the business tax. Eventually, 2.75% is imposed on the sales revenue.

The corporate income tax is levied on the net profit at a rate of 35.0%, if the company is not listed on the Securities Exchange of Thailand.

Consequently, revenue programs (berth rent: ฿130,000/year), depreciation schedule and operating expenses for the terminals in Chiang Mai, Khon Kaen and Hat Yai/Songkhla are prepared as shown in Appendix 9 (Table 4: Depreciation and Amortization Schedule; Table 5: Operating Revenue; Table 6: Operating Expenses).

4) Financial IRR

In order to analyze the profitability of the project on the total investment costs (ROI: Return on Investment), regardless of who owes the capital investment, financial IRRs (Internal Rate of Return) for the three truck terminals are obtained at various rates of berth rents as shown in Fig. 9.4.2. and Table 9.4.2.

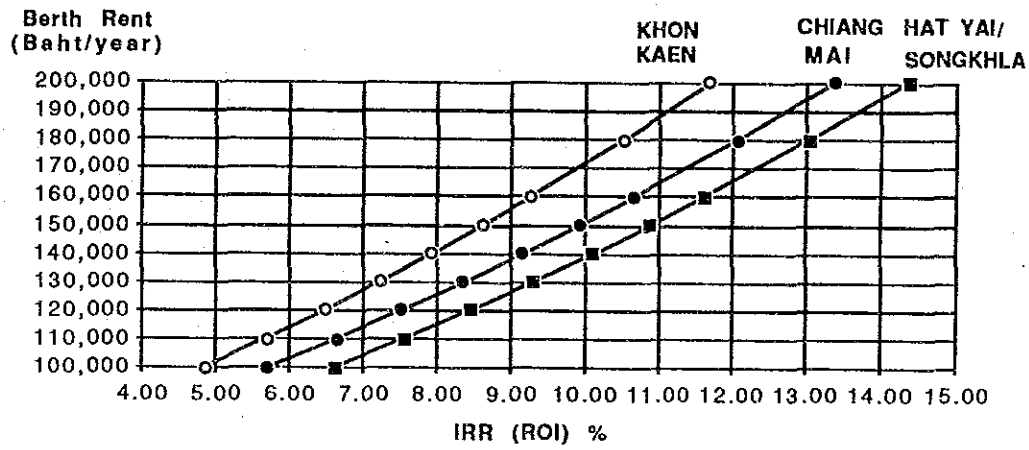
From the financial viewpoint the higher the rate of return, the more profitable it is to the terminal operator. A private investor is assumed to expect, at the minimum, a return on investment of more than 15%, which is a few percent higher than the prevailing interest rate of a short-term loan.

If the berth rent is set at a higher level it cannot be tolerable for the trucking company's management to absorb. Based on the previous analysis of the rental fee, it should be less than 130,000 to 150,000 Baht/berth per year.

Table 9.4.2 Relationship between Financial IRR and Berth Rent

RENTAL CHARGE (Baht/year)	ROI expressed by IRR (%)		
	CHIANG MAI	KHON KAEN	HAT YAI/ SONGKHLA
100,000	5.71	4.87	6.61
110,000	6.64	5.69	7.55
120,000	7.51	6.47	8.44
130,000	8.35	7.22	9.28
140,000	9.15	7.93	10.09
150,000	9.91	8.61	10.86
160,000	10.65	9.26	11.61
180,000	12.05	10.51	13.02
200,000	13.37	11.67	14.35

Fig. 9.4.2 Financial IRRs vs. Various Berth Rents



According to this IRR analysis it is found that the project is not attractive enough for the private sector to invest for their benefit.

Therefore, countermeasures to create an incentive for the private sector should be taken by the Government and this is already justified by the result of economic feasibility analysis of the project.

The countermeasures to be enumerated will include:

i) Application of a long-term loan with a low interest rate to the initial investment.

ii) Tax exemption from the terminal operation during an appropriate time of early operation.

iii) Government's participation to the share capital without dividend but the tax is assured as Government revenue.

These countermeasures are further analyzed in the later section of 9.4.3 and thereafter.

9.4.2 Capital Requirement and Financing Plan

1) Cost Projection and Initial Investment

The capital investment for the terminal construction has been estimated in the previous section 8.4 and its schedule of disbursement is prepared following the implementation schedule as shown in Appendix 9 (Table 1: Cost Projection).

In the financial analysis of the project, it is assumed that only the initial investment cost (1st stage construction) is procured by share capital and a long-term loan.

Therefore, the initial capital requirements in the total investment of the three truck terminals are as shown in Table 9.4.3.

Table 9.4.3 Capital Requirement for Initial Investment of Projects

Terminal Name	Investment Cost (1,000 Baht)		
	Initial	Second	Total
Chiang Mai	44,306	9,590	53,896
Khon Kaen	58,397	11,082	69,479
Hat Yai/Songkhla	76,76	22,78	99,634

2) Alternative Financing Plans

In order to improve the financial situation of the terminal operator and to enhance the incentive of the private sector to invest in the project, the application of a low interest long-term loan should be incorporated in the financing plan of the project. This means that the Government should support the project to introduce a foreign aid program and to guarantee the repayment of the loan.

If this long-term loan occupies a higher proportion of the initial investment amount the return on equity (share capital) can be improved, because of the lower rate of interest and the grace period during which repayment of the principal is excused.

Alternative financing plans are, therefore, assumed combining the share capital and the long-term loan with the following proportions (i.e., gearing ratio):

Gearing Ratio		Share capital (%)	Long-term Loan (%)
10:90	=	10	90
30:70	=	30	70
50:50	=	50	50
70:30	=	70	30
90:10	=	90	10
100: 0	=	100	0

3) Conditions of Long-term and Short-term Debt

In order to determine an optimal combination of financial sources of share capital (equity) and long-term loan, a criteria of the ROE* (Return on Equity) is employed. The ROE in this evaluation is defined to exceed more than 15% in order to attract the private investor for raising share capital.

The ROE is affected by a gearing ratio (proportion between the share capital and long-term loan) and a cash surplus which incorporate such factors as rental revenue, conditions of long-term and short-term loans.

Repayment conditions of these loans are assumed with reference to the present monetary market in Thailand and the loan conditions of foreign aid programs as given below:

Long-term loan : Interest rate is 3% p.a., grace period is 10 years and the equal repayment of principal during 20 years subsequent to the grace period.

Short-term loan : Interest rate is 12% p.a. and the principal is repaid in the following year.

9.4.3 Gearing Ratio and ROE

The procurement of a long-term low-interest loan is essential to secure a sound financial operation of the project on one hand. However, the increase in foreign debt from the international financing organization is not necessarily agreed by the Government on the other hand.

Therefore, a strong effort to induce private funds is expected to the maximum possible extent and to prepare conditions to attract it even for public investment projects in these days.

Several alternatives are considered combining gearing ratios and berth rents to obtain ROEs. The ROE which indicates the return on equity is anticipated to be

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Note * : ROE is defined to be an IRR (r). derived from the below equation:

$$\sum_{t=1}^{T} \frac{Et}{(1+r)^t} = \sum_{t=1}^{T} \frac{St}{(1+r)^t}$$

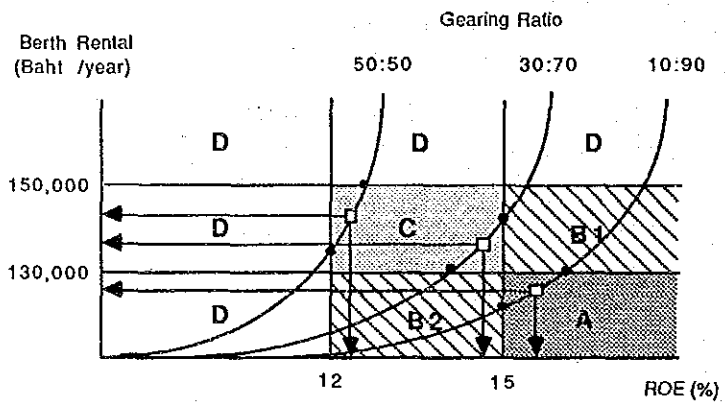
where, Et : Share capital in the year t
St : Cash surplus derived from the "Sources and Application of Funds"
T : Project life
r : ROE

more than 15% or at least 12% which is a prevailing rate of interest for short-term loan.

The berth rent, as discussed previously, should be less than 150,000 Baht/year or preferably less than 130,000 Baht/year.

Taking the above two criteria on ROE and berth rent the alternative gearing ratios are compared as shown in Fig. 9.4.3. and Tables 9.4.4 and 9.4.5.

The analytical result of the ROE-Berth Rent-Gearing Ratio relationship is categorized by the following zone ranks.



A : Generally acceptable
B1 : Acceptable by the terminal operator but barely acceptable by the berth lessee
B2 : Acceptable by the berth lessee but barely acceptable by the terminal operator
C: Barely acceptable by both terminal operator and berth lessee
D: Not acceptable

□: Optimal point of ROE and berth rent at a given gearing ratio

Table 9.4.4

Relationship between ROE and Berth Rent for Alternative Gearing Ratios

CHIANG MAI

RENTAL	ROI	ROE (%) at Gearing Ratios of :					
(Baht/Year)	(%)	10:90	30:70	50:50	70:30	90:10	100:0
100,000	5.71	9.60	6.39	5.10	4.20	3.54	3.27
110,000	6.64	12.45	8.14	6.36	5.24	4.42	4.09
120,000	7.51	14.61	9.58	7.49	6.19	5.25	4.87
130,000	8.35	16.57	10.93	8.56	7.08	6.03	5.60
140,000	9.15	18.54	12.20	9.55	7.94	6.76	6.28
150,000	9.91	20.47	13.41	10.50	8.72	7.45	6.94
160,000	10.65	22.37	14.55	11.37	9.47	8.12	7.57
180,000	12.05	25.89	16.64	13.04	10.91	9.39	8.78
200,000	13.37	29.22	18.63	14.61	12.27	10.58	9.89

KHON KAEN

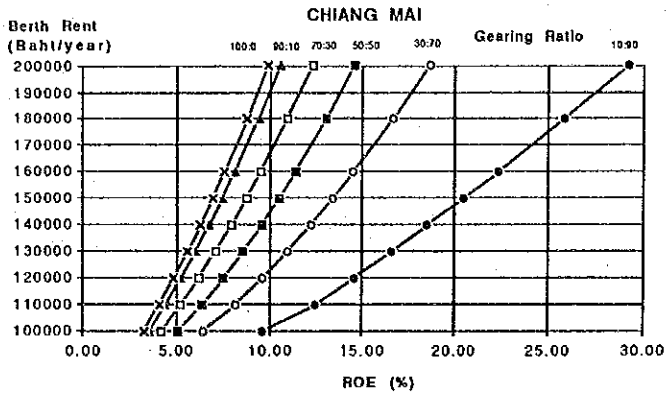
RENTAL	ROI	ROE (%) at Gearing Ratios of :					
(Baht/Year)	(%)	10:90	30:70	50:50	70:30	90:10	100:0
100,000	4.87	6.37	4.68	3.91	3.24	2.71	2.49
110,000	5.69	9.80	6.48	5.10	4.18	3.50	3.22
120,000	6.47	12.22	7.85	6.13	5.04	4.24	3.92
130,000	7.22	14.06	9.07	7.08	5.84	4.94	4.57
140,000	7.93	15.76	10.21	7.98	6.60	5.60	5.19
150,000	8.61	17.48	11.29	8.82	7.32	6.22	5.78
160,000	9.26	19.18	12.31	9.62	7.99	6.81	6.34
180,000	10.51	22.37	14.17	11.08	9.26	7.95	7.42
200,000	11.67	25.29	15.88	12.44	10.45	9.01	8.43

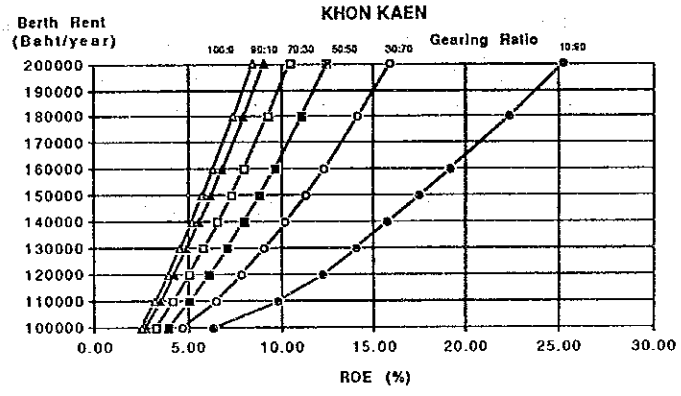
HAT YAI/SONGKHLA

RENTAL	ROI	ROE (%) at Gearing Ratios of :					
(Baht/Year)	(%)	10:90	30:70	50:50	70:30	90:10	100:0
100,000	6.61	10.95	7.23	5.83	4.93	4.26	3.99
110,000	7.55	13.69	9.04	7.17	6.02	5.19	4.85
120,000	8.44	15.85	10.45	8.33	7.00	6.05	5.66
130,000	9.28	17.60	11.75	9.40	7.92	6.85	6.41
140,000	10.09	19.31	12.99	10.41	8.78	7.60	7.13
150,000	10.86	21.13	14.17	11.36	9.60	8.31	7.79
160,000	11.61	22.94	15.31	12.28	10.37	8.99	8.43
180,000	13.02	26.51	17.43	13.95	11.81	10.27	9.65
200,000	14.35	29.98	19.42	15.54	13.18	11.49	10.81

