Table 11.4.6 Project Evaluation Indicators (ROI)
(with Government Support)

Cost	Charge	Gearing Ratio				
		10:90	2:80	30:70	40:60	50:50
Cost B	Charge 1	Nil	4.90	8.12	8.84	8.84
	Charge 2	11.81	12.29	12.29	12.29	12.29
	Charge 3	14.98	14.98	14.98	14.98	14.98
	Charge 4	17.60	17.60	17.60	17.60	17.60
	Charge 5	20.07	20.07	20.07	20.07	20.07
	Charge 6	22.33	22.33	22.33	22.33	22.33
	Charge 7	24.46	24.46	24.46	24.46	24.46
	Charge 8	26.62	26.62	26.62	26.62	26.62
	Charge 9	28.60	28.60	28.60	28.60	28.60
Cost C	Charge 1	Nil	6.16	8.85	9.22	9.22
	Charge 2	12.47	12.72	12.72	12.72	12.72
	Charge 3	15.45	15.45	15.45	15.45	15.45
	Charge 4	18.12	18.12	18.12	18.12	18.12
	Charge 5	20.64	20.64	20.64	20.64	20.64
	Charge 6	22.94	22.94	22.94	22.94	22.94
	Charge 7	25.11	25.11	25.11	25.11	25.11
	Charge 8	27.31	27.31	27.31	27.31	27.31
	Charge 9	29.33	29.33	29.33	29.33	29.33
Cost D	Charge 1	5.86	9.54	10.48	10.48	10.48
	Charge 2	14.17	14.17	14.17	14.17	14.17
	Charge 3	17.05	17.05	17.05	17.05	17.05
	Charge 4	19.87	19.87	19.87	19.87	19.87
	Charge 5	22.55	22.55	22.55	22.55	22.55
	Charge 6	24.99	24.99	24.99	24.99	24.99
	Charge 7	27.29	27.29	27.29	27.29	27.29
	Charge 8	29.63	29.63	29.63	29.63	29.63
	Charge 9	31.78	31.78	31.78	31.78	31.78
Cost E	Charge 1	7.27	10.42	10.92	10.92	10.92
	Charge 2	14.67	14.67	14.67	14.67	14.67
	Charge 3	17.60	17.60	17.60	17.60	17.60
	Charge 4	20.48	20.48	20.48	20.48	20.48
	Charge 5	23.21	23.21	23.21	23.21	23.21
	Charge 6	25.69	25.69	25.69	25.69	25.69
	Charge 7	28.04	28.04	28.04	28.04	28.04
	Charge 8	30.42	30.42	30.42	30.42	30.42
	Charge 9	32.62	32.62	32.62	32.62	32.62

Note; Cells encircled by the double line indicate that net cash flow on this condition generates positive profit, and short-term loan for offsetting annual deficit is not necessary.

As for Cost A, the findings are as followings;

(1) Charge 6 (= berth charge of 110 Baht/m^2/month) and lower charge levels cannot make the project feasible regardless of the gearing ratio.

(2) Charge 7 (= berth charge of 120 Baht/m^2/month) and higher charge levels can guarantee the financial feasibility of the project at any case of gearing ratio since the returns on investment (ROIs) are all above 12%.

(3) Thus the problem falls on whether Charge 7 or higher levels can be justified by the public or not.

As for other cost cases, it is apparent that the viability of the project is dependent of the charge. Major findings are as follows;

(1) In any case of Charge 1 (Model Charge), the project cannot be feasible.

(2) In case of Charge 2 (= berth charge of 60 Baht/m^2/month), the project turns feasible regardless gearing ratio if Costs D and E are adopted.

(3) In any cases with Charge 3, the project is feasible regardless the gearing ratios. In this case, problems lies which condition is more important, charge level or the government cost burden.

This study judges that;

Cost E, Charge 2, and Gearing Ratio 10:90 is the best combination for the semi-pubic investment.

This is because;

(1) Charge level should be kept close to Model Charge (= Charge 1) as much as possible,

(2) two (2) to three (3) per cent of margin of the return above the criteria (=12%) is most preferable for the semi-public investment with the government capital participation. This means that the government should not seek for a large profit and should return its profit to the public.

(3) Equity ratio should be a minimum level since it contributes to reduce the government burden and to make it easy to collect the equity amount from the private sector.

Table 11.4.7 shows the best charge system.

Best combination of influential variables is selected. This is applied to evaluate Case 1 and Case 2-2. Table 11.4.8 summarizes the results.

Table 11.4.8 FIRRs of All the Project Cases

Conditions	Case 1	Case 2-1	Case 2-2
Cost E Charge 2 Gearing Ratio 10:90	10.26	14.67	18.11

The final results suggest that Case 2-1 is much preferable to Case 1, and Case 2-2 guarantees the highest feasibiity if Case 2-1 is implemented prior to Case 2-2, ant that Case 1 shows the lowest return in investment. ROI of Case 1 is less than the project justification level.

11.4.4 Sensitivity Analysis

This study conducted two kinds of sensitivity analysis with variables of interest rate of loan-term loan and additional cost of flyover construction by the terminal company.

Table 11.4.7 Best Charge System of Public Truck Terminal

(unit: Baht/m2/month)

Unit Charge of Lease Contract	1992	1995	(1996)	2000	(2001)	2005	2010	2015	2020
Charge 2	3%								
1. Berth	60	66	68	76	78	88	102	118	137
2. Parking	33	36	37	42	43	48	56	65	76
3. Administration Building									
(a) Meeting Room	99	108	111	125	129	145	169	195	227
(b) Training Room	99	108	111	125	129	145	169	195	227
(c) Canteen	96	105	108	122	125	141	163	189	220
(d) Rest Room*1	122	133	137	155	159	179	208	241	279
4. Office	96	105	108	122	125	141	163	189	220
5. Warehouse	50	55	56	63	65	73	85	99	114
6. Lodging	120	131	135	152	157	176	204	237	275
7. Service Station									
(a) Gas Station*2	78,822	86,131	88,715	99,849	102,845	115,753	134,189	155,562	180,339
(b) Repair Shop*2	78,822	86,131	88,715	99,849	102,845	115,753	134,189	155,562	180,339
(c) Car Washing Shop									

(Note): *1 Averge of room area is 13 sq. meter per room.
*2 Unit of this charge is set per whole area of one factory.

A. Interest of Loan

In case that the interest of long-term loan varies, results below are obtained.

Table 11.4.9 Sensitivity Analysis with Various Interest Rates (Case 2-1)

Long-term Loan Interest	4.5%	7%	12%
FIRR	20.6	17.1	14.67

Furthermore, case with the highest interest in the past (interest rate = 15%) was also studied for reference, and FIRR for this case dropped to 9.9%, less than an approval level of investment.

B. Flyover Construction Cost

This study proposes to install intersection in front of terminal site. Alternative plan is flyover, which costs 120 million Baht in addition. Table 11.4.10 summarizes the corresponding FIRRs (ROIs).

Table 11.4.10 FIRRs on Cases with Flyover

Case with Flyover	Case 1	Case 2-1
FIRR	6.11%	9.02%

Note; Cost of flyover for Case 2-2 is not estimated.

11.5 Necessary Government Support

Various combination of the government policy measures are examined to clarify how these measures can contribute to improve the feasibility of the project. Results clarifies that the followings are the necessary measures for the public truck terminal project.

- Land provision by the government
- Capital participation of the government
- Provision of infrastructure, and
- Provision of terminal facilities.

11.6 Conclusions of Financial Evaluation

1. With the government's support, the project Case 2-1 proves its financial feasibility of 14.67% of financial internal rate of return (FIRR). Case 2-2 can guarantee the highest FIRR of 28.11% if Case 2-1 is implemented prior to Case 2-2. Without the government support, financial feasibility indicators cannot reach the minimum level of project justification.

Conditions	Case 1	Case 2-1	Case 2-2
Cost E Charge 2 Gearing Ratio 10:90	10.26	14.67	18.11

Conditions:

a. Cost E (with the Government supports as described 2. below)
b. Charge 2 (Berth charge ; 60 Baht/m^2/month)
c. Gearing Ratio 10:90 (Equity : Loan)

2. Required measures of the government's support are as follows:

- Provision of the land for the truck terminal to the terminal management entity at a least charge level,
- Capital participation by the government (49% of total equity),
- Provision of infrastructure, and
- Provision of terminal facilities.

3. In sensitivity analysis clarified that the project feasibility indicator is most sensitive to the charge level, and construction cost that the management entity has to invest. The latter relates the involvement

degree of the government to the project. The government's supports described above are minimum and indispensable.

4. This public truck terminal project cannot be feasible without government's supports. On the contrary, with the government's supports on the land acquisition, capital participation, construction of infrastructure and terminal facilities, the project turns out to be feasible. This provides the rationale for the government to support this semi-public project by its nature.

With all the results above, the project necessitates the government supports in various fields. Within the financial burden of the government that is justified by the economic return to the whole Thai economy, this project turns to feasible. If this project is levied to the private investors alone, the Thai economy faces the another negative economic effects as described in the economic analyses.

In conclusion, this financial study suggests the project should be implemented with the government supports, and that the government take the actions within the range the economic benefit.

CHAPTER 12

ORGANIZATION, OPERATION AND MANAGEMENT

CHAPTER 12 ORGANIZATION, OPERATION AND MANAGEMENT PLAN

This section presents the organization, and the operation and management plan for the highest priority truck terminal, i.e., the ideal North Public Truck Terminal. This is designed applicable to other truck terminals such as a planned East Public Truck Terminal and West Truck Terminal.

12.1 Organization

12.1.1 Proposed Administrative Organization of Public Truck Terminal

This study proposes to establish the organization shown in Fig. 12.1.1. This is the best alternative, and the second best alternative is explained in section 12.1.2.

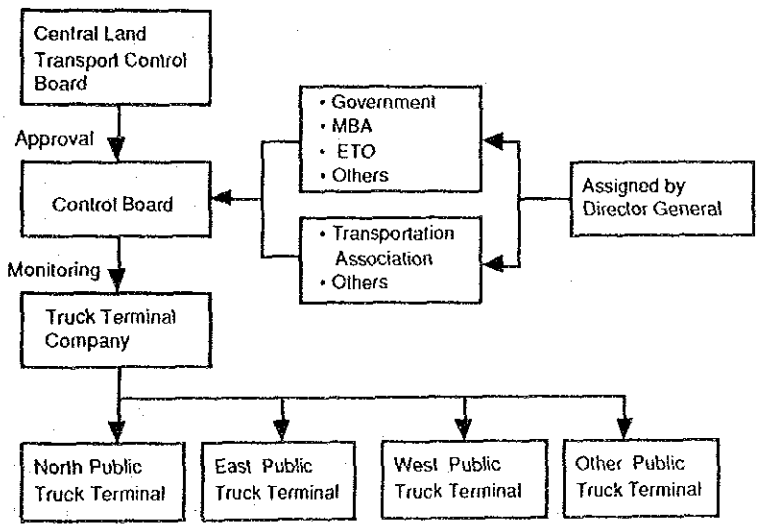


Fig. 12.1.1 Proposed Administrative Organization

Feature of this organization lies in an establishment of "Control Board," new organization for monitoring the administration of Truck Terminal Company under the supervision of "Central Land Transport Control Board."

All truck terminals in the Bangkok Metropolitan area should be managed by one truck terminal company to formulate the systematic cargo operations among the terminals and to connect each terminal with an integrated network of physical distribution network.

Roles of each are explained in the following section.

A. Central Land Transport Board

The Land Transport Act 1979 delegates the authority for the regulation of transport to three committees below;

1. Land Transport Policy Committee
2. Central Land Transport Control Board
3. Provincial Land Transport Control Board

Therefore, an official control board is indispensable for administrating the public truck terminal. Its main functions and roles are to control and advice about the policy below;

1. To formulate an expansion plan of the truck terminal according to future demand
2. To formulate and execute new traffic control policies on heavy trucks
3. To revise the berth rental charges and others

B. Control Board

This is the organization for monitoring how the terminal is managed under the supervision of Central Land Transport Control Board. The main functions and roles of the board are as follows;

1. Future planning aspect (expansion or others)
2. Policy coordination among authorities such as traffic police and others.
3. Reviewing the management matters such as revise of charge

Actual members of the board will be appointed by Director-General of Department of Land Transport (DLT). Its key members should include;

1. Government ; staff of MOTC and DLT
2. BMA ; planning staff and others
3. ETO ; operation and management staff
4. Transportation Association ; executive class

12.1.2 Second Best Administrative Organization of Public Truck Terminal

Fig. 12.1.2 shows the second best administrative organization of the truck terminal.

Department of Land Transport (DLT) rents all the facilities to the Truck Terminal Company under its supervision. DLT will monitor the administration of the Truck Terminal Company under the supervision of Central Land Transport Control Board. All the actual operations are managed by the Truck Terminal Company.

Formation of this organization is the most simple and easy to implement if the government could construct the whole truck terminal at the government expense. In this sense, this is much preferable to the previous alternative.

