

National Economic and Social Development Board
The Kingdom of Thailand

**The Study on Financial Frameworks
in Mass Transit System Project
in Thailand**

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August 2010

JAPAN INTERNATIONAL COOPERATION AGENCY

KRI INTERNATIONAL CORP.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank	
AFC	Automatic Fare Collection	
ARL	Airport Rail Link	Thailand
ATP	Automatic Train Protection	
BLO	Build-Lease-Operation	
BLT	Build-Lease-Transfer	
BMA	Bangkok Metropolitan Administration	Thailand
BMC	Bangkok Metropolitan Council	Thailand
BMCL	Bangkok Metro Public Company Limited	Thailand
BMR	Bangkok Metropolitan Region	Thailand
BLT	Build- Lease- Transfer	
BOO	Build- Owned- Operate	
BOT	Build- Operate- Transfer	
BRT	Bus Rapid Transit	
B/S	Balance Sheet	
BTO	Build-Transfer-Operation	
BTSC	Bangkok Mass Transit System Public Company Limited	Thailand
CA	Concession Agreement	
CAT	City Air Terminal	
CDRC	Corporate Debt Restructuring Committee	Malaysia
CMLT	Commission for the Management of Land Traffic	Thailand
DfT	Department for Transport	U.K.
DMRC	Delhi Metro Rail Corporation	India
DOTC	Department of Transport and Communications	The Philippines
DSCR	Debt Service Coverage Ratio	
DTCP	Department of Town and Country Planning	Thailand
EDSA	Epifanio de los Santos Avenue	The Philippines
EIA	Environmental Impact Assessment	
ERL	Express Rail Link	Malaysia
ERP	Electric Road Pricing	
E&M	Electrical and Mechanical Equipment	
FCDU	Foreign Currency Deposit Unit	The Philippines
FY	Fiscal Year	
GDP	Gross Domestic Product	
GOT	Government of Thailand	Thailand
GTZ	German Technical Agency for Cooperation	Germany
ICR	Inception Report	
IFC	International Finance Corporation	
IMTI	Integrated Multi-Modal Travel Information System	
Infracos	Infrastructure Companies	U.K.
ISC	Infrastructure Service Charge	U.K.
ITR	Interim Report	
JBIC	Japan Bank for International Cooperation	Japan
JRTT	Japan Railway Construction, Transport and Technology Agency	Japan
KfW	Kreditanstalt für Wiederaufbau	Germany
KLIA	Kuala Lumpur International Airport	Malaysia
KPI	Key Performance Indicator	
KTM	Keretapi Tanah Melayu (Malayan Railways)	Malaysia
LIBOR	London Inter-Bank Offered Rate	
LRT	Light Rail Transit	Singapore
LRT	Light Rail Transit	
LRTA	Light Rail Transit Authority	The Philippines
LTA	Land Transport Authority	Singapore

LTCB	Land Transport Control Board	Thailand
LUL	London Underground Limited	U.K.
MAS	MRT Assessment Standardization	Thailand
MIR	Metropolitan Intercity Railway Company	Japan
MLITT	Ministry of Land, Infrastructure, Transport and Tourism	Japan
MLR	Minimum Lending rate (of Bangkok Bank)	Thailand
MOI	Ministry of Interior	Thailand
MOT	Ministry of Transport	Thailand
MPC	Monetary Policy Committee	Thailand
MRT	Mass Rapid Transit	
MRT	Metro Rapid Transit	The Philippines
MRTA	Mass Rapid Transit Authority of Thailand	Thailand
MRTC	Mass Rapid Transit Corporation	Singapore
MRTC	Metro Rail Transit Corporation	The Philippines
MTR	MTR Corporation Limited	Hong Kong
NESDB	Office of the National Economic and Social Development Board	Thailand
NPL	Non-performing Loan	
NPV	Net Present Value	
O&M	Operation and Maintenance	
OCC	Operations Control Centre	
OCMLT	Office of the Commission for the Management of Land Traffic	Thailand
ODA	Official Development Aid	
OTP	Office of Transport and Traffic Policy and Planning	Thailand
PDMO	Public Debt Management Office of Ministry of Finance	Thailand
PGS	Parking Guide System	
P/L	Profit and Loss Statement	
PPP	Public Private Partnership	
PSC	Public Sector Comparator	
PSO	Public Service Obligation	Thailand
PTC	Public Transport Council	Singapore
PUTRA	Projek Usahasama Transit Ringan Automatik	Malaysia
RAFID	Radio Frequency Identification	
RapidKL	Rangkaian Pengangkutan Integrasi Deras Sdn Bhd	Malaysia
ROE	Return on Equity	
SARL	Suvarnabhumi Airport Rail Link	Thailand
SOE	State-Owned Enterprise	
SEPO	State Enterprise Policy Office, Ministry of Finance	Thailand
SMRT	SMRT Corporation	Singapore
SPAD	Signal Passing Accident Danger	
SPNB	Syarikat Prasarana Negara Berhad	Malaysia
SRT	State Railways of Thailand	Thailand
STAR	Sistem Transit Aliran Ringan Sdn Bhd	Malaysia
TA	Technical Assistance	
TFL	Transport for London	U.K.
TOD	Transit Oriented Development	
TOR	Terms of Reference	
URMAP	Urban Rail Master Plan	Thailand
VfM	Value for Money	

CHAPTER 1 INTRODUCTION

1.1 Background of the Study

Bangkok metropolitan area has the registered population of 6.7 million and the daytime population reaches over 11 million, about 18% of the entire population in the country. Bangkok is the political and economic center of Thailand as it accounts for about 50% of national GDP. In Bangkok, currently more than 90% of transportation depends on road transport and there has been a rapid increase in the number of motor vehicles. Despite the development of road-related infrastructures in the last three decades, serious traffic congestion has remained as a bottleneck of physical distribution and logistics within the city.

To address this problem, the Cabinet approved a plan of mass rapid transit (MRT) Projects in Bangkok in November, 2006. The plan identified 5 priority lines of a total length of 118km. At present, there are two mass transit lines in operation and one under construction in Bangkok. The Green Line from Mo Chit to On Nut (16.4 km) and from National Stadium to Saphan Taksin (6.5 km) opened in 1999, the Blue Line from Bang Sue to Hua Lamphong (19.7 km) opened in 2004 and the Airport Rail Link (ARL) from Suvarnabhumi International Airport to Makkasan and Phaya Thai Area (28.5km) is expected to complete in the third quarter of 2009. The existing lines currently serve in total of more than 500,000 passengers a day. MRT projects have been one of the top priorities of the Government in terms of mitigating the traffic related problems as well as stimulating the national economy.

In general, MRT project requires relatively large capital investment and long-term construction period, leaving a significant financial burden to project owners. In this connection, public private partnership (PPP) scheme has been considered to achieve an effective mobilization of public and private capitals. The PPP scheme was adopted for the existing Green Line and the Blue Line, but the experiences shows that there is still a large room for improvement in PPP scheme for MRT projects. More knowledge and experiences should be accumulated for sound financial framework of MRT projects. Since Japanese ODA loan will be a strong potential financial source for future MRT projects in Thailand, it is useful to study various financial framework of MRT project in the light of utilizing Japanese ODA loan.

1.2 Objectives of the Study

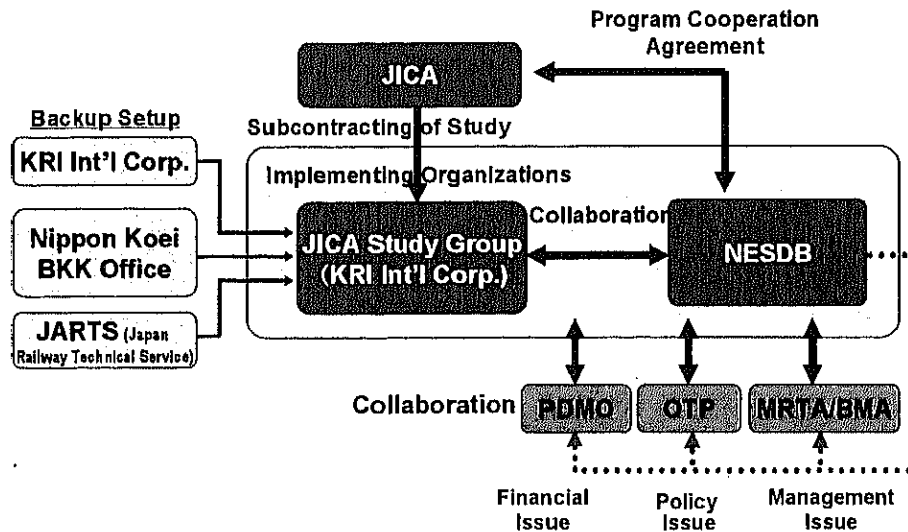
Based on the above mentioned background, the objectives of the Study were set as follows:

- a) To review various financial frameworks of MRT project, in the forms of PPP scheme and operation-by-state scheme, and to identify advantages and disadvantages of these financial frameworks from the viewpoints of financial burden and how to realize efficient, effective and sustainable construction & operation of MRT projects in Thailand; and
- b) In particular, to clarify advantages and disadvantages of each financial framework for new MRT projects in Thailand using potential Japanese ODA loan as a case study and to provide useful information for the consideration of MRT projects (including PPP scheme) financed by Japanese ODA loan.

1.3 Study Framework

1.3.1 Executing Agency

The counterpart agency to the Study is the National Economic and Social Development Board (NESDB). NESDB makes necessary coordination with related organizations, the Public Debt Management Office (PDMO) in the Ministry of Finance, the Office of Transport and Traffic Policy and Planning (OTP) in the Ministry of Transportation, MRTA Mass Rapid Transit Authority of Thailand (MRTA), and Bangkok Metropolitan Administration (BMA), for the implementation of the Study.



Source: Study Team

Figure 1.3-1: Study Implementation Structure

1.3.2 Study Area

The Study has been conducted in Bangkok, Thailand.

1.4 Scope of Study

1.4.1 Original Implementation Methods

To achieve the objectives, following 12 work modules were designed and proposed in the Inception Report (ICR) at the start of the Study.

- Module A: Reviewing a financial framework for urban railway systems in other countries
- Module B: Reviewing performance of existing urban railway systems in other countries
- Module C: Differentiation and comparison of the proposed project implementation frameworks
- Module D: Financial analysis of existing yen loan financed urban railway project
- Module E: Comparative analysis of implementation framework of the MRT project
- Module F: Analyzing other issues on PPP in MRT project

Module G: Detail analysis of financial framework of the existing urban railway systems in Bangkok

Module H: Survey of service performance of existing MRT projects in Bangkok

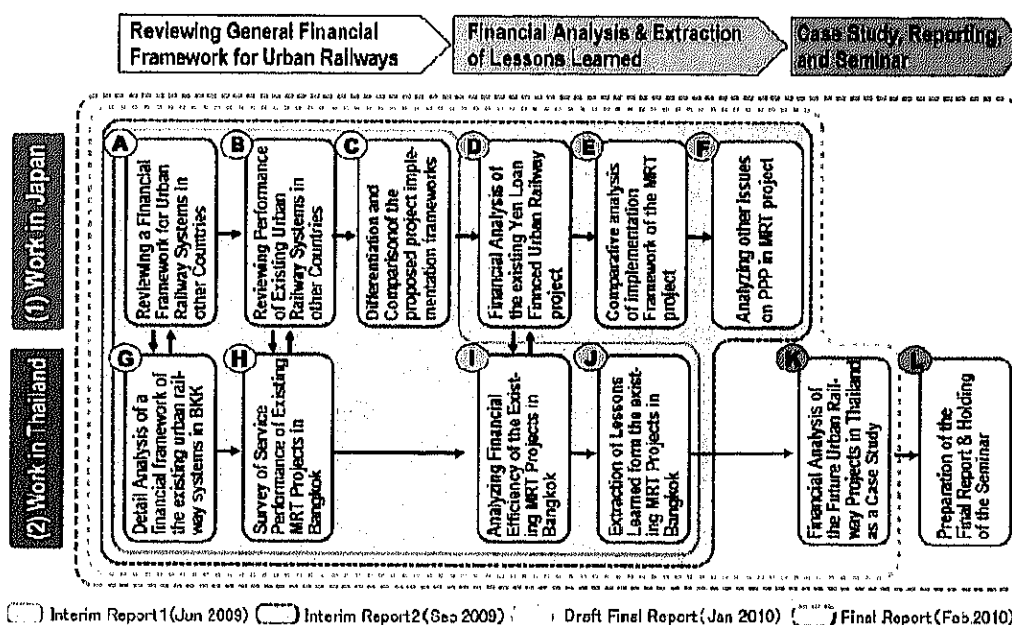
Module I: Analyzing financial efficiency of the existing MRT projects in Bangkok

Module J: Extraction of lessons learned from existing MRT projects in Bangkok

Module K: Financial analysis of the future urban railway projects in Thailand as a case study

Module L: Preparation of the final report and holding of seminar

Modules A~F were designed for study activities in Japan and modules G~L were designed for study activities in Bangkok.



Source: Study Team

Figure 1.4-1: Original Study Flow and Activity Modules from ICR

1.4.2 Revised Implementation Methods

The Study Team visited Bangkok in May 2009 to discuss current issues of financial framework of MRT projects. Based on discussions with stakeholders such as NESDB, OTP, PDMO, MRTA, BMA, BMCL, BTS, SRT and private financial institutions, it became quite apparent that issues of project implementation scheme of MRT are far broader than financial framework. More specifically, the following three-tiered issue structure was identified.

- Tier1: Issues regarding mass transit sector, including sector vision, governance, law and regulation
- Tier2: Issues regarding integrated MRT masterplan, including integration with city planning, integration with multi-modal transport planning and network integration
- Tier3: Issues regarding each MRT line, which is about each line’s implementation scheme

The Study Team places governance and legal issues of MRT project in Tier 1 because these issues

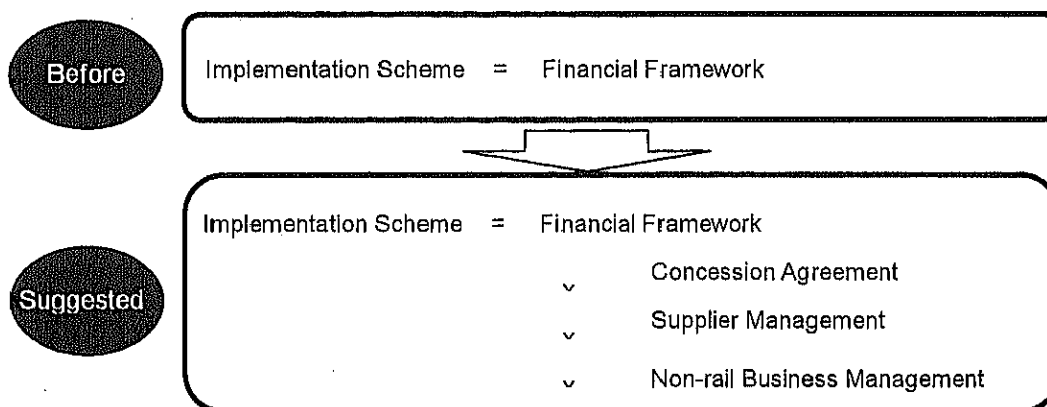
concern all MRT projects. Issues regarding linkage with city planning and urban transportation planning, which are mentioned in “other related issues” in the original scope, compose Tier 2 because these issues are important in integrating all MRT lines. Such issues as concession management, suppliers management and non-rail business, in addition to financial framework, consist of Tier 3. The Study Team considers that success of each line (Tier 3) is dependent on how mass transit sector is governed and developed as a sector (Tier1) and overall network planning (Tier2).

	Key Issues	Category
Tier 1 Mass Transit Sector Tier 2 Integrated MRT Master Plan Tier 3 Each MRT Line Implementation	<ul style="list-style-type: none"> • Policy & Planning, Regulator, Contract Agency, Operator are not clearly separate • MRT specific regulation still limited 	<ul style="list-style-type: none"> • Sector Vision • Governance • Law and Regulation
	<ul style="list-style-type: none"> • Too much political intervention • Ridership risk too high for private due to network schedule delays • Lack of system compatibility planning may jeopardize cost efficiency and user convenience (e.g. AFC system, Signaling system) 	<ul style="list-style-type: none"> • Integrated Bangkok City TOD Plan • Integrated Multi-modal Plan • MRT Network Integration
	<ul style="list-style-type: none"> • Clarifying merits and demerits of financial framework (e.g. net vs gross, gov't vs private) • Tender process did not sufficiently address network private skill requirements (e.g. private consortium experience) • Lack of contract depth and flexibility (e.g. no revision clause, lack KPI details, limited cost breakdown) • Unclear guidelines on supplier requirements (e.g. line extension consideration, information disclosure) • Revenue stream from non-rail still limited 	<ul style="list-style-type: none"> • Financial Framework • Concession Agreement • Supplier Management • Non-rail Business Management

Source: Study Team

Figure 1.4-2: Three-tiered Issue Structure of MRT in Thailand

In addition, even within Tier3, the following redefinition of implementation scheme was proposed.