Fig. 9.4.3

Relationship between ROE and Berth Rent for Alternative Gearing Ratios





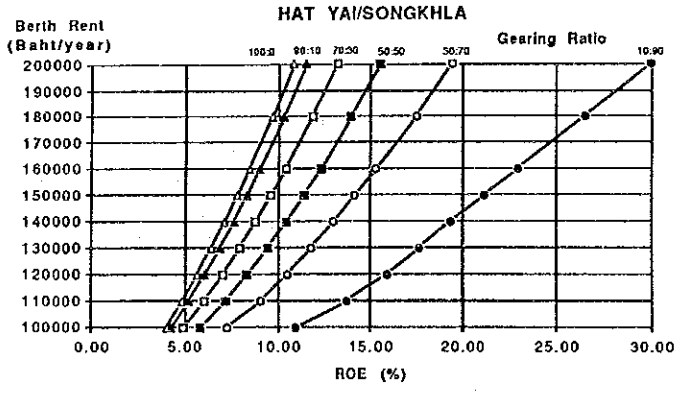


Table 9.4.5 Preferable Gearing Ratio and Optimum ROE and Berth Rent

Gearing Ratio	Zone Rank	Chiang Mai	Zone Rank	Khon Kaen	Zone Rank	Hat Yai/ Songkhla
10:90	A	(ROE: 16%) (Rent: 124,000)	C	(ROE: 14.5%) (Rent: 132,000)	A	(ROE: 16%) (Rent: 123,000)
30:70	C	(ROE: 13%) (Rent: 145,000)	D	---	C	(ROE: 13.0%) (Rent: 140,000)
50:50	D	---	D	---	D	---
70:30	D	---	D	---	D	---
90:10	D	---	D	---	D	---
100:0	D	---	D	---	D	---

Eventually, the long-term loan will be required for 90% or more of the total initial investment amount in order to attain the categorized rank A zone (ROE: over 15%; Berth rent: below ฿130,000/year). As long as the Government hopes the private sector will participate further in the project investment, additional countermeasures to improve the financial condition of the terminal operation are urged. The effort to introduce the long-term loan by the Government is not sufficient by itself to induce private funds for implementing the project.

In this sense, a share capital should be more than 50% of the initial capital requirement.

A base case is therefore established adopting the above gearing ratio (50:50) and the berth rent of 130,000 Baht/year for the subsequent financial analyses and comparison of alternative countermeasures.

9.4.4 Requirement of Government's Contribution

Aside from the Government's guarantee to the long-term loan, additional contribution of the Government will be required in order to improve the profitability of terminal operation.

Among others, i) Tax exemption and ii) Participation in share holding without dividend are taken as the alternative cases to improve the profitability and discussed further below.

1) Tax Exemption

Assumptions are made as follows:

i) Sales tax (business tax plus local tax) is exempted for 5 years since the operating revenue emerges; and

ii) Corporate income tax is exempted for 5 years since the net profit becomes surplus.

The effect of the above tax exemption is presented in Table 9.4.6. The tax revenue and cash surplus are calculated in terms of accumulated present values discounted at 15% for the project life span of 20 years.

The tax exempted amounts to about 15% to 30% of the original tax revenue and the cash surplus increases 8% to 18% of the original cash surplus, depending on the alternative gearing ratios. These effects on the improvement of ROE is relatively small ranging about 5% to 10%. The elasticity coefficient is, therefore, small to indicate -0.3, which means that 1% decrease in tax revenue contribute to the increase in ROE by 0.3%.

Furthermore, it can be said that the counter-measure of this tax exemption could not reach a sufficient ROE exceeding 15%, despite the abandonment of tax revenue by 30%.

The extension of exemption period may be one of solutions to boost the ROE. However, the provision of tax privilege for a long time may not be acceptable for the Government administration and a sound development of the terminal management.

Consequently, it is considered that the tax exemption measure should not be employed as a principal measure but as a supplementary measure.

2) Government's Participation Required in Share Capital

The participation of the Government in the terminal management has been recommended previously in section 9.3.4 of "Desirable Management Body for Truck Terminal". To maintain the Government's function in terminal operation it is desirable that the Government shares the capital investment for the project.

However, if the Government expects a profit in a same manner and a rate as the private sector this is hardly realized except for borrowing a low interest long-term loan accounting for more or less 90% of the initial investment cost.

Providing the Government does not agree to increase the foreign debt, a measure that the Government shares the investment capital which is recovered not by a dividend but by a tax revenue should be considered to improve the ROE for attracting private investors.

Table 9.4.7 shows the percentage composition of the Government share required to improve the ROE of private investors upto 15%.

According to the above analysis, 55% of the total share capital is required to the Government for Chiang Mai Terminal with a berth rent of ฿130,000/year and gearing ratio of 50:50.

Table 9.4.6 Effects of Tax Exemption Measure

CHIANG MAI

Berth Rent (Baht/year)	Gearing Ratio (%)	WITHOUT "Tax Exemption" Tax* Revenue	Cash* Surplus	ROE (%)	WITH "Tax Exemption" Tax* Revenue	Cash* Surplus	ROE (%)	Changes (%) Tax Revenue	Cash Surplus	ROE	Elasticity (ROE/Tax)
100,000	10:90	1,804,524	1,329,315	9.6	1,162,415	1,892,632	11.4	-35.6	42.4	18.8	-0.5
	30:70	1,996,095	2,373,901	6.4	1,179,191	3,130,756	7.7	-40.9	31.9	21.2	-0.5
	50:50	2,159,214	3,405,228	5.1	1,655,156	3,871,866	5.6	-23.3	13.7	10.0	-0.4
	70:30	2,319,372	4,405,850	4.2	1,695,825	5,014,179	4.7	-26.9	13.8	11.4	-0.4
	90:10	2,451,226	5,469,237	3.5	1,736,494	6,179,801	4.0	-29.2	13.0	13.1	-0.4
	100:0	2,514,976	6,013,476	3.3	1,756,828	6,771,624	3.7	-30.1	12.6	13.9	-0.5
110,000	10:90	2,187,560	2,268,268	12.4	1,769,893	2,620,386	13.3	-19.1	15.5	6.7	-0.4
	30:70	2,386,010	3,359,883	8.1	1,807,531	3,895,995	8.9	-24.2	16.0	8.8	-0.4
	50:50	2,545,937	4,455,660	6.4	1,846,752	5,138,509	7.0	-27.5	15.3	9.9	-0.4
	70:30	2,677,791	5,519,046	5.2	1,887,421	6,305,196	5.8	-29.5	14.2	11.1	-0.4
	90:10	2,798,376	6,618,555	4.4	1,928,090	7,488,841	5.0	-31.1	13.1	12.5	-0.4
	100:0	2,856,973	7,172,116	4.1	1,948,424	8,080,664	4.6	-31.8	12.7	13.2	-0.4
120,000	10:90	2,602,496	3,223,362	14.6	1,961,177	3,813,742	15.8	-24.6	18.3	8.0	-0.3
	30:70	2,772,030	4,406,569	9.6	1,998,816	5,160,628	10.5	-27.9	17.1	9.1	-0.3
	50:50	2,903,453	5,567,384	7.5	2,038,037	6,428,510	8.2	-29.8	15.5	9.9	-0.3
	70:30	3,022,300	6,668,561	6.2	2,078,706	7,612,155	6.9	-31.2	14.1	11.0	-0.4
	90:10	3,155,701	7,759,475	5.2	2,283,620	8,631,556	5.8	-27.6	11.2	9.7	-0.4
	100:0	3,225,797	8,301,536	4.9	2,309,386	9,217,947	5.4	-28.4	11.0	10.3	-0.4
130,000	10:90	2,998,955	4,249,902	16.6	2,152,852	5,071,336	18.1	-28.2	19.3	9.0	-0.3
	30:70	3,130,089	5,517,098	10.9	2,190,491	6,446,183	11.9	-30.0	16.8	9.4	-0.3
	50:50	3,246,614	6,719,238	8.6	2,229,712	7,736,140	9.4	-31.3	15.1	10.0	-0.3
	70:30	3,384,991	7,805,175	7.1	2,448,008	8,742,158	7.7	-27.7	12.0	8.9	-0.3
	90:10	3,525,183	8,889,298	6.0	2,877,864	9,536,617	6.4	-18.4	7.3	5.4	-0.3
	100:0	3,610,966	9,415,671	5.6	2,917,765	10,108,872	5.9	-19.2	7.4	5.8	-0.3
140,000	10:90	3,357,924	5,356,431	18.5	2,514,671	6,186,606	20.0	-25.1	15.5	8.0	-0.3
	30:70	3,476,680	6,659,715	12.2	2,562,537	7,573,857	13.2	-26.3	13.7	7.8	-0.3
	50:50	3,614,771	7,851,717	9.6	2,612,318	8,854,171	10.4	-27.7	12.8	8.4	-0.3
	70:30	3,754,963	8,935,840	7.9	3,071,059	9,619,744	8.3	-18.2	7.7	5.2	-0.3
	90:10	3,951,578	9,963,539	6.8	3,150,862	10,764,255	7.2	-20.3	8.0	6.0	-0.3
	100:0	4,050,106	10,477,168	6.3	3,190,764	11,336,510	6.7	-21.2	8.2	6.4	-0.3
150,000	10:90	3,710,594	6,485,524	20.5	2,730,483	7,460,638	22.2	-26.4	15.0	8.3	-0.3
	30:70	3,846,306	7,791,200	13.4	3,186,322	8,451,185	14.1	-17.2	8.5	5.0	-0.3
	50:50	3,996,781	8,970,820	10.5	3,264,025	9,703,575	11.0	-18.3	8.2	5.2	-0.3
	70:30	4,193,837	9,998,078	8.7	3,343,829	10,848,086	9.2	-20.3	8.5	5.8	-0.3
	90:10	4,390,893	11,025,336	7.4	3,423,632	11,992,597	7.9	-22.0	8.8	6.6	-0.3
	100:0	4,489,421	11,538,965	6.9	3,463,534	12,564,853	7.4	-22.9	8.9	6.9	-0.3

Note : * Accumulated present value of Baht discounted at 15% p.a.