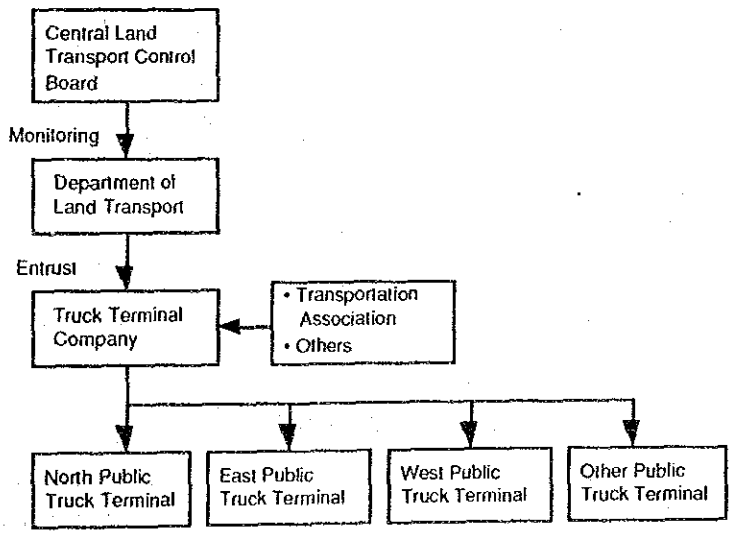


Fig. 12.1.2 Second Best Administrative Organization

However, this is the case extremely different from the present policy of the government. This faces the less possibility to be implemented by the

government. Because of this problem, this alternative was ranked at the second of the alternatives.

12.1.3 Organization of Public Truck Terminal Company

A. Organization

Overall organization chart is shown in Fig. 12.1.3.

The truck terminal company manages the company, operates the truck terminal, and supervises tenants.

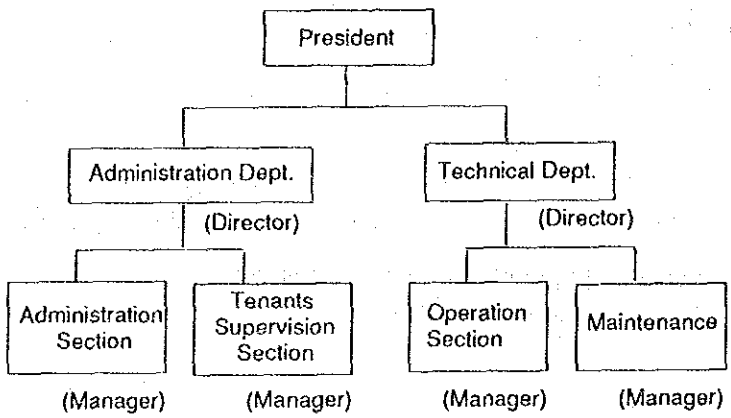


Fig. 12.1.3 Organization of Public Truck Terminal Company

B. Function and Tasks of Each Section

1. Administration Section

This section engages in an administration works of the truck terminal company. Major work items are shown below;

a) General affairs on company administration,
b) Financial, budgeting and accounting matters,
c) Personnel management,
d) Secretarial work, and
e) Regal and legislative matters.

2. Supervision Section

This section supervises tenants and manages its facilities. Detail tasks are described below:

a) Property management,
b) Supervising truck terminal users,
c) Supervising tenants, and
d) Management rental offices, parking and temporary storage.

3. Operation Section

This section operates truck terminal and engages in business development activities. Detail tasks are as follows:

a) Supervising berth operation,
b) Supervising security,
c) Promotion of truck terminal, and
d) Preparing statistical data on operation.

4. Maintenance Section

Maintenance section is in charge of maintenance of site and building. Detail tasks are as follows:

a) Utility maintenance,
b) Building maintenance,
c) Machine maintenance, and
d) Site and infrastructure maintenance.

12.1.4 Management Entity

A. Management Entities and Fields

Facilities are managed by the truck terminal company and by sub-contract tenants.

The truck terminal company is responsible for the management of all the facilities in the terminal. However, some should be managed by the contracted tenants with the corresponding specific knowledge and management techniques.

The latter includes repair shop, gas station, rest room and lodging room and so on. Other facilities are directly managed by the truck terminal company.

The management entity of each facility is proposed as shown in Table 12.1.1.

Table 12.1.1 Proposed Management Assignment

Facilities	Management Entity	
	Truck Terminal Company	Contracted Tenant
Berth	O	
Office at Platform	O	
Office in Administration Building	O	
Parking		O
Temporary Storage		O
Rest Room		O
Lodging Room		O
Repair Shop		O
Gas Station		O

B. Form of Sub-contract

Two types of sub-contract are examined in this study. It is judged that the second type of the sub-contract is more appropriate to meet the purpose of the public truck terminal.

1. Rent Sub-contract of Facilities

With this type of sub-contract, rent-holders have all responsibility for the facility construction and management. The rent-holders

pay relatively lower leasing fee, however need large initial investment. It can reduce business risk for the truck terminal company. However, it can have little control over the rent-holders.

2. Management Sub-contract

With this type of sub-contract, the truck terminal company provides all the facilities to tenants and they engage in their operation only. The tenants do not need large amount of initial investment but are required to pay higher rent. The truck terminal company can have more influential power over tenants' performance.

12.2 Construction Management Plan

12.2.1 Construction Management Entity

Three kinds of the construction management entity are set for analysis in this study. This issue relates who bears the cost. Major difference lies in the level of the government participation in the cost sharing.

Three possible cases are shown below;

A. Private	The truck terminal is constructed by either the private investor, or the beneficiaries' association.
B. The government	The terminal is constructed and managed by the government alone. However, the present conditions in Thailand make this case less practical.
C. Private company with the government fund	The government participates in the management by means of the equity participation, the provision of government land and infrastructure, etc.

12.2.2 Two-Staged Construction

This study proposes a two-staged construction.

Truck terminal with 500 berths is required in the north of the Bangkok Metropolitan area at the year 2000. However, the demand of truck terminal at the year 1995 is less than that at the year 2000. Therefore, the two-staged construction is proposed so that the investor can avoid the excessive investment at the initial stage.

In addition, a limited possibility of wide land acquisition gives other rationale reason to the two-staged construction.

In implementing a two-staged construction, two cases are anticipated: First case is to secure the whole land wide enough to install 500 berths in one place at one time, and construction works are divided into two stages. Second case is that two different lots of land are separately acquired at a different time. One lot is for 350 berths, sufficient to meet the demand at the year 1996. The other lot is for the other truck terminal with 150 berths in the different place.

Cases are summarized as follows;

	Case 1	Case 2
1st Stage	- Whole land for 500 berths is acquired in this stage. - 350 berths are constructed.	- Land for 350 berths is acquired. - 350 berths are constructed.
2nd Stage	- 150 berths are constructed.	- New land for 150 berths is acquired. - 150 berths are constructed.

12.2.3 Land Acquisition

This study evaluated two entities of land acquisition.

A. The Government

The government possesses the land in the Bangkok Metropolitan area, and can transfer it to the truck terminal.

This measure can be only one possible way to provide a breakthrough for this truck terminal project if executed. For the terminal construction plans in the past were deadlocked without any exception because of high land acquisition cost and a consequent low feasibility of the project. Rapid increase in land price had further aggregated the situation.

It is suggested that the government use its own land for the project, and not to purchase a new land for the terminal. This can minimize the financial burden of the government.

The government should rent the land to the truck terminal company at low rental charge, for instance, at charge calculated at the depreciation period of 50 or 100 years.

B. Private Investors

This is the common case for almost all the projects. Private investors can be divided into two groups:

1. Commercial investors
2. Beneficiaries' associations

Some of the commercial investors possess the suitable land for the project and plan to use it for this public truck terminal project. Others are to acquire new land for the terminal.

However, it is clear that the investment return is not so attractive by its nature to the investors unless they seek for the fringe benefits accruing to the construction of the truck terminal. Some have plans to construct the condominium or shopping center around the terminal.

Is this type of real estate development suitable for town planning in Bangkok? Answer is suggested by the Japanese custom. It is noteworthy that those kinds of land uses are prohibited by law in Japan so that the urban planning can be more systematically carried out, and higher living amenity can be pursued in the urban area.

A task of how investors acquire the necessary land is levied to the investors in this study, and its magnitude of financial burden alone is a subject of analysis in this study.

C. Best Ownership

This study proposes that the land be provided by the government, regardless to how to get the land. The best way is to use its own land that is not yet used. Availability of suitable land is confirmed by the JICA Study Team as for the North Truck Terminal.

This is concluded based on the following criteria:

1. The public truck terminal project is considered a subject of public investment so that the government should play an important role of contributor.

2. Land price at the market is so high that the truck terminal project can not guarantee a return enough to recover the land investment fee. The land acquisition should not be a task of private investor, especially for this kind of semi-public project.

3. Development around the planned terminal site should be restricted in a line of the town planning or land use plan. Especially, residential and commercial development should be controlled in the land near the terminal since traffic of heavy trucks induces the aggravation of living amenity under the circumstances. In case of Japan, land use law restricts all the residential and commercial development around the truck terminal site, and only the physical distribution industry is permitted. This also contributes to generate the scale merit of the industry. The government is suggested to stick to this principle.

12.2.4 Infrastructure

This study proposes that these infrastructures be constructed by the government to support this semi-public investment.

These infrastructures are listed below:

A. Access Road	Access road is indispensable if the terminal site is not adjacent to the major trunk road.
B. Truck Road in the Terminal	This connects the terminal with the related facilities.
C. Water Supply & Other Facilities	These supply water and other services required in the terminal.
D. Telecommunication Facility	This is indispensable to assure a quick and accurate order handling for delivery and collection works.

12.2.5 Finance

Following four are possible financial sources;

A. Private Investors' Own Capital	This case is that all the construction and land acquisition are carried by the private investor alone, and the fund is raised by their own capital or loan from the private banks.
B. Government Fund	This case is that the government finances all the cost necessary for the construction and land acquisition.
C. Combination of the Two Above	This is the case when the project is conducted by the private company with the government fund. Financing sources are thus the capital of both the government fund and the investor's fund.
D. Foreign Governmental Institute of Finance	The project can be a subject of the foreign governmental institute of finance if it is constructed by the Thai government. For instance, Overseas Economic Cooperation Fund of Japan (OECF) can offer a loan with favorable conditions than the commercial loan.

During the operational period, some subsidies can be offered to supplement the management cost as a mean of the governmental support if necessary.

12.3 Management and Operation Plan

12.3.1 Responsible Entity

Responsible entity for the management and operation can be selected regardless to who owns the terminal. Four entities can be candidates for the management and operation. Those are shown in Table 12.3.1.

Table 12.3.1 Responsible Entity for Management and Operation

Responsible Entity	Contents
Commercial Investors	This is the case that the construction entity engages in the management and operation of the terminal, too.
Government	Only with the ownership of the terminal, the government can take part in the terminal management.
Professional Management Team	This is the case that the owner invites a professional management team, and delegates all the rights of the management decision making to the team.
Private Company with the Government Fund	This type of management entity can apply to either the government owned terminal or private owned terminal.

A. Private Investor

This is the case that the construction entity engages in the management and operation of the terminal, too. But this is the most difficult case to implement the public truck terminal project as the past experiences indicate.

One more problem relates to the principle of fairness. Any user should be given access to the public terminal without any discrimination. However, this principle is sometimes infringed by profit-oriented entrepreneurs.

B. The Government

The truck terminal has a characteristic of public investment. In this aspect, the construction and management by the government is given a rational and an approval by the society.

However, actual implementation by this entity alone raises various problems, and it can be least possible measure except for supervising the design and construction matters.

Procedure of this management system is shown in Table 12.3.2.

Table 12.3.2 Procedure of Construction, Management and Operation

Step	Contents
Step 1 Establishment of New Organization	There are few authorities in Thailand at present capable to implement whole the truck terminal project. However most potential organization is Department of Land Transport (DLT). New organization should be established under the supervision of DLT.
Step 2 Revision of Laws Concerned	Present laws and institutional amendments will be carried out. Major items are shown below; - to approve the truck terminal project as a public investment - to establish the necessary organizations
Step 3 Budget Allocation	- to allocate necessary budget to the project
Step 4 Construction	- to construct the truck terminal
Step 5 Management	- to manage and operate the truck terminal

Fig. 12.3.1 illustrates the management procedure for a reference.

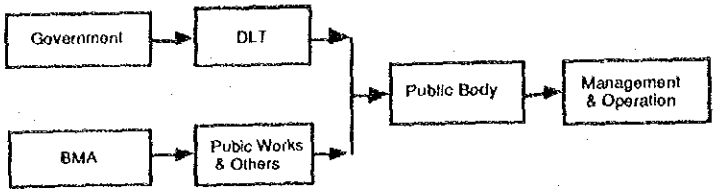


Fig. 12.3.1 Example of Management by the Government

It should be noted that the implementation of truck terminal project by the government alone may violate the government principle of fairness to all the people. Since the users of truck terminal are limited to the truck company, the government's management may generate the benefit only for the truck company. This is apparently against the principle of public investment. Thus, it is judged that this method has a least possibility.

C. Professional Management Team

This is the case that the owner invites a professional management team, and delegates all the rights of the management decision making to the team.

This is the most efficient form of the management. This can be adopted by any type of owner. However, problem of this case is whether this kind of professional team is available, especially for the public truck terminal. The management of physical distribution facility requires special operation know-hows. Since the margin of profit is usually low compared with the other commercial activities, it makes more difficult to find the professional management team.

D. Private Company with Governmental Fund

This type of management entity can apply to either the government owned terminal or private owned terminal. Private company are given all the rights of the management decision by the owner. If it is the

government owned terminal, a kind of monitoring mechanism should be established in order to guarantee the principle of fairness in management of public truck terminal. Capital participation makes the control of the company easy and smooth.

With the government participation, other private investors can take part in the project. This means that it is easy to collect the necessary capital for new establishment of company from the private sector.