Source: Study Team

Figure 1.4-3: Redefinition of Implementation Scheme (Tier3)

It is important to note that, under the new definition, financial framework is positioned as one element of the implementation scheme. In other words, changes in financial framework will not

ensure success unless concession agreement, supplier management and non-rail business management are packaged together as one scheme.

These key findings were shared with Thai MRT stakeholders during the visit in May 2009, which further led to suggestions on refinement of study scope. Thereafter, the study team agreed with JICA to refine the study scope which is summarized as follows:

ICR Scope	Refined Scope
Module A - Reviewing a financial framework for urban railway systems in other countries	▶ Same (covered in ITR1)
Module B - Reviewing performance of existing urban railway systems in other countries	▶ Same (covered in ITR1 and ITR2)
Module C - Differentiation and comparison of the proposed project implementation frameworks (scheme)	▶ - Financial framework patterns will follow MAS study patterns. Cannot generalize quantified differentiation. NPV gap and gap-fill target sensitivities will be quantified. (covered in ITR1)
Module D - Financial analysis of existing yen loan financed urban railway project	▶ - Financial analysis of planned Purple Line (covered in ITR1)
Module E - Comparative analysis of implementation framework of the MRT project	▶ - Advantages and disadvantages of various implementation scheme patterns will be synthesized based on redefinition(not only financial framework but also concession agreement, supplier management and non-rail business management) (covered in ITR2 and final report)
Module F - Analyzing other issues on PPP in MRT project	▶ - Tier1 (mass transit sector governance, laws and regulation), Tier2 (Integrated MRT masterplan) related case analysis will be the focus (covered in ITR2)
Module G - Detail analysis of financial framework of existing urban railway systems in BKK	▶ - Current issues will be analyzed for Tier1, Tier2, Tier3 issues and not just on financial framework
Module H - Survey of service performance of existing MRT projects in BKK	▶ - Same (covered in ITR1 and ITR2)
Module I - Analyzing financial efficiency of existing MRT projects in BKK	▶ - Same (covered in ITR1 and ITR2)
Module J - Extraction of lessons learned from existing MRT projects in BKK	▶ - Lessons will be drawn from Tier1, Tier2, Tier3 issues (to be covered in final report)
Module K - Financial analysis of future urban railway projects in Thailand as a case study	▶ - Refined method of MAS study will be used to conduct simulation of future line (to be covered in final report)
Module L - Preparation of final report and holding of seminar	▶ - Same (to be completed in March2010)

Source: Study Team

Figure 1.4-4: Comparison of Activity Modules

Based on these changes, the study team developed and communicated the interim report in September 2009. During this second visit, additional topics regarding the details of MRT master plan and Purple Line tender preparation were raised by stakeholders. As a result, together with JICA's request, two study items were added to the original terms of reference (TOR) for the Study. They are:

- Collection of data & information on MRT master plan in Thailand and analysis of issues of MRT master plan (added in October, 2009)
- Review of tender documents for the Purple Line (added in January, 2010)

1.6 Member of Study Team

The Study Team consists of the following members:

Name	Assignment
Makoto SUNAGAWA	Team Leader/ PPP (1)
Kazuo MISHIMA	Sub-Team Leader/ Financial Analysis (1)
Atsushi HASHIMOTO	PPP (2)
Makoto OZAWA	MRT Management
Takeshi YAMASHITA	Financial Analysis (2)
Tetsuro AIKAWA	MRT Planning
Futoshi MITSUHATA	Urban Planning

CHAPTER 2 REVIEW OF URBAN RAILWAY SYSTEMS IN THAILAND

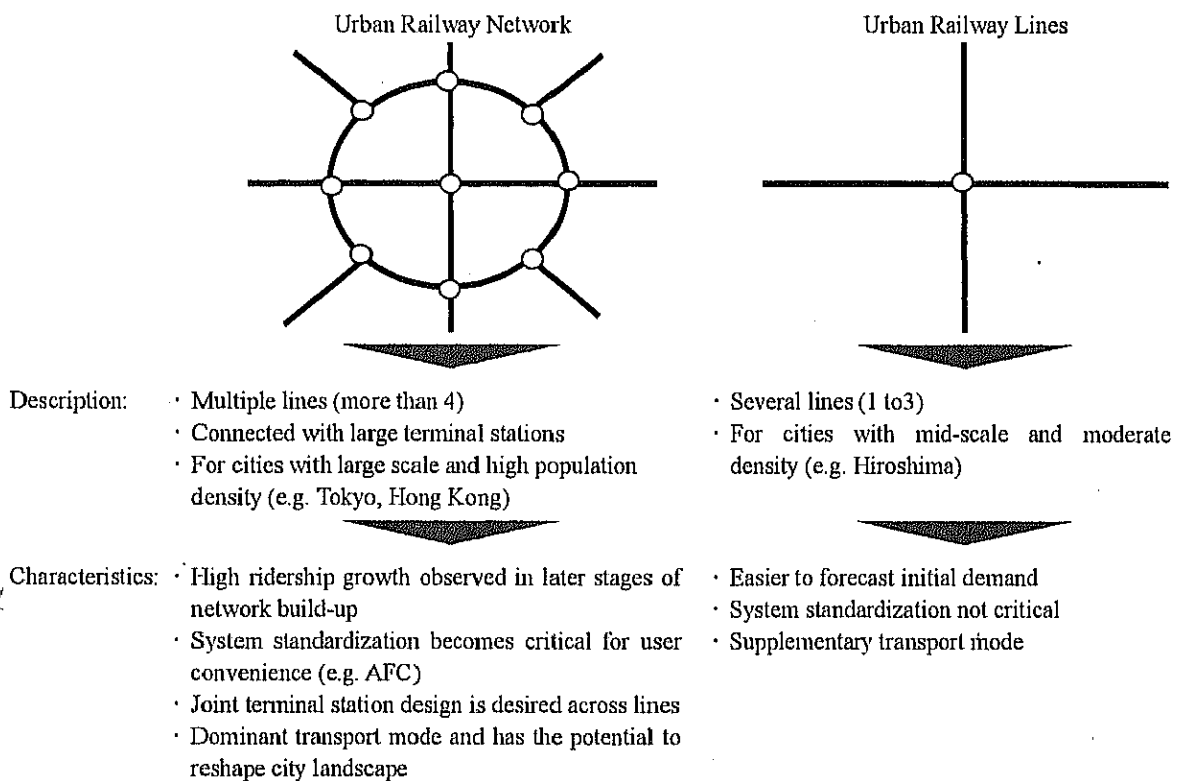
2.1 Basic Characteristics of Urban Railway Development

For this study activity, the Study Team was mindful of the need to tailor our analysis and recommendations to meet the unique characteristics of “Urban Railway Development”, “Thailand” and “PPP”. Therefore, in this chapter, the Study Team explained these characteristics to establish a common view on the underlying thinking behind research analysis and recommendations. The business characteristics of urban railway development in general are explained in 2.1.1 and how Thailand’s attempt to build urban railway infrastructure is unique and different from other countries is described in 2.1.2. Lastly, in 2.1.3, the unique characteristics of PPP application in urban railway development are described.

2.1.1 Business Characteristics of Urban Railway Development

Characteristics of urban railway development will be significantly different depending on the scale and density of the city. As described in Figure 2.1.1, cities with large scale and population density will likely choose to build up an “urban railway network”, consisting of multiple lines (typically more than 4 lines) that are inter-connected at several large terminal stations. Bangkok is clearly in this league. For cities planning to build this type of network, the following characteristics are notably important:

- Ridership forecast for line nodes in early stages of network building will be quite a difficult task. This is because the schedules of other network node build-up will significantly affect ridership. In other words, each line node’s ridership is heavily dependent on other line node’s ridership. An inter-linked network characteristics.
- System standardization will become key to success. Take AFC system as an example. Users will want one card. That is the prevailing mode for successful network. Simple but difficult to implement if each line node is implemented by different entities. Government (or the contracting agency) will need to lead and drive the standardization effort.
- Terminal station will need to be large, accommodating multi-modal transport. Convenient access across MRT lines, LRT lines, feeder bus and other transport will need to be embedded into the station design. Also, this terminal station has the potential to become the destination for commercial complex, with station building skyscrapers including hotels, office space, department stores, residential condominium, etc.
- City planning could be re-shaped according to plans for urban railway network. City sub-centre functions could be designed around multiple terminal stations and residential districts could be developed along railway extension alignment.



Source: JICA Study Team

Figure 2.1-1: Comparison of Urban Railway Characteristics

On the other hand, cities of mid-scale and moderate density will most likely develop only several urban railway lines (1 to 3). In this case, above network characteristics will not need to be taken into considerations. Perhaps, cities outside Bangkok would fall under this league.

In addition to characteristics described by city types, the following financial characteristics are also important to take into consideration:

- Capital intensive industry: Upfront cash flow investment for civil and M&E systems with positive cash flow to be gained only several years after operation. Ramp-up speed of ridership can be slow, especially in the early stages of network build-up. Therefore, government needs to design how to financially support the operating company especially in the early stages.
- Operational efficiency cost difference is not significant once the infrastructure is installed. This is because labor requirements are not large and relatively fixed regardless of the operator. Also, the electricity cost is not controllable.
- Maintenance cost requires lifecycle point of view. Cheap equipment could lead to large maintenance costs later on. Government needs to decide M&E systems with this in mind.
- Successful urban railway operations are typically supported by non-rail revenue source. Without sufficient non-rail revenue, it is typically difficult to justify financial sustainability just from ridership revenues.

2.1.2 Characteristics of Urban Railway Development in Thailand

As described above, Urban Railway system in Bangkok definitely belongs to Urban Railway Network because of its size and population density. In this connection, JICA study team observed following characteristics of Bangkok.

i) Sharp population increase and strong demand for mass transit system

Population in Bangkok and vicinities has grown sharply in the last two decade, from 8.6 million in 1990 and 12.0 million in 2008 resulting in heavy density. Naturally, road congestion has become serious giving adverse affects in various aspects particularly in environment. The government has put the highest priority on the construction of mass transit system.

ii) Tight Budget

Despite putting its highest priority on the development of urban transport, the Government faces budget constraints. The capital expenditure of the budget has been planned basically by domestic revenue supplemented by donors' assistance. This is not sufficient to fulfill the capital expenditure requirements. Therefore, the government decided to adopt PPP system in its financial framework to secure additional financing capacity from private sector.

iii) Three public agencies joined mass transit system

In Bangkok, three public agencies have joined in its Urban Railway development, namely Bangkok City(BMA), National Railway(SRT) and newly organized MRTA. These three agencies have developed and planned different MRT lines separately with limited coordination. This has led to issues of network integration (e.g. no common ticketing), which will be described in Chapter 3.

iv) Heavy dependence on foreign suppliers

Except portions of civil work, concerned technology needed in developing MRT systems were not available in Thailand. Therefore, it was necessary to depend on foreign suppliers.. However, after more than ten years, there is still an over-dependence on foreign suppliers. This is due to lack of effective technical transfer, information disclosure and intent.

v) Lack of integration with city planning

Urban railway is to be built for the citizens and for city development. It is found out, however, that serious consideration has not been paid to ensure integration with city planning.

2.1.3 Characteristics of PPP, particularly in Thailand

PPP, which was originated in the form of PFI in late 80's in UK, has been popularized in infrastructure construction in the last two decades over the world. In Asia, it became familiar since mid 90's. In this section, characteristics of PPP will be reviewed, especially with regards to Bangkok urban transport system.

1) A country which suffers budget deficit tends to adopt PPP for its infrastructure development

The main objective to adopt PPP in infrastructure construction is to get a part of necessary capital in the investment from private sector and also to induce management skill in its operation. The concept of VfM is also often adopted as a justification to use PPP system for the specific sector investment. The most important characteristic is to clarify roles and duties necessary for the operation of a concerned project in the form of the agreement among public and private at equal partnership basis. While PPP has become familiar in developing countries, in terms of infrastructure development, real success cases are fewer than expected.

2) Government Support and Legal Framework is quite important

To succeed in the PPP project, government policy and legal framework to support PPP are quite important. In this connection, it is also essential to set up independent regulatory body. In Thailand these are generally insufficient.

3) Sector-wide observation

Among infrastructures, the familiar sectors with PPP are, firstly telecommunication, secondly power, and thirdly road, water and others depending on the countries. But it is difficult to find urban railway in the higher rankings. Reasons for this, together with overseas failure and success cases, will be described in Chapter5.

4) Vertical separation method is utilized in PPP projects under ODA loan.

ODA loan provision is limited legally to only Government of the recipient country; therefore it will be provided for a specified construction portion to which the government is responsible, e.g. civil works of MRT construction, while private sector will finance M&E system portion..

2.2 Legal Framework and Government Policy Concerning MRT Projects in Thailand

2.2.1 Legal Framework of Government Agencies Related to MRT System

(1) Government Agencies Related to MRT System

The following government agencies and state enterprises are related to policies and projects of urban railway system in Thailand.

The Office of Transport and Traffic Policy and Planning (OTP) under the Ministry of Transportation is responsible for formulating transport and traffic plans and working out transport safety measures along with the national transport and traffic policy. OTP submits its opinions to the National Transport Policy Board on the formulation and amendment of the law on the national land transport and legislation for transport and traffic management.

The Commission for the Management of Land Traffic (CMLT), which consists of key Ministers and the Governor of Bangkok as members and OTP as secretariat, provides advises

and makes plans for integrated transportation system. CMLT was an independent office in MOT, but it was transferred under OTP.

The Mass Rapid Transit Authority of Thailand (MRTA) is a state enterprise which oversees MRT projects. MRTA used to be under the Prime Minister's Office, but was recently transferred to MOT. According to the Mass Rapid Transit Authority of Thailand Act B.E. 2543 (2000) (MRTA Act), MRTA is authorized to operate Mass Rapid Transit Systems within the Greater Bangkok Area and other provinces, or between the provinces and to run business related to the MRT enterprise¹. MRTA granted a concession of the first MRT line in Bangkok, Blue Line, to the Bangkok Metro Public Company Limited (BMCL). MRTA holds a 20% share of BMCL.

The Bangkok Metropolitan Administration (BMA) is the local city government of Bangkok Province. BMA granted a concession of the Bangkok Mass Transit System to the Bangkok Mass Transit System Public Company Limited (BTSC).

The National Economic and Social Development Board (NESDB), under the Office of Prime Minister, is responsible for formulating a five-year development plan, formulating policies and strategies for key development issues, analyzing budget proposals from state enterprises and related agencies, etc. As for a PPP project involving new assets, a feasibility study report should be submitted to NESDB.

The Public Debt Management Office (PDMO), under the Ministry of Finance, is responsible for general affairs of public debt management policy and supervision.

The State Railway of Thailand (SRT) is a state enterprise operating the national railway network under the Ministry of Transportation.