KHON KAEN

Berth Rent (Baht/year)	Gearing Ratio (%)	WITHOUT "Tax Exemption" Tax* Revenue	Cash* Surplus	ROE (%)	WITH "Tax Exemption" Tax* Revenue	Cash* Surplus	ROE (%)	Changes (%) Tax Revenue	Cash Surplus	ROE	Elasticity (ROE/Tax)
100,000	10:90	1,946,190	892,358	6.4	1,215,956	1,509,654	8.8	-37.5	69.2	37.8	-1.0
	30:70	2,268,332	2,252,430	4.7	1,383,363	3,057,901	6.0	-39.0	35.8	28.4	-0.7
	50:50	2,479,473	3,652,779	3.9	1,939,370	4,136,462	4.4	-21.8	13.2	11.9	-0.5
	70:30	2,710,950	4,925,329	3.2	1,992,973	5,618,338	3.7	-26.5	14.1	13.9	-0.5
	90:10	2,889,368	6,314,992	2.7	2,046,576	7,146,804	3.2	-29.2	13.2	16.2	-0.6
	100:0	2,974,731	7,025,491	2.5	2,073,378	7,926,345	2.9	-30.3	12.8	17.1	-0.6
110,000	10:90	2,415,190	1,839,103	9.8	1,493,292	2,666,962	11.7	-38.2	45.0	19.9	-0.5
	30:70	2,668,387	3,339,325	6.5	2,101,597	3,841,198	7.1	-21.2	15.0	9.3	-0.4
	50:50	2,933,546	4,752,255	5.1	2,152,185	5,504,198	5.7	-26.6	15.8	11.2	-0.4
	70:30	3,113,128	6,137,344	4.2	2,205,788	7,027,136	4.7	-29.1	14.5	12.9	-0.4
	90:10	3,277,107	7,569,503	3.5	2,259,391	8,587,219	4.0	-31.1	13.4	14.5	-0.5
	100:0	3,354,339	8,299,113	3.2	2,286,192	9,367,260	3.7	-31.8	12.9	15.5	-0.5
120,000	10:90	2,835,448	2,883,453	12.2	2,266,067	3,374,402	13.1	-20.1	17.0	7.4	-0.4
	30:70	3,144,127	4,399,975	7.8	2,314,066	5,185,482	8.6	-26.4	17.9	9.9	-0.4
	50:50	3,335,883	5,958,061	6.1	2,364,653	6,909,878	6.8	-29.1	16.0	10.9	-0.4
	70:30	3,501,273	7,382,223	5.0	2,418,256	8,465,239	5.6	-30.9	14.7	12.1	-0.4
	90:10	3,658,381	8,838,800	4.2	2,664,515	9,832,666	4.7	-27.2	11.2	10.7	-0.4
	100:0	3,750,769	9,553,254	3.9	2,698,475	10,605,549	4.4	-28.1	11.0	11.5	-0.4
130,000	10:90	3,333,776	3,901,569	14.1	2,478,969	4,688,424	15.3	-25.6	20.2	8.8	-0.3
	30:70	3,560,158	5,574,326	9.1	2,526,967	6,584,062	10.0	-29.0	18.1	9.9	-0.3
	50:50	3,725,872	7,195,688	7.1	2,577,555	8,344,004	7.8	-30.8	16.0	10.6	-0.3
	70:30	3,882,880	8,652,365	5.8	2,836,435	9,698,810	6.4	-27.0	12.1	9.4	-0.3
	90:10	4,067,657	10,081,274	4.9	2,904,355	11,244,575	5.5	-28.6	11.5	10.7	-0.4
	100:0	4,160,045	10,795,728	4.6	3,392,479	11,563,295	4.9	-18.5	7.1	6.1	-0.3
140,000	10:90	3,785,470	5,006,990	15.8	2,691,784	6,068,951	17.3	-28.9	21.2	9.7	-0.3
	30:70	3,955,389	6,800,848	10.2	2,739,782	8,004,318	11.2	-30.7	17.7	9.9	-0.3
	50:50	4,107,923	8,466,866	8.0	3,008,268	9,566,521	8.7	-26.8	13.0	8.5	-0.3
	70:30	4,292,700	9,895,774	6.6	3,076,188	11,112,286	7.2	-28.3	12.3	9.5	-0.3
	90:10	4,491,248	11,310,912	5.6	3,643,148	12,159,012	5.9	-18.9	7.5	5.9	-0.3
	100:0	4,621,111	11,987,892	5.2	3,695,740	12,913,263	5.5	-20.0	7.7	6.4	-0.3
150,000	10:90	4,183,573	6,218,081	17.5	2,904,566	7,480,282	19.2	-30.6	20.3	10.0	-0.3
	30:70	4,336,948	8,058,844	11.3	3,183,715	9,210,769	12.2	-26.6	14.3	8.1	-0.3
	50:50	4,517,352	9,711,128	8.8	3,247,988	10,980,492	9.6	-28.1	13.1	8.7	-0.3
	70:30	4,716,214	11,125,952	7.3	3,840,972	12,001,194	7.7	-18.6	7.9	5.4	-0.3
	90:10	4,975,940	12,479,911	6.2	3,946,155	13,509,696	6.6	-20.7	8.3	6.4	-0.3
	100:0	5,105,803	13,156,891	5.8	3,998,747	14,263,947	6.2	-21.7	8.4	6.9	-0.3

Note : * Accumulated present value of Baht discounted at 15% p.a.

Table 9.4.6 Effects of Tax Exemption Measure (continued)

HAT YAI/SONGKHLA

Berth Rent (Baht/year)	Gearing Ratio (%)	WITHOUT "Tax Exemption" Tax* Revenue	Cash* Surplus	ROE (%)	WITH "Tax Exemption" Tax* Revenue	Cash* Surplus	ROE (%)	Changes (%) Tax Revenue	Cash Surplus	ROE	Elasticity (ROE/Tax)
100,000	10:90	3,669,871	2,748,699	11.0	2,461,323	3,809,982	12.7	-32.9	38.6	16.3	-0.5
	30:70	4,042,172	4,452,619	7.2	2,490,659	5,881,092	8.6	-38.4	32.1	19.4	-0.5
	50:50	4,327,040	6,106,288	5.8	2,870,130	7,458,269	6.8	-33.7	22.1	16.6	-0.5
	70:30	4,667,764	7,678,531	4.9	3,640,639	8,619,975	5.4	-22.0	12.3	9.8	-0.4
	90:10	4,980,414	9,344,095	4.3	3,711,094	10,560,973	4.7	-25.5	13.0	11.3	-0.4
	100:0	5,112,328	10,227,550	4.0	3,746,321	11,554,764	4.5	-26.7	13.0	11.9	-0.4
110,000	10:90	4,462,437	4,468,631	13.7	2,708,076	6,090,265	15.7	-39.3	36.3	14.4	-0.4
	30:70	4,783,218	6,290,519	9.0	3,902,786	7,061,560	9.6	-18.4	12.3	6.7	-0.4
	50:50	5,174,723	7,892,762	7.2	3,972,004	9,009,210	7.8	-23.2	14.1	8.7	-0.4
	70:30	5,478,550	9,573,614	6.0	4,042,459	10,954,583	6.6	-26.2	14.4	10.0	-0.4
	90:10	5,731,989	11,365,008	5.2	4,112,914	12,953,203	5.8	-28.2	14.0	11.0	-0.4
	100:0	5,846,201	12,286,113	4.9	4,148,141	13,959,314	5.4	-29.0	13.6	11.6	-0.4
120,000	10:90	5,249,929	6,258,350	15.8	4,238,229	7,148,653	16.8	-19.3	14.2	6.0	-0.3
	30:70	5,671,045	8,038,468	10.4	4,303,958	9,315,108	11.3	-24.1	15.9	8.0	-0.3
	50:50	5,973,105	9,803,346	8.3	4,373,176	11,349,712	9.1	-26.8	15.8	9.2	-0.3
	70:30	6,220,609	11,604,258	7.0	4,443,631	13,348,319	7.7	-28.6	15.0	10.1	-0.4
	90:10	6,448,763	13,450,519	6.1	4,514,086	15,374,234	6.7	-30.0	14.3	10.9	-0.4
	100:0	6,563,252	14,388,364	5.7	4,900,752	16,048,068	6.2	-25.3	11.5	8.8	-0.3
130,000	10:90	6,143,656	7,999,760	17.6	4,640,224	9,398,427	18.9	-24.5	17.5	7.6	-0.3
	30:70	6,466,562	9,955,393	11.7	4,705,953	11,660,674	12.8	-27.2	17.1	8.7	-0.3
	50:50	6,710,054	11,844,934	9.4	4,775,171	13,744,861	10.3	-28.8	16.0	9.4	-0.3
	70:30	6,938,465	13,687,332	7.9	4,845,625	15,771,666	8.7	-30.2	15.2	10.0	-0.3
	90:10	7,184,258	15,554,047	6.8	5,306,599	17,431,706	7.4	-26.1	12.1	8.6	-0.3
	100:0	7,305,692	16,493,114	6.4	5,351,236	18,447,570	7.0	-26.8	11.9	9.0	-0.3
140,000	10:90	6,956,055	9,885,019	19.3	5,042,044	11,739,561	21.0	-27.5	18.8	8.8	-0.3
	30:70	7,200,947	12,002,229	13.0	5,107,773	14,058,394	14.1	-29.1	17.1	9.0	-0.3
	50:50	7,429,271	13,928,914	10.4	5,578,362	15,770,382	11.2	-24.9	13.2	7.6	-0.3
	70:30	7,680,821	15,788,923	8.8	5,667,635	17,802,109	9.5	-26.2	12.8	8.2	-0.3
	90:10	7,923,690	17,667,068	7.6	6,652,107	18,938,651	8.0	-16.0	7.2	4.6	-0.3
	100:0	8,048,024	18,603,234	7.1	6,721,232	19,930,026	7.5	-16.5	7.1	4.8	-0.3
150,000	10:90	7,692,228	11,921,803	21.1	5,443,806	14,131,176	23.1	-29.2	18.5	9.3	-0.3
	30:70	7,928,636	14,078,496	14.2	5,940,836	16,049,546	15.2	-25.1	14.0	7.6	-0.3
	50:50	8,176,689	16,025,104	11.4	6,028,614	18,173,179	12.3	-26.3	13.4	8.0	-0.3
	70:30	8,419,557	17,903,236	9.6	7,078,022	19,244,771	10.0	-15.9	7.5	4.6	-0.3
	90:10	8,738,722	19,705,085	8.3	7,216,274	21,227,533	8.7	-17.4	7.7	5.0	-0.3
	100:0	8,909,412	20,594,896	7.8	7,285,400	22,218,907	8.2	-18.2	7.9	5.3	-0.3

Note : * Accumulated present value of Baht discounted at 15% p.a.

Table 9.4.7 Required Share Capital of Government and Tax Revenue for Alternative Gearing Ratios

Chiang Mai

Gearing Ratio	Berth Rent	1) ROE	Total Share Capital	Cash Inflow to Government and Private Investors: Tax Revenue		Cash Surplus		Total of Tax + Surplus*	Required Gov't Share Capital	Ratio of Tax Revenue to Gov't Share 3)	ROG: IRR of Tax Revenue
(%)	(Baht/year)	(%)	Baht*	Baht*	(%)	Baht*	(%)		(%) 2)		(%) 4)
10:90	100,000	9.6	3,419,486	1,804,524	57.58	1,329,315	42.42	3,133,840	61.13	0.66	13.69
	110,000	12.4	3,419,486	2,187,560	49.09	2,268,268	50.91	4,455,828	33.67	1.90	20.26
	120,000	14.6	3,419,486	2,602,496	44.67	3,223,362	55.33	5,825,858	5.74	13.27	43.37
	130,000	16.6	3,419,486	2,998,955	41.37	4,249,902	58.63	7,248,857	-24.28	-3.61	---
	140,000	18.5	3,419,486	3,357,924	38.53	5,356,431	61.47	8,714,355	-56.64	-1.73	---
	150,000	20.5	3,419,486	3,710,594	36.39	6,485,524	63.61	10,196,119	-89.66	-1.21	---
30:70	100,000	6.39	9,342,686	1,996,095	45.68	2,373,901	54.32	4,369,997	74.59	0.29	5.94
	110,000	8.14	9,342,686	2,386,010	41.53	3,359,883	58.47	5,745,893	64.04	0.40	8.09
	120,000	9.58	9,342,686	2,772,030	38.62	4,408,569	61.38	7,178,599	52.83	0.56	10.49
	130,000	10.93	9,342,686	3,130,089	36.20	5,517,098	63.80	8,647,187	40.95	0.82	13.37
	140,000	12.20	9,342,686	3,476,680	34.30	6,659,715	65.70	10,136,394	28.72	1.30	17.20
	150,000	13.41	9,342,686	3,846,308	33.05	7,791,200	66.95	11,637,507	16.61	2.48	23.33
50:50	100,000	5.10	14,812,407	2,159,214	38.80	3,405,228	61.20	5,564,442	77.01	0.19	2.91
	110,000	6.36	14,812,407	2,545,937	36.36	4,455,660	63.64	7,001,597	69.92	0.25	4.50
	120,000	7.49	14,812,407	2,903,453	34.28	5,567,384	65.72	8,470,837	62.41	0.31	6.12
	130,000	8.56	14,812,407	3,246,614	32.58	6,719,238	67.42	9,965,852	54.64	0.40	7.83
	140,000	9.55	14,812,407	3,614,771	31.52	7,851,717	68.48	11,466,488	46.99	0.52	9.71
	150,000	10.50	14,812,407	3,996,781	30.82	8,970,820	69.18	12,967,601	39.44	0.68	11.84
70:30	100,000	4.20	19,878,850	2,319,372	34.49	4,405,850	65.51	6,725,222	77.64	0.15	1.05
	110,000	5.24	19,878,850	2,677,791	32.67	5,519,046	67.33	8,196,837	72.24	0.19	2.38
	120,000	6.19	19,878,850	3,022,300	31.19	6,666,561	68.81	9,690,862	66.45	0.23	3.69
	130,000	7.08	19,878,850	3,384,991	30.25	7,805,175	69.75	11,190,166	60.74	0.28	5.05
	140,000	7.94	19,878,850	3,754,963	29.59	8,935,840	70.41	12,690,803	55.05	0.34	6.45
	150,000	8.72	19,878,850	4,193,837	29.55	9,998,078	70.45	14,191,915	49.70	0.42	7.94