E. Best Entity

1. Selection of Best Entity

This section shows the results of comparison of three management entities. Table 12.3.3 summarizes the results of comparison.

It is concluded that the third type, private company with the government fund, is the preferable type of the management for the truck terminal.

This management entity is the preferable for the truck terminal. This is attributable to the low profitability of this project.

The charge is controlled by the government. An increase in charge is strictly controlled to keep the charge level low and to prevent the general prices from escalating rapidly. This is quite rationale because transportation cost has a great influence in deciding the goods' prices.

However, these price policies by the government had depressed the financial conditions of the truck terminal all over the world.

This gives another rationale that the government gives access to the governmental financial sources and plays a role to guarantee the management stability.

Table 12.3.3 Comparative Evaluation of the Management Entities

Sector	Merit	Demerit
Private	- To be able to manage the truck terminal efficiently. - To pay much attention by themselves to make profits.	- How to guarantee the profit of the project - How to secure the fairness and publicity. This public truck terminal has a characteristic of public investment and thus issue lies in how to keep the truck terminal open equally to any kinds and any size of the truck companies. This should be stressed if the project is implemented by investors such as real estate company.
Government	- The government can control necessary policies such as on charge, expansion and so forth. - This makes it easier to invest governmental fund	The government invests the national budget into this project. However, actual befit takers are limited to the truck companies alone. This kind of dilemma is expected.
Professional Management Team	Most efficient to manage and operate the terminal. Professional knowledge on management and technical operation are kinds of no-tangible assets.	Most difficult to find out the appropriate personnel or team. Few management professionals are available in the truck terminal field. Thus this has a limited possibility.
Private Company with the Government Fund	This type of management organization requires all the benefit takers to take an equal burden in the project management. This burden sharing is appreciated. Each entity can use its most valuable and unique resource to the entity such as management sill, capital, land and so on. Each can supplement its role to manage the project effectively.	Few entity has sufficient management skill of the truck terminal

Thus it is judged that this type of management is the preferable.

This guarantees two important aspects of the truck terminal below.

a) The project should guarantee the minimum profit of the investor.

b) To secure fairness and the equal opportunity in using the truck terminal.

2. Establishment of Organization

a) Government Side

Department of Land Transport (DLT) can be a representative of the government.

b) Private Investor's Side

Two entities from the commercial investor sides can be anticipated. They are;

(1) Private investor or truck industry-related company, and

(2) Combination of the two above

In case that the companies that have already submitted the proposal to the Department of Land Transportation (DLT), will be approved to conduct the truck terminal project, either of them will be a representative of the private investor side.

In the above case, some conditions should be attached to the concession that requires a participation of both the private investor and truck industry-related organization.

Actual organization is suggested as shown in Fig. 12.3.2. This shows that the company will be established with an equal capital share among the government and private sector, and that the company is managed with this equal participation principal.

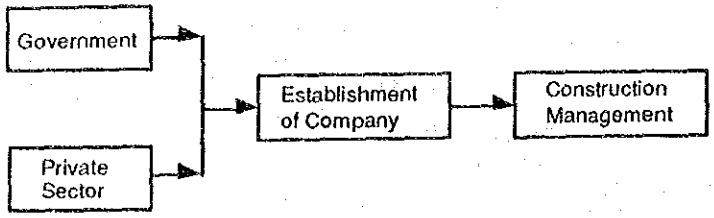


Fig. 12.3.2 Suggested Organization

12.4 Government Support Plan

This section presents how the government can support the truck terminal company in the case that it is constructed and managed by the private company with government fund.

Possible measures of government supports cover three fields below:

Financial field:

A. Capital participation
B. Provision of government land

Tax field:

C. Exemption of corporate tax

Other field:

D. Application of special depreciation rate
E. Provision of related infrastructure

Each item is explained more detail in the following spaces.

A. Capital

This study recommends that a private company with the government fund should construct, manage and operate the public truck terminal, and that the government invest a part of capital of the truck terminal company.

Thailand has experienced this kind of the government support in many projects. This measure is therefore highly possible for the government to adopt. Society can receive an economic benefit in welfare because it can relieve traffic congestion and consequently saves energy and time wasted in view of national economy.

It is suggested that forty-nine (49) percentage of the total capital be shared by the government and the remaining fifty-one (51) percentage by a private investor.

Table 12.4.1 shows the proposed capital requirement and the ideal capital share of each investment body for the North Truck Terminal. This assumes that the government provides the land for the terminal.

Table 12.4.1 Proposed Capital Requirement

(Million Baht)

	Case 1 (500 berths)	Case 2-1 (350 berths)	Case 2-2 (150 berths)
Initial Investment	588.3	401.7	192.4
Desirable Capital	96	73	33
- Government Fund	47	36	16
- Private Fund	49	37	17

B. Use of Public Land

This study strongly proposes that the government provide the suitable land of the truck terminal at the government expense in either way of purchasing a new land or providing her own land. It should be noted that the government at present has 230,000 square meters of a her own empty land, suitable for the North Truck Terminal.

It is efficient for the truck terminal project not only in reducing land acquisition cost but also in shortening project preparation period. It is because land acquisition cost composes a largest portion of the initial investment and it is a heaviest burden to the investors. It is also because land acquisition usually takes long time and hard negotiation with the land owner.

These two reasons provide a rational to the provision of government land for the North Truck Terminal project.

With the government's land, two cases are envisaged in assuring 500 berths.

1. To construct all of 500 berths on the government land, and its adjacent private land if necessary.

2. To construct 350 berths at the government land, and 150 berths at a different lot of the government land.

In either case, the following conditions should be determined in co-ordination with the authority concerned;

1. Land acquisition method

   There are two alternatives; purchasing and renting, regardless to how to acquire. However, a rent is preferable and more common measure in Thailand.

2. Land price

Land price, in either form of rent charge or buying price, is a main subject to discuss. This study proposes that the land price be decided on the non-market mechanism. At least, price should be set at a lower level than that of the neighboring lands.

Some cases, it is reported, set the price of the government land at a very low level, almost negligible level.

C. Tax Exemption

The government can offer a business tax exemption to this kind of public investment according to the request of the management entity of the truck terminal. This privilege is restricted to the period when the financial balance is in red.

D. Special Depreciation

Usually, straight line method or accelerated method is adopted within a certain period. The government can offer a special short period of depreciation for the building, facilities, and land, etc.

E. Provision of Related Infrastructure

The government can provide some infrastructure. For the government has to do its duties in investing for the public purpose and to reduce financial burden of the truck terminal company who is to play a part of the public service entity.

This study proposes that the following infrastructures be provided by the government:

Area	Infrastructure
Project Site	- Drainage - Electricity and others - Road
Neighboring Area	- Access road - Intersection

12.5 Facility Charge

The truck terminal is run with revenue accruing to facility charges that consist of charges for berth and other facilities. Among them, the charge for berth shares largest portion of total revenue of the truck terminal.

Other facilities charge can be divided into two types;

A. the charges directly collected from the truck terminal users, and
B. the charges indirectly collected from the sub-contract tenants.

Distinction of two types of charges depends on services. One is a peculiar service to the truck terminal, and the other services are additional services that usually need specific knowledge and techniques. The latter should be served by the sub-contract tenants.

Fig. 12.5.1 shows the structure of facility charges.

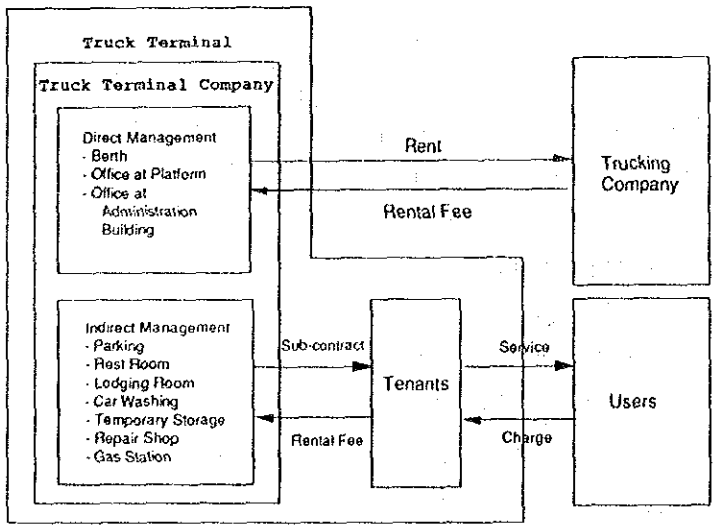


Fig. 12.5.1 Structure of Facility Charges

12.5.1 Charge for Berth

A. Factors to Be Considered

In determining charges for berth, four factors are taken into consideration. They are;

1. Magnitude of economic benefit,
2. Financial viability of the truck terminal,
3. Affordability of forwarder, and
4. Price escalation effect.

In the following space, each of items above is explained.

1. Magnitude of Economic Benefit

This sets a ceiling level of the charge and the charge should be set less than this level.

Economic benefit consists of saving in (1) the fixed cost of truck, (2) waiting time of truck, and (3) handling cost. All of which go to the forwarder and the trucking company, an other economic benefit which the national economy can receive are not included in this calculation.

2. Financial Viability of the Public Truck Terminal

Truck terminal is managed as a private company. It should be financially independent by itself. It means that the company must guarantee profit and returns to the investors.

Thus, charges for facilities should be at a level to keep a financial viability of a business.

However, some kinds of financial supports from the government such as subsidy, tax exemption, provisions of low interest loan are involved in this project. Therefore, magnitude of these elements should be reflected in setting the charges.

3. Affordability of Trucking Company

Forwarders' affordability is an another criterion since the charge is paid by the truck terminal users.

Trucking companies in Thailand are so small that they cannot absorb additional transportation cost without shifting the additional financial burden to the transportation charge. Their affordability seems to be small if the transportation cost is kept unchanged. The charge, therefore, should be set enough low for the trucking company to bear.

4. Price Escalation Effect

It is apparent that the additional transportation cost will be indispensable because of intervention of the truck terminal. The forwarders is apt to shift its financial burden to the transportation charges. This consequently raises overall prices in the country.

B. Basic Principle in Setting the Charge

Financial viability criterion is apt to set the charge higher than affordability criteria. To satisfy both criteria, the government supports are necessary up to the amount equivalent to the economic benefit (= maximum level). This also works to depress an expected price hike if the transportation charge is set unchanged.

In practice, the charge level is determined through a try-and-error process in the financial analysis.

In setting the charge for the berth, only two criteria are adopted in this study. However, in the actual setting other elements should also be involved.

Judging from these points of view, the following level of renting charge is preferable as analyzed in Chapter 11 "Financial Evaluation."

Table 12.5.1 Charge for Berth

Item	Charge & Space	Remarks
Space of Berth	157.5 m^2	3.5 m x (10+15+20)m
Unit Charge	49 Baht/m^2/month	per month
Charge/Berth	7,800 Baht/berth/month (=7,718)	per month (approximately)

12.5.2 Other Facility Charges

Charges of other facilities are divided into two according to the management body of the facilities.

A. Charges on Directly Managed Facilities

Facility directly managed have only one item, i.e., rental office space at platform. Method to determine the charge is same as the charge for berth because it must be determined in terms of various points of view such as financial viability and affordability.

B. Charges on Indirectly Managed Facilities

Facilities indirectly managed should be charged, too. This kind of charges are further divided into two groups;

1. Charge levied on tenants
2. Charge levied on users

Both charges are closely related to the financial viability of both the truck terminal company and the tenants, while the charge to users must be set with a due consideration on affordability of the users. Relationship between the both charges is illustrated in Fig. 12.5.2.

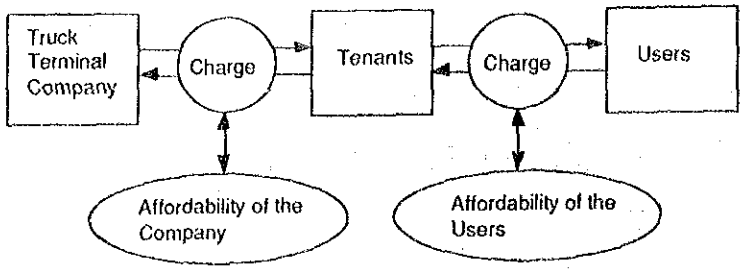


Fig. 12.5.2 Relationship of Other Facilities' Charges

Preferable unit charges for the facilities on indirect management are as shown in Table 12.5.2.

Table 12.5.2 Preferable Unit Charges for Other Facilities

(unit; Baht/m^2/month)

Items	Unit Charge *1
Parking;	27
Administration Building;	80
Office;	78
Warehouse;	41
Lodging;	97
Gas Station;	64,000 *2
Repair Shop;	64,000 *2

*1 Leasing charge from tenants to the truck terminal company.
*2 Leasing charge for whole area of one factory

12.6 Financing Program

For the North Truck Terminal, necessary amount of investment is shown in Table 12.4.1. Total amount of initial investment including land acquisition is estimated 1,882.5 million Baht in case of 500 berths of the truck terminal, and 1,455 million Baht and 663.5 million Baht in cases of 350 berths and 150 berths of the truck terminals respectively.

Table 12.5.1 Initial Investment of the North Truck Terminal

	Case 1	Case 2-1	Case 2-2
Berth	500	350	150
Area (Rai)	167	144	66
Investment (M. Baht)	558	408	192

Initial investment is financed by equity, loan from the commercial banks or the government.

A. Equity

Two sectors invest the capital of the north truck terminal company, which are the central government and private company. The former 49 per cent, the latter 51 per cent.