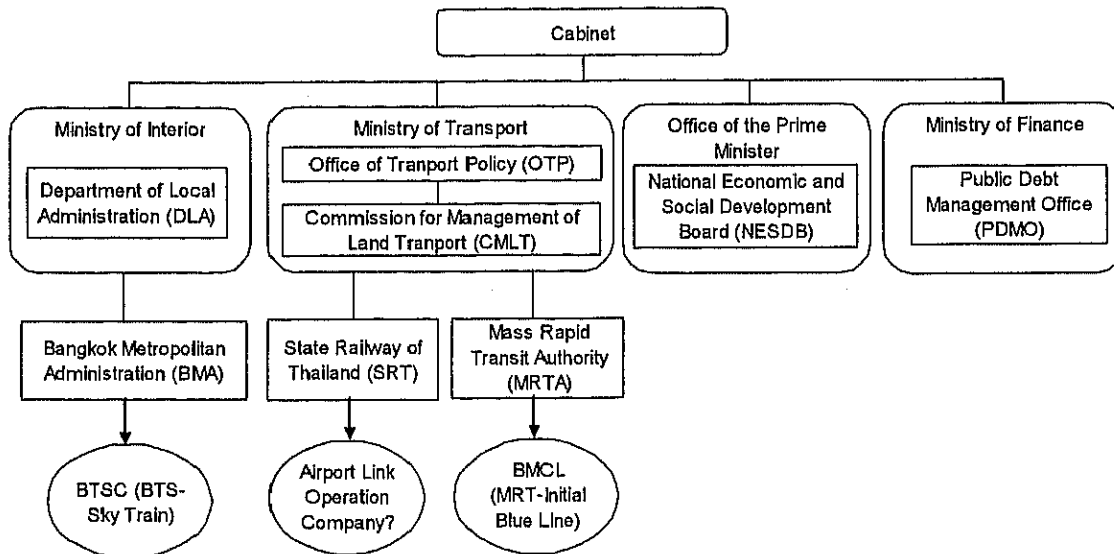
In 2006, the MRT committee was established by the Ministry of Transportation to oversee construction works of MRT lines and to confirm the form of MRT operating concessions and how they would be financed. Under this committee, a subcommittee focusing on finance and operations of MRT lines, which was chaired by PDMO, was also established to integrate and standardize the approaches of the three government agencies responsible for MRT concessioning, i.e., MRTA, SRT and BMA. The Policy and Management Committee for MRT in the Bangkok Metropolitan Region was established in July 2007. This is a high-level policy committee chaired by the Prime Minister and includes such members as Minister of Finance, Minister of Transport, Governor of BMA, Secretary General of NESDB, Secretary General of State Council, and so on².

BMA, MRTA, and SRT are public agencies responsible for managements of BTSC (SkyTrain), MRT, Airport Link, and Red Line respectively.

Organization chart of the governmental agencies related to MRT System is as shown in the following figure.

¹ Home page of MRTA (http://www.mrta.co.th/eng/about_mrta.htm).

² P. Sayeg, D. Bray, G. Ellis, S. Manibhandu, and H. Na Pombejra, "Project Number: 40138 Thailand: Infrastructure Investment Advisory Assistance (Phase II)," Asian Development Bank, July 2007.



Source: JICA Study Team

Figure 2.2-1: Governmental Agencies Related to MRT System in Thailand

(2) Laws and Regulations Regarding Thai Railway Sector

SRT has 150 years’ history and was legally established according to SRT Act B.E. 2494 (1951). Prior to SRT Act, Railway and Highway Act B.E. 2464 (1921) was issued. These laws are legal bases to construct and operate the railway in Thailand.

MRTA was established on the basis of MRTA Act in 2000. This Act consists of 93 sections of 8 chapters. Following the definition of the terms in the Act, Chapter I and II stipulate the organizational arrangement: capital, board of directors. Chapter III lays down how MRTA constructs, operates and maintains MRT System. Chapter IV stipulates that MRTA can grant its right to the private sector in the form of concession. Chapter V lays down passengers’ responsibility and MRTA’s responsibility to the passengers. Chapters from VI to VIII set down organizational matters such as financing and auditing, supervision, and penalties.

(3) Responsibilities of Public Agencies

The responsibilities of public agencies for MRT development range from the planning stage to the operation stage. The responsible public agencies by stage are shown in the following table. MRTA regulates most of matters in the downstream including concession agreements with the private sector. In the case of BTSC-Sky Train, BMA plays the same role as MRTA.

Table 2.2-1: Tasks and Responsible Public Agencies

Subject	Task	Responsible Public Agency
(a) Inter-modal Master Plan	Transportation network of multi-modal: bus, car, and MRT System	- OTP
(b) MRT System Master Plan	Network development plan of MRT System; prioritization of implementation	- OTP
(c) Implementation Framework	Application for PPP Act, internal and external borrowing	- NESDB, PDMO, BMA*
(d) Design	Design works, bidding procedure, evaluation	- MRTA (Blue Line & Purple Line) - BMA (BTSC) - SRT (Airport Rail Link & Red Line)

Subject	Task	Responsible Public Agency
(e) Procurement	- Land acquisition	- MRTA (Blue Line & Purple Line) - BMA (BTSC) - SRT (Airport Rail Link & Red Line)
	- Civil construction	- MRTA (Blue Line & Purple Line) - SRT (Airport Rail Link & Red Line)
	- Electrical & mechanical works - Rolling stock	- SRT (Airport Rail Link & Red Line)
	- Operator	- MRTA (Blue Line & Purple Line) - BMA (BTSC) - SRT (Airport Rail Link & Red Line)
(f) Operation & Maintenance	- Establishment of operation company - Operation rules - Operation plan - Safety standard - Maintenance routine	- SRT (Airport Rail Link & Red Line)
(g) Fare	- Fare structure	- MRTA (Blue Line & Purple Line) through the concession agreement with operator - BMA (BTSC) through the concession agreement with operator - SRT (Airport Rail Link & Red Line)

Note: * BMA had decided implementation framework for BTSC, before MRTA Act was established.

Source: JICA Study Team

2.2.2 Legal Framework for PPP Projects

(1) Thai PPP Act

The Act on Private Participation in State Undertaking B.E. 2535 (1992) (PPP Act) is the legal basis to utilize private investment, financing, operation and management know-how to implement the project that would be undertaken by the Government. The PPP Act consists of 25 sections (articles) in 5 chapters. The important chapters are: Chapter 2, 3 and 4 which stipulate the submission of the project, project Implementation, and project monitoring.

(2) Procedures of PPP Project According to the PPP Act

The Act on Private Participation in State Undertaking B.E. 2535 (1992), or PPP Act, stipulates the framework and government procedures of PPP projects of which the funds or assets are 1 billion baht or more (Section 5 of the Act). According to the PPP Act, the procedures of PPP project are as follows:

a. Approval of Project

A government agency which desires to implement a PPP project should submit a detailed result of study and project analysis to the responsible ministry. When a project fund or assets exceeds 5 billion baht, the agency should hire a consultant to prepare a separate report. The responsible ministry submits the result of study and project analysis to the Office of the National Economic and Social Development Board for consideration for new projects and to the Ministry of Finance for projects with existing assets (Section 8 of the Act).

If the Office of the National Economic and Social Development Board or the Ministry of Finance agrees with the project, the project is submitted to the Council of Ministers for approval in principle

The Office of NESDB or the Ministry of Finance should finish the consideration of the project within 60 days as from the date of its receipt. If such period expires, the Office of NESDB and the Ministry of Finance shall be deemed to agree with the project.

If the Office of the NESDB or Ministry of Finance disagrees with the project, the project agency shall submit the opinion or additional explanations through the responsible minister to the Council of Ministers for decision.

b. Implementation of Project

After the Council of Ministers has already approved any project, the project agency prepare an invitation for private participation and the project scope and essential terms and conditions to be included in an agreement for private participation.

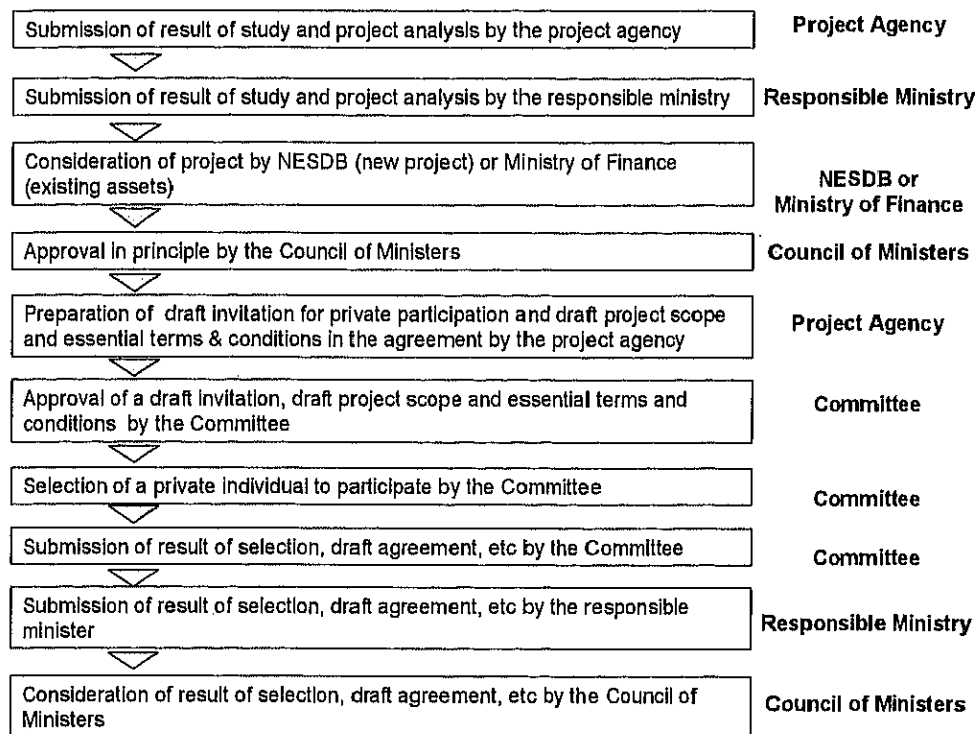
The project agency appoints a Committee consisting of representative of the responsible ministry (representative from state enterprise, state agency or local administration office) as a Chairman, representative of the Ministry of Finance, representative of the Office of the Attorney-General, representative of the Office of NESDB, representative of the Bureau of the Budget, a representative each other two Ministries, and not more than three qualified persons as members. A representative of the project agency shall be a member and secretary.

The Committee have the powers and duties to i) give approval for a draft invitation for private participation, draft project scope and essential terms and conditions to be included in the agreement for the private participation, ii) determine the bid security and performance security, iii) select a private individual to participate, etc.

The decision of the meeting on the selection of proposals and the bargaining negotiation should be made by the votes of not less than two-thirds of the number of the members present (at least three-fourth of the total members). The Office of the Attorney-General examines the draft agreement for private participation before signing.

The Committee submits the result of selection together with the justification, the issues negotiated and bargained on the interest of the State, draft agreement and all other documents through the Responsible Minister to the Council of Ministers for consideration within 90 days after the decision.

If the Council of Ministers disagrees with the result, the matters should be returned to the Committee for revision, and the result of revision is submitted to the Council of Ministers for final decision.



Source: Compiled by Study Team based on the PPP Act.

Figure 2.2-2: Flow of PPP Project Approval

2.2.3 Situation of MRT Plan, Other Public Transport Plan and Related City Plan

(1) Current Situation of Urban Railway in the Bangkok Metropolitan Region

Since the 1970s, the Thai government and Bangkok Metropolitan Administration (BMA) made and promoted a plan of developing MRT lines in the Bangkok Metropolitan area with the purpose of solving the traffic congestion and environmental issues in this area.

Two urban rail lines are currently operating and one urban rail line is to be open in 2010. The first urban rail line in Bangkok, Bangkok Transit System (BTS), which is also called as the SkyTrain or the initial Green Line, was officially opened in December 1999. The BTSC was wholly privately financed. The Bangkok Transit System Corporation (BTSC) operates the Sky Train under a concession agreement with the Bangkok Metropolitan Administration (BMA). The second MRT line, the Blue Line, was opened in August 2004. The Blue line was financed jointly by the public sector and the private sector. The national government funded the civil works and a private consortium, the Bangkok Metro Company Ltd (BMCL), provided electrical & mechanical equipment (E & M) and rolling stock. BMCL operates the line under the concession agreement with the Mass Rapid Transit Authority (MRTA)³. The Suvarnabhumi Airport Rail Link (ARL) linking from the Suvarnabhumi Airport to urban area of Bangkok, which is to be owned and operated by the State Railway of Thailand (SRT), is planned to start operation in 2009.

³ NESDB, World Bank, "Thailand Infrastructure Annual Report 2008," 2008

(2) History of Development of Urban Railway Master Plan for the Bangkok Metropolitan Region

The first urban railway master plan for Bangkok Metropolitan Region (BMR), "Conceptual Mass Rapid Transit Implementation Master Plan Project (CMIP)", was formulated by OCMLT in 1996

CMIP and "Additional Feeder Routes Plans under the Mass Transit Feeder System Study" were integrated under the Urban Rail Transportation Master Plan (URMAP 1) by OCMLT in 2001. URMAP 1 plan provided a framework for subsequent planning and engineering studies and implementation of individual projects and programs. URMAP 1 sought to make best use of existing rail lines and facilities as part of an optimum urban railway system for BMR.

In September, 2004, OTP formulated the succeeding master plan "URAMP 2" based on URMAP 1, and then, the Government approved this new master plan. After the refinement works, Cabinet approved a revised master plan in June, 2005. The plan aimed to develop 7 lines, namely the extension of BTSC Skytrain and blue line, and new development of the dark green, red north-south, red east-west (Airport Rail Link), orange and purple lines, with total length of 277 km by 2012. Out of 277 km, 138 km of line was expected to be developed by SRT, 94 km by MRTA, and 45 km by BMA. The total estimated cost envisaged under URMAP 2 was 556 billion baht (equivalent to US\$ 14 billion). While investment cost for civil work was supposed to be wholly financed by the government, investment cost for E&M and rolling stock was planned to be jointly financed by the government and private concessionaires. At the time, private concessionaires to operate these lines were not specified yet.

Under the plan, high priority was given to upgrading of the rail link connecting central Bangkok and the newly developed Suvarnabhumi Airport located in Bangkok's eastern suburbs (Airport Rail Link: 28.0 km) as well as the existing Don Muang International Airport located in city's northern suburbs (Red Line: 21.0 km). In addition, the completion of ring-shaped blue line in central Bangkok, and the extension to the North-west (Purple Line) and South-west (Red Line) were expected to form the backbone of the MRT network in BMR.

Currently, OTP has prepared the latest master plan following URMAP 2, which is called M-MAP (mass transit master plan).

Table 2.2-2: Current Situation of Urban Railway System Development Plan in Bangkok

Project owner	Lines		Specifications		Operator	Availability of FS	Status		
			Mode	Gauge etc			Finance/cabinet approval	Construction works	
	Airport link		MRT	1435mm, catenaries	Subsidiary company of SRT	Yes		Soon opening	
	Red	West				Yes	Govt. approved Finance fixed	Contractors selected for civil works	
		North	MRT, Intercity trains	1000mm, catenaries	Subsidiary company of SRT	Yes	Govt. approved, Japanese ODA fixed for all assets	Not yet	
		Missing Link				Preliminary design completed	Not yet	Not yet	
		East				Not yet	Not yet		
BMA	Green	CT			BTSC	Yes	Private finance	Opened	
		Light Green	MRT	1435mm, third rail		Yes(Thai version)	Govt. approved	Partially opened, the rest under construction	
		Dark Green1				Not fixed	Govt. approved	Not yet	
BMA/BRTA		Dark Green2				?	Not yet	Not yet	
	Blue	MRT			BMCL	Yes	Infra, ODA, E&M, PPP	Opened	
		Extension	MRT			Not fixed	Yes	Cabinet approved on civil works	Not yet
	Purple	North	MRT			Not fixed	Yes	Cabinet approved ODA loan fixed for civil works	Contractors selected for some civil works
		South				Not fixed	Not yet	Not yet	Not yet
	Orange	Green	MRT	Depot for Orange Line common with that for Blue		Not fixed	Yes	Not yet	Not yet
		Brown				Not fixed	Soon FS Completed	Not yet	Not yet
	Pink	West section	Monorail			Not fixed	Soon FS Completed	Not yet	Not yet
		East section				Not fixed	Completed	Not yet	Not yet
Yellow	Dark section	MRT(LRT)			Not fixed	Soon FS Completed	Not yet	Not yet	
	Light		1435mm, catenaries		Not fixed	Completed	Not yet	Not yet	

Source: Compiled by JICA Study Team based on the interview survey in the First Field Study in Thailand.