Khon Kaen

Gearing Ratio	Berth Rent	1) ROE	Total Share Capital	Cash Inflow to Government and Private Investors: Tax Revenue		Cash Surplus		Total of Tax + Surplus*	Required Gov't Share Capital	Ratio of Tax Revenue to Gov't Share 3)	ROG: IRR of Tax Revenue
(%)	(Baht/year)	(%)	Baht*	Baht*	(%)	Baht*	(%)		(%) 2)		(%) 4)
10:90	100,000	6.37	4,496,420	1,945,190	68.56	892,358	31.44	2,838,548	80.15	0.54	10.53
	110,000	9.80	4,496,420	2,415,190	56.77	1,839,103	43.23	4,254,293	59.10	0.91	14.28
	120,000	12.22	4,496,420	2,835,448	49.58	2,883,453	50.42	5,718,901	35.87	1.76	19.57
	130,000	14.06	4,496,420	3,333,776	46.08	3,901,569	53.92	7,235,344	13.23	5.60	31.27
	140,000	15.76	4,496,420	3,785,470	43.05	5,006,990	56.95	8,792,459	-11.36	-7.41	---
	150,000	17.48	4,496,420	4,183,573	40.22	6,216,081	59.78	10,401,654	-38.28	-2.43	---
30:70	100,000	4.68	12,819,418	2,268,332	50.18	2,252,430	49.82	4,520,762	82.43	0.21	4.30
	110,000	6.48	12,819,418	2,668,387	44.42	3,339,325	55.58	6,007,712	73.95	0.28	5.96
	120,000	7.85	12,819,418	3,144,127	41.68	4,399,975	58.32	7,544,101	65.88	0.37	7.72
	130,000	9.07	12,819,418	3,560,158	38.97	5,574,326	61.03	9,134,483	56.52	0.49	9.60
	140,000	10.21	12,819,418	3,955,389	36.77	6,800,848	63.23	10,756,237	46.95	0.66	11.72
	150,000	11.29	12,819,418	4,336,948	34.99	8,058,644	65.01	12,395,592	37.14	0.91	14.25
50:50	100,000	3.91	20,337,073	2,479,473	40.43	3,652,779	59.57	6,132,253	82.04	0.15	1.67
	110,000	5.10	20,337,073	2,933,546	38.17	4,752,255	61.83	7,685,801	76.63	0.19	2.99
	120,000	6.13	20,337,073	3,335,883	35.89	5,958,061	64.11	9,293,944	70.70	0.23	4.27
	130,000	7.08	20,337,073	3,725,872	34.11	7,195,688	65.89	10,921,559	64.62	0.28	5.56
	140,000	7.98	20,337,073	4,107,923	32.67	8,466,666	67.33	12,574,789	58.37	0.35	6.91
	150,000	8.82	20,337,073	4,517,352	31.75	9,711,128	68.25	14,228,480	52.25	0.43	8.34
70:30	100,000	3.24	27,014,807	2,710,950	35.50	4,925,329	64.50	7,636,279	81.77	0.12	0.00
	110,000	4.16	27,014,807	3,113,128	33.65	6,137,344	66.35	9,250,472	77.28	0.15	1.12
	120,000	5.04	27,014,807	3,501,273	32.17	7,382,223	67.83	10,883,495	72.67	0.18	2.21
	130,000	5.84	27,014,807	3,882,880	30.98	8,652,365	69.02	12,535,245	67.97	0.21	3.30
	140,000	6.60	27,014,807	4,292,700	30.25	9,895,774	69.75	14,188,474	63.37	0.25	4.40
	150,000	7.32	27,014,807	4,716,214	29.77	11,125,952	70.23	15,842,166	58.82	0.30	5.52

Hat Yai/ Songkhla

Gearing Ratio	Berth Rent	1) ROE	Total Share Capital	Cash Inflow to Government and Private Investors: Tax Revenue		Cash Surplus		Total of Tax + Surplus*	Required Gov't Share Capital	Ratio of Tax Revenue to Gov't Share 3)	ROG: IRR of Tax Revenue
(%)	(Baht/year)	(%)	Baht*	Baht*	(%)	Baht*	(%)		(%) 2)		(%) 4)
10:90	100,000	10.95	5,506,713	3,669,871	57.18	2,748,699	42.82	6,418,569	50.08	1.33	17.25
	110,000	13.69	5,506,713	4,462,437	49.97	4,468,631	50.03	8,931,068	18.85	4.30	28.10
	120,000	15.85	5,506,713	5,249,929	45.62	6,258,350	54.38	11,508,278	-13.65	-6.98	---
	130,000	17.60	5,506,713	6,143,656	43.44	7,999,760	56.56	14,143,417	-45.27	-2.46	---
	140,000	19.31	5,506,713	6,956,055	41.30	9,885,019	58.70	16,841,074	-79.51	-1.59	---
	150,000	21.13	5,506,713	7,692,228	39.22	11,921,803	60.78	19,614,031	-116.50	-1.20	---
30:70	100,000	7.23	15,600,442	4,042,172	47.58	4,452,619	52.42	8,494,790	71.46	0.36	7.58
	110,000	9.04	15,600,442	4,783,218	43.19	6,290,519	56.81	11,073,737	59.68	0.51	9.96
	120,000	10.45	15,600,442	5,671,045	41.37	8,038,468	58.63	13,709,513	48.47	0.75	12.72
	130,000	11.75	15,600,442	6,466,562	39.38	9,955,393	60.62	16,421,955	36.19	1.15	16.13
	140,000	12.99	15,600,442	7,200,947	37.50	12,002,229	62.50	19,203,176	23.08	2.00	21.13
	150,000	14.17	15,600,442	7,928,636	36.03	14,078,496	63.97	22,007,131	9.76	5.21	31.36
50:50	100,000	5.83	24,722,228	4,327,040	41.47	6,106,288	58.53	10,433,328	75.30	0.23	4.35
	110,000	7.17	24,722,228	5,174,723	39.60	7,892,762	60.40	13,067,485	68.07	0.31	6.08
	120,000	8.33	24,722,228	5,973,105	37.88	9,803,346	62.14	15,776,451	60.35	0.40	7.86
	130,000	9.40	24,722,228	6,710,054	36.16	11,844,934	63.84	18,554,988	52.09	0.52	9.78
	140,000	10.41	24,722,228	7,429,271	34.78	13,928,914	65.22	21,358,185	43.66	0.69	11.92
	150,000	11.36	24,722,228	8,176,689	33.79	16,025,104	66.21	24,201,793	35.18	0.94	14.47
70:30	100,000	4.93	33,499,326	4,667,764	37.81	7,678,531	62.19	12,346,295	77.08	0.18	2.39
	110,000	6.02	33,499,326	5,478,550	36.40	9,573,614	63.60	15,052,164	71.42	0.23	3.82
	120,000	7.00	33,499,326	6,220,609	34.90	11,604,258	65.10	17,824,867	65.36	0.28	5.24
	130,000	7.92	33,499,326	6,938,465	33.64	13,687,332	66.36	20,625,797	59.14	0.35	6.69
	140,000	8.78	33,499,326	7,680,821	32.73	15,788,923	67.27	23,469,744	52.87	0.43	8.23
	150,000	9.60	33,499,326	8,419,557	31.99	17,903,236	68.01	26,322,793	46.56	0.54	9.89

Notes : * Accumulated present value discounted at 15 % p.a. during 20 years of project life span

1) ROE for the total share capital

2) Government's share capital required to improve ROE for private investors towards 15% p.a.

3) Tax Revenue/ Government share capital in terms of present values discounted at 15% p.a.

4) ROG : Return on Government Share Capital which is defined as IRR derived from the inflow of tax revenuesand the cash outflow of Government's share capital

The ratio of tax revenue over the Government's share capital represents the recovery of Government's investment in terms of present value discounted at 15%. This ratio in the above Chiang Mai case shows 0.40 or 7.83% in IRR (ROG), which indicates a rate of return (tax revenue) on the Government's share capital.

The appropriate berth rent and corresponding percentage share required to the Government are obtained assuming the tolerance of berth rent, tax IRR and ROE for the private sector to be as follows:

Premises:

i) Berth rent should be less than ฿150,000/year.

ii) IRR derived from tax revenue and Government's share capital should be 10%.

iii) ROE for the share capital of private investor should be assured to be 15%.

The results of above analysis are presented in Fig. 9.4.4 and summarized in Table 9.4.8. According to these premises it is found that the share of Government capital is required to account for about 50% or more of the total share capital. At the same time, this diagram implies that a proportion of the share capital cannot exceed 50% of the total investment, if the Government requires a tax revenue to be more than 10% in IRR (ROG).

Therefore, if the percentage share of Government capital is defined to be 50% and the berth rent to be around ฿130,00/year, acceptable gearing ratios and the resulting IRR (ROG) of tax revenue are obtained as shown in Table 9.4.9.

To be brief, it is required to improve the ROE of the private investor towards, at least, 15% to attract the private funds for raising investment capital. From the viewpoint of berth lessee, a berth rent should be set less than ฿130,000/year.

Besides the above conditions, there are two factors, out of three actually, that the Government should determine by themselves. They are:

i) Gearing ratio: a proportion of the long-term debt, which the Government agrees to guarantee for repayment, in the total capital investment

ii) Government share capital: a proportion of the total share capital (equity) that the Government agrees to invest for the project

iii) IRR (ROG) of tax revenue: a rate of return which presents the efficiency to recover the Government's Share Capital by tax revenue

Based on the analyses so far, it can be said for the above three factors that:

i) Share capital can not exceed more than 50%, in other words, more than 50% of the required capital has to rely on the low rate long-term loan.

ii) Government share capital is required 50% or more of the total share.

Fig. 9.4.4 Berth Rent, Tax IRR and Government Share Capital by Gearing Ratio

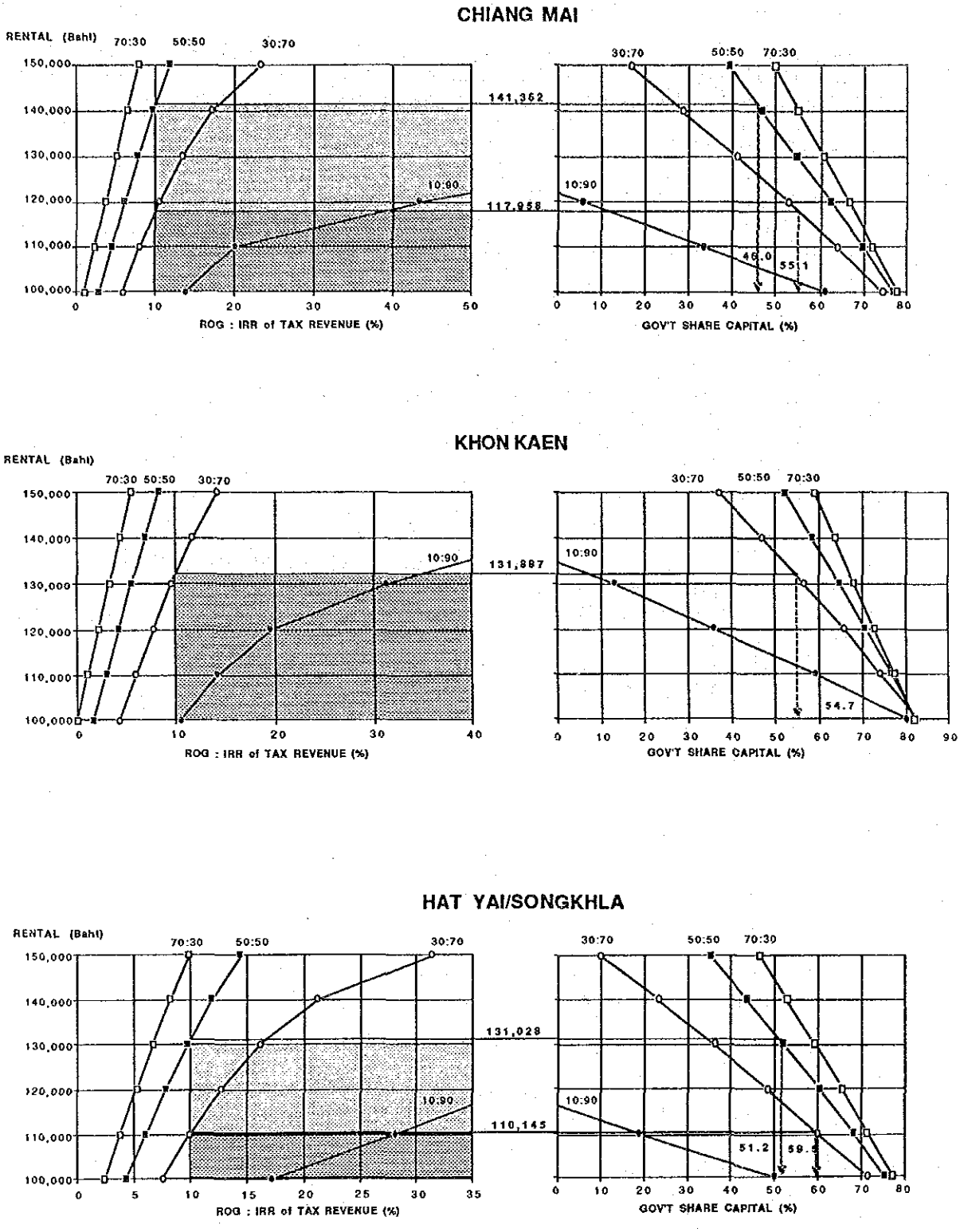


Table 9.4.8 Berth Rent and Required Share of Government Capital
- IRR of Tax Revenue: 10% -
- ROE for Private Investors: 15% -

Terminal Name	Gearing Ratio	Berth Rent (฿)	Required Share of Gov't Capital	
			(1000 Baht)	(%)
Chiang Mai	10:90	94,000	2,664	77.9
	30:70	118,000	5,148	55.1
	30:50	141,000	6,814	46.0
	70:30	-	-	-
Khon Kaen	10:90	99,000	3,737	83.1
	30:70	132,000	7,012	54.7
	50:50	-	-	-
	70:30	-	-	-
Hat Yai/ Songkhla	10:90	93,000	3,910	71.0
	30:70	110,000	9,282	59.5
	50:50	131,000	12,658	51.2
	70:30-	-	-	-

Note: * Accumulated present value discounted at 15% p.a.