B. Loan

Condition of the overnment loan for the project is set almost same as the loan from the commercial institutions of finance.

12.7 Staff Training Plan

A. Number of Staff Required by Section

For an effective management, number of staff should be reduced as much as possible, especially at the beginning stage of truck terminal operation.

Table 12.7.1 shows recommended number of staff by section.

Table 12.7.1 Number of Staff by Section

Case	Case 1	Case 2-1	Case 2-2
No. of Berth	500	350	150
President	1	1	0
Director for Administration	1	1	0
Director for Engineering	1	1	0
Administration Section	6	5	3
Supervision Section	4	4	3
Operation Section	3		
Maintenance Section	4	3	1
Total	20	15	7

(Note) In cases of 350 and 150 berths of the truck terminal, supervision section and operation section are combined into one section.

B. Required Ability of Staff

Required abilities of staff differ according to the tasks. Table 12.7.2 shows relationship between tasks of each section and required ability of staff.

C. Education and Training Program

Specific know-how, knowledge and techniques about business can be acquired through "on-the-job-training." under the supervision of experts

from outside the company, especially technically and systematically matured countries in terms of physical distribution management. In this sense, an education and training program is required and aims at:

1. Improving ability,
2. Acquiring applied techniques and know-how, and
3. Learning related knowledge.

Table 12.7.2 Relationship between Tasks and Required Ability

Section	Task	Ability
Administration section	- general affairs	
	- financial, budgeting and accounting	- business administration
	- personnel management	- accounting
	- secretarial work	- taxation
	- regal and legislative matters	
Supervision section	- property management	
	- supervising truck terminal users	- business administration
	- supervising tenants	
	- managing facilities	
Operation section	- supervising berth operation	- distribution control
	- supervising security	
	- promotion of truck terminal	- marketing and promotion
	- statistical data	
Maintenance section	- utility management	- mechanical engineer
	- building management	- civil engineer
	- machine maintenance	- electrical engineer
	- site and infrastructure maintenance	

The truck terminal company can provide the on-the-job-training and recruits professional management personnel from the outside of the company. However, some training courses at special occasion can be a good opportunity to acquaint the skill and to embody to personnel. Table 12.7.3 shows proposed education and training courses.

Table 12.7.3 Education and Training Program

Ability	Improving Ability	Acquiring applied techniques and know-how	Learning related knowledge
Business Administration	-	-	Economic condition Traffic Policy (seminar)
Accounting	-	Computerization of accounting system	-
Taxation	Taxation system (Seminar)	-	-
Distribution	-	Practical distribution technique (seminar)	Distribution Policy (seminar)
Quality control	Quality Control Theory (Seminar)	-	-
Security and safety	Seminar on Safety and Security	-	-
Marketing	Marketing Theory	marketing methods	-
Promotion	Promotion Theory	promotion method	-
Mechanical Engineer	-	exercise of applied technique	-
Civil Engineer	-	exercise of applied technique	-
Electrical Engineer	-	exercise of applied technique	-

(Note) "-" means that on-the-job training is available in the course of daily work

CHAPTER 13

IMPLEMENTATION PROGRAM

CHAPTER 13 IMPLEMENTATION PROGRAM

13.1 Facility Plan

Table 13.1.1 lists necessary facilities for the public truck terminal by the construction stage. The first stage is implemented by the year 1995, while the second stage is scheduled to complete by the year 2000.

Table 13.1.1 Spaces of Truck Terminal Facilities

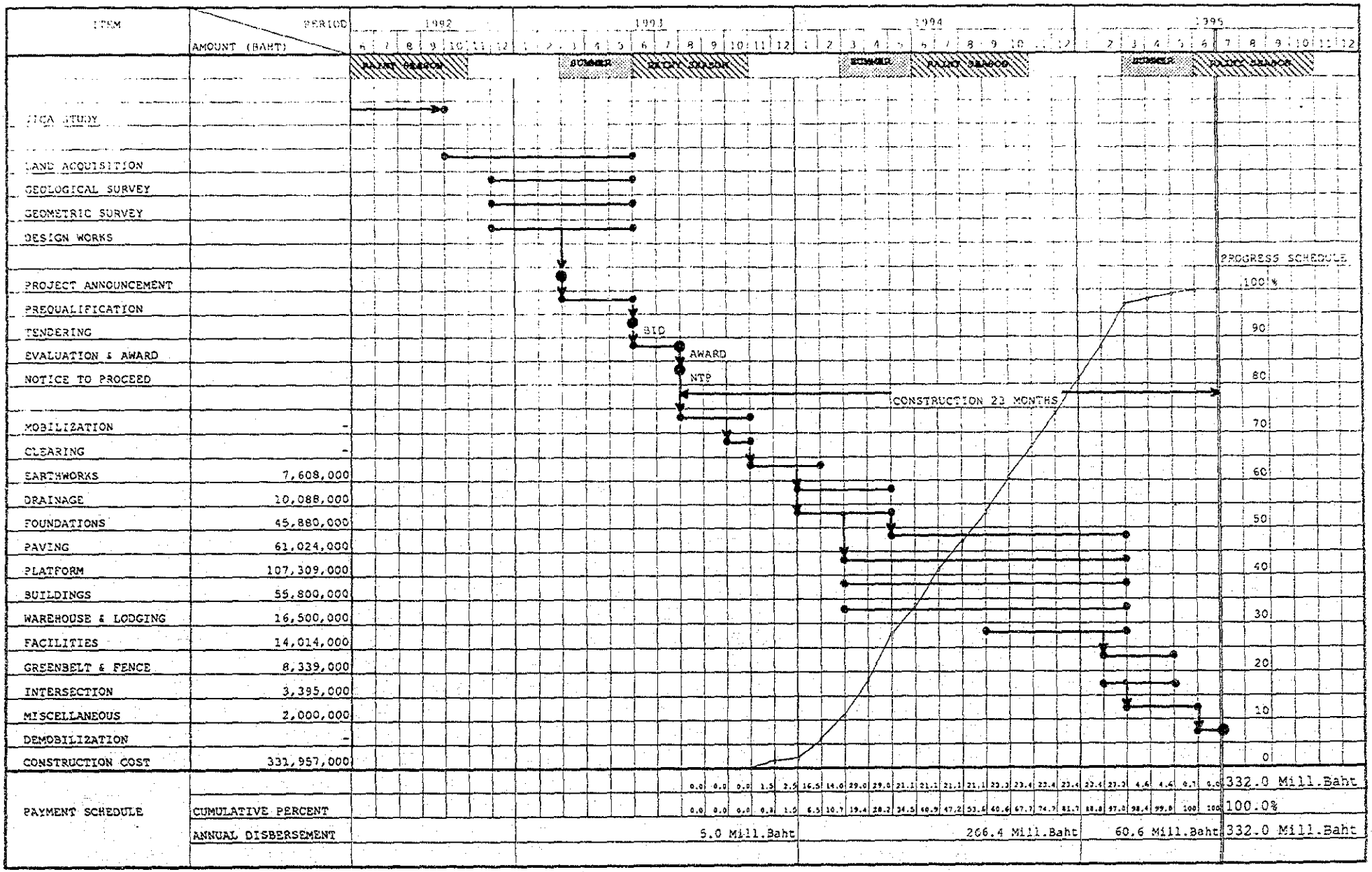
Facility	Case 2-1 (m^2)	Case 2-2 (m^2)	Total (m^2)
Platform	24,500	10,500	35,000
Apron	30,625	13,125	43,750
Parking	32,430	11,325	43,755
- Line-haul Truck	(18,000)	(6,075)	(24,075)
- Pick-up/Delivery Truck	(11,700)	(3,900)	(15,600)
- Staff Use	(2,730)	(1,350)	(4,080)
Administration Building	1,000	600	1,600
Office Building	4,200	1,800	6,000
Warehouse	3,000	2,000	5,000
Lodging	800	640	1,440
Service Station	2,800	2,000	4,800
Green Belt	9,200	5,850	15,050
Road & Others	102,770	40,510	143,280
Total	211,325	88,350	299,675

13.2 Construction Schedule

Table 13.2.1 shows the proposed construction schedule. This study proposes two-staged construction measure. The total construction period consists of two stages; first stage (1992-1995), and second stage (1996-2000).

In the first stage, 350 berths and relevant facilities are constructed by the year 1995, and the remaining 150 berths is constructed by the year 2000.

Table 13.2.1 Construction Schedule (Case 2-1)



13.3 Investment Plan

A. Annual Investment

1. Project Cost

Table 13.3.1 shows the project cost by work item and by construction stage. Sixty-eight (68) percent of the total cost is invested in the first stage, and the remaining thirty-two percent is disbursed in the second stage.

This project cost does not include the land acquisition cost. With this land acquisition cost , total project cost reaches 975 million Baht; 673 million Baht for the first stage and 302 million Baht for the second stage. In this case, the land price is set at 5,000 Baht per square wah (= 4 m^2), equivalent to two million Baht per rai.

This exclusion is attributable to the assumption that the government provides her own land to this project.

Table 13.3.1 Project Cost

(Unit : Million Baht)

Item	First Stage (Case 2-1)	Second Stage (Case 2-2)	Total
Preparatory Works	32.2	15.6	48.8
Construction Works	332.0	156.3	488.3
Supervision	16.6	7.8	24.4
Others	26.7	12.6	39.3
Total	408.5	192.4	600.9

* Excluding land price

2. Annual Investment Plan

Table 13.3.2 shows annual investment cost in 1992 price. This is tabulated by the construction stage.

Table 13.3.2 Annual Investment Cost

(Unit : Million Baht)

	1992 1st	1993 2nd	1994 3rd	1995 4th	1996 5th	1997 6th	1998 7th	1999 8th	2000 9th
1st Stage	5.9	35.3	299.2	68.0	-	-	-	-	-
2nd Stage	-	-	-	-	-	-	16.7	93.8	81.9
Total	5.9	35.3	299.2	68.0	-	-	16.7	93.8	81.9

Disbursement amount at the third year occupies 50% of the total investment, followed by 16% for the eighth year and 14% for the ninth year. Each of other years requires less than 6% of the total cost.

B. Fund Raising

The total amount of necessary fund for the truck terminal project reaches 600.9 million Baht. This study proposes three sources share the fund-raising burden. Table 13.3.3 shows the proposed financial sources and their required amount.

Table 13.3.3 Fund Raising Plan

(Unit : Million Baht)

Item	Amount	Remarks
1. Capital	48.2	
- Government	23.6	49% of total capital
- Private	24.6	51% of total capital
2. Government Support	118.5	
3. Loan	434.2	
Total	600.9	

* Excluding land price

This study proposes that the government share the burden in financing the total project cost. Those items are common-use infrastructure and sown in Table 13.3.4. The government share reaches 118.5 million Baht, about 20% of the total construction cost.

Table 13.3.4 Government Expenditure

(Unit : Million Baht)

	Case 2-1	Case 2-2	Total
Drainage	10.1	4.1	14.5
Paving Road	61.0	23.9	84.9
Electricity	2.0	1.0	3.0
Intersection	3.4	3.0	6.4
Terminal Facility	7.0	3.0	10.0
Total	83.5	35.0	118.5

C. Repayment Plan

Conditions of Loan

The condition of soft loans and other loans, and repayment plan are shown in Table 13.3.5.

Table 13.3.5 Conditions of Loans and Repayment

Amount (M.Baht)	Interest (%)	Grace Period (years)	Repayment Period
434.2	12	5	20

D. Land

This study proposes that the government rent her own land to the truck terminal company under the supervision of the Department of Land Transport (DLT). DLT should also play a key role to get the permission to use the government land.

Table 13.3.6 shows the general conditions of the rented land.

Table 13.3.6 Conditions of Land Rented

Item	Case 2-1	Case 2-2	Total
Size	144	63	210
Ownership	Gov.	Gov.	-
Rental Condition			
1. Period	50	50	-
2. Charge	5.76	2.52	8.28
3. Administration	DLT	DLT	DLT

(Note) Gov. means "Government."
DLT means "Department of Land Transport."

13.4 Management

A. Organization

Fig. 13.4.1 shows the organization for the truck terminal management. This study proposes that two new organizations be established; Policy Control Board an Truck Terminal Company.

Policy Control Board will be set up according to the Land Transport Act, and this board should be responsible for the policy matters such as construction of new truck terminal, expansion plan of the existing truck terminal, revision of the charge for the facilities of truck terminal, traffic control devices and others.

The Truck Terminal company is responsible of the construction and operation of the pubic truck terminal.

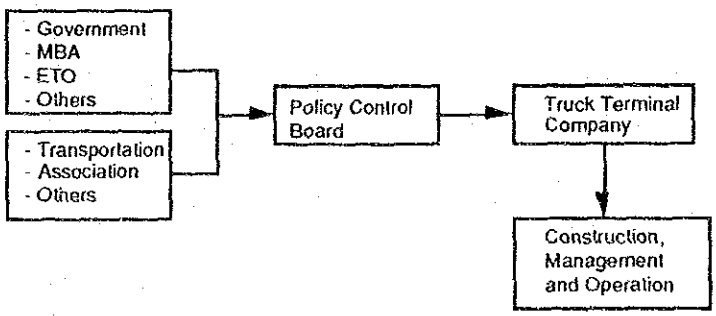


Fig. 13.4.1 Outline of Organization

B. Management

The berth, office at platform and office in administration building are managed by the truck terminal company.

The other facilities such as parking, lodging and so forth are rented to the tenants which have specific know-hows to manage the rented facilities in the truck terminal.

The necessary sections and staffs are listed in Table 13.4.1, and Table 13.4.2 shows the management entity.