(3) Current Situation of the Latest Urban Railway Master Plan

According to the latest related document on URMAPP3 as of October 2009, the succeeding MRT master plan includes the followings:

- a) Urban Development Directions: By reviewing the urban development-related plans and projects in Bangkok and surrounding areas such as 12-Year Bangkok Development Vision, comprehensive plans for Bangkok and other related provinces, Bangkok and Vicinities Regional Plan Project and IMAC Project, the rail routes are planned to mainly cover CBDs or commercial centers and are extended to pass the commercial sub-centers to urban community sub-centers. The intermodal facilities and feeder systems are planned in low-density suburbs to allow the convenient access to the trunk routes.
- b) Overview of Mass Transit Network: The mass transit network is classified into three categories, namely, major trunk routes, minor trunk routes and feeder lines. Different type of systems are planned to each network category, i.e. heavy rail systems for major trunk routes, LRT or BRT for minor trunk routes and bus or van for feeder routes. To encourage the use of mass transit system, it is recommended to construct the intermodal transfer facilities at each terminal and significant station including the public transport interchange with feeder bus system and park & ride facility. The common ticket system and the same fare structure are also recommended to the complete coverage of network.
- c) Network of Rail Mass Transit Routes: The rail mass transit network comprises 12 routes with a total distance of 490km, eight of which are major trunk routes and four are minor trunk routes. The eight major trunk routes are composed with three Commuter Train (CT) lines

operated by SRT (Dark Red Line, Light Red Line and Airport Rail Link) and five MRT lines (Dark Green Line, Light Green Line, Blue Line, Purple Line and Orange Line). The route alignments are developed in compliance with the principal concept of the previous master plan or the radial and circumferential pattern.

- d) **Development Plan:** Above mentioned 12 routes excluding the ongoing three sections are divided into 21 sections and classified into three categories from the development priority viewpoint, namely, Urgent Plan (within 2016), First 10-year Plan (within 2019) and Second 10-year Plan (within 2029). Urgent Plan includes five lines and seven sections of network for a distance of 145km mainly consist of CT and MRT. First 10-year Plan includes eight sections with a total distance of 146.2km which are extension of MRT system and new LRT system. Finally, Second 10-year Plan includes remaining six sections with a total distance of 107.4km.
- e) **Demand Forecast:** In 2008, the amount of MRT passenger is 0.6 million trips per day which is equal to 3.9% of the total travel demand in Bangkok and Metropolitan area. The future MRT passenger demand is projected as 1.8 million trips per day in 2014, 4.4 million trips per day in 2019, and 7.7 million trips per day in 2029, which are equal to 15%, 28% and 35% of total travel demand in Bangkok and Metropolitan area in 2014, 2019 and 2029 respectively.
- f) **Cost Estimation:** The total construction cost for 12 routes with a total distance of 404.6km is estimated at 794 billion Baht in 2009 current price which includes expropriation works, civil works, E&M works, rolling stock, track works, facilities infrastructure, detailed design and construction supervision fee and depot.
- g) **Economic Analysis:** EIRR of each development plan is estimated at 22.83% for Urgent Plan, 20.64% for First 10-year Plan and 20.77% for Second 10-year plan with an assumption that all 12 routes will be operated in 2019.
- h) **Financial Analysis:** From the financial feasibility viewpoint, all routes are unfeasible if the Government invests both civil and E&M works. To make the project feasible, the Government financial burdens must be reduced by applying PPP scheme as mentioned in the Government policy.
- i) **Environmental Impact and Public Participation:** According to the Initial Environmental Evaluation (IEE) for 12 routes, the construction and operation of mass transit system will affect environmental issues in more or less level depending on the type of train system. The series of public participation procedure such as Public Information (PI), Public Consultation (PC) and Public Survey has been implemented during the preparation of URMAPP3
- j) **Implementation Plan:** Mass Rapid Transit Commission (MRTC) which is responsible for developing and planning rail transit projects, funding, setting investment scheme, issuing fare policy, managing fare revenues and regulating standards of construction, safety and level of services is proposed for the smooth achievement of the planned mass rapid transit network. MRTC consists of three subunits, namely, mass transit development unit, financial support unit and public transport regulatory unit with participation from the Ministry of Transport, the Ministry of Finance, part of MRTA and local administration.

(3) Current Situation of Integration with City Planning

As for the mass transit system coverage area, the Bangkok Metropolitan Administration (BMA) and the Department of Public Works and Country Planning, Ministry of Interior are responsible in developing the city planning of Bangkok Metropolitan Region and its surrounding area respectively. Those agencies prepared the policy plans such as land use plan of their responsible area; however, they have not prepared any implementation program which drives the policy planning into realization. Against this situation, BMA is implementing the pilot project on the new city development at Klong Dan Station area (3.2 km²) where the Light Green Line will be extended in the future. According to the information of BMA, it is necessary to set up the City Planning Act to get the budget for the construction of public facilities in the new developing city.

From the viewpoint of the integration between city planning and MRT planning, city planning agencies consider about the city sub-center development surrounding MRT terminal station in preparing policy plan. However, any coordination works with relevant railway agencies have not been made in the process of developing their plan.

From the viewpoint of MRT operator, BTS has much interest in developing the area surrounding the station. However, those agencies do not have legal authority in planning the station plaza which includes public facilities. In addition, there is any scheme or law which supports the joint real estate development between public sector and private sector.

In 2005, OTP implemented the Intermodal Service Integration for the Improvement of Mobility, Accessibility, Sustainability and Livelihood for Bangkok Metropolitan Region and Surrounding Area (IMAC). In this study, the conceptual designs of the development of the areas surrounding ten major stations were prepared by following the MRT planning. As for the institutional aspect, it is recommended to set up the Urban Development Authority (UDA) which is responsible for developing the city sub-center. However, at present, UDA has not been established yet.

(4) Current Situation of Integration with Other Transport Modes

To achieve the public transport based city, the well-coordination between mass transit systems and other transport modes is essential. The current situation of the integration between MRT plan and other transport modes is as follows:

- a) Feeder Bus System: Well organized feeder bus system between station and residential area is one of the most important issues to shift the passengers from private vehicle to public transport. The study on the feeder bus system is currently ongoing and almost complete sponsored by OTP.
- b) Buss Rapid Transit (BRT): BRT is an effective system in supplementing the mass transit network without huge investment. The BRT network is initiated by BMA and mentioned in the IMAC Study. However, according to the information of OTP, it seems that any close coordination for MRT plan is not made.

- c) **Park and Ride Facility:** At present, there are several park and ride facilities along BTSC and MRT stations such as Mo Chit Terminal and Lat Phrao Station. BMA proposes another park and ride facility along the extended BTSC Line, but the capacity is quite limited. Capacity requirement should be discussed between railway operator and city planning agency.
- d) **Tariff Policy:** As Bangkok will shift to the public transport-based city, well-coordinated tariff structure should be developed so that the modal shift to the public transport will be smoothly implemented. At present, any policy on this issue has not developed yet.
- e) **Transportation Demand Management (TDM):** Road pricing is one of the effective methods to reduce the vehicle within the central city area and shift passengers to the public transport. OTP has made a study on road pricing, and it is waiting for the development of mass transit network as an alternative transport for private vehicle users.

2.3 PPP Models of MRT Projects in Thailand

2.3.1 PPP Models of Current MRT Projects

The general characteristics of PPP models of current two lines are as shown in the following table⁴.

Table 2.3-1: PPP Models of Current MRT Projects

Feature	Bangkok Transit System (BTSC Green Line)	MRTA Initial System Project (Blue Line - East)
Start of Operation	December 1999	July 2003
Type of concession	- BTO for civil works - BOT for E & M	- Civil works transferred from MRTA to BMCL for use - BOT for E& M
Government agency which provide a concession	Bangkok Metropolitan Authority (BMA)	Metropolitan Rapid Transit Authority (MRTA)
Concessionaire	Bangkok Mass Transit System PCL (BTSC)	Bangkok Metro Co. Ltd. (BMCL)
Concession period	30 years from first day of the commercial operation	25 years after construction period
Revenue sharing	No revenue sharing	Revenue sharing between MRTA and BMCL
Ridership Risk	Concessionaire	Concessionaire
Performance	Not referred	Indications of carrying capacity, train performance, and safety
Cooperation with Other Transit System	Not referred	Cooperation for common ticketing and other forms of passenger movement is mentioned. Sharing of depot with other extension operator is referred.
Concession extension	To be notified by BTSC between 3-5 yrs before expiration	Not referred
Line extension/system expansion	BTSC has the first refusal right to negotiate with BMA for new routes	"to be practical for ease of expansion and interfacing between the projects" (Annex VII, Part 2, 2)

Source: JICA Study Team

⁴ The financial framework and concession conditions of current two lines are described in Chapter 5

General remarks of the current PPP models are as follows:

- Concessionaires chosen were land developer/construction companies which had no experiences in railway business;
- It has been observed that ridership risk is too large to keep a MRT business sustainable. Under the current net cost concession model, a concessionaire holds a ridership risk. In other words, most of risks except land acquisition are allocated to the concessionaire; while the concessionaire is granted passenger's fare revenue and other sources of revenue which are vulnerable to mis-prediction of ridership and economic slump;
- The risk concerning civil construction is under the concessionaires;
- There is no amendment or revision clause/section in concession agreement. No amendment of the concession agreement has been made yet for neither BTSC nor BMCL;
- There is no clause regarding an extension of concession period is given to BMCL. Limited concession period without an extension clause may discourage the concessionaires to improve service;
- Land development right provided to concessionaires is limited;
- The right of contractors (project owners) to control technical specifications such as signals, rolling stock, AFC, etc. was not included in the concessionaire agreements;
- The clause which decides the minimum performance level or gives contractors authority to monitor the performance of concessionaires is not included in the concessionaire agreements; and
- Future cooperation/coordination with other operators is not clearly described in detail in the concessionaire agreements.

2.3.2 PPP Concession Models Recommended by ADB Technical Assistance

(1) Outline of ADB's Technical Assistance (TA)

The Asian Development Bank (ADB) provided a technical assistance (TA 4904: THA for Infrastructure Investment Advisory Assistance - Phase II) with the purpose of supporting successful delivery and integration of the new rail MRT and associated wider public transport system in Thailand. The TA was provided through the MRT implementation committee and its finance and operations sub-committee. More generally, the TA provided analytical and advisory support to PDMO and OTP. The TA aimed at structuring private concessions for the operations and maintenance of new rail lines and integrating the rail MRT network through the introduction of a single ticketing system⁵.

In this TA, four options of concession models for MRT projects were analyzed and evaluated. Other major outputs of TA were:

⁵ P. Sayeg, D. Bray, G. Ellis, S. Manibhandu, and H. Na Pombjra, "Project Number: 40138 Thailand: Infrastructure Investment Advisory Assistance (Phase II)," Asian Development Bank, July 2007.

- Preparation of a standardization requirements paper for all MRT studies under the PPP Act;
- Development of a new concession contract template based on the review of legal requirements and standardization of concessioning approach;
- Identification of integrated ticketing needs in Bangkok;
- Procurement options for ticketing: evaluation of options;
- Action plan for implementing integrated ticketing system, concessions and related matters for the rail MRT system, etc.

(2) Evaluation of Concession Models

The Sub-Committee for MRT Finance and Operations specified three different types of concessions (Net Cost, Gross Cost and Partial Gross Cost) for the study. A revised net cost model was added for comparison.

The definitions of four concession models are as shown in the following table.

Table 2.3-2: Definition of Concession Model

Model	Definition
Current Net Cost Concession	The government manages civil infrastructure delivery using private sector contractors; government engages the private sector to provide electrical and mechanical (E&M) assets and trains and to undertake operation and maintenance (O&M) through a concession; government leases civil infrastructure to the concessionaire; government sets safety standards and fare structure; the concessionaire determines services to be provided and retains fare and other revenue, in which; and additional payments may need to be made by the government to the concessionaire to cover revenue shortfall, or the reverse if revenue exceeds costs.
Revised net cost concession (with enforced integration)	The same as for the current net cost concession other than conditions that can improve network integration (e.g., integrated ticketing) are specified at the time of tendering and incorporated into the concession.
Simple gross cost concession (with no risk transfer)	The government manages civil infrastructure delivery using private sector contractors; government engages the private sector to provide E&M and trains and to undertake O&M through a concession; government sets safety and service standards, service levels, and fare structure and level; government pays the concessionaire an amount equal to the costs the concessionaire incurs in providing agreed services as established through a competitive, quality-based tender; and government retains all fare revenue.
Modified Gross Cost Concession (with some risk transfer)	The same as for the simple gross cost concession model other than part of the payment to the concessionaire is linked to the number of passengers carried with a corresponding lesser need for monitoring of the quality of service that is provided.

Source: P. Sayeg, D. Bray, G. Ellis, S. Manibhandu, and H. Na Pombejra, "Project Number: 40138 Thailand: Infrastructure Investment Advisory Assistance (Phase II)," Asian Development Bank, July 2007

The major features of the four concession models and the need of supervision by the public sector are as shown in the following tables.

Table 2.3-3: Comparison of Net Cost and Gross Cost Concession Models

	Net Cost	Gross Cost
Infrastructure	Government provides civil infrastructure and some other infrastructure. Concessionaire provides trains and related assets.	
Risk Sharing	Concessionaire assumes all ridership risk, and shares extra profits (if any) with the government	Risk is shared between the government and concessionaire. Optimum sharing of risk will minimize the concession cost
Revenue	Concessionaire keeps revenue	Fare revenue is given to the government
Services	Concessionaire determines services to be provided on the basis of profitability	Government sets service standards and the concessionaire determines services based on these Standards
Payments	Concessionaire meets costs from its own revenue	Government pays the concessionaire for services provided according to rates set on the basis of competitive tendering and quantity/quality of service provided
Government Role	Government invites tenders & establishes a concession; has only a small role thereafter; difficult to vary contract conditions.	Government invites tenders and establishes a concession; has a continuing major role in managing the concession agreement; can vary conditions when needed.

Source: P. Sayeg, D. Bray, G. Ellis, S. Manibhandu, and H. Na Pombejra, "Project Number: 40138 Thailand: Infrastructure Investment Advisory Assistance (Phase II)," Asian Development Bank, July 2007

Table 2.3-4: Needs of Supervision by the Public by Model

	Form of Concession		
	Net cost (current)	Gross cost (with some transfer of risk)	Gross cost (with no transfer of risk)
Extent of Risk Transfer			
Need for concession management			
Supervision needed as a condition of payment(1)			
Quantity of service (eg car-km of service)	Not needed	Essential	Essential
Quality of services (eg maximum load, comfort)	Not needed	Limited need	Essential
Number of passengers	Not needed	Essential	Not needed
Additional supervision needed for general contractual oversight			
Quantity of service	Not needed	Not needed	Limited need
Quality of services	Limited need	Limited need	Limited need
Number of passengers	Limited need	Not needed	Limited need

Source: P. Sayeg, D. Bray, G. Ellis, S. Manibhandu, and H. Na Pombejra, "Project Number: 40138 Thailand: Infrastructure Investment Advisory Assistance (Phase II)," Asian Development Bank, July 2007

The conclusions of the study provided under the TA were as follows⁶:

- A net cost form of concession, even with modifications to improve MRT integration, will still have substantial limitations, because the need to give the concessionaire a high level of certainty over the circumstances of their commensurate system with the substantial risk transferred to them either restricts government flexibility with regard to future MRT development and policy change, or requires the government to renegotiate concession agreements to take account of changes that occur;

⁶ P. Sayeg, D. Bray, G. Ellis, S. Manibhandu, and H. Na Pombejra, "Project Number: 40138 Thailand: Infrastructure Investment Advisory Assistance (Phase II)," Asian Development Bank, July 2007.

- A gross cost form of concession is needed to give the government the capacity to deliver fully integrated MRT in Bangkok that can also adapt to changing circumstances over time, acknowledging that it is not possible to identify in advance all such changes that could occur over a typical 30 year concession duration;
- There still needs to be some transfer of risk to concessionaires with a gross cost concession to ensure costs are minimized, good performance by concessionaires is encouraged and concession supervision requirements are minimized; and
- Concession supervision should focus on key factors that will ensure the government achieves value-for-money.

As the result of TA, the Thai government recognized that the gross cost model applied in a standardized way irrespective of the implementing agency is essential to achieve an integrated future MRT network at the least possible cost. The Ministry of Finance and Ministry of Transport decided in June 2007 to adopt the gross cost concession model for all MRT concessions in future.

The Thai government has adopted “Draft Standardization Directive” included in the report of this TA, as guidelines for their project evaluation of MRT line. The Draft Standardization Directive is attached in Appendix 2. The Draft Standardization Directive mentions that the following options should be considered as financial modeling of PPP options:

Investment and Operations:

- Public Sector Comparator (PSC): A private sector concessionaire undertakes only O&M, with the Government financing all infrastructures
- Public Private Partnership (PPP): A private sector concessionaire finances all E&M and rolling stock investment and undertakes O&M, with the Government financing other infrastructure investment.