Table 9.4.9 Acceptable Gearing Ratio and Eventual IRR of Tax Revenue
- Share of Government Capital: 50% -
- ROE for Private Investors: 15% -

Terminal Name	Gearing Ratio	Berth Rent (฿)	Tax Revenue	
			(1000 Baht)*	IRR (ROG)** (%)
Chiang Mai	10:90	104,000	1,958	16.4
	30:70	122,000	2,844	11.1
	50:50	135,000	3,431	8.3
Khon Kaen	10:90	104,000	2,134	12.0
	30:70	137,000	3,837	11.1
	50:50	-	-	-
Hat Yai/ Songkhla	10:90	100,000	3,670	17.3
	30:70	119,000	5,582	12.4
	50:50	132,000	6,584	10.5

Note: * Accumulated present value discounted at 15% p.a.
** Defined as IRR derived from tax revenue and Government share capital

iii) Under the conditions above, IRR (ROG) of the tax revenue will reach around 10% and more.

9.4.5 Evaluation of Financial Conditions

Financial conditions of the terminal operation are analysed under the assumptions below:

i) Berth rent: ฿130,000/year

ii) Alternative Gearing ratios: 10:90, 30:70 and 50:50 (Share capital vs. Long-term loan)

iii) Government's share capital: 50% of the total share capital with no dividend allocated to the Government

iv) Loan conditions:

- Long-term loan: Interest rate is 3.0% p.a., grace period is 10 years and thereafter annual equal repayment of principal starts for 20 years.
- Short-term loan: Interest rate is 12.0% p.a., and a principal is repaid in the following year.

v) Taxes: Business tax is 2.5% on revenue, local tax is 10% on the business tax and corporate income tax is 35% on the net profit.

In order to make several evaluation indicators, Profit and Loss Statement and Sources and Application of Funds (Cash Flow) are prepared for analysis and discussed further in the subsequent sections.

1) Profit and Loss Statement

The profit and loss statements are prepared for the alternative gearing ratios and the following evaluation indicators are obtained as summarized in Table 9.4.10.

a) Period turning from deficit to surplus in a single year

b) Period to diminish the accumulated deficit.

c) Average operating 1/ (working 2/) ratio

1/: (Operating expenses + Interest payment)/(Operating revenue)
2/: (Operating expenses - Deprecations + Interest payment)/(Operating revenue)

d) Year of operating ratio over 100%.

e) Average profit-revenue ratio

Table 9.4.10 Comparison of Profit and Loss Statement Analyses

Terminal Name	Gearing Ratio	(a) (year)	(b) (year)	(c) (%)	(d) (year)	(e) (%)
Chiang Mai	10:90	7th	13th	66.23 (47.28)	7th	18.41
	30:70	7th	12th	63.93 (44.98)	7th	20.25
	50:50	7th	11th	61.93 (42.97)	6th	21.83
Khon Kaen	10:90	7th	14th	68.62 (49.40)	7th	16.44
	30:70	7th	13th	65.45 (46.24)	7th	18.98
	50:50	7th	12th	62.99 (43.77)	7th	20.94
Hat Yai/ Songkhla	10:90	7th	13th	63.25 (44.38)	7th	20.06
	30:70	7th	12th	60.77 (41.90)	7th	22.01
	50:50	7th	12th	58.77 (39.90)	7th	23.57

According to the above result it can be said that:

i) The first single year surplus emerges in the 7th year of operation in all the terminals.

ii) The accumulated deficit diminishes in the 11th to 14th year of operation. Khon Kaen Terminal is relatively slow in recovery.

iii) Average operating ratios vary from 58.77% of Hat Yai/Songkhla to 68.62% of Khon Kaen. In addition, average working ratios are all less than 50%, which indicates a capability to retain a higher rate of profit on an average.

iv) Year of operating ratio over 100% emerges mostly in the 7th year of operation and this coincides with the year of single year surplus.

v) Average profit-revenue ratios denotes the profitability of the respective terminal operations. Hat Yai/Songkhla terminal is the highest of 23.57% and Khon Kaen is the lowest of 18.98%.

vi) Comparing the alternative gearing ratios, the more a portion of share capital the more it is profitable and stable in management.

2) Cash Flow Analysis

A table of Sources and Application of Funds shows cash inflow and outflow. This is prepared in order to evaluate the creditability to repay a debt both long-term and short-term loans by the indicator of DSCR* (Debt Service Coverage Ratio). Therefore, a DSCR is evaluated when the maximum short-term debt is required as well as the average DSCR.

Note * : DSCR = (Net profit after tax + Depreciation + Interest payable)/(Principal repayable + Interest payable)

The year when a cash surplus emerges indicates the dissolution of short-term debt.

Consequently, the following indicators are obtained as summarized in Tables 9.4.11 and 9.4.12.

a) Maximum amount of shot-term debt required and DSCR at that time, and the average DSCR

b) Years of DSCR not more than 1.5 and average DSCR

c) The first year of cash surplus (period from the start of operation)

d) ROI (Return on Investment) and ROE (Return on Equity) (1) for total share capital and (2) for private investors

e) ROG (Tax Revenue on Government's share capital)

Table 9.4.11 Results of Cash Flow Analysis on DSCR and Cash Surplus

Terminal Name	Gearing Ratio	(a)			(b)		(c)	(d)(%)			(e)(%)
		Max. Short-term Debt (1000 Baht)		DSCR	DSCR ≤1.5	Average DSCR	1st year of Cash Surplus	ROI	ROE (1)	ROE (2)	ROG
Chiang Mai	10:90	2,909	(8th yr)	3.05	9 yrs	2.21	9th yr	8.35	16.57	21.85	19.65
	30:70	412	(3rd yr)	0.68	3 yrs	3.31	5th yr	8.35	10.93	16.36	11.81
	50:50	0		-	0	4.84	1st yr	8.35	8.56	14.15	8.48
Khon Kaen	10:90	6,824	(8th yr)	1.03	10 yrs	1.52	11th yr	7.22	14.06	18.77	18.18
	30:70	2,287	(8th yr)	3.45	4 yrs	2.64	5th yr	7.22	9.07	13.96	10.49
	50:50	0		-	0	4.28	1st yr	7.22	7.09	12.21	7.33
Hat Yai/ Songkhla	10:90	15,110	(8th yr)	0.96	10 yrs	1.78	11th yr	9.28	17.60	22.65	21.82
	30:70	9,526	(8th yr)	4.10	5 yrs	2.88	5th yr	9.28	11.75	16.84	13.48
	50:50	5,463	(8th yr)	5.60	4 yrs	4.54	4th yr	9.28	9.40	14.66	10.09

Table 9.4.12 Results of Cash Flow Analysis on ROI, ROE and ROG

Terminal Name	Gearing Ratio	(d) ROI (%)	(d) Total Share Capital (1000฿)	(d) Accm.Cash Surplus* (1000฿)	(d) ROE (1)	(d) ROE (2)	(e) Accm. Tax Revenue* (1000฿)	(e) ROG (%)
Chiang Mai	10:90	8.35	3,419	4,520	16.57	21.85	2,999	19.65
	30:70	8.35	9,343	5,517	10.93	16.36	3,130	11.81
	50:50	8.35	14,812	6,719	8.56	14.15	3,247	8.48
Khon Kaen	10:90	7.22	4,496	3,902	14.06	18.77	3,334	18.18
	30:70	7.22	12,819	5,574	9.07	13.96	3,560	10.49
	50:50	7.22	20,337	7,196	7.09	12.21	3,726	7.33
Hat Yai/ Songkhla	10:90	9.28	5,507	8,000	17.60	22.65	6,144	21.82
	30:70	9.28	15,600	9,955	11.75	16.84	6,447	13.48
	50:50	9.28	24,722	11,845	9.40	14.66	6,710	10.09

Note: * Present values discounted at 15% p.a.

According to the above tables it can be said that:

i) From the viewpoint of cash flows, a higher proportion of share capital, needless to say, contributes to the improvement of DSCRs, because a burden of short-term debt is reduced.

ii) In most cases, the requirement of maximum short-term debt takes place in the 8th year (year 2000) of operation when the fund is required for the second stage construction. If the portion of share capital is lower a short-term debt requirement is larger and a DSCR at that time is lower. Before the 2nd stage construction the maximum short-term debt emerges in the 3rd year of operation and the DSCR at that time is quite low less than 1.0. This means, the managing body at that time faces difficulty to procure short-term debt, though the DSCR improves to exceed 1.5 in the following year or the year after next in case of the gearing ratios 30:70 and 50:50. It takes, however, a longer time for the gearing ratio 10:90 to reach the year exceeding 1.5 of DSCR.

iii) Contrarily, a higher proportion of long-term loan contributes to the improvement of ROE and ROG as well, because of a very low rate of interest, which is 1/4 of the short-term loan interest, and a long time of grace period.

iv) Accumulated cash surplus increases as the proportion of share capital increases. This is also the same to the accumulated tax revenue.

v) The gearing ratio of 10:90 shows high rates of ROE (2) exceeding more than 15%. However, the acquired cash surplus is about 75% of the 30:70 case and 60% of the 50:50 case. Therefore, the gearing ratio of 10:90 should not be selected for the reasons right above, item ii) and the result of profit/loss statement analysis.

vi) If the importance is given to ROE and ROG a gearing ratio of 30:70 should be selected but the Government's guarantee is indispensable for raising short-term funds in the early years (3 ~ 5 years) of operation.

vii) If the importance is given to the flexibility of cash flow (higher rate of DSCRs) a gearing ratio of 50:50 should be selected but some additional contribution by the Government, tax exemption for example, will be required in order to improve the ROE for private investors, particularly for Khon Kaen Terminal.

9.5 Promotion to Users of Truck Terminals

9.5.1 Understanding and Promotion to Users for Regional Truck Terminals

Because of the promotion to users for regional truck terminals, action at two levels becomes necessary. At the first level, it is to secure understanding and positive acceptance of regional truck terminals. At the second level, it is to promote to users stimulated by the action at the first level.

Through the action to secure understanding and acceptance at the first level, it is necessary to make propaganda for the parties concerned in Thailand. It is very important to secure understanding of the government departments, business circles as shippers, and the physical distribution industry.

The action at the second level is to directly make propaganda for those who will use regional truck terminals. The targets of promotion in project cities' influence areas (see Section 4.5.2) and Bangkok Metropolitan Area (BMA) include trucking companies, forwarders and shippers who need regional depots. This action consists of not only simple advertisement and propaganda but also the canvassing activities of terminal officers that are a central core and are supported by advertising and propaganda.

9.5.2 Contents of Promotion

On first level and second level activities, there are common promotion regarding method of information diffusion. However, on second level activities, special requirements are considered.

1) Common Contents

i) Introduction of Truck Terminals (including combined facilities):

Purpose, Function, Location of terminal, etc.

ii) Effects given to Each Group of Users:

Effects given to each group of users are described in Table 9.5.1.

Table 9.5.1 Effects Given to Groups of Users

Group of Users		Effects
Trucking Companies		. Upgrading of Transport Service . Reduction of Transport Fee . Strengthening of Marketing Power . Enhancement of Companies' Trust . Accumulation Merits of Carriers
Manufacturers with National Brand		. Build-up of Regional Distribution System (by using truck terminals as Regional Depots) . Upgrading of Pickup and Delivery Service . Reduction of Pickup and Delivery Fees . Strengthening of Marketing Power . Accumulation Merits of Forwarders
Regional Society	Economic Circle	. Contribution of Growth of Primary Industry Market . Contribution of Growth of Secondary Industry Market . Upgrading of Distribution Service
	Society	. Contribution to Traffic Problems . Contribution to City Planning
Man-power of Physical Distribution		. Enhancement of Social Position

2) Special Requirements for Promotion to Users

There are special requirements to give various kinds of information to users that will be of advantage to users by using truck terminals. Especially, the following information should be included in pamphlets.

a) A map of location of truck terminals with main road networks, city areas, etc.

b) A map of arrangement of regional truck terminals and related facilities.

c) A discussion of the functions of regional truck terminals and related facilities.

d) A bird's eye view drawing regional truck terminals and related facilities.

e) Diagrams of main facilities in regional truck terminals.

f) Explanation on how to lease.

g) Comparison on efficiency between existing private terminals and new regional terminals.

h) Others

Pamphlets describing the items mentioned above can be used in the canvassing activities.