Table 13.4.1 Number of staff by Section

Section	First Stage	Second Stage
President	1	0
Director for Administration	1	0
Director for engineering	1	0
Administration Section	5	3
Supervision Section	} 4	} 3
Operation Section		
Maintenance Section	3	1
Total	15	7

Table 13.4.2 Management Assignment

Facilities	Management & Operation Entity	
	Direct Management	Operated by Tenant
Berth	0	
Office at berth side	0	
Office at administration building	0	
Parking		0
Temporary storage		0
Rest room		0
Lodging room		0
Repair shop		0
Gas Station		

13.5 Environmental Impact Assessment

13.5.1 General

Pubic truck terminal can give some environmental impacts on the surrounding area of its site once its construction and operation commences. Expected items are listed below with some explanations. Detail survey are required for the items concerned.

1. Traffic Management	Heavy traffic of trucks requires the well designed traffic management system at the intersection between arterial road and the entrance/exit of the truck terminal.
2. Noise Pollution alongside Road	Noise pollution can be caused by large trucks at the surrounding area of terminal, and also by traffic vehicles at the intersection between approach road and arterial road.
3. Land Subsidence	Land subsidence has become a social problem in Bangkok and its peripheral area, and the countermeasures is essential, especially for keeping the terminal operation normal.
4. Drainage	Quality of drainage water should be checked and controlled. Especially drainage from the gas station can be a subject of this survey.
5. Utilization of Rainfall Water	This truck terminal locates far from the center of Bangkok, and it costs a huge amount of investment if new water supply system should be constructed. Thus why full utilization of rainfall water should be planned.
6. Vibration	Truck traffic raises vibration problem especially where the ground is loose. This effect is related with the earth work method. Thus vibration effect should be checked with an examination of earth work method.

13.5.2 Traffic Management

A. Traffic Volume

Table 13.5.1 shows the traffic volume which utilizes the truck terminal in the year 2000.

Table 13.5.1 Traffic Volume* in 2000

(Unit: Vehicle)

Type	Volume/day	Volume/hour
Line-haul Truck	1,280	256
Pick-up	5,200	1,040
Others	600	120
Total	7,080	1,416

* Total Volume of in and out

B. Measures of Traffic Management

The peak hour traffic volume in and out of truck terminal is about 1,820 PCU (Passenger Car Unit). On the other hand Route No. 1 is likely to become a arterial road to which the approach road of the North Public Truck Terminal connect. Route No. 1 with four lanes has comparatively high traffic volume as many as 44,000 vehicles per day.

However, a signal control system at intersection of approach road and arterial road functions well to guarantee smooth traffic since the traffic volume generating at the truck terminal is not so large. Therefore, a ground intersection type is proposed in this study.

13.5.3. Noise Pollution

Noise pollution may occur at the following two spots, and thus the assessment on this matter should be conducted carefully there.

A. On the Surrounding Area of Truck Terminal

A running speed of trucks that move around in the truck terminal is rather low. Under this condition, truck's engine noise is not so large. Thus, noise observed at the surrounding area is anticipated not to become serious problem.

It is not essential to prepare any measures at the early stage of the terminal operation. However, it is suggested that countermeasures such as noise protection wall and other noise shutting facilities be re-examined at the stage that the truck terminal will operate at its full capacity.

B. Approach Road and Conjunction

There is no approach road attached to the ideal North Public Truck Terminal since the truck terminal is to locate next to a arterial road. Meanwhile, as for the entrance and exit of the truck terminal, the conjunction is designed to be a ground intersection.

Noise pollution at this conjunction might be an issue. The truck terminal is constructed alongside Route No. 1 which has a traffic volume as much as about 40,000 vehicles per day. Therefore a noise generation from traffic on the arterial road will become heavier in comparing to that at the conjunction.

No other additional noise problem is anticipated. Since large trucks utilizing a truck terminal run on the arterial road even now between BMR and the up-countries, it is supposed that new problems on noise pollution will not occur.

13.5.4 Land Subsidence

A remarkable land subsidence has been observed in the BMR and its peripheral area due to huge consumption volume of the underground water and the deterioration of base. However, it is prohibited now to use the underground water for an industrial and other development purpose.

Therefore any facility in this terminal is designed not to use the underground water, and thus have no impact on land subsidence. For instance, car-washing station is designed to use a rain water in rainy season.

13.5.5 Drainage

Water treatment plant is planned for the sewage in the terminal to satisfy the drainage criteria of the Thailand government. This facility's capacity and water treatment level should be checked, if possible periodically, to keep the environment clean.

This plant is used mainly for the car-washing station, vehicle repair shop, canteen and so on. Drainage demand of the truck terminal can be low by its nature in both quantity and quality, and shows a sharp contrast from an industrial development project.

13.5.6. Utilization of Rainfall Water

Rainfall water stored in rain season is used in the truck terminal except for drinking use since the site location of the truck terminal is far from the center of Bangkok. This means practical use of rainfall resources to save water supply more efficiently, and to make time lag in discharge to use drainage facilities.

13.5.7 Vibration

This can be an issue especially where the ground is loose and where the surrounding is the residential area or educational area. The effect relates with the earth work method. Thus vibration effect should be checked with an examination of earth work method.

13.6 Land Use Control for the Truck Terminal Project

Land use is controlled by City Planning Act. This makes it possible that the truck terminal-related industries can locate in one area, and function closely and integrally with each other. This kinds of land use control are indispensable for the truck terminal project. This section reviews present city planning acts and its role. And some suggestions are presented.

13.6.1 Present Role of City Planning Act

A. City Planning Act

There are two kinds of city planning status; city planning acts for the city and the sub-district.

City Planning Act of Thailand aims at creating the town which can functions efficiently because of a systematic allocation of urban facilities.

City Planning Act is to classify the land use into fourteen (14) categories, and to require some specific cities to prepare a master plan of the land use plan. This expects that a systematic land use plan will contribute to guarantee the most efficient economic activities and the high living amenities for the inhabitants there.

However, the government can not have any control power on the town development. For no actual case have been executed in Thailand up to now. BMA is not an exception.

On the contrary, other town planning status is frequently executed by some specific districts. This is the case the government could get a power to control the quality of town development. This requires the developer to provide the roads, utilities and other public facilities in their development site at their own expense. With this conditions, the developer can sell the residential land by lot. Almost all new housing sites of large scale have been supplied by this method.

B. Role of City Planning for Public Truck Terminal Project

Present City Planning Act is not applicable for an ideal Public North Truck Terminal project since it is only effective inside the BMA other major towns. This means that the government does not have any legislative power to agglomerate all the physical distribution facilities in one area. This results in inefficient economic activities and physical distribution flows.

13.6.2 Desirable Planning Procedure

A. Implication of Land Use Plan

In implementing the truck terminal project, all other investment plan should be prepared in a frame of town planning or land use plan. For this purposes, the following two methods play key roles on a city planning.

1. To complete the outer ring road construction as soon as possible, and

2. To allocate all the physical distribution facilities alongside this outer ring road which now spread in the CBD of Bangkok.

To make the land use plan useful for the truck terminal project, the following steps are suggested.

1. To designate an integrated physical distribution district,

2. To make a truck terminal plan inside this district, and

3. To confine the plan of other facilities unfavorable to the physical distribution activities.

The detailed steps are shown in Fig. 13.6.1.

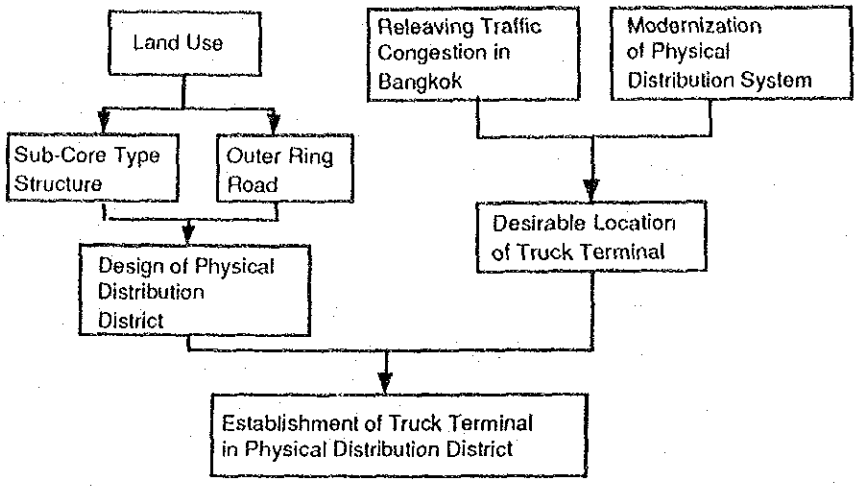


Fig. 13.6.1 Relationship between Truck Terminal & Physical Distribution District

C. Desirable Procedure to Establish Truck Terminal

This study proposes to construct a truck terminal alone, without any relevant physical distribution facilities by the year 1996. This is because immediate provision of the truck terminal is indispensable in Bangkok, and because land acquisition is impossible for all the necessary facilities.

However, this study proposes the government to take the following steps in future to make a physical distribution district.

1. To Designate Integrated Physical Distribution District

   To designate a integrated physical distribution district alongside the outer ring road from view points of land use, transportation planning and physical distribution system.

2. To Prepare District Planning

   To prepare land use and facility plans of the district which is designated as integrated physical distribution district.

3. To Form a Plan of Truck Terminal

To make a plan of truck terminal with necessary size and scale inside this district.

4. To Give Formal Approval to the Truck Terminal Plan under the City Planning Act

It is necessary to define this plan as city planning in case that this district locates inside a city planning area.

D. North Area Truck Terminal

This study selected a site and a plan of the truck terminal, and then designated a surrounding area as an integrated physical distribution district where relevant physical distribution facilities locate.

It is desirable to take a policy to confine the land use and to provide relevant physical distribution facilities around the terminal site after the establishment of North Public Truck Terminal.

CHAPTER 14

CONCLUSIONS & RECOMMENDATION

CHAPTER 14 CONCLUSIONS AND RECOMMENDATIONS

14.1 Conclusions

14.1.1 Necessity of Truck Terminals in Bangkok Metropolitan Area

Pubic truck terminals are indispensable in the Bangkok Metropolitan area. With this facility, a relieving traffic congestion and more efficient physical distribution can be expected.

Traffic congestion in Bangkok had aggravated since the precious JICA Study proposed the construction of public truck terminal in 1980. Load and un-load of the truck cargo on the road is prevailing widely. Truck traffic limits traffic capacity on the road. In addition, physical distribution industry faces detrimental conditions of narrow space for cargo handling with no expansion space, parking restriction and excessive cargo transport demand.

Now those two problems are issues of policy tackling to guarantee the economic activities in BMR and Thailand.

14.1.2 Necessary Number of Truck Terminals

Necessary number of public truck terminals in Bangkok Metropolitan area is three, and the Bangkok area are divided into three territories for collection and delivery activities of cargo.

Total demand of cargo is 25,938 ton per day at the year 2000. This demand is forecast under the 24 hour control on the truck traffic in the central business district.

Table 14.1.1 Demand of Cargo Transportation

(unit; ton/day)

	North Public Truck Terminal	East Public Truck Terminal	West Public Truck Terminal
Demand of Cargo Transportation	9,530	9,817	6,517
	(37%)	(38%)	(25%)

Each terminal locates along the planned Outer Ring Road since it is convenient to connect each other.

14.1.3 Highest Priority Truck Terminal and its Dimension

Public truck terminal with the highest priority is North Public Truck Terminal.

In attaching the priority, six socio-economic indexes are integrated into one priority indicator by policy preference weight.

Table 14.1.2 Priority Index of Three Terminals

	North Public Truck Terminal	East Public Truck Terminal	West Public Truck Terminal
Priority Index	1.204	0.924	0.876
Priority Order	**First** Priority	**Second** Priority	**Third** Priority

In this study, North Public Truck Terminal stands alone, without warehouse, truck center, and others because of difficulty in acquiring land for those additional facilities. It is recommended that the others be constructed near the truck terminal.

Facilities necessary in the public truck terminal are shown in Table 14.1.3.

Table 14.1.3 Truck Terminal Facilities and Areas

(unit ; sq. meter)

Facility	Area	
	First Stage	Second Stage
Platform	24,500	10,500
Apron	30,625	13,125
Parking	32,430	11,325
Administration building	1,000	600
Office building	4,200	1,800
Warehouse	3,000	2,000
Lodging	800	640
Service station	2,800	2,000
Green belt	9,200	5,850
Road & others	102,770	40,510
Total	311,325	88,350

14.1.4 Project Cost

Total project cost is 600.9 million Baht excluding land acquisition cost as shown below. If the land is purchased at the market price, it reaches 975 million Bath.

Table 14.1.4 Project Cost

(Unit : Million Baht)

Item	First Stage (Case 2-1)	Second Stage (Case 2-2)	Total
Preparatory Works	32.2	15.6	48.8
Construction Works	332.0	156.3	488.3
Supervision	16.6	7.8	24.4
Others	26.7	12.6	39.3
Total	408.5	192.4	600.9

* Excluding land price

14.1.5 Fund Raising Plan

Table 14.3.3 shows the proposed financial sources and their required amount.

Table 14.1.5 Fund Raising Plan

(Unit : Million Baht)

Item	Amount	Remarks
1. Capital	48.2	
- Government	23.6	49% of total capital
- Private	24.6	51% of total capital
2. Government Support	118.5	
3. Loan	434.2	
Total	600.9	

* Excluding land price

14.1.6 Economic Evaluation

A. Economic evaluation proves that the integrated case of Cases 2-1 and 2-2 is the best alternative among all. It also shows all other cases feasible with higher internal rate of return.