Concessionaire Payment Options:

- Net Cost (current method)
- Gross Cost
- Modified Gross Cost (with partial demand risk transfer)

Table 2.3-5: PPP Option Matrix for the Evaluation of MRT Project

		Capital Cost Sharing				Payment Option		
		Civil Work	E & M	Rolling stock	O & M	Net Cost (Current Method)	Gross Cost	Modified Gross Cost
Investment & Operation Option	Public Sector Comparator (PSC)	Public	Public	Public	Private			
	Public Private Partnership (PPP)	Public	Private	Private	Private			

Source: P. Sayeg, D. Bray, G. Ellis, S. Manibhandu, and H. Na Pombjra, “Project Number: 40138 Thailand: Infrastructure Investment Advisory Assistance

2.4 Financial and Fiscal Situation of Thailand

The financial framework for the future MRT projects in Thailand will be affected by the financial and fiscal conditions. For example, the government borrowing for a project will face the ceiling of public debt regulated in the Public Debt Management Act and the Fiscal Sustainability Framework. The fund raising by a private participant will be influenced by the financial market conditions. In this section, the financial and fiscal situations in Thailand are analyzed from these perspectives.

2.4.1 Financial Situation in Thailand

(1) Economic Situation

The Thai economy has shown a downturn trend since the third quarter of 2008 as the result of exposure to the global financial crisis as shown in Figure 2.3-1. The real growth rate (year on year) of GDP on an expenditure basis dropped to -4.2% in the fourth quarter of 2008 and further dropped to -6.9% in the first quarter of 2009. In the fourth quarter of 2008, the gross fixed capital formation and net exports recorded a decrease (year on year) although the Thai economy was supported by a rather stable private consumption and an increase in inventories. In the first quarter of 2009, economic stagnation became more pronounced. Both the growth of private consumption and gross capital formation turned to negative. In the second and third quarters, the growth of GDP (year-on-year base) was still negative. Economic contraction was due to drop in gross capital formation and imports and inventories.

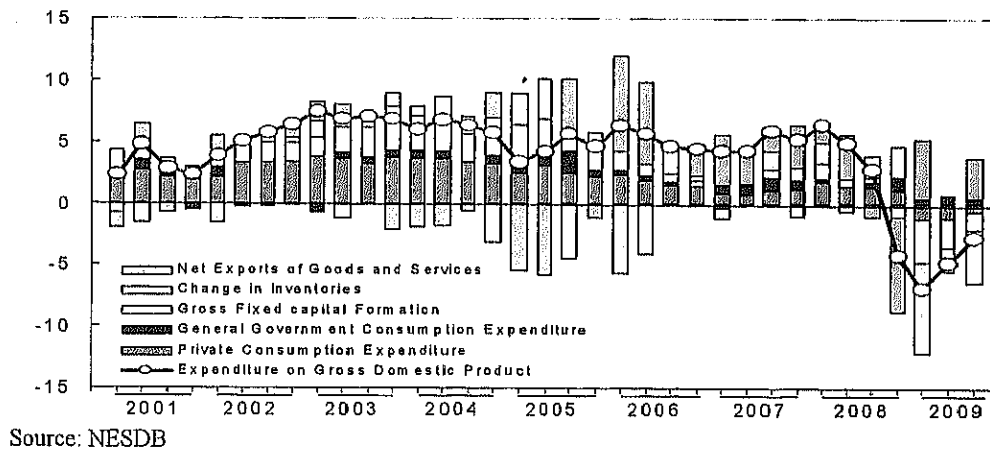


Figure 2.4-1: Trend of GDP in Thailand

(2) Money Supply

The growth rate of broad money in Thailand is as shown in Figure 2.4-2.

The acceleration of broad money growth experienced since the second half of 2005 was due to a successive increase in deposit rates. However, the growth rate (on a year-on-year basis) of broad money turned to a decreasing trend in the middle of 2006. The Bank of Thailand pointed out that major reasons for this trend were stabilized interest rates and slowdown in private credits. In 2007, in addition to the downward deposit interest rates, issuance of bills of exchange by commercial banks in stead of conventional deposits also gave a negative impact to the broad money growth.

Since the second half of 2008, broad money has tended to expand because investors have redirected their funds to deposits under the uncertainty of economy. There is another reason for this expansion. The definition of broad money was changed to include bills of exchange, money market mutual funds, and deposits at saving cooperatives to accord with international standards⁷ Since July 2009, the growth of broad money has tended to drop. In November 2009, the growth rate of broad money was 6.5% on a year-on-year basis.



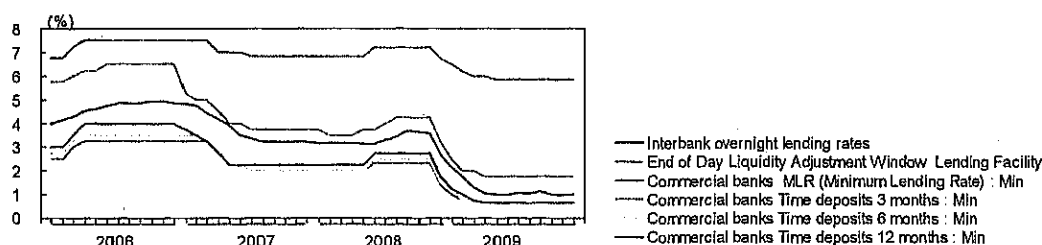
Source: Bank of Thailand

Figure 2.4-2: Growth Rate of Broad Money (Year-on-Year Basis)

During the first half of 2007, the Monetary Policy Committee (MPC) decreased the policy interest rate five times from 5.0% per annum at the end of December 2006 to 3.25% per annum at the end of July 2007 as a stimulus to domestic demand. The MPC maintained the policy interest rate at 3.25% per annum during the first half of 2008. However, the policy rate was increased to 3.75 percent per in July 2008 with the assessment of inflation risk. The MPC lowered the policy interest rate to 2.75% in December 2008 responding the negative impact of global financial crisis and weakened confidence of investors. The policy interest rate was further decreased to 2.00% on January 14, 2009, to 1.50% on February 15, and to 1.25% on April 8.

The average short-term money market rates in 2008 declined from the previous year in tandem with the policy interest rate. The one-day inter-bank rate averaged at 3.35% per annum in 2008, against 3.79% annum in 2007.

The reference interest rates of commercial banks, both deposit rates and loan rates, moved in line with the policy interest rate.



Note: Commercial banks rates are quoted by the 5 commercial banks.

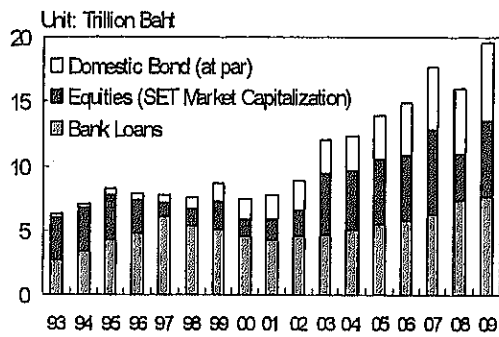
Source: Bank of Thailand

Figure 2.4-3: Trend of Key Interest Rates

⁷ Monetary Policy Group, "Thailand's Economic and Monetary Conditions in 2008," March 2009, Bank of Thailand

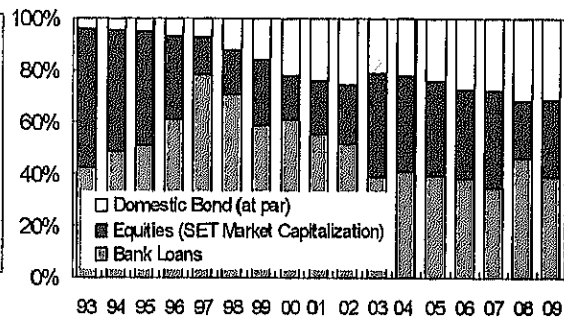
(3) Financial Market

The financial system of Thailand consists of commercial banks, government-owned specialized financial system, capital markets, and non-bank financial intermediaries. The size of finance tended to expand during the 2000s with a favorable growth of the Stock Exchange of Thailand and issuance of bonds. The share of bank loans has remained at around 40%.



Source: Thai Bond Market Association

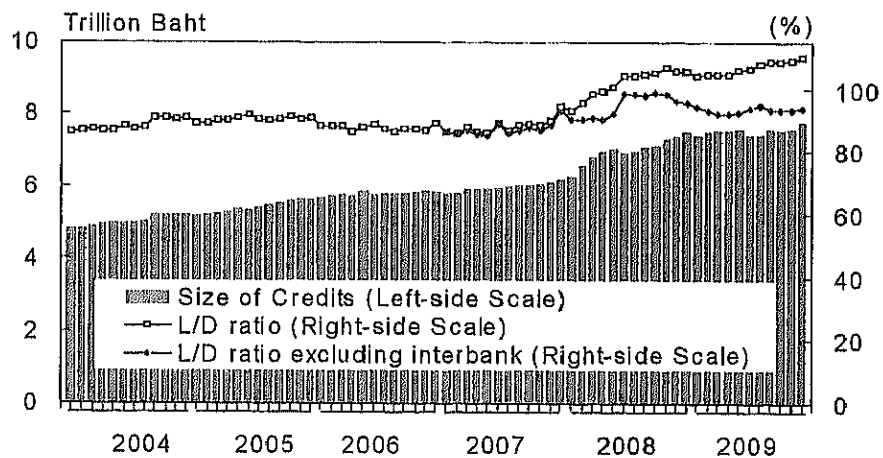
Figure 2.4-4: Size of Financial Market in Thailand



Source: Thai Bond Market Association

Figure 2.4-5: Share of Financial Market in Thailand

As of November 2009, there are 32 commercial banks operating in Thailand, 17 domestic commercial banks and 15 foreign commercial bank branches. Major domestic commercial banks are Krung Thai Bank, Bangkok Bank, and Thai Farmers Bank. The size of bank loans has shown an increasing trend since 2008. The ratio of loans to deposits has tended to increase from the later half of 2007 due to the increase in inter-bank lending.



Note: Including inter-bank deposits and credits.

Source: Bank of Thailand

Figure 2.4-6: Size of Credits and Ratio of Loans to Deposits of Commercial Banks

Among the total credits of commercial banks, almost half of total credits are directed to the business sector followed by individuals and domestic banks & financial institutions. As mentioned above, the loans to domestic banks and financial institutions increased through 2008 and 2009. The shares of government and state enterprises & government organizations are minimal.

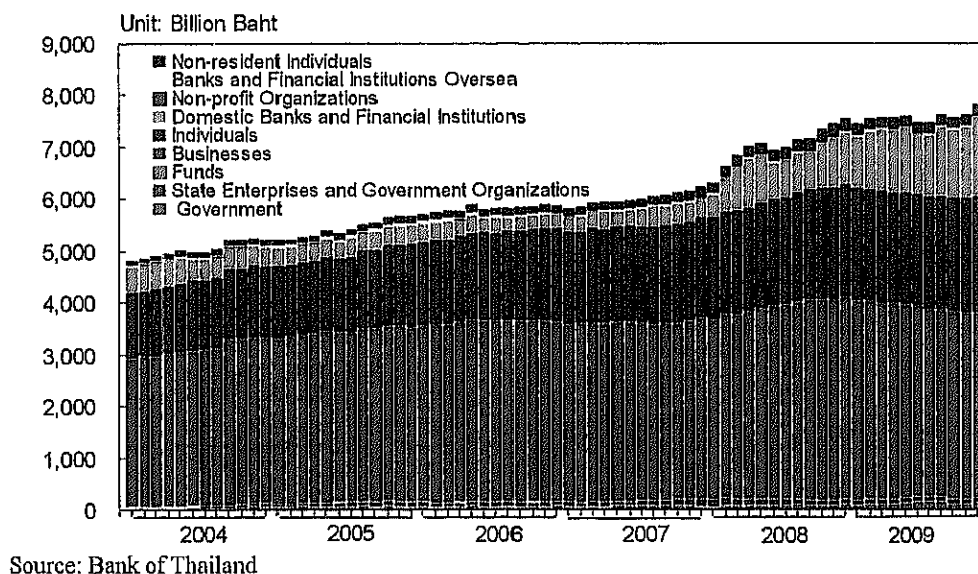


Figure 2.4-7: Breakdown of All Commercial Banks' Credits by Type of Debtors

The ratio of gross non-performing loans (NPLs) of commercial banks to total loans has been decreasing steadily since 2001. As of September 2009, they were 5.7% of total loans for domestic commercial banks and 1.8% for foreign commercial banks.

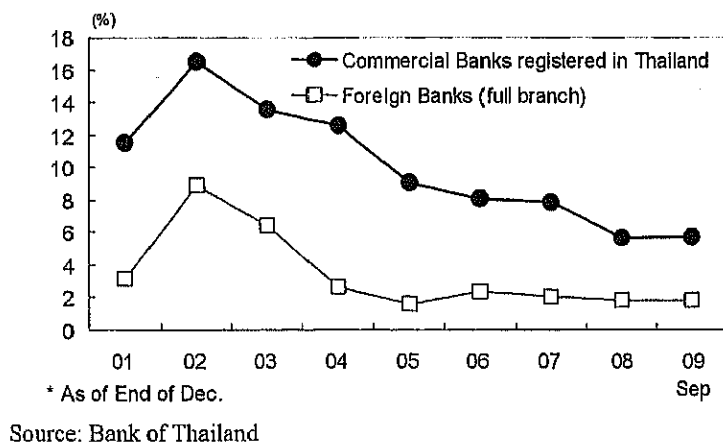


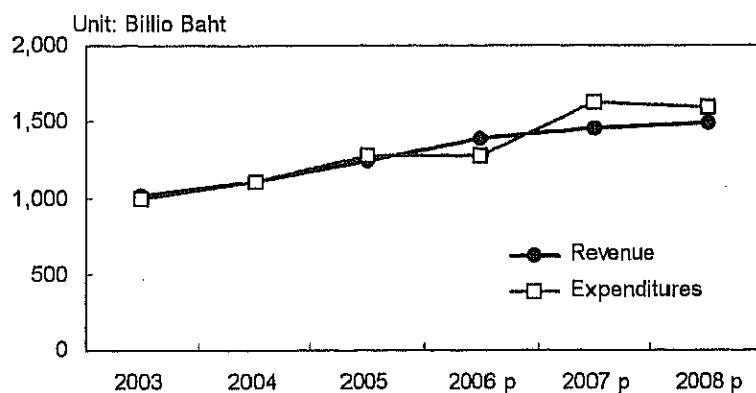
Figure 2.4-8: Ratio of Gross NPL to Total Loan

2.4.2 Fiscal Situation

(1) Government Finance

The fiscal balance of the central government was balanced until 2006. However, the Thai government adopted a deficit budget for the fiscal year 2008 responding the predicted economic slowdown. In the budget, government expenditure was set at 1,660 billion baht against the net revenue of 1,495 billion baht. A deficit was projected to be 1.8% of GDP. For the fiscal year of 2009, the government continued to set a deficit budget under the impact of continuing global economic slowdown. The expenditure budget for fiscal year 2009 was 1,951.7 billion baht including supplementary budget of 116.7 billion baht against the estimated net revenue of 1,604.6 billion baht. The deficit is estimated at 347.1 billion baht, equivalent to 3.7% of GDP.

In January 2009, the Government allocated 116.7 billion baht in cash handouts, tax cuts, and subsidies as an economic stimulus mostly targeting low-income people. In May 2009, the Cabinet approved a second stimulus and social-welfare package of 1.43 trillion baht for the fiscal year 2009 - 2012. This package is an addition to the annual budget.



Source: Bank of Thailand

Figure 2.4-9: National Government Finance

(2) Public Debt

The Public Debt Management Act was put into effect in 2005. This Act stipulates the regulations concerning the public debt management of Thailand. Under the Ministry of Finance, key organizations for public debt management are the Public Debt Policy and Supervision Committee and the Public Debt Management Office (PDMO).

The Public Debt Policy and Supervision Committee chaired by the Minister of Finance has the powers and duties relating to public debt management including reporting of public debt status to the Council of Ministers, the submission of public debt management plan for each fiscal year to the Council of Ministers for approval, prescription of rules on the loan raising, guaranteeing and repaying and rules on public debt restructuring, etc⁸.

PDMO is responsible for general affair of the Public Debt Policy and Supervision Committee. PDMO takes a role of analyzing public debt structure, gathering information related to the estimate on financial need of public sector and on public debt management; managing public debt including borrowing of loan, disbursing loan and repaying debt, etc⁹.