3) Persons in Charge of Promotion and Its Cost

In order to promote understanding, good will and the demand for regional truck terminals, it is necessary to designate persons in charge who utilize mass media and cover its costs.

There are some alternative ways to decide persons in charge. In practical terms, it seems that the following ways are suitable.

To secure understanding and good will, the Central Government and Local Governments should be responsible in national and regional areas and should bear the expenses. But, in fact, it is better to use enough publicity through mass media such as television, general magazines and economic newspapers.

It is necessary to promote to users in the BMA and each Project City's influence area. But it is desirable to promote users under the responsibility and expenses of truck terminal companies and SCBT (Sub-Control Board on Truck Terminal). The most effective mean of promotion is persuasion activities to groups of trucking companies and forwarders by members of Terminal companies, Central and Local Government.

9.6 Governmental Contribution to Users

9.6.1 Leading Users to Regional Truck Terminals

Trucking companies, forwarders and consignors which seek to gain their own regional depots may be considered as the major potential users for regional ruck terminals.

Section 9.3.13 explains that the utilizing of regional truck terminals is more profitable to the user in the aspect of operation and handling costs compared with the existing private terminals. Beside the economical condition, however, there may be other factors when trucking companies decide whether they use the truck terminal or private one.

Therefore, some promotive action to the users should be scheduled for implementation by the Government or other authorized body.

1) Priority Issue of Business Licenses and Reduction of License Fee

According priority to provide business license and to reduce the license fee to the trucking companies which take part in the regional truck terminals will be one of the most effective measures to lead them to the terminals.

At present, in Thailand, licenses of fixed route operators and forwarders are not issued. As a matter of fact, the function of fixed route operators and forwarders has been executed as proxy by non-fixed route operators and private operators. Therefore, if these operators executing their function want to use regional truck terminals, operators' licenses should be preferentially issued by lower license fees. At the same time, activities of unlicensed operators should be regulated.

2) Exemption of Taxes for Truck Operator and Reduction of Vehicle Tax

The exemption of such taxes as business tax, local tax and corporate income tax will contribute to a sound financial condition. Therefore, the tax can be exempted, for instance, during the 5 years from the commencement of operation.

The reduction of vehicle tax for terminal-based trucks, owned by trucking companies and forwarders, operating as line haul trucks and pickup/delivery service is one of the effective measures to persuade trucking companies use the regional truck terminals (License Fee and Vehicle Tax are scheduled in Land Transport Act 1979).

3) Building up of Cooperative Associations and Joint Operation in Truck Terminal

Cooperation and joint operation will be mainly managed by cooperative associations. Their activities will range from the widest sphere to the smallest sphere. Their contents will include joint works such as education and training, welfare, etc., cooperative purchases of operating materials such as fuel oil, tires, vehicles, etc., joint usage of cargo-handling instruments, information materials, etc., financial activities such as the borrowing of low interest loans, the guarantee for loan, etc. In addition, their contents will include operating activities such as joint delivery, joint pickup, joint material handling, joint collection of money services, etc.

4) Establishment of Educational and Training Courses (for Staff of Trucking companies and Forwarders)

By organizations such as cooperative association, some educational and training courses should be introduced. These courses might consist of management activities, relationship between employer and employee, traffic safety, pollution control, etc.

These activities by SCBT may be considered as a Governmental contribution to the staffs of truck terminal users.

Through the appropriate implementation of the above mentioned Government schemes, motivation for leading to regional truck terminal should be increased.

9.6.2 Restrictions on Private Truck Terminal Operations

Even after the regional truck terminals are constructed, the following possibilities may be considered:

1) Trucking companies, forwarders and consignors use only their own existing private terminals without using regional truck terminals.

2) Through expansion of demand in the future, trucking companies and others plan to expand their own existing terminals within city area or suburbs.

If such trends are not controlled, the demand for regional truck terminals will decline. Furthermore, the traffic congestion both within city area and suburbs will become worse, and traffic accidents and pollution will escalate, unless some restrictions on private truck terminal operation are introduced.

Therefore, it will be necessary to adopt some regulations for new construction and expansion of private truck terminals.

The following can be considered:

a) Strengthening of regulation of heavy trucks moving in cities.

b) Control of new construction and expansion of private truck terminals according to town planning.

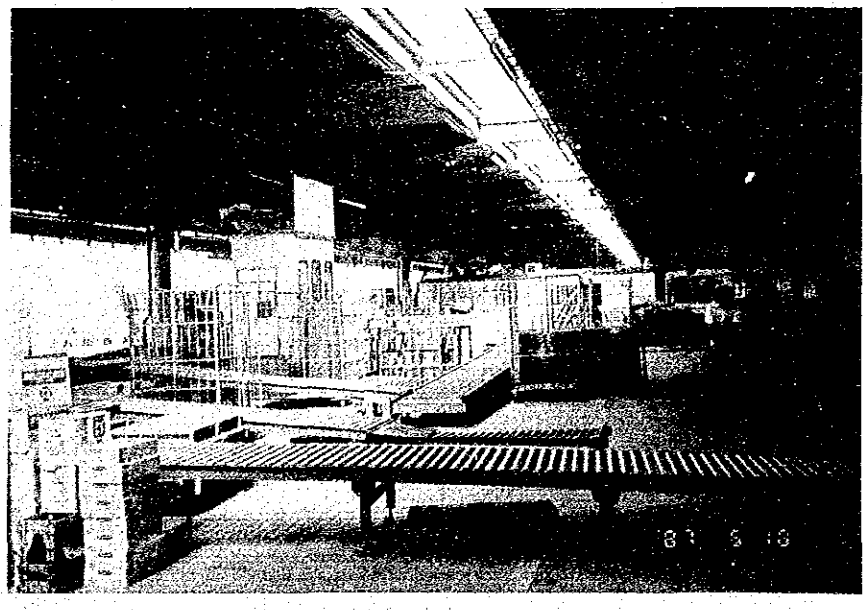
c) Establishment of license system on new construction and expansion of private terminals and strengthening of regulation along the line of the Motor Terminal Structure and Facility Order in Japan. (Refer to Section 5.4.2.)

Items a) and b) describe regulations of private truck terminals within cities, and item c) means systems and regulations aiming at the sound development of private terminals.

Under cooperation between the Department of Land Transport, SPCT (Sub-Policy Committee on Truck Terminal) and SCBT (Sub-Control Board on Truck terminal), these systems and regulations will be expected to be executed before the commencement of regional truck terminal operations.

CHAPTER 10

PLANNING FOR RELATED FACILITIES



CHAPTER 10 PLANNING FOR RELATED FACILITIES

10.1 General

In Bangkok Metropolitan Area and Project Cities Areas, they are having many social problems awaiting solution. The environment surrounding them is getting worse because of the disorderly expansion of the urban area, and both industrial and economic activities are being reduced by the traffic congestion. In consideration of these situations, some kind of Committee of Urban Renewal should be set up by both central and local Governments in Thailand to find out useful programs for solving these troubles. They will come to the conclusion that it will be necessary to decentralize various kind of physical distribution facilities and to establish a new traffic system. As one of the effective solutions, the Study Team suggests to develop a distribution center located at an important point of transportation which has a truck terminal, a truck center, warehouses, wholesaler's facilities and other facilities.

Therefore, the Study Team plans the following distribution center for each Project City as a terminal complex. However, these complexes will be developed on a secondary priority from the Bangkok Terminal Complex which will be given the first priority for construction.

Firstly, the necessity to establish physical distribution facilities that involve truck terminals as a core, is manifested and the type, definition and functions/roles of the related facilities are also discussed. Secondly, assuming the scale of related facilities at each Project Truck Terminal, a layout plan of these facilities is prepared.

10.2 Necessity of Related Facilities, and Their Types, Definitions, Functions and Roles

10.2.1 Necessity for the Related Facilities

The main functions for regional truck terminals were presented in the preceding Chapter.

The purpose of adding other functions and roles to the truck terminal as a terminal complex is to improve the whole services of the consolidated cargo transport and to make it work efficiently. This purpose could also be promoted with more effective use of the related facilities themselves in the terminal complex if they are located adjoining the truck terminal.

Concrete examples are as follows:

- Improving the level of safety and efficiency of line-haul transport by setting swapping points at terminals located in the middle of the routes for long consolidated haul (see next section)
- Setting adjoiningly distribution centers (terminal complex) and offices of wholesalers and forwarders as consignors of consolidated cargoes

One of disadvantages of the truck terminal is a longer delivery distance caused by the outlying location of the terminal as discussed in Sub-section 9.2.1 "Effects of Delivery System of Truck Terminal".

A counter-measure to this disadvantage is to introduce cargo-related facilities, which have close relations with the truck terminal, to the terminal complex. Commercial warehouses for general cargoes and wholesalers' stock-points will be major consignors/consignees of fixed route transport. Inclusion of these facilities in the complex will contribute to the reduction of average delivery distance of cargoes to and from the terminal.

The construction of the truck terminal complex will also provide the opportunity to expand and modernize the existing facilities of trucking companies located in a builtup area. At the same time, the relocation of these facilities outside the city area will contribute to the urban renewal planning in the central urban area.

Empty return-haul of the consolidated cargo would be reduced by setting adjoiningly distribution centers, offices of wholesalers and forwarders, and commercial and private warehouses that are consignors of the truckload cargoes. At the same time, if the facilities of the non-fixed route carriers and forwarders are established near the terminals, flexible use of trucks both for the non-fixed route transport and the consolidated line-haul transport would be possible.

Besides, if bonded areas are involved in the truck terminals, a combination of international transport and the fixed-route transport could be provided.

10.2.2 Types, Definitions, Functions and Roles of Related Facilities

In order to obtain above-stated merits that can be given by the combination of the terminals and other related facilities, Japanese public truck terminals often incorporate these related facilities surrounding them.

The type and definition of such facilities are as follows:

1) Temporary storage space attached to truck terminals
(where consolidated general cargo are stored for a short term by the needs of shippers.)

2) Swapping point facilities
(where drivers of main-haul and return-haul trucks in scheduled long-hauls are exchanged, and tractor-trailers are also exchanged.)

3) Area of commercial warehouses
(facilities of warehouse companies.)

4) Area of physical distribution facilities of the distribution industry
(distribution depots for storage and delivery of wholesalers and large retailers.)

5) Facilities area for locally chartered trucking carriers
(where offices, parking lot, storage space and service facilities for charter trucks are involved.)

6) Public markets for freshfood
(where facilities for wholesaling fresh vegetables, fruits, fish and shellfish are provided.)

7) Depot for railroad containers
(depot for pick-up and delivery from the terminal stations of railroad container.)

With the knowledge of the location of these facilities in Japan, when the Study Team prepares a plan of the public truck terminal, considering the present and future situations in Thailand and the selected three Project Cities, the following cargo related facilities would be required.

1) Temporary Storage Space Attached to Truck Terminals

This is a facility to store arriving and departing cargoes temporarily at the terminal. The temporary storage makes it possible to deliver the cargo in the city and also to haul it to another terminal on request of customers. This will eventually improve the service level of the terminal system.

2) Truck Center

a) Offices of forwarders

This is a facility of forwarders who function to arrange cargoes for fixed-route trucks. The forwarder's office adjoining to the truck terminal will also arrange cargoes for return-haul trucks of the fixed-routes.

b) Business offices and yards of non-fixed route carriers

These are facilities to function as a business operation of non-fixed route carriers. The existing trucking companies located in the central urban area of regional city will move to this terminal complex area for their expansion of business. The delivery trucks owned by these trucking companies will be utilized for the truck terminal, and these trucking companies also function as a forwarder to arrange the return-haul cargo for the fixed-route operation.

c) Truck service area

This is a welfare facility mainly to provide services for truck drivers and related workers of non-fixed route carriers.

3) Warehouse Area

a) Commercial warehouse for general cargo

This is a facility to store general cargoes, other than those stored at the terminal's temporary storage, with relatively longer period for commercial basis. The cargoes appropriate to the commercial warehouse in the complex are, for instance, manufactured products from Bangkok, and high value-added agricultural products and local manufactured products from the upcountry.

b) Company-owned warehouse (wholesaler's stock-point)

This is a warehouse owned by a wholesaler and a large retailer. This facility will function as a regional depot of national brand products and a distribution center of the local wholesaler.

Cargoes in this warehouse will be carried by industrial carrier from such a large city as Bangkok, and will be distributed through the truck terminal or forwarder in the truck center to regional cities to correspond to orders promptly.