Table 14.1.6 EIRRs

(Unit : Million Baht)

Item	Case 1	Case 2-1	Case 2-2	Case 3 (Integrated Case of Cases 2-1 & 2-2)
E.I.R.R	17.39	15.60	16.70	20.24

B. In terms of the project with 500 berths as a whole, Case 3 (an integrated case of Case 2-1 and Case 2-2) shows the highest economic internal rate of return among the three alternatives. However,

1. Case 3 has some risk in acquiring of additional land for the terminal with 150 berths in a different place. Since the land price has escalated and leaded various truck terminal projects

2. Case 1 also faces a land acquisition problem since no government land for the 500 berth is available. Availability of private land is limited since they are offered with some additional concessions that the most difficult the government tackles.

3. Case 1 is required to invest excessively land acquisition fund for the additional terminal in the same terminal site. This land does not generate any economic benefit for five years until the additional terminal is constructed on it.

C. As for the segmented cases (Cases 2-1 and 2-2), Case 2-1 shows sufficiently high internal rate of return to justify the project. The latter case shows slightly higher internal rate of return. However, difference is marginal, and it is judged that it does not have any significant meaning.

D. In comparison with Case 2-1 and Case 2-2, the later case is much preferable to the former if the suitable government land is available. The land for the Case 2-2 is not yet assured.

14.1.7 Financial Evaluation

A. With the government support, the project can be feasible. Level of financial internal rate of return is not kept so high (=14.67%), slightly higher than the opportunity cost of capital (12%).

B. If implemented, the public truck terminal project needs the financial supports from the government as listed below:

1. Provision of land for the public truck terminal,
2. Provision of infrastructure for the terminal,
3. Provision of intersection in front of the terminal, and
4. Provision of terminal facilities.

C. Without the financial support from the government, any case of the project is not feasible. This shows why various plans of public truck terminal in past had been deadlocked. This indicates some financial support are indispensable for the project within the range the economic benefit.

D. Charge setting has a significant impact on the financial feasibility of the terminal management.

14.1.8 Organization

Best organization is shown below;

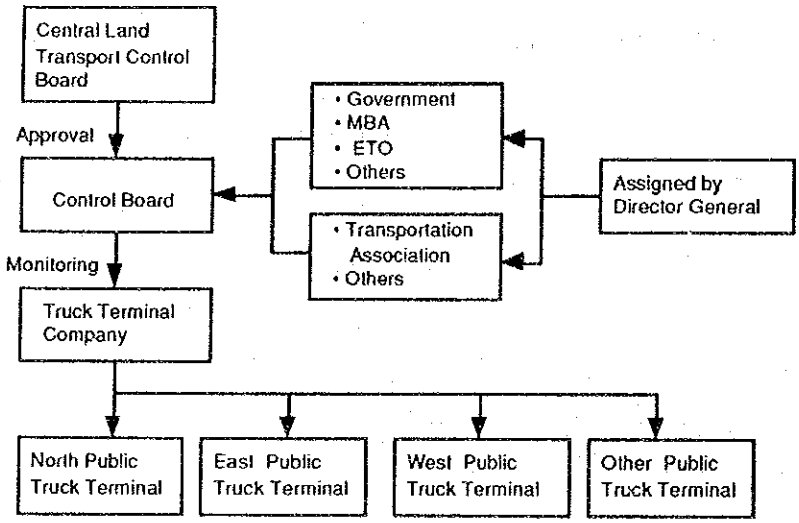


Fig. 14.1.1 Best Administrative Organization

New two organization will be established: Control Board, and Truck Terminal Company. The former is a organization for monitoring the administration of Truck Terminal Company under the supervision of "Central Land Transport Control Board."

Control Board should consist of the following agencies;

1. Government ; staff of MOTC and DLT
2. BMA ; planning staff and others
3. ETO ; operation and management staff
4. Transportation Association ; executive class

All truck terminals in the Bangkok Metropolitan area should be managed by one truck terminal company to operate them in an integrated and interdependent manner.

Second best organization can replace the first best alternative if the government can finance all the project cost, and rents all the facilities to the Truck Terminal Company.

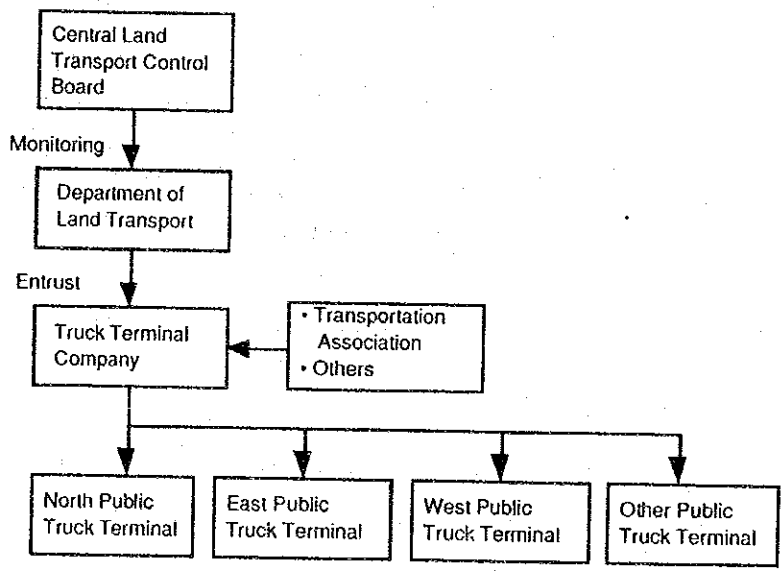


Fig. 14.1.2 Second Best Administrative Organization

However, this is the case extremely different from the present policy of the government. This faces the less possibility to be implemented by the government. Because of this problem, this alternative was ranked at the second of the alternatives.

14.1.9 Implementation Program

It is planned that project implementation commence in the year 1992, and complete at the year 2000. Whole period is divided into two stages: first stage (1992-96) and second stage (1996-2000).

Disbursement schedule is shown in Table 14.1.7.

Table 14.1.7 Annual Investment Cost

(Unit : Million Baht)

	1992 1st	1993 2nd	1994 3rd	1995 4th	1996 5th	1997 6th	1998 7th	1999 8th	2000 9th
1st Stage	5.9	35.3	299.2	68.0	-	-	-	-	-
2nd Stage	-	-	-	-	-	-	16.7	93.8	81.9
Total	5.9	35.3	299.2	68.0	-	-	16.7	93.8	81.9

First stage is to construct the 350 berth terminal. This is because the land wide and suitable only for the 350 berths is available in the proposed area at present, and because the opening of public truck terminal is in urgent matter for relieving the traffic congestion in Bangkok area.

Second stage is to construct other 150 berths, and can meet the demand of cargo transportation at the year 2000. In this stage, land for the 150 berths should be acquired by the government.

14.2 Recommendations

This study recommends that:

A. Public truck terminal project be implemented as soon as possible with the support of the government. This project can be a basic condition to relieve

the traffic congestion in Bangkok Metropolitan region, and also to induce the modernization progress of the physical distribution system.

B. Three public truck terminals be open at the same time since the 24 hour traffic control on the truck in the central business district should be effective all over the Bangkok Metropolitan area. Otherwise, truck traffic control should be executive when three public truck terminals are open.

C. The government start the budget preparation for this project as soon as possible. These include the arrangement for;

1. Capital participation to the public truck terminal company,
2. Provision of land to the public truck terminal management entity,
3. Provision of infrastructure,
4. Provision of intersection in front of the terminal, and
5. Provision of terminal facilities.

D. The project start with the terminal of 350 berths. Later, additional 150 berths should be constructed in a different lot, but near the 350 berth terminal. This is the most cost saving and the practical way to construct the truck terminal in Bangkok because of land availability.

E. Land acquisition plan be prepared as soon as possible in order to guarantee land of both the 350 berth terminal and the 150 berth terminal. If possible, the government should provide its own land, or it should purchase the private-owned land and provides it to the public terminal company at the low rental charge (calculated with a rental period of 50 years or 100 years).

F. Planned Outer Ring Road be completed by the year 1996 when the North Public Truck Terminal be open to the public. This can provide the indispensable network among the public truck terminals in the Bangkok Metropolitan area.

APPENDIX

Table 1 Charge Level of Truck Terminal in Japan

(Unit: Japanese Yen/m2/month)

Unit Charge of Lease Contract	Keihin Truck Teminal	Itabashi Truck Teminal	Adachi Truck Teminal	Kasai Truck Teminal	Total
1. Berth	1,110	1,110	1,400	1,450	1,268
2. Parking	620	620	750	800	698
3. Administration Building					
(a) Meeting Room	1,800	1,800	2,300	2,400	2,075
(b) Training Room	1,800	1,800	2,300	2,400	2,075
(c) Canteen	1,800	1,850	2,200	2,200	2,013
(d) Rest Room *1	37,800	33,600	27,300	35,200	33,475
4. Office	1,800	1,600	2,300	2,400	2,025
5. Warehouse	1,400	710	-	-	1,055
6. Loding	37,800	33,600	27,300	-	32,900
7. Service Station					
(a) Gas Station	-	-	-	-	0
(b) Repair Shop *2	1,900,000	1,420,000	-	-	1,660,000
(c) Car Washing Shop	-	-	-	-	-

(Note); *1 Unit of this charge is set per room/month.
Averge of room area is 13 sq. meter per room.
*2 Unit of this charge is set per whole area of one factory.

65.00

Table 2 Best Charge System of Public Truck Terminal

Charge 2

increase rate; 3%

Revisioin; Every 5 years

(unit; Baht/m2/month)

Unit Charge of Lease Contract	1992	1995	(1996)	2000	(2001)	2005	2010	2015	2020
Charge 2	3%								
1. Berth	60	66	68	76	78	88	102	118	137
2. Parking	33	36	37	42	43	48	56	65	76
3. Administration Building									
(a) Meeting Room	99	108	111	125	129	145	169	195	227
(b) Training Room	99	108	111	125	129	145	169	195	227
(c) Canteen	96	105	108	122	125	141	163	189	220
(d) Rest Room*1	122	133	137	155	159	179	208	241	279
4. Office	96	105	108	122	125	141	163	189	220
5. Warehouse	50	55	56	63	65	73	85	99	114
6. Lodging	120	131	135	152	157	176	204	237	275
7. Service Station									
(a) Gas Station*2	78,822	86,131	88,715	99,849	102,845	115,753	134,189	155,562	180,339
(b) Repair Shop*2	78,822	86,131	88,715	99,849	102,845	115,753	134,189	155,562	180,339
(c) Car Washing Shop									

(Note); *1 Averge of room area is 13 sq. meter per room.

*2 Unit of this charge is set per whole area of one factory.

Table 3 Area of Each Facility for Rent (Case 1)

(unit: Baht/m2/month)

Items	1995	(1996)	2000	(2001)	2005	2010	2015	2020
Planned Area (sq. meter)								
1. Berth	55,125	55,125	55,125	78,750	78,750	78,750	78,750	78,750
2. Parking	32,850	32,850	32,850	41,550	41,550	41,550	41,550	41,550
3. Administration Building								
(a) Meeting Room	200	200	200	200	200	200	200	200
(b) Training Room	175	175	175	175	175	175	175	175
(c) Canteen	700	700	700	700	700	700	700	700
(d) Rest Room	540	540	540	540	540	540	540	540
4. Office	8,400	8,400	8,400	12,000	12,000	12,000	12,000	12,000
5. Warehouse	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
6. Lodging	1,664	1,664	1,664	1,664	1,664	1,664	1,664	1,664
7. Service Station								
(a) Gas Station	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
(b) Repair Shop	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
(c) Car Washing Shop	800	800	800	800	800	800	800	800
Total	108,654	108,654	108,654	144,579	144,579	144,579	144,579	144,579

Table 4 Area of Each Facility for Rent (Case 2-1)

(unit: Baht/m2/month)

Items	1995	(1996)	2000	(2001)	2005	2010	2015	2020
Planned Area (sq. meter)								
1. Berth	55,125	55,125	55,125	55,125	55,125	55,125	55,125	55,125
2. Parking	32,430	32,430	32,430	32,430	32,430	32,430	32,430	32,430
3. Administration Building								
(a) Meeting Room	160	160	160	160	160	160	160	160
(b) Training Room	100	100	100	100	100	100	100	100
(c) Canteen	500	500	500	500	500	500	500	500
(d) Rest Room	360	360	360	360	360	360	360	360
4. Office	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400
5. Warehouse	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
6. Lodging	1,152	1,152	1,152	1,152	1,152	1,152	1,152	1,152
7. Service Station								
(a) Gas Station	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200
(b) Repair Shop	800	800	800	800	800	800	800	800
(c) Car Washing Shop	800	800	800	800	800	800	800	800
Total	104,027	104,027	104,027	104,027	104,027	104,027	104,027	104,027

Table 5 Area of Each Facility for Rent (Case 2-2)

(unit: Baht/m2/month)