The Public Debt Management Act stipulates the following principles of public debt:

- a) In each fiscal year, the raising of loan by the Ministry of Finance to finance budget deficit shall be in Thai Baht and the aggregate amount of loan shall not exceed:
 - i) 20% of the existing annual budgetary appropriation and the additional budgetary appropriation;
 - ii) 80% of the budgetary appropriation as set out for repayment of principal (Section 21).

⁸ Stipulated in the Section 35 of the Public Debt Management Act, B.E. 2548 (2005)

⁹ Stipulated in the Section 36 of the Public Debt Management Act, B.E. 2548 (2005)

- b) The raising of loan for economic and social development shall be made if it is necessary to spend money in foreign currency apart from the annual budgetary appropriation, or if it is necessary to raise loan so as to strengthen national financial security. In this case, the Ministry of Finance shall raise loan in foreign currency¹⁰ and the aggregate amount of loan shall not exceed:

- 10% of the annual budgetary appropriation (Section 22).

In addition, the Ministry of Finance, according to the decision of the Council of Ministers, has the following framework for the fiscal sustainability:

- a) Public debt outstanding to GDP does not exceed 50%;
- b) Debt service ratio to total budget does not exceed 15%; and
- c) Capital budget is not less than 25% of total budget.

According to the statistics of PDMO¹¹, total public debt was 3,799 billion baht as of the end of April, 2009. Total public debt of 3,799 billion baht consisted of direct government debt of 2,446 billion baht, non-financial public enterprise debt of 1,036 billion baht, Special Financial Institutions Guaranteed Debt of 205 billion baht, financial institution development fund (FIDF) Debt of 108 billion baht, and autonomous agency debt of 3,683 billion baht.

The ratio of public debt to GDP increased to 43.0 percent in April 2009. This increase is due to the higher public borrowing for expansionary fiscal policy in the fiscal year of 2009. However, the level of the ration is still below the 50 percent public debt ceiling under the Fiscal Sustainability Framework.

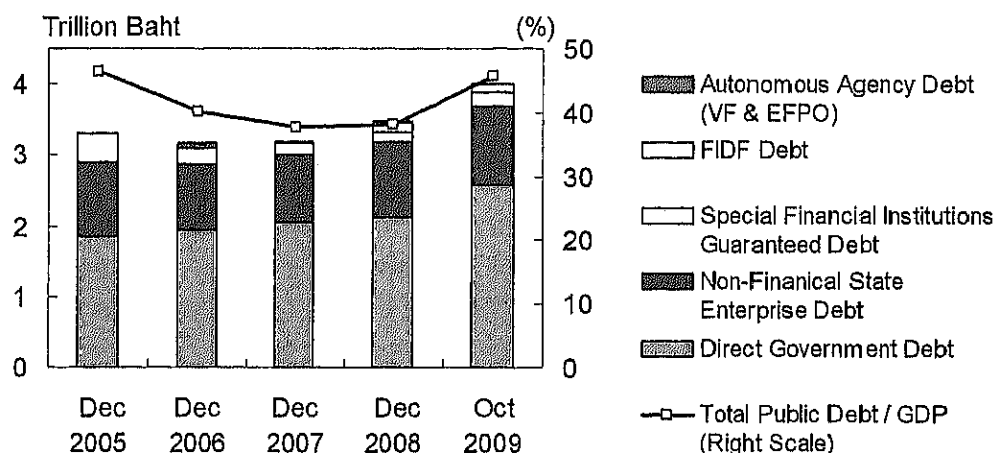
In 2009, the Government is forced to increase borrowing to finance the three-year stimulus programs. In May 2009, the Lower House passed two bills to authorize the government to borrow 800 billion baht. In June 2009, the Constitution Court ruled that the government's executive decree to borrow 400 billion baht from domestic banks is lawful because it is an act committed to sustain the economy as demanded by the constitution. The PDMO plans to borrow the first 200 billion baht during 2009 by offering 5-year savings bonds worth 30 billion baht to the public and offering 3-year floating rate promissory notes, long-term government bonds and treasury bills for the remaining 170 billion baht¹². With the increase in public debt due to the borrowing of 400 billion baht loans, the government expects that the ratio of public debt to GDP will be 47%, below the ceiling¹³.

¹⁰ If the conditions of domestic monetary market are conducive and it is beneficial to develop monetary system, public finance and capital market, the Ministry of Finance can borrow a loan in Thai Baht instead of foreign currency with approval of the Council of Ministers.

¹¹ <http://www.pdmo.mof.go.th/pdebte.php?ptype=dob>

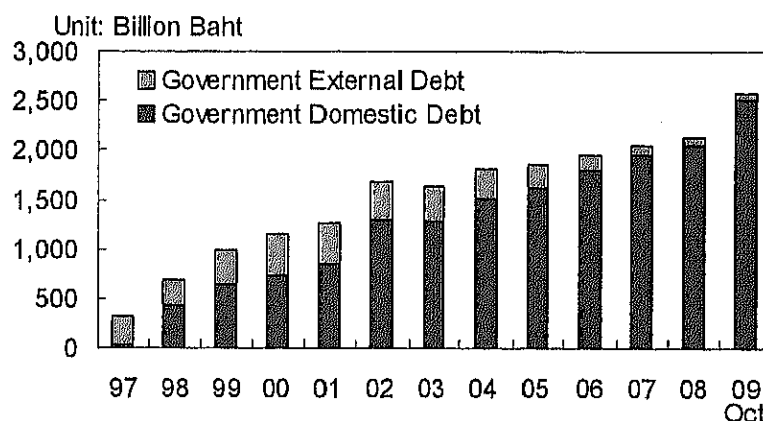
¹² Chalathip Thirasoonthrakul, "Thai court upholds borrowing decree for stimulus," June 3, 2009, Reuters

¹³ National news bureau of Thailand, "Special Report: Necessity of B400-billion-loan Executive Decree for economic stimulation," May 23, 2009



Source: PDMO

Figure 2.4-10: Breakdown of Public Debt and Ratio of Public Debt to GDP



Note: As of the end of year.

Source: Bank of Thailand

Figure 2.4-11: Breakdown of Direct Government Debt

2.5 Review of Existing MRT Lines

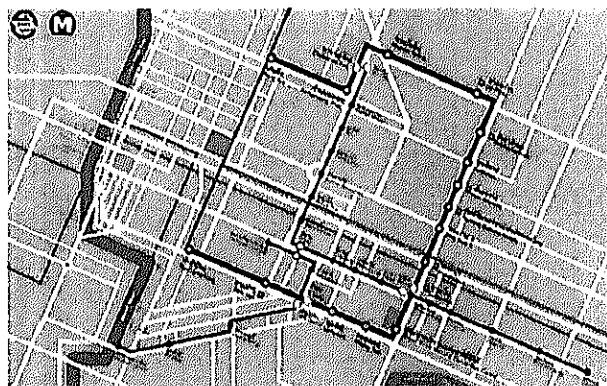
In this section, the current urban railway projects, i.e., Blue Line and SkyTrain, are studied and reviewed to understand the adopted financial framework, current service performance level and financial efficiency, and to identify lessons for the implementation of future MRT projects in Thailand.

2.5.1 Review of Blue Line

(1) Outline of Line

The MRT Chaloe M Ratchamongkhon Line (the MRT System or Blue Line) is the first underground railway system in Thailand. The Blue Line links between Hua Lamphong to Bang Sue. The Blue Line, with 21 km of length and 18 stations, carried 194,230 passengers on average every day on week days.

The Blue Line starts from Bangkok Railway Station (Hua Lamphong) along Rama 4 road, crosses Samyan intersection, Silom intersection and Wireless intersection, turns left to Ratchadaphisek Road at Rama 4 intersection, passing Queen Sirikit National Convention Center to Asoke-Sukhumvit intersection, Asoke-Phetchaburi intersection, Rama 9 intersection, Huai Khwang intersection, and Sutthisan intersection, then turns left to Lat Phrao road at Ratchada-Lat Phrao intersection, faces to Lat Phrao intersection, Phahon Yothin road, Chatuchak Park, Mo Chit Northern Bus Terminal (Old), and turns right to Kamphaeng Phet road, passing the Marketing Organization for Farmers (MOF) market, and finally ends at Bang Sue Railway Station¹⁴.



Source: BMCL

Figure 2.5-1: Map of Blue Line

(2) Financial Framework

The concession agreement was signed between the Metropolitan Rapid Transit Authority (MRTA) and the Bangkok Metro Company Limited (BMCL) on August 1, 2000.

Table 2-5-1: Major Items in the Contract

Items	Contents	
a) Revenue sharing: The following payments were to be made from BMCL to MRTA:	i) From fair revenue	- A lump sum payment of 43.567 billion baht in annual installments from year 11 to year 25 - A proportional payment from fare revenues annually over 25 years: 1%: from year 1 to year 14, 2% from year 15, 5% from year 16 to 18, and 15% from year 19 to year 25
	ii) From commercial development	A lump sum of 930 million baht from commercial development
	iii) Access charge	A proportional payment from excess profit when the return on equity exceeds 14.75%
b) Commercial development of land:	Underground area of Lat Phrao park & ride and 13 designated station	
c) Technology transfer	BMCL provides training to MRTA staff	
d) Cooperation with other transit system	i) Cooperation for common ticketing and other forms of passenger movement; ii) Depot to be shared with other extension operator	
e) Concession extension	Not referred	
f) Line extension/ system expansion	Mentioned as "to be practical for ease of expansion and interfacing between the projects (Annex VII, Part 2. 2)"	
g) Variations	All additions, amendments and variations to be in writing and signed by authorized representatives	
h) Performance	Not referred	
i) Tributary	A few indications: carrying capacity, train performance, safety	

Source: JICA Study Team

a. Type of Concession

¹⁴ Homepage of Bangkok Metro Public Company Limited (BMCL).

A BTO method was applied for electrical & mechanical works. MRTA was responsible for civil works. Civil works were to be transferred to BMCL for use after the completion of construction. BMCL was granted an exclusive right to design, manufacture, install, test and commission M&E equipment and to perform MRTA Initial System.

b. Concessionaire

The concessionaire was the BMCL: Bangkok Metro Co. Ltd.

c. Concession Period

The concession period was 25 years after the construction period.

d. Major Items in the Contract

Major Items in the Contract are as the below table:

(3) Review of Operation and Service Level

a. Current Operation Status

1) Outline

During five years since its operation commencement, Blue Line has gained its position as an indispensable transportation for Bangkok citizens. Big shopping malls, condominiums and office buildings have been constructed around the stations of Blue Line. The punctuality of MRT is much higher than that of road traffic. Blue Line goes through sub city centers. It is observed that the operation of Blue Line has induced the development of areas.

2) Ridership and Fare Revenue

Ridership is still lower than the estimation. However, at the peak hours in the morning, trains are so congested that some passengers sometimes pass on the next train. In line with the increase in ridership, fare revenue has been also increased. According to the deputy governor of MRTA, Dr. Yiemchai, the average fare price is around 22 baht and it is still higher than expected which is almost as same as lunch fee for the lower income class.

Table 2.5-2: Ridership Forecast of Original plan

	2002	2010	2020
Ridership Forecast (Trips/day)	321,600	793,000	984,500

Source: MRTA, "Project Completion Report"

Table 2.5-3: Actual Number of Passengers and Revenue per Day

Year	Working days		Whole days	
	Number of Trips (trips/day)	Fare Revenue per Day (Million Baht)	Number of Trips (trips/day)	Revenue per Day (Million Baht)
2004	151,255 (100%)	2.53 (100%)	147,458	2.43
2005	179,145 (118%)	3.02 (119%)	163,403	2.83
2006	179,563 (118%)	3.65 (144%)	158,396	3.37
2007	188,643 (125%)	3.92 (155%)	164,507	3.48
2008	194,230 (128%)	4.22 (169%)	169,813	3.76

Source: MRTA, "Annual report 2008-09"

3) Safety

On January 17, 2005, a traffic accident occurred. A deadhead train crushed into a parked train at Culture Center station and two hundred passengers in the parked train were injured. The cause of accident was the inappropriate braking of driver. The driver of the deadhead train released the brake of the train stopping at steeply-sloped section without any direction from the Operations Control Centre (OCC). After this accident MRTA and BTSC carried out the training of drivers to prevent a recurrence of accident.

Basically the accident is made by human error. However, normally poor equipments are behind. The Study Team could not find any description on improvement of facilities against this accident on their annual report.

4) Extension of Blue Line

Extension works of Blue line has not been commenced. Current conditions are as follows:

- On May 27, 2008, the Council of Ministers resolved to grant approval for MRTA to undertake construction of the Blue Line extension from Hua Lamphong to Bang Khae, within an amount of 56 billion baht.
- The National Environmental Board approved the Environmental Impact Assessment (EIA) of the project in July 2008.
- The financing arrangement has been suspended.

b. Current Status of Operation Efficiency

1) Train Operation

Work Efficiency of Operation Staff

In the following table, train-km per driver and staff number per station of Bangkok and Japanese urban railways are express displayed. Basically the operation system of Sky Train is same with that of Blue Line. The train-km per driver of Sky Train is lower than that of Blue Line. This is because the travel time of Silom Line of Sky Train is extended due to the single track operation at Saphan Taksin after opening of the section between Saphan Taksin and Wongwian Yai, but their figure is almost same with that of Japanese metro. These facts show that the work efficiency of Sky Train and Blue Line is fine.

Table2.5-4: Work Efficiency of Drivers and Station Staff

Item	Thailand		Japan	
	Blue Line	Sky Train	Tokyo Metro	Osaka Metro
Route km	20.1	25.7	183.2	129.9
Train-km per day	8,749	11,833	85,729	47,562
Number of drivers	95	180	1,252	746
Train-km per driver	92.1	65.7	68.5	63.8
Number of station staff	594	674	2,734	2,177
Number of station	18	25	169	133
Staff number per station	33	27	17	17

Source: Annual Railway Statistics 2006(MLIT Japan), BMCL and BTSC

The staff number at stations of Blue Line is larger than that of Sky Train. It is said that the structure of underground stations of Blue Line needs more staff than that on the ground of Sky Train, but their staff numbers are much larger than those of Japanese metros. Few ticket bending machines are installed at stations of Blue Line and Sky Train. This fact may be the cause of the difference of the station staff number between Bangkok and Japan.

Power Consumption

The following table displays unit traction power and power consumption per station of Blue Line and Sky Train.

Basically specifications for train sets of Blue Line are same with those of Sky Train. The result of traction power per train km of Blue Line is similar to that of Sky Train. Energy consumption per station was obtained by deducting the traction power consumption from the total power consumption. It should be noted that energy consumption per station includes the power consumption per the depot and the headquarters are included.

When comparing the power consumption per station of Blue Line with that of Sky Train, it can be seen that the volume of the Blue Line is much larger than that of Sky Train. This is due to the air-conditioning in underground stations. The Study Team has to suggest that the reduction of power consumption is one of the ways to enhance the profitability of Blue Lines. To reduce the power consumption for air conditioning at stations, the structure of stations has to be carefully designed.

Table 2.5-5: Power Consumption per Train-km and per Stations

Item	Unit	Blue Line	Sky Train
Traction power	KWh/train-km	8.9	9.4
Energy consumption per station	KW/day/station	5,348.0	236.2

Source: BMCL and BTSC

2) Maintenance

Although all of the maintenance works of BMCL facilities are outsourced, it is costly since these works are supervised by foreigners. According to Dr. Sombat Kitjalaksana, the BMCL managing director, the contract fee with the supplier for the coming five years is not going to be reduced from that of the initial five years' contract. However, the Study Team considers that there may be some room for negotiation since the number of foreign experts required for the second term will be smaller than that for the initial five years.

c. Current Status of Service Level

1) Customer Satisfaction

Table 2.5-6 shows the results of customer satisfaction survey conducted by the Research and Development Institute, Ramkhamheang University. According to this survey, customers are satisfied with overall aspects of Blue Line. However, items on "pay rate" and "security" got lower score than the others. The above-mentioned comment by the deputy governor of MRTA on "pay rate" corresponds with this result. Regarding "security", BMCL carries out security

check at every front gate of station, and passengers are required to open their bags for it. Some of customers may feel uncomfortable.

Table 2.5-6: Survey Result of Customer Satisfaction

Item	Satisfied
All average	96.7%
Service	97.4%
Station	97.1%
Staff	97.3%
Pay rate	94.9%
Park and Ride	96.6%
Security	95.4%

Source: Study of Research and Development Institute Ramkhamheang University Year 2008(MRTA)

2) Number of Train Operation

On the train accident on January 17, 2005, two trains were damaged. One of the damaged trains was repaired and resumed the service on December 23, 2006. The other train resumed the service on September 1, 2007. Fluctuation of "number train in service" in 2007 of the following table shows the situation during the repairing tasks. Now all the trains are fully in daily operation as shown in 2008 of the following table.