4) Bonded Area

This is a facility required for the international cargoes, so that it will be convenient to lie near the international border. Therefore, the bonded area can be incorporated in the terminal complex of Hat Yai/Songkhla.

a) Exports of perishable foods and manufactured goods

A major international cargoes transported from and through Hat Yai/ Songkhla is perishable foods at present. Manufactured products in future will enlarge its composition in the international cargoes. Part of these perishable foods and manufactured goods will be carried by a fixed-route transport. Therefore, it is preferable to the international cargo that the bonded area is located near the truck terminal and in the terminal complex.

b) Facility for customs

This is a facility to provide services required for customs formality.

The following are some facilities whose locations are considered not appropriate.

1) Swapping point facilities
Reason: Three regional terminals are located at the end of the line-haul.

2) Depot for railroad container
Reason: The trend of railroad container is not evident because its development depends on the traffic policy.

Considering that most of the commercial warehouses for business are the port warehouses and government-demanded warehouses for bulk cargoes, and inland warehouse is rare, they should be kept aloof from the above related facilities under the present situation. However, the Study Team assumed that the development of both national and regional economy in Thailand would cause demand for inland commercial warehouses for business in the future.

10.3 Combined Layout Plan

Arrangement of related facilities around each truck terminal should be determined in consideration of the following factors:

1) Importance of Functional Relations for Facilities

- Since the truck center is similar in nature to the truck terminal, they can be supplemental to each other and thus should preferably be located in its proximity.

- The truck center and the commercial warehouse should be located in its proximity to ensure efficiency of operations.

- The company-owned warehouse (wholesaler's stock point) and the truck terminal should preferably be located in its proximity to streamline pick-up and delivery.

2) Consideration Related to Phased Construction

The truck terminal will be constructed in Phase 1; the truck center, the commercial warehouse and the bonded area in Phase 2, and the company-owned warehouse in Phase 3.

To minimize the project area, the company-owned warehouse should preferably be located away from the front road as far as possible.

3) Consideration Related to Facility Characteristics

The company-owned warehouse should preferably be located near the front road from the viewpoint of advertising effect to retailers. On the other hand, the bonded area needs to be arranged at the opposite end to the front road for security reasons.

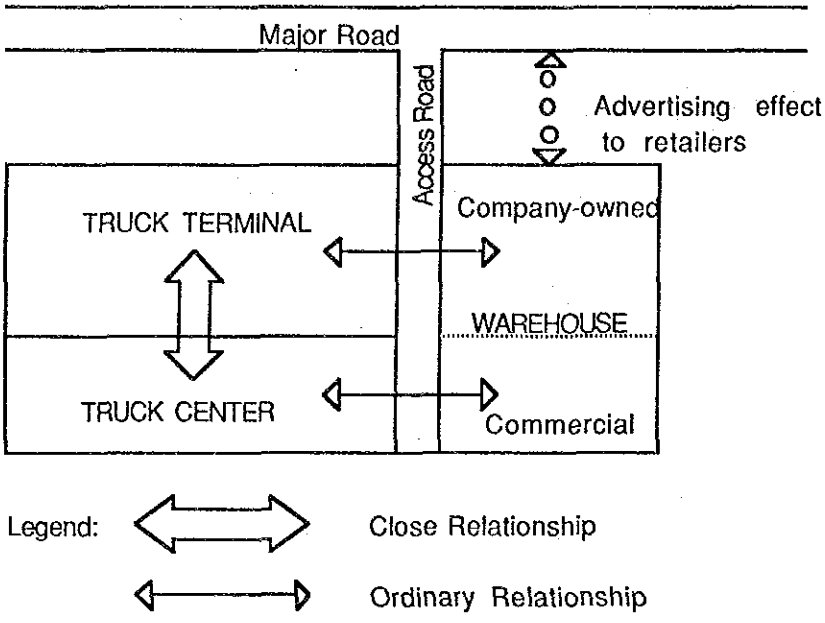
4) Consideration Related to Land Size

The truck terminal and the truck center will occupy similar sizes of land, and so do the commercial warehouse and the company-owned warehouse. Thus, arrangement of the truck terminal and truck center on one side of the access road and warehouses on the other will result in the most organized facility layout.

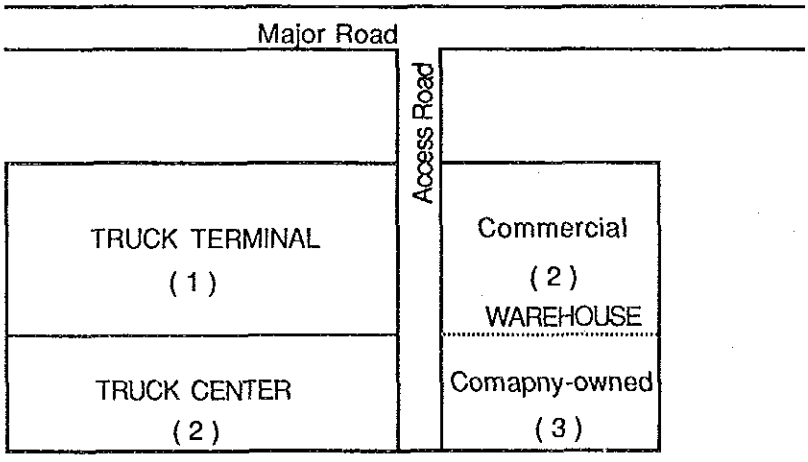
As a result, the overall layout was proposed in the following two alternatives. (See Fig. 10.3.1)

Fig. 10.3.1 Conceptual Layout for Related Facilities

Layout Emphasizing Functional Relationship - Plan A



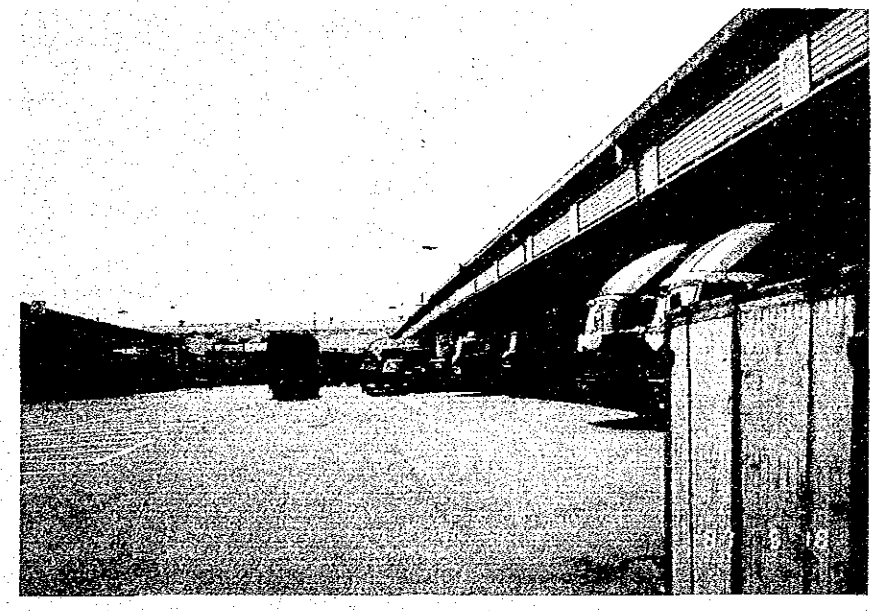
Layout Emphasizing Construction Schedule - Plan B



Note: Figures in parentheses indicate the construction phases.

CHAPTER 11

OVERALL IMPLEMENTATION



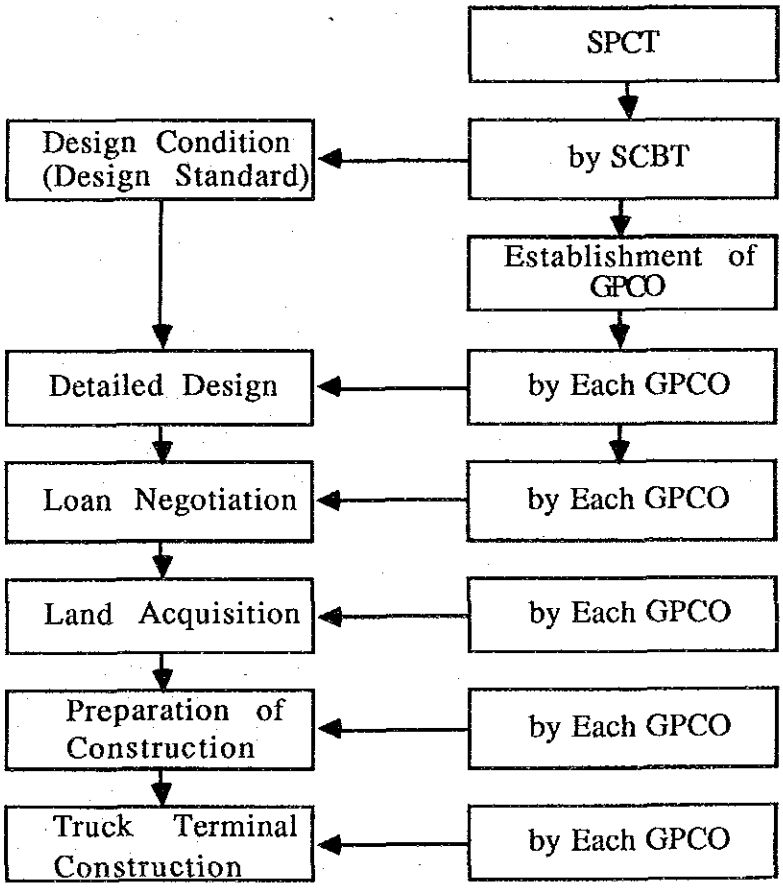
CHAPTER 11 OVERALL IMPLEMENTATION

11.1 General

In the execution of the Project Truck Terminals, it is assumed that the Government (SCBT) will carry out the establishment of design conditions and after that the Government and Private Corporate Organizations (GPCO) will carry out the detailed design, land acquisition and construction of truck terminals. (See Fig. 11.1.1)

As the truck terminals development planning involves construction of unified high standard facilities, it should preferably be executed by contractors who have experiences in this type of project. The contractors should, therefore, be prequalified by the above-mentioned Government and Private Corporation Organizations.

Fig. 11.1.1 Flow Chart of Implementation of Terminal Construction



SPCT : Sub-Policy Committee on Truck Terminal
SCBT : Sub-Control Board on Truck Terminal
GPCO : The Government and Private Corporation Organization (at Chiang Mai, Khon Kaen, Hat Yai)

11.2 Implementation Plan

The implementation schedule was prepared on the condition that the entire construction of the three truck terminals would be completed by the end of 1992 (Stage I) and the end of 2000 (Stage 2) in consideration of effective investment.

After careful study of the implementation method, it was found that each terminal complex including the truck terminal should be sub-divided into several sections having regard to the scale of work and the employment of stage construction technique. Truck terminal itself also is constructed by the stage construction method to meet the demand of cargo volumes and in consideration of appropriate scale of work as mentioned in preceding chapter.

Before beginning the construction of truck terminals, it is necessary to carry out such pre-construction work as topographical survey, soil investigation, detailed engineering, land acquisition and procurement of the finances.

11.2.1 Implementation Schedule

The project implementation schedule of truck terminal construction that has been prepared according to the above mentioned requirements as shown in Figs. 11.2.1 through 11.2.3. The economic and financial studies were carried out based on this schedule. The requirement of each major activity is as described below.

1) Detailed Engineering Design

The detailed design of the three truck terminals will be completed in 12 months for not only Stage 1 construction but also Stage 2. If there are changes in the socio-economic conditions, policies of urban planning and transportation, etc., the review of feasibility study should be commenced at the early stage of the detailed engineering design.

2) Tender Process

After completion of the detailed engineering design and financial arrangement, 6 months will be required for the tender process. The pre-qualification of contractors will also be required for the solicitation of contractors.

3) Land Acquisition and Compensation

Since the construction will take place in near the urban areas, it is foreseen that serious problems of land acquisition and compensation for terminal complex would occur. Therefore, the period of the land acquisition and compensation are estimated at 12 months for whole area of truck terminal at one time.

However, other related facility areas except the truck terminal should be only secured for development in order for easy land acquisition when the construction for the related facilities will be started.

4) Construction

Almost all of the construction sites are far away from the developed area (Bangkok). Therefore, the construction methods will be limited because of lack of skilled labor and the construction will take a longer period compared with that in the Bangkok area. For this reason the construction period was estimated for at least 18 months for Stage 1.

11.2.2 Stage Construction for Terminal Complex

The construction of the terminal complex requires very large investment due to various design requirements. For this reason and to obtain the maximum economic benefit it is desirable to consider stage construction instead of completing the final scheme from the initial stage. Stage construction will be considered in such categories as truck terminal, warehouses, truck center, wholesaler's stock point, bonded area, and others. (See Figs. 11.2.1 through 11.2.3)

1) Phase-1 Construction

The construction of the three truck terminals is scheduled in the Phase-1 stage. This construction will be carried out in consideration of the terminal traffic demand, efficiency of developing the suburban area, construction costs, difficulty of land acquisition, construction progress of other terminals, and traffic congestion on the existing roads in the Project Cities.