Items	1995	(1996)	2000	(2001)	2005	2010	2015	2020
Planned Area (sq. meter)								
1. Berth	23,625	23,625	23,625	23,625	23,625	23,625	23,625	23,625
2. Parking	15,325	15,325	15,325	15,325	15,325	15,325	15,325	15,325
3. Administration Building								
(a) Meeting Room	80	80	80	80	80	80	80	80
(b) Training Room	260	260	260	260	260	260	260	260
(c) Canteen	360	360	360	360	360	360	360	360
(d) Rest Room	156	156	156	156	156	156	156	156
4. Office	3,600	3,600	3,600	3,600	3,600	3,600	3,600	3,600
5. Warehouse	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
6. Lodging	896	896	896	896	896	896	896	896
7. Service Station								
(a) Gas Station	800	800	800	800	800	800	800	800
(b) Repair Shop	800	800	800	800	800	800	800	800
(c) Car Washing Shop	400	400	400	1,200	1,200	1,200	1,200	1,200
Total	48,302	48,302	48,302	49,102	49,102	49,102	49,102	49,102

Table 6 Rental Revenue accruing to Each Facility (Case 2-1, Best Charge System)

(unit: 1,000 Baht/year)

Items	1995	(1996)	2000	(2001)	2005	2010	2015	2020
1. Berth	39,690	43,659	44,982	50,274	51,597	58,212	67,473	78,057
2. Parking	12,842	14,010	14,399	16,345	16,734	18,680	21,793	25,295
3. Administration Building								
(a) Meeting Room	190	207	213	240	248	278	324	374
(b) Training Room	119	130	133	150	155	174	203	234
(c) Canteen	576	630	648	732	750	846	978	1,134
(d) Rest Room	527	575	592	670	687	773	899	1,041
4. Office	9,677	10,584	10,886	12,298	12,600	14,213	16,430	19,051
5. Warehouse	1,800	1,980	2,016	2,268	2,340	2,628	3,060	3,564
6. Lodging	1,659	1,811	1,866	2,101	2,170	2,433	2,820	3,276
7. Service Station								
(a) Gas Station	946	1,034	1,065	1,198	1,234	1,389	1,610	1,867
(b) Repair Shop	946	1,034	1,065	1,198	1,234	1,389	1,610	1,867
(c) Car Washing Shop	0	0	0	0	0	0	0	0
Total	68,972	75,652	77,865	87,474	89,749	101,015	117,201	135,761

Table 7 Financial Analysis Sheet

1 Cost Projection

	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Capital Investment													
a Engineering Works	5,533	27,663											
b Land Acquisition	0	0	0	0									
c Construction Works		5,072	216,652	48,311									
d Supervision		254	13,317	3,027									
e VAT	387	2,309	16,098	3,594									
Total Investment	5,920	35,298	246,067	54,932	0	0	0	0	0	0	0	0	0
Accumulated Investment	5,920	41,219	287,285	342,217	342,217	342,217	342,217	342,217	342,217	342,217	342,217	342,217	342,217

2 Financial Plan

		-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Financial Source for Investment	408,474													
a Equity	10%	40,847												
1) Government (49%)		2,901	17,114	0	0									
2) Private Sector (51%)		3,019	17,813	0	0									
3) Total		5,920	34,927	0	0									
4) Cumulative Eqity		5,920	40,847	40,847	40,847									
b Long-term Loan	90%	367,627												
1) Long-term Loan in First Stage			371	246,067	54,932									
2) Long-term Loan in Second Stage														
3) Cumulative Long-term Loan			371	246,438	301,370									
Total		5,920	35,298	246,067	54,932									
Cumulative Loan Amount		5,920	41,219	287,285	342,217									

3 Repayment Schedule of Long-term Loan — Interest: 12% | Grace Period: 5 Years | Repayment Year: 20 Years

	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
a Repayment of Principle													
1) Long-term Loan in First Stage										24,508	24,508	24,508	24,508
2) Long-term Loan in Second Stage													
b Payment of Interest													
1) Long-term Loan in First Stage					36,164	36,164	36,164	36,164	36,164	36,164	41,174	38,233	35,292
2) Interest during Construction Period					13,156	13,156	13,156	13,156	13,156				
3) Long-term Loan in Second Stage													
4) Interest during Construction Period													
Total	0	0	0	0	49,321	49,321	49,321	49,321	49,321	60,673	65,683	62,742	59,801

Table 7 Financial Analysis Sheet (cont'd)

4 Depreciation Schedule

		-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
First Stage														
a Engineering Works (5 Years)	(5 Years)					6,639	6,639	6,639	6,639	6,639				
b Land Acquisition														
c Construction Works (20 Years)	(20 Years)					13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502
d Supervision (5 Years)	(5 Years)					3,320	3,320	3,320	3,320	3,320				
Second Stage														
a Engineering Works (5 Years)	(5 Years)													
b Land Acquisition														
c Construction Works (20 Years)	(20 Years)													
d Supervision (5 Years)	(5 Years)													
Total		0	0	0		23,461	23,461	23,461	23,461	13,502	13,502	13,502	13,502	13,502
Accumulated Depreciation		0	0	0		23,461	46,921	70,382	93,842	107,344	120,846	134,347	147,849	161,351
Accumulated Investment		5,920	41,219	287,285	342,217	342,217	342,217	342,217	342,217	342,217	342,217	342,217	342,217	342,217
Year-end Book Value		5,920	41,219	287,285	342,217	318,756	295,296	271,835	248,375	234,873	221,371	207,870	194,368	180,866

5 Operating Revenue

	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Annual Rental Revenue													
a accruing to Berths					43,659	43,659	43,659	43,659	43,659	50,274	50,274	50,274	50,274
b accruing to Related Facilities					29,296	29,296	29,296	29,296	29,296	34,071	34,071	34,071	34,071
c accruing to Tenants					2,697	2,697	2,697	2,697	2,697	3,128	3,128	3,128	3,128
Total	0	0	0	0	75,652	75,652	75,652	75,652	75,652	87,474	87,474	87,474	87,474

6 Operating Expenses

	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
a Operation & Maintenance Cost	0	0	0	0	9,019	27,885	9,019	27,885	13,567	27,885	9,019	27,885	9,019
b Land Rental Charge	0	0	0	0	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880
c Depreciation Cost													
1) First Stage	0	0	0	0	23,461	23,461	23,461	23,461	23,461	13,502	13,502	13,502	13,502
2) Second Stage	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	35,359	54,226	35,359	54,226	39,908	44,267	25,400	44,267	25,400

Table 7 Financial Analysis Sheet (cont'd)

7 Profit & Loss Statement

		-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Revenue														
a Operating Revenue		0	0	0	0	75,652	75,652	75,652	75,652	75,652	87,474	87,474	87,474	87,474
Expenses														
b Operating Expenses														
1) Operation & Maintenance Cost		0	0	0	0	9,019	27,885	9,019	27,885	13,567	27,885	9,019	27,885	9,019
2) Land Rental Charge		0	0	0	0	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880
c Depreciation Cost														
1) First Stage		0	0	0	0	23,461	23,461	23,461	23,461	23,461	13,502	13,502	13,502	13,502
2) Second Stage		0	0	0	0	0	0	0	0	0	0	0	0	0
d Interest Payment														
1) Long-term Loan in First Stage		0	0	0	0	49,321	49,321	49,321	49,321	49,321	36,164	41,174	38,233	35,292
2) Long-term Loan in Second Stage		0	0	0	0	0	0	0	0	0	0	0	0	0
3) Short-term Loan		0	0	0	0	0	0	0	0	0	0	0	0	0
e Profit before Tax		0	0	0	0	-9,027	-27,894	-9,027	-27,894	-13,576	7,042	20,899	4,973	26,781
f Cumulative Profit before Tax		0	0	0	0	-9,027	-36,922	-45,949	-73,843	-87,419	-80,377	-59,478	-54,505	-27,724
g Tax	35%	0	0	0	0	0	0	0	0	0	0	0	0	0
h Profit after Tax		0	0	0	0	-9,027	-27,894	-9,027	-27,894	-13,576	7,042	20,899	4,973	26,781
Cumulative Profit		0	0	0	0	-9,027	-36,922	-45,949	-73,843	-87,419	-80,377	-59,478	-54,505	-27,724
Tax Income		0	0	0	0	0	0	0	0	0	0	0	0	0
Cummulative Tax Income		0	0	0	0	0	0	0	0	0	0	0	0	0

8 Short-term Loan & Repayment

		-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
		1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
a Temporary Sources of Funds						14,433	-4,434	14,433	-4,434	9,885	20,544	34,401	18,475	40,283
1) Temporary Cash Generation						14,433	-4,434	14,433	-4,434	9,885	20,544	34,401	18,475	40,283
2) Profit after tax		0	0	0	0	-9,027	-27,894	-9,027	-27,894	-13,576	7,042	20,899	4,973	26,781
3) Depreciation														
First Stage		0	0	0	0	23,461	23,461	23,461	23,461	23,461	13,502	13,502	13,502	13,502
Second Stage		0	0	0	0	0	0	0	0	0	0	0	0	0
4) Temporary Financial Sources						0	0	0	0	0	0	0	0	0
5) Equity		5,920	34,927	0	0	0	0	0	0	0	0	0	0	0
6) Long-term Loan														
Long-term Loan in First Stage		0	371	246,067	54,932	0	0	0	0	0	0	0	0	0
Long-term Loan in Second Stage		0	0	0	0	0	0	0	0	0	0	0	0	0
b Temporary Application of Funds						0	0	0	0	0	24,508	24,508	24,508	24,508
1) Capital Investment		5,920	35,298	246,067	54,932	0	0	0	0	0	0	0	0	0
2) Repayment of Long-term Loan														
Long-term Loan in First Stage		0	0	0	0	0	0	0	0	0	24,508	24,508	24,508	24,508
Long-term Loan in Second Stage		0	0	0	0	0	0	0	0	0	0	0	0	0
Annual Deficit/Surplus		0	0	0	0	14,433	-4,434	14,433	-4,434	9,885	-3,965	9,892	-6,034	15,774
Short-term Loss/Surplus		0	0	0	0	14,433	9,999	24,433	19,999	29,883	25,919	35,811	29,778	45,552
Repayment of Short-term Loan		0	0	0	0	0	0	0	0	0	0	0	0	0
Payment of Interest on Short-term Loan	12%						0	0	0	0	0	0	0	0

Table 7 Financial Analysis Sheet (cont'd)

9 Sources & Application of Funds
(Cash Flow)

	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
a Inflow	5,920	35,298	246,067	54,932	75,652	75,652	75,652	75,652	75,652	87,474	87,474	87,474	87,474
1) Operating Revenue	0	0	0	0	75,652	75,652	75,652	75,652	75,652	87,474	87,474	87,474	87,474
2) Equity	5,920	34,927	0	0	0	0	0	0	0	0	0	0	0
Government	2,901	17,114	0	0	0	0	0	0	0	0	0	0	0
Private Sector	3,019	17,813	0	0	0	0	0	0	0	0	0	0	0
3) Loan	0	371	246,067	54,932	0	0	0	0	0	0	0	0	0
Long-term Loan in First Stage	0	371	246,067	54,932	0	0	0	0	0	0	0	0	0
Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0	0
Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0	0
b Outflow	5,920	35,298	246,067	54,932	61,219	80,086	61,219	80,086	65,768	91,438	77,581	93,507	71,699
1) Capital Investment	5,920	35,298	246,067	54,932	0	0	0	0	0	0	0	0	0
2) Operation & Management Cost	0	0	0	0	9,019	27,885	9,019	27,885	13,567	27,885	9,019	27,885	9,019
3) Land Rental Charge	0	0	0	0	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880
4) Repayment of Loan	0	0	0	0	0	0	0	0	0	24,508	24,508	24,508	24,508
Long-term Loan in First Stage	0	0	0	0	0	0	0	0	0	24,508	24,508	24,508	24,508
Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0	0
Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0	0
5) Payment of Loan Interest	0	0	0	0	49,321	49,321	49,321	49,321	49,321	36,164	41,174	38,233	35,292
Long-term Loan in First Stage	0	0	0	0	49,321	49,321	49,321	49,321	49,321	36,164	41,174	38,233	35,292
Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0	0
Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0	0
6) Tax	0	0	0	0	0	0	0	0	0	0	0	0	0
Cash Generation	0	0	0	0	14,433	-4,434	14,433	-4,434	9,885	-3,965	9,892	-6,034	15,774
Balance from Backward					0	14,433	9,999	24,433	19,999	29,883	25,919	35,811	29,778
Balance carried Forward					14,433	9,999	24,433	19,999	29,883	25,919	35,811	29,778	45,552
Total					14,433	9,999	24,433	19,999	29,883	25,919	35,811	29,778	45,552

10 IRR of Tax and Government' Investment

	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
a Government' Equity	2,901	17,114	0	0	0	0	0	0	0	0	0	0	0
b Tax Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0
c Net Cash Flow	-2,901	-17,114	0	0	0	0	0	0	0	0	0	0	0
IRR(%)	12.29%												

Table 7 Financial Analysis Sheet (cont'd)

11 Financial IRR (ROI)

	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
a Capital Investment	5,920	35,298	246,067	54,932	0	0	0	0	0	0	0	0	0
b Financial Return on Investment	0	0	0	0	63,754	44,887	63,754	44,887	59,205	56,708	75,575	56,708	75,575
1) Profit befor Tax	0	0	0	0	-9,027	-27,894	-9,027	-27,894	-13,576	7,042	20,899	4,973	26,781
2) Depreciation	0	0	0	0	23,461	23,461	23,461	23,461	23,461	13,502	13,502	13,502	13,502
3) Interest Payment	0	0	0	0	49,321	49,321	49,321	49,321	49,321	36,164	41,174	38,233	35,292
Long-term Loan in First Stage	0	0	0	0	49,321	49,321	49,321	49,321	49,321	36,164	41,174	38,233	35,292
Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Cash Flow	-5,920	-35,298	-246,067	-54,932	63,754	44,887	63,754	44,887	59,205	56,708	75,575	56,708	75,575
Net Present Value (discounted at 12%)	52,731												
FIRR (Return on Investment)	14.67%												