The utilization ratio per full passenger capacity is around 50% and the train number at peak time seems to be enough. From these figures, it can be said that the operation plan of Blue line is efficient.

Table 2.5-7: Full Passenger Capacity of MRT and Actual Number of Passengers

	2007		2008
	Jan 1 - Aug 31	Sept 1 - Dec 31	Jan 1 - Dec 31
No. of Days of Service(Days)	243	122	366
No. of Trains in Service(Trains)	18	19	19
Full Passenger Capacity Per Day (Persons)	318,960	336,680	336,680
Full Passenger Capacity of the Metro (Persons)	77,507,280	41,074,960	123,224,880
	118,582,240		
No. of Actual Passengers of Service (Persons)	60,045,076		62,151,665
Utilization Rate Per Full Passenger Capacity	50.64%		50.44%

Source: Annual report of BMCL 2008

3) Reliability and Punctuality

According to the data on service Performance presented by BMCL, the ratio of trains which arrives at the station within 2 minutes was 99.76% in 2008. This figure means the punctuality of train operation is excellent.

Information of customer satisfaction also gives high score for its service level. This fact shows that its operation is carried out well.

d. Issues to Be Tackled

Blue Line is well operated and maintained by looking at the fact that the line is operated punctually, station staff is friendly to passengers, and both station and rolling stock are clean. However, there are some issues to be tackled. These issues are also pointed out by MRTA/BMCL.

1) Fare Level

Although the number of passengers increases year by year, the ridership is still lower than estimated. As already mentioned, the average fare price is more than 22 baht, almost as same as lunch fee for the lower income class. The fare level is still higher than affordable level for the lower income class. The following table expresses that the minimum fare in Bangkok is rather higher than other cities. The urban railway is a kind of infrastructure for big cities. The reduction of fare level in Bangkok has to be discussed together with introduction of integrated fare system.

Table 2.5-8: Minimum Fare of Commuter Lines at Asian Cities

Cities	Line	Minimum fare	
		In local currency	In USD*
Manila	Line1	12 Pesos	0.55
Bangkok	Sky Train	16Bahts	1.00
	Blue Line	15Bahts	0.94
Singapore	SMRT	1S\$	0.93
Hong Kong	Hong Kong	4H\$	0.71
New Delhi	Delhi Metro	6 Rupees	0.41

*Note: Converted to USD with Purchase Parity Power

Source: Study Team

2) Enhancement of Efficiency

Even though BMCL assumes that it is difficult to bargain on the contract fee of maintenance for the second five years, there may be some ways to enhance maintenance efficiency by cutting the wages for foreign experts. To do this, the technology transfer on maintenance to the local staff becomes urgent. This issue will be important for future MRT projects in Thailand. Thus, the MRTA and BMCL have to study further on this issue.

3) Enhancement of Safety

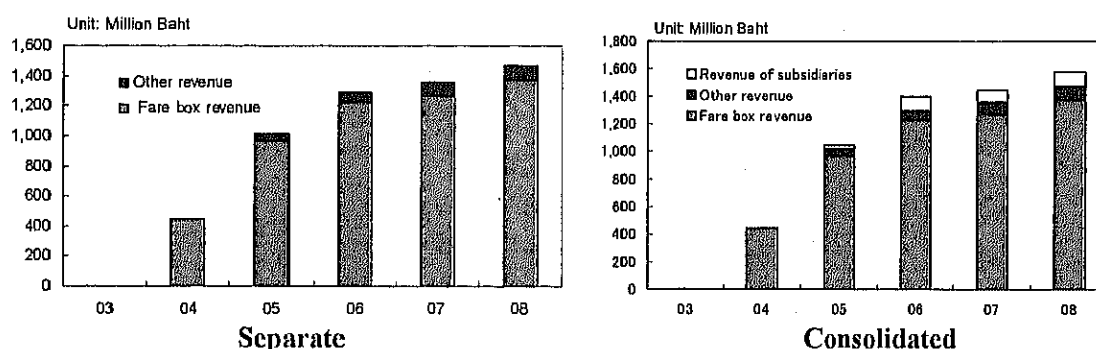
As a countermeasure to a collision accident, BMCL carried out the re-training of the drivers. As already expressed, poor facilities or equipment is considered to be one of the causes behind the accident since a human error could be avoided if facilities or equipment perfectly worked. An accident tends to occur at a weak point of the railway system. If there is no improvement of facilities or equipment, an accident may occur again. Therefore, the Study Team recommends MRTA/BMCL to examine the countermeasures against accidents also in the field of facilities /equipments.

(4) Analysis of Financial Position

During the first field survey in Thailand, the Study Team collected the annual reports of BMCL during the period from 2003 until 2008. BMCL has three subsidiaries companies. Therefore, BMCL publishes consolidated and separate financial statements.

a. Income Statement

BMCL officially started operation in August 2004. The growth of revenue in 2005 and 2006 was rather high. However, the growth of revenue in 2007 and 2008 was rather decelerated. The average annual revenue growth rate during the period from 2005 until 2008 was 14.7% on a consolidated basis. Fare box revenue was 1578.7 million baht, in 2008 on a consolidated basis, which accounted for 87.1% of total revenue. The breakdown of revenue is shown in the following table. Among other revenues, revenue from advertising services has the largest share of 7.25%. In addition, revenue from telecommunications services increases rapidly in 2008.



Source: BMCL

Figure 2.5-1: Revenue Trend of BMCL

Table 2.5-9: Breakdown of Revenue of BMCL Group

Type of Revenue	Operated by	2006		2007		2008	
		Revenue (Mil. Baht)	Share (%)	Revenue (Mil. Baht)	Share (%)	Revenue (Mil. Baht)	Share (%)
Revenue from train operations	BMCL	1,229.50	87.89	1,270.41	87.87	1,374.59	87.07
Revenue from advertising services	Triads Networks	101.62	7.26	103.86	7.18	114.46	7.25
Revenue from telecommunications services	BMCL Network	-	-	11.96	0.83	48.92	3.1
Revenue from retail space leases	Metro Mall Development	23.02	1.65	17.32	1.2	19.27	1.22
Revenue from ATM and public telephone services	BMCL	20.41	1.46	20.29	1.4	17.29	1.09
Other income	BMCL and its subsidiaries	24.39	1.74	21.99	1.52	4.19	0.27
Total		1,398.94	100	1,445.83	100	1,578.72	100

Source: BMCL

During the last five years, the total expenses continued to largely exceed the total revenues. BMCL recorded a loss before finance cost and corporate income tax every year. The loss before finance cost and corporate income tax was equal to 37.0% of total revenues in 2007 and 31.7% in 2008. Financial cost was also huge, equal to more than 60% of total revenues. Therefore, BMCL has continued to report a huge net loss every year. Net loss in 2008 was 1,457.0 million baht, equivalent to 92.3% of total revenues.

Table 2.5-10: Income Statement of BMCL: Consolidated

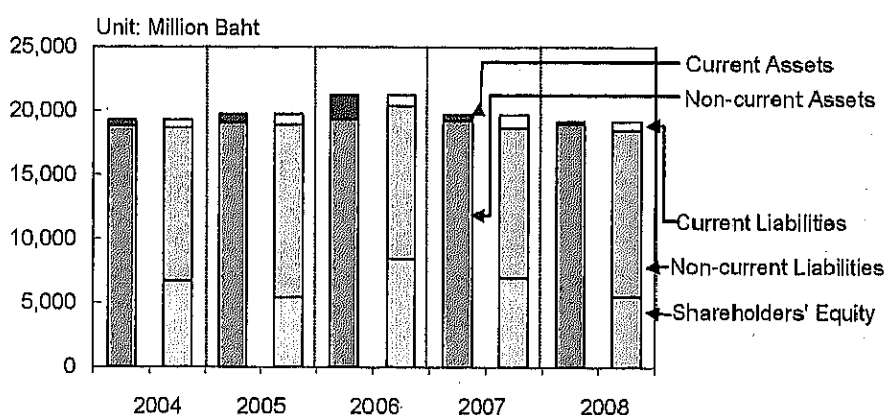
Unit: Million Baht

	2004	2005	2006	2007	2008
Total revenues	445.9	1,046.0	1,398.9	1,445.8	1,578.7
Total expenses	1,045.5	1,960.7	2,012.4	1,981.3	2,078.8
Loss before finance cost and corporate income tax	-599.6	-914.6	-613.4	-535.5	-500.1
Finance cost	375.9	811.0	1,061.0	946.6	953.6
Corporate income tax of a subsidiary	0.0	0.0	2.9	2.9	3.3
Net loss for the year	-975.5	-1,725.6	-1,677.3	-1,485.0	-1,457.0
Amortization of project costs	125.0	171.7	156.6	194.3	218.8

Source: BMCL

b. Balance Sheet

Total assets of BMCL on a consolidated basis were 19,187.6 million baht as of December 31, 2008 compared with 19,705.3 million baht in the previous year. Total liabilities increased from 12,737.4 million baht in 2007 to 13,680.7 million baht in 2008. On the contrary, shareholders' equity decreased from 6,967.8 million baht in 2007 to 5,506.9 million baht in 2008. The decrease in total assets was mainly due to a decrease in cash and cash equivalents and amortization of projects costs. On the credit side, a huge deficit was offset by an increase in long-term loans. BMCL's shareholders' equity significantly increased in 2006 because of issuance of shares. However, it has continued to decrease due to successive deficit in the following period.



Note: As of the end of year.

Source: BMCL

Figure 2.5-2: Balance Sheet of BMCL (Consolidated)

The major item of assets is “project cost” in non-current assets, which accounted for 96.7% of total assets as of the end of December 2008. The breakdown of net project cost was as shown in the following table.

Table 2.5-11: Breakdown of Project Cost of BMCL (Consolidated)

	2004		2006		2008	
	Amount (Mill. Baht)	Share (%)	Amount (Mill. Baht)	Share (%)	Amount (Mill. Baht)	Share (%)
M&E Equipment	11,949	64.3	12,381	65.2	12,470	64.2
Project management fees per agreement	2,464	13.3	2,464	13.0	2,464	12.7
Consultant fees	601	3.2	607	3.2	607	3.1
Depot building and administration building	1,255	6.8	1,256	6.6	1,257	6.5
Interest expenses	1,265	6.8	1,265	6.7	1,265	6.5
Others	1,040	5.6	1,011	5.3	1,353	7.0
Total	18,574	100.0	18,984	100.0	19,416	100.0
Less: Accumulated amortization of Project costs	-125		-453		-866	
Project costs, net	18,449		18,530		18,550	

Source: BMCL

Among the total liabilities, long-term loans and accrued interest, and long-term loans from shareholder and accrued interest account to 92.1%. BMCL raised funds in December 2001 under the long-term loan agreement with a group of four commercial banks. The amount of long-term loan was 11,000 million baht for the payment of project costs. The interest rate is 7.75% for the first 2 years from the date of the agreement, MLR+0.25 for the third year until the project completion date¹⁵, and MLR after the project completion date. Repayment conditions were quarterly installments from March 2006 until December 2016. Thereafter, BMCL was granted an extension of the grace period for repayment of the principal until December 2012. The modified repayment period is from March 2013 until December 2024. The balance of long-term loan and accrued interest was 10,780.2 million baht as of December 2008.

BMCL has made the sponsor support agreement for liquidity support with three major shareholders, i.e., CH. Karnchang Public Company Limited, Natural Park Public Company Limited, and Hicrete Products & Technology Co., Ltd., according to the sponsor support agreement. The balance of long-term loans from CH. Karnchang Public Company Limited, and its accrued interest from was 1,821.6 million baht as of December 31, 2008 on a consolidated basis.

c. Financial Ratios

The trend of BMCL’s major financial ratios is as shown in the following table. The current ratio drastically improved in 2006 due to the offering of shares. However, this ratio tended to significantly decrease since then. Since the fixed assets capitalization ratio is around 100%, long-term project costs are covered with long-term funds. Net loss before interest payment has

¹⁵ As of end of March, 2009, MLR of Bangkok Bank, largest commercial bank in Thailand, was 6.00%.

been minus and debt service coverage ratio has also been minus. Therefore, ratios regarding profitability, return on assets and return on equity, have continued to be minus. These indicators show that BMCL does not have a capacity to pay installments and interests of long-term loans. In addition, BMCL needs to raise funds through loans and/or share issuing to finance operating deficit at the moment.

Table 2.5-12: Key Financial Ratios of BMCL

Ratio	2004	2005	2006	2007	2008
Current ratio	78.0%	76.6%	218.7%	44.9%	27.4%
Fixed ratio	279.5%	351.9%	228.8%	275.7%	344.7%
Fixed assets capitalization Ratio	100.6%	100.8%	94.8%	103.0%	102.7%
Debt Service Coverage Ratio (DSCR)	-0.61	-0.53	-0.37	-0.36	-0.35
Assets turnover	-	0.023	0.051	0.068	0.074
Return on assets	-	-5.0%	-8.4%	-8.2%	-7.6%
Return on equity	-	-16.1%	-24.9%	-21.8%	-23.8%
Debt to Equity Ratio	1.87	2.64	1.52	1.83	2.48

Source: Calculated by the Study Team based on the financial statements of BTSC.

d. Change in Share Capital

BMCL was established on February 18, 1998 with an initial registered capital of one million baht and was converted to a public limited company on May 11, 2004.

Table 2.5-13: Shares of Major Shareholders

Shareholder		Unit: %			
		2006 Jan	2006 Sep	2007 Mar	2008 Apr
Mass Rapid Transit Authority of Thailand		-	25.00	25.00	25.00
CH. Karnchang Public Company Ltd.	CH. Karnchang Group	28.23	15.80	24.61	24.61
Bangkok Expressway Public Company Ltd.		18.89	9.99	11.93	11.93
Hicrete Products & Technology Co., Ltd.		-	-	-	6.68
Kim Eng Securities Pte. Ltd.		-	-	-	4.85
Krung Thai Bank Public Company Ltd.		9.48	-	-	3.94
Mahasiri Siam Company Ltd.	CH. Karnchang Group	11.91	3.68	6.88	3.68
Natural Park Public Company Ltd.	Natural Park Group	13.94	8.92	6.86	3.38
Syntec Construction Public Company Ltd.	Natural Park Group	4.81	3.08	3.08	3.08
TMB Bank Public Company Ltd.		4.81	2.00	2.30	2.12
Merrill Lynch International		-	-	3.97	-
Krung Thai Bank Public Company Ltd.	Krung Thai Bank Group	-	3.94	3.94	-
Nomura Singapore Ltd.		-	-	0.84	-
Siam City Bank Public Company Ltd.		2.30	0.96	-	-
Tokyu Construction Company Ltd.		1.31	0.84	-	-
Transit Expert Company Ltd.	CH. Karnchang Group	0.12	0.08	-	-
The Krung Thai Thana Wattana Fund	Krung Thai Bank Group	0.07	-	-	-
Others		4.13	25.71	10.59	10.73
Total		100.00	100.00	100.00	100.00

Source: BMCL

The value of registered stock was 6.8 billion baht at the beginning of 2003. With newly paid-up share capital of 3.0 billion baht during 2003, the issued and paid-up share capital at the end of 2003 was 6.4 billion baht. At the end of 2004, BMCL's issued and paid-up capital increased to 7.25 billion baht because of capital increase and call for share payment. In 2004, the par value of an ordinary share decreased from 100 baht to 1 baht. Therefore, the number of issued and paid-up shares increased from 64.0 million at the end of 2003 to 7,250 million at the end of 2004. In 2005, the issued and paid-up share capital increased to 7.35 billion baht by the allocation of additional ordinary shares to the existing shareholders at a price of 3 baht.

On September 21, 2006, BMCL was listed on the Stock Exchange of Thailand. BMCL made a public offering of 1,315.8 million additional shares at a price of 1.31 baht per share. BMCL's shares are registered in the transportation & logistics sector of the Stock Exchange of Thailand. At the same time, 2,987.5 million ordinary shares (25% of the issued and paid-up capital) were allocated and offered to the Mass Rapid Transit Authority of Thailand at the par value of 1 baht. As at December 31, 2008, the registered capital and paid-up capital of BMCL are 11,950 million baht with par value of 1 baht each.