The construction of the three truck terminals will be completed for their greater part by the year 1992.

The rest of the truck terminal facilities will be completed by the year 2000.

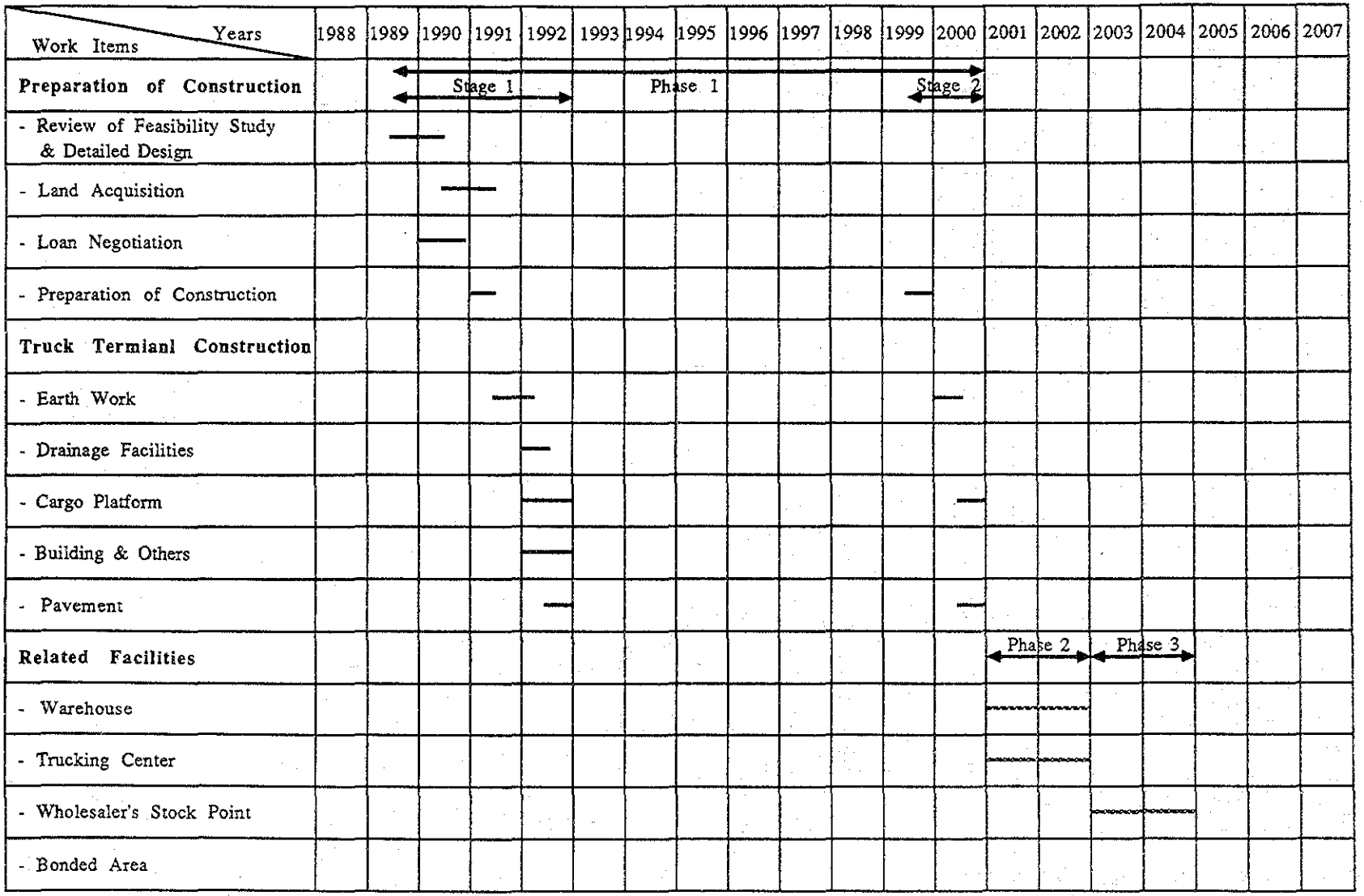
2) Phase-2 Construction

Related facilities such as warehouses, truck centers and bonded area (Hat Yai only) will be constructed in Phase-2 stage after operation of truck terminal in consideration of combination with Phase-1 facilities. (See Figs. 11.2.1 through 11.2.3)

3) Phase-3 Construction

The construction of wholesaler's stock point will be made in the final stage. After completion of this facility, the terminal complex will be formed as the facility of full function for the land physical distribution. (See Figs. 11.2.1 through 11.2.3)

Fig. 11.2.1 Implementation Schedule for Regional Truck Terminal (Chiang Mai)



Note: ——— Implementation & Preparation of Truck Terminal
~~~~~ Implementation of Related Facilities
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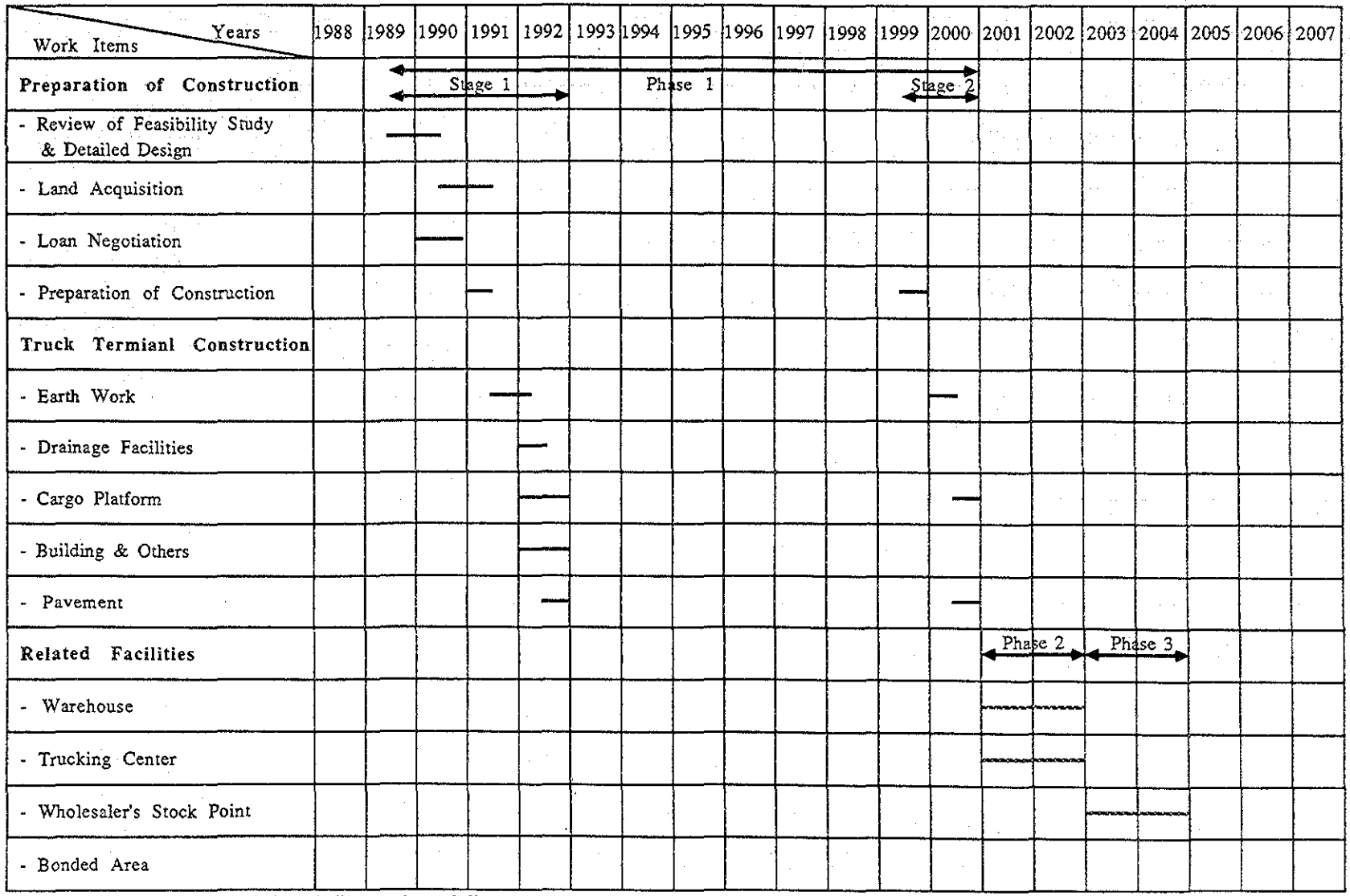
Fig. 11.2.2 Implementation Schedule for Regional Truck Terminal (Khon Kaen)



Note: ——— Implementation & Preparation of Truck Terminal

~~~~~~~~~~ Implementation of Related Facilities
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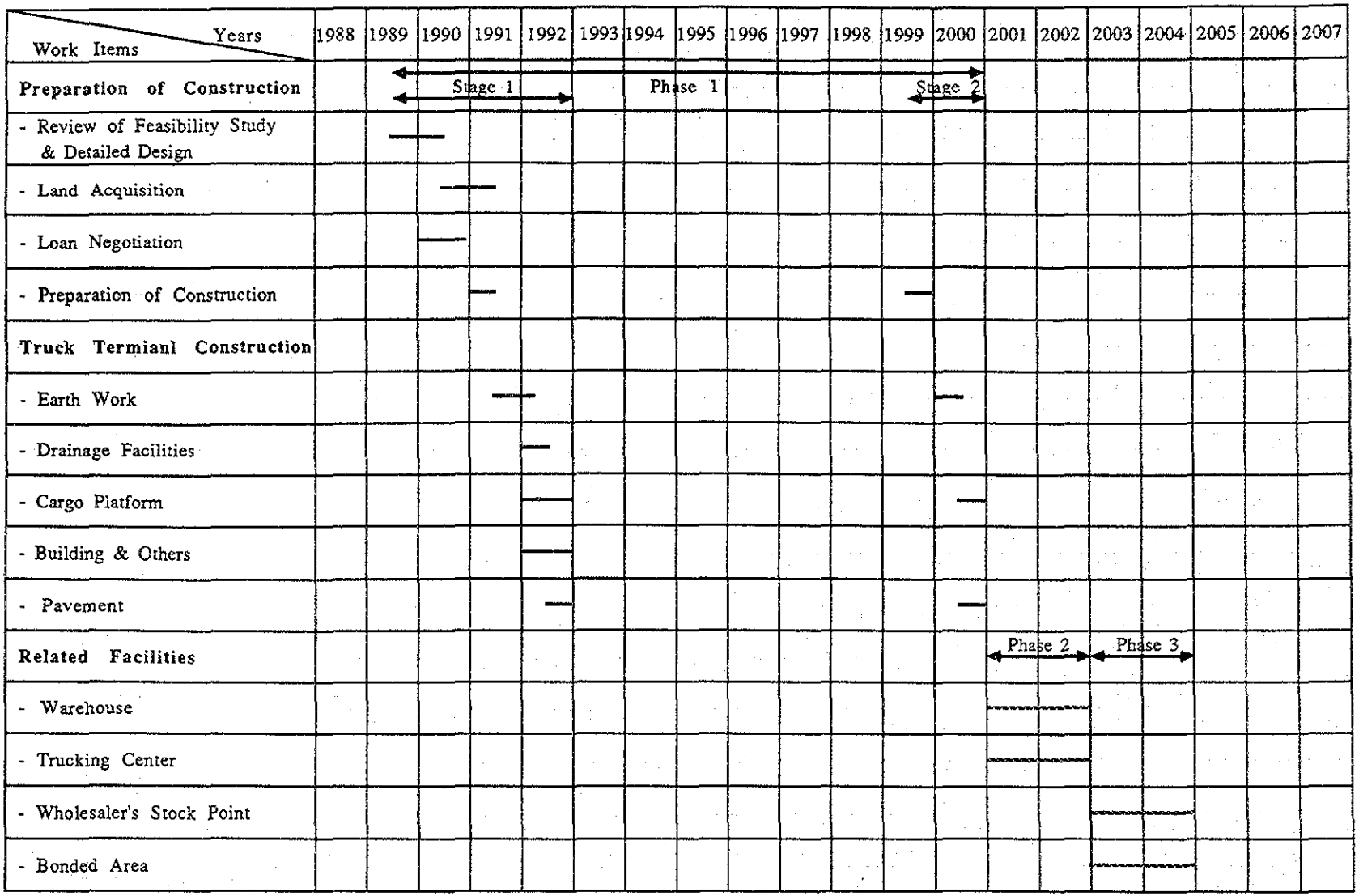
Fig. 11.2.3 Implementation Schedule for Regional Truck Terminal (Hat Yai)



Note: ——— Implementation & Preparation of Truck Terminal
——— Implementation of Related Facilities