12 Return on Equity

	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
a Equity Investment													
1) Government	2,901	17,114	0	0	0	0	0	0	0	0	0	0	0
2) Private Sector	3,019	17,813	0	0	0	0	0	0	0	0	0	0	0
b Cash Generation	0	0	0	0	14,433	-4,434	14,433	-4,434	9,885	-3,965	9,892	-6,034	15,774
Net Cash Flow (Total)	-5,920	-34,927	0	0	14,433	-4,434	14,433	-4,434	9,885	-3,965	9,892	-6,034	15,774
ROE for Total Equity	12.84%												
Net Cash Flow (Private Sector)	-3,019	-17,813	0	0	14,433	-4,434	14,433	-4,434	9,885	-3,965	9,892	-6,034	15,774
ROE for Private Equity	20.42%												

Table 7 Financial Analysis Sheet (cont'd)

13 Debt Service Coverage Ratio (DSCR)

	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
a Profit after Tax	0	0	0	0	-9,027	-27,894	-9,027	-27,894	-13,576	7,042	20,899	4,973	26,781
b Depreciation	0	0	0	0	23,461	23,461	23,461	23,461	23,461	13,502	13,502	13,502	13,502
1) Long-term Loan in First Stage	0	0	0	0	23,461	23,461	23,461	23,461	23,461	13,502	13,502	13,502	13,502
2) Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0	0
c Interest Payment	0	0	0	0	49,321	49,321	49,321	49,321	49,321	36,164	41,174	38,233	35,292
1) Long-term Loan in First Stage	0	0	0	0	49,321	49,321	49,321	49,321	49,321	36,164	41,174	38,233	35,292
2) Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0	0
3) Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0	0
d Repayment of Loan Principle	0	0	0	0	0	0	0	0	0	24,508	24,508	24,508	24,508
1) Long-term Loan in First Stage	0	0	0	0	0	0	0	0	0	24,508	24,508	24,508	24,508
2) Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0	0
3) Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0	0
Operating Ratio (%)					-8.06	-2.61	-8.06	-2.61	-5.36	7.05	2.62	10.40	1.82
Working Ratio (%)					-8.06	-2.61	-8.06	-2.61	-5.36	3.57	1.44	5.47	0.91

14 Profit - Revenue Ratio

	-4	-3	-2	-1	1	2	3	4	5	6	7	8	9
	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
a Profit after Tax	0	0	0	0	-9,027	-27,894	-9,027	-27,894	-13,576	7,042	20,899	4,973	26,781
b Operation Revenue	0	0	0	0	75,652	75,652	75,652	75,652	75,652	87,474	87,474	87,474	87,474
Profit - Revenue Ratio (%)					-11.93%	-36.87%	-11.93%	-36.87%	-17.95%	8.05%	23.89%	5.69%	30.62%
Average Profit-Revenue Ratio (%) =		15.63%											

Table 7 Financial Analysis Sheet (cont'd)

7 Profit & Loss Statement

		10	11	12	13	14	15	16	17	18	19	20	Total
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
Revenue													
a Operating Revenue		89,749	89,749	89,749	89,749	89,749	101,015	101,015	101,015	101,015	101,015	117,201	1,799,178
Expenses													
b Operating Expenses													
1) Operation & Maintenance Cost		32,434	9,019	27,885	9,019	27,885	13,567	27,885	9,019	27,885	9,019	32,434	387,234
2) Land Rental Charge		2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	57,600
c Depreciation Cost													
1) First Stage		13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	319,829
2) Second Stage		0	0	0	0	0	0	0	0	0	0	0	0
d Interest Payment													
1) Long-term Loan in First Stage		32,351	29,410	26,469	23,528	20,587	17,646	14,705	11,764	8,823	5,882	2,941	591,574
2) Long-term Loan in Second Stage		0	0	0	0	0	0	0	0	0	0	0	0
3) Short-term Loan		0	0	0	0	0	0	0	0	0	0	0	0
e Profit before Tax		8,582	34,938	19,013	40,820	24,895	53,420	42,043	63,851	47,925	69,733	65,444	442,940
f Cumulative Profit before Tax		-19,142	15,796	34,809	75,630	100,524	153,944	195,987	259,838	307,763	377,496	442,940	1,470,342
g Tax	35%	0	12,228	6,654	14,287	8,713	18,697	14,715	22,348	16,774	24,407	22,905	161,729
h Profit after Tax		8,582	22,710	12,358	26,533	16,181	34,723	27,328	41,503	31,151	45,326	42,539	281,212
Cumulative Profit		-19,142	3,568	15,926	42,460	58,641	93,364	120,692	162,195	193,347	238,673	281,212	
Tax Income		0	12,228	6,654	14,287	8,713	18,697	14,715	22,348	16,774	24,407	22,905	161,729
Cummulative Tax Income		0	12,228	18,883	33,170	41,883	60,580	75,295	97,643	114,417	138,823	161,729	

8 Short-term Loan & Repayment

	10	11	12	13	14	15	16	17	18	19	20	Total
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
a Temporary Sources of Funds	22,084	36,212	25,860	40,035	29,683	48,225	40,830	55,005	44,653	58,828	56,040	601,041
1) Temporary Cash Generation	22,084	36,212	25,860	40,035	29,683	48,225	40,830	55,005	44,653	58,828	56,040	601,041
2) Profit after tax	8,582	22,710	12,358	26,533	16,181	34,723	27,328	41,503	31,151	45,326	42,539	281,212
3) Depreciation												
First Stage	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	319,829
Second Stage	0	0	0	0	0	0	0	0	0	0	0	0
4) Temporary Financial Sources	0	0	0	0	0	0	0	0	0	0	0	0
5) Equity	0	0	0	0	0	0	0	0	0	0	0	40,847
6) Long-term Loan												
Long-term Loan in First Stage	0	0	0	0	0	0	0	0	0	0	0	301,370
Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0
b Temporary Application of Funds	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	367,627
1) Capital Investment	0	0	0	0	0	0	0	0	0	0	0	342,217
2) Repayment of Long-term Loan												
Long-term Loan in First Stage	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	367,627
Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0
Annual Deficit/Surplus	-2,425	11,703	1,351	15,527	5,175	23,717	16,321	30,496	20,145	34,320	31,532	
Short-term Loss/Surplus	43,127	54,831	56,182	71,709	76,884	100,600	116,921	147,418	167,562	201,882	233,414	
Repayment of Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	
Payment of Interest on Short-term Loan 12%	0	0	0	0	0	0	0	0	0	0	0	

Table 7 Financial Analysis Sheet (cont'd)

9 Sources & Application of Funds
(Cash Flow)

	10	11	12	13	14	15	16	17	18	19	20	Total
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
a Inflow	**89,749**	**89,749**	**89,749**	**89,749**	**89,749**	**101,015**	**101,015**	**101,015**	**101,015**	**101,015**	**117,201**	2,141,395
1) Operating Revenue	89,749	89,749	89,749	89,749	89,749	101,015	101,015	101,015	101,015	101,015	117,201	1,799,178
2) Equity	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	40,847
Government	0	0	0	0	0	0	0	0	0	0	0	20,015
Private Sector	0	0	0	0	0	0	0	0	0	0	0	20,832
3) Loan	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	301,370
Long-term Loan in First Stage	0	0	0	0	0	0	0	0	0	0	0	301,370
Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0
Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	
b Outflow	**92,174**	**78,046**	**88,397**	**74,222**	**84,574**	**77,299**	**84,694**	**70,519**	**80,871**	**66,696**	**85,669**	1,907,981
1) Capital Investment	0	0	0	0	0	0	0	0	0	0	0	342,217
2) Operation & Management Cost	32,434	9,019	27,885	9,019	27,685	13,567	27,885	9,019	27,885	9,019	32,434	387,234
3) Land Rental Charge	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	2,880	57,600
4) Repayment of Loan	**24,508**	**24,508**	**24,508**	**24,508**	**24,508**	**24,508**	**24,508**	**24,508**	**24,508**	**24,508**	**24,508**	367,627
Long-term Loan in First Stage	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	367,627
Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0
Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0
5) Payment of Loan Interest	**32,351**	**29,410**	**26,469**	**23,528**	**20,587**	**17,646**	**14,705**	**11,764**	**8,823**	**5,882**	**2,941**	591,574
Long-term Loan in First Stage	32,351	29,410	26,469	23,528	20,587	17,646	14,705	11,764	8,823	5,882	2,941	591,574
Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0
Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0
6) Tax	0	12,228	6,654	14,287	8,713	18,697	14,715	22,348	16,774	24,407	22,905	161,729
Cash Generation	-2,425	11,703	1,351	15,527	5,175	23,717	16,321	30,496	20,145	34,320	31,532	
Balance from Backward	45,552	43,127	54,831	56,182	71,709	76,884	100,600	116,921	147,418	167,562	201,882	
Balance carried Forward	43,127	54,831	56,182	71,709	76,884	100,600	116,921	147,418	167,562	201,882	233,414	
Total	43,127	54,831	56,182	71,709	76,884	100,600	116,921	147,418	167,562	201,882	233,414	

10 IRR of Tax and Government' Investment

	10	11	12	13	14	15	16	17	18	19	20	Total
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
a Government' Equity	0	0	0	0	0	0	0	0	0	0	0	20,015
b Tax Revenue	0	12,228	6,654	14,287	8,713	18,697	14,715	22,348	16,774	24,407	22,905	161,729
c Net Cash Flow	0	12,228	6,654	14,287	8,713	18,697	14,715	22,348	16,774	24,407	22,905	141,714
IRR(%)												

Table 7 Financial Analysis Sheet (cont'd)

11 Financial IRR (ROI)

	10	11	12	13	14	15	16	17	18	19	20	Total
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
a Capital Investment	0	0	0	0	0	0	0	0	0	0	0	342,217
b Financial Return on Investment	54,435	77,850	58,983	77,850	58,983	84,568	70,250	89,117	70,250	89,117	81,887	1,354,343
1) Profit befor Tax	8,582	34,938	19,013	40,820	24,895	53,420	42,043	63,851	47,925	69,733	65,444	442,940
2) Depreciation	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	319,829
3) Interest Payment	32,351	29,410	26,469	23,528	20,587	17,646	14,705	11,764	8,823	5,882	2,941	591,574
Long-term Loan in First Stage	32,351	29,410	26,469	23,528	20,587	17,646	14,705	11,764	8,823	5,882	2,941	591,574
Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0
												0
Net Cash Flow	54,435	77,850	58,983	77,850	58,983	84,568	70,250	89,117	70,250	89,117	81,887	1,012,126
Net Present Value (discounted at 12%)												
FIRR (Return on Investment)												

12 Return on Equity

	10	11	12	13	14	15	16	17	18	19	20	Total
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
a Equity Investment												
1) Government	0	0	0	0	0	0	0	0	0	0	0	20,015
2) Private Sector	0	0	0	0	0	0	0	0	0	0	0	20,832
b Cash Generation	-2,425	11,703	1,351	15,527	5,175	23,717	16,321	30,496	20,145	34,320	31,532	233,414
Net Cash Flow (Total)	-2,425	11,703	1,351	15,527	5,175	23,717	16,321	30,496	20,145	34,320	31,532	192,567
ROE for Total Equity												
Net Cash Flow (Private Sector)	-2,425	11,703	1,351	15,527	5,175	23,717	16,321	30,496	20,145	34,320	31,532	
ROE for Private Equity												

Table 7 Financial Analysis Sheet (cont'd)

13 Debt Service Coverage Ratio (DSCR)

	10	11	12	13	14	15	16	17	18	19	20	Total
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
a Profit after Tax	8,582	22,710	12,358	26,533	16,181	34,723	27,328	41,503	31,151	45,326	42,539	281,212
b Depreciation	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	
1) Long-term Loan in First Stage	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	13,502	319,829
2) Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0
c Interest Payment	32,351	29,410	26,469	23,528	20,587	17,646	14,705	11,764	8,823	5,882	2,941	591,574
1) Long-term Loan in First Stage	32,351	29,410	26,469	23,528	20,587	17,646	14,705	11,764	8,823	5,882	2,941	591,574
2) Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0
3) Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0
d Repayment of Loan Principle	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	367,627
1) Long-term Loan in First Stage	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	24,508	367,627
2) Long-term Loan in Second Stage	0	0	0	0	0	0	0	0	0	0	0	0
3) Short-term Loan	0	0	0	0	0	0	0	0	0	0	0	0
Operating Ratio (%)	5.34	1.89	3.23	1.40	2.11	0.90	1.03	0.61	0.72	0.43	0.39	2.10
Working Ratio (%)	2.49	0.81	1.25	0.47	0.59	0.19	0.14	0.02	-0.07	-0.11	-0.19	0.80

14 Profit - Revenue Ratio

	10	11	12	13	14	15	16	17	18	19	20	Total
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	
a Profit after Tax	8,582	22,710	12,358	26,533	16,181	34,723	27,328	41,503	31,151	45,326	42,539	281,212
b Operation Revenue	89,749	89,749	89,749	89,749	89,749	101,015	101,015	101,015	101,015	101,015	117,201	1,799,178
Profit - Revenue Ratio (%)	9.56%	25.30%	13.77%	29.56%	18.03%	34.37%	27.05%	41.09%	30.84%	44.87%	36.30%	15.63%
Average Profit-Revenue Ratio (%)