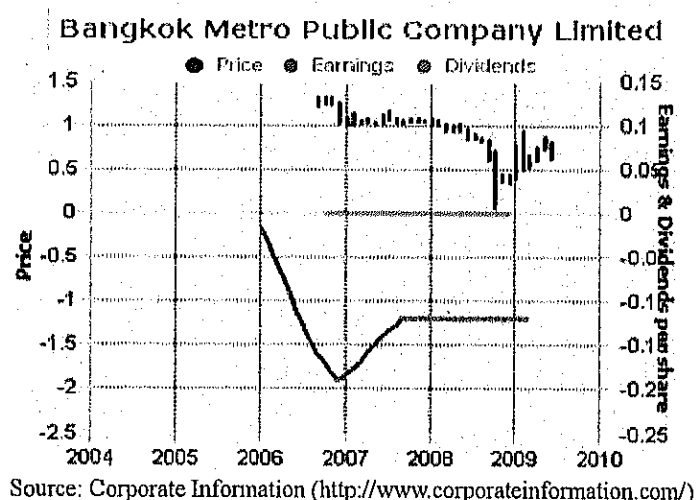


Figure 2.5-3: Share Price of BMCL

(5) Non-rail Business of BMCL

a. Provisions of Non-rail Business in Concession Agreement

1) Right of Commercial Development

In the concession agreement between MRTA and BMCL ("8.2 Commercial Development Rights"), BMCL is granted the right to exclusively undertake Commercial Development including advertising, leasing, such as retail outlets and other commercial activities in all 18 stations as well as cars provided that the Commercial Development in the form of retail outlets shall be allowed in the thirteen 13 designated stations.

As for Lat Phrao Park and ride facilities, BMCL has the right to exclusively undertake commercial development only in the underground areas. The parking building management and maintenance are under the responsibility of the MRTA.

2) Concession Fee of Commercial Development

In the concession agreement between MRTA and BMCL ("8.5 Payment of Remuneration to the MRTA"), BMCL should pay the following concession fees for commercial development to MRT:

i) Annual Remuneration:

930 million baht (inclusive of value added tax) through the contract period consists of: 10 million baht per year from the 1st - 8th years of Revenue Service; and 50 million baht per year from the 9th - 25th years of Revenue Service.

ii) Percentage Remuneration

7% per annum inclusive of value added tax from Revenue Service commencement year until the end of Contract Period

b. Types of Non-rail Business

BMCL receives gains from commercial development in addition to fares. Revenue from commercial development consists of two categories, i.e., direct business by BMCL and business by BMCL's subsidiaries.

1) Direct Business

BMCL directly executes business with other companies by granting the following rights:

- ATM service in all 18 stations to 7 commercial banks;
- Public telephone service to True Corporation Public Company Limited;
- Procurement and/or production of advertising media on Platform Screen Doors in all 18 stations to How Come Media Co., Ltd.;
- Procurement and/or production of advertising banners on the hand grip media in 19 trains, by granting the rights to Ambient Media Co., Ltd.

2) Business by Subsidiaries

BMCL has granted the following rights to the Subsidiaries:

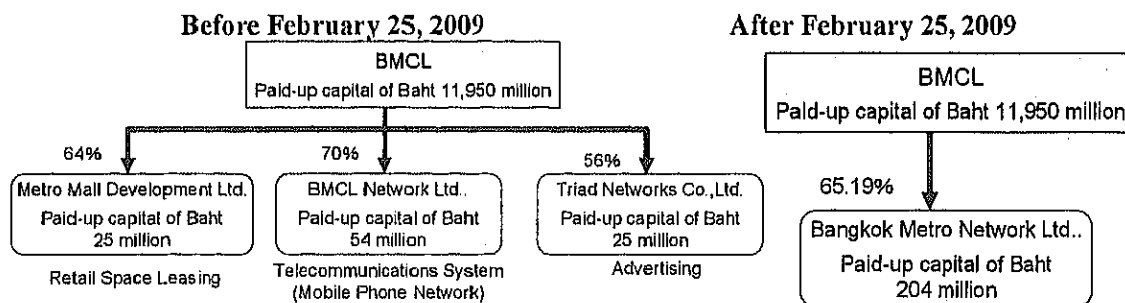
- Procurement of image advertisement signboards to Triads Networks Company Limited;
- Management of retail spaces to Metro Mall Development Limited; and
- Service and maintenance of telecommunications system equipment to BMCL Network Limited.

In return, BMCL has received a revenue sharing before deduction of expenses, as well as dividends from the Subsidiaries.

On February 25, 2009, Bangkok Metro Networks Limited was incorporated to combine the subsidiaries' businesses with the purposes of minimizing operating costs and enhancing the competitiveness. The business of Bangkok Metro Networks consists of the followings:

- i) To provide space rental for retail shops in 11 stations and spaces in the basement level of the Lat Phrao park and ride facility. At Present, the company operates 4 retail shops in Sukhumvit station, Phahon Yothin Station, Chatuchak Park Station and Kamphaeng Phet Station
- ii) To manage the advertising panels (e.g., advertising light boxes and stickers) in the 18 stations and 19 trains with operations in the train network

iii) To provide and maintain the telecommunication system and equipment in each station.



Source: BMCL

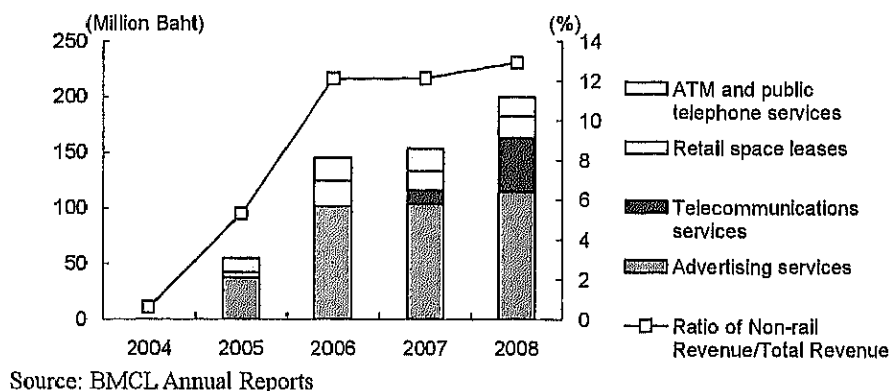
Figure 2.5-4: Subsidiaries of BMCL

Metro Mall Development was a joint venture with Ch. Karnchang PCL to handle the retail trading inside MRTA Subway station areas.

Triads Networks (former Radianz Communications Network Limited) was a joint venture between BMCL and Yimwilai family (44% shareholding). In 2004, the concession contract was modified, advertisement in the train tunnels was removed and contract period was shortened from 25 years to 10 years. BMCL explained that How Come Co Ltd, established by Mr. Panthongtae Shinawatra, offered the higher prices for advertising. BMCL and Triads Networks agreed to revise the sole advertising concession for BMCL.

c. Revenue of Non-rail Business

The revenue from commercial development significantly increased in FY2006. However, it has not shown a significant increase in the following years. In FY2008, the revenue from commercial development occupies 12.9% of total revenue. Among revenue from commercial development, revenue from advertising accounts for 57.2%, followed by telecommunications services (24.5%), retail space leases (9.6%), and ATM and public telephone services (8.6%).



Source: BMCL Annual Reports

Figure 2.5-5: Non-rail Business Revenue of BMCL

d. Concession Payment to MRTA

BMCL paid 13.6million baht in 2007 and 15.4 million baht in 2008 as remuneration from commercial development revenue according to the concession contract. According to the annual

reports of MRTA, MRTA received concession fees from BMCL from commercial development as shown in Table 2.5-14.

When BMCL invested in subsidiaries to operate commercial development, MRTA and BMCL negotiated the revenue sharing of subsidiaries' businesses. MRTA demanded a revenue share higher than the 7% of total revenues of three subsidiaries¹⁶. MRTA agreed to receive 7% from BMCL's revenue from commercial development including revenue from subsidiaries. The subsidiaries pay 25% of revenue of the 1st - 5th year, and 35% from that of the 6th -10th year.

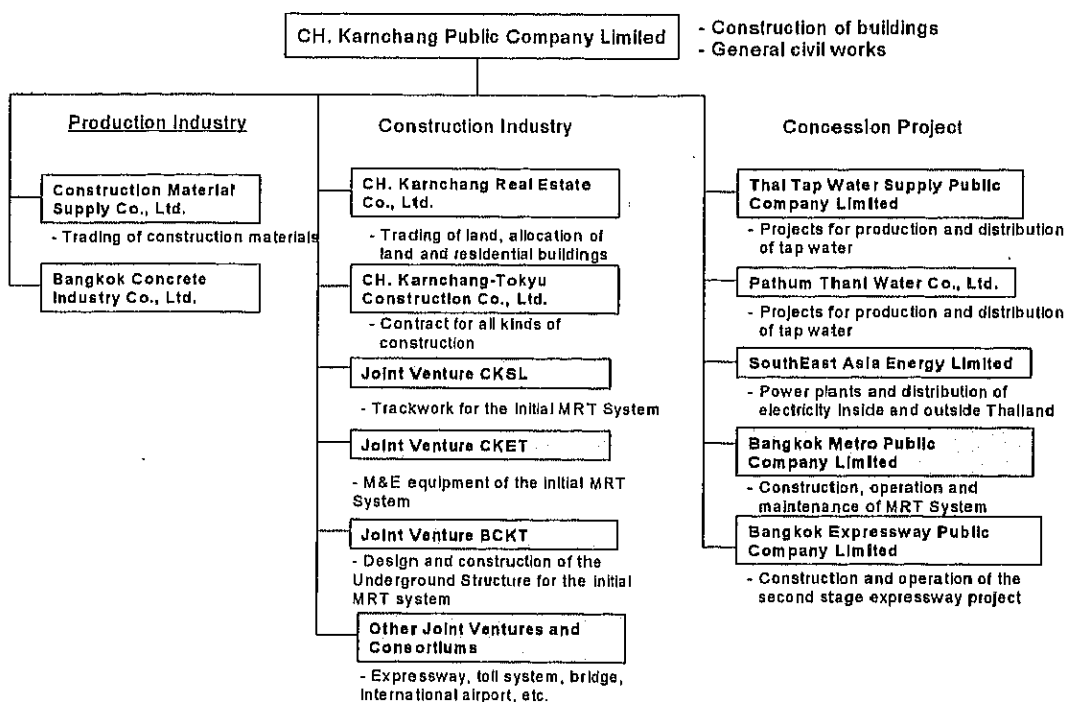
Table 2.5-14: MRTA's Receipt of Concession Fees from Commercial Development

Item	2005	2006	2007
Percentage Remuneration from Commercial Development (Operation Year)	10.37	9.34	9.35
Percentage Remuneration from Commercial Development (7%)	0.74	3.83	3.67
Total	11.11	13.17	13.02

Source: MRTA Annual Reports

e. Parent Company of BMCL

CH. Karnchnag Group is the main shareholder of BMCL. CH. Karnchang Public Company Limited (CH. Karnchang) was incorporated as a limited company in November, 1972 to engage in general construction business, i.e., construction of buildings and general civil works. CH. Karnchang was listed on the Stock Exchange of Thailand in 1994. Other than the construction business, CH. Karnchang engages in concession business operation of basic infrastructure, such as hydroelectric power production, tap water production, etc.



Source: CH. Karnchang Public Company Limited

Figure 2.5-6: Simplified Organization Chart of CH. Karnchnag Group

¹⁶ Bangkokpost, Feb 21, 2005

CH. Karnchang engaged in the construction works of the MRTA Initial System Project, Chaloem Ratchamongkhon Line.

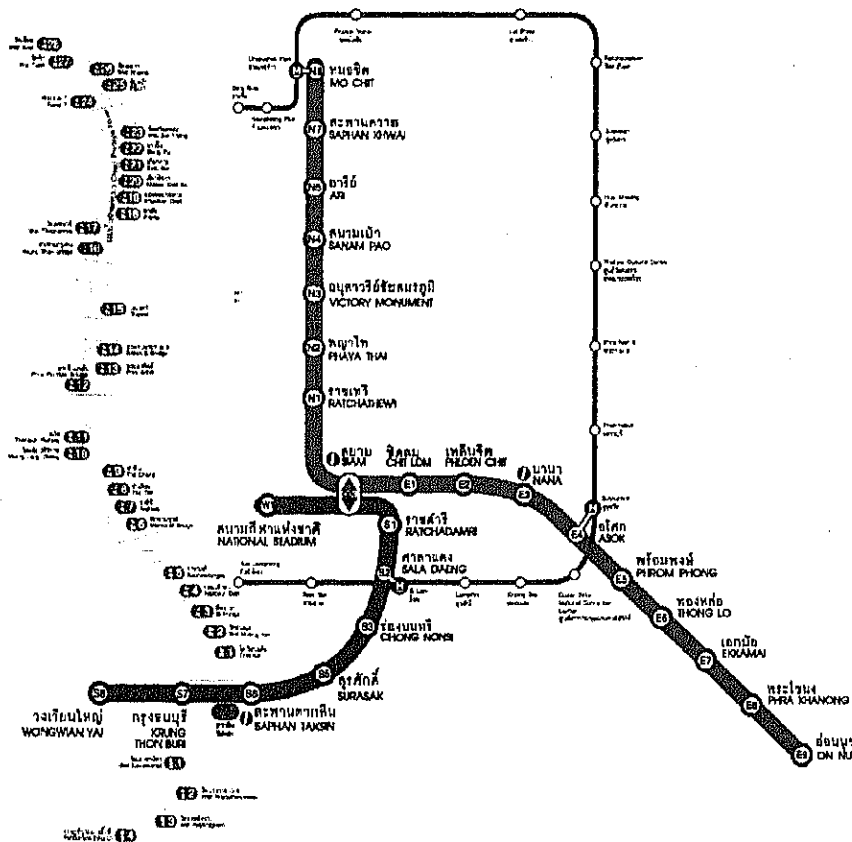
2.5.2 Review of SkyTrain

(1) Outline of Line

The SkyTrain system was officially opened in December, 1999. The SkyTrain is operated by the Bangkok Mass Transit System Public Company Limited (BTSC) under the concession form the Bangkok Metropolitan Authority (BMA). BTSC now operates two lines: Sukhumvit Line from Mo Chit station to On Nut station and Silom Line from National Stadium station to Wongwian Yai station. Two lines interchange at Siam station.

During the financial year from April 2007 to March 2008, the total ridership of SkyTrain was 133.1 million trips and average weekday ridership was 414,595 trips.

BMA has commenced the construction of the Silom Line extension to the south and the Sukumvit Line to the east, fully funded by BMA for civil infrastructure and electrical & mechanical works excluding rolling stock.



Source: BTSC (<http://www.bts.co.th>)

Figure 2.5-7: Map of SkyTrain

(2) Financial Framework

The concession contract was signed between the Bangkok Metropolitan Administration (BMA) and the Bangkok Mass Transit System PCL (BTSC) for the construction and operation of the BMA Transit System on April 9, 1992.

a. Type of Concession

A BTO method was adopted for civil works, and a BOT method for the electrical & mechanical works. BMA was responsible for land acquisition and utility diversions and BTSC was responsible for financing and construction of all other project components including operations. Civil works were determined to be transferred to BMA after construction on a BTO basis. The electrical and mechanical works were to be transferred to BMA at the end of concession.

b. Concessionaire

The concessionaire was the Bangkok Mass Transit System PCL (BTSC).

c. Concession Period

The concession period was 30 years from the first day of the commercial operation.

d. Major Items in the Contract

a) Revenue sharing:	No revenue sharing
b) Commercial development of land:	Little land included except Right-of-Way
c) Technology transfer	Not referred
d) Cooperation with other transit system	Not referred
e) Concession extension	To be notified by BTSC between 3-5 yrs before expiration
f) Line extension/system expansion	BTSC has the first refusal right to negotiate with BMA for new routes
g) Variations	Not referred
h) Performance	Not referred
i) Tributary	BMA supports vacating/accepting passengers of Sky Train, "including operation of supplemental system such as minibus."

(3) Review of Operation and Service**a. Current Operation Status****1) Outline**

As well as Blue Train, Sky Train has obtained its position as an indispensable traffic mode for Bangkok citizens. The areas along SkyTrain have been developed and SkyTrain transports passengers by linking sub city centers.

2) Ridership and Fare Revenue

Ridership has been increasing year by year. At peak hour, a lot of passengers use Sky Train. Trains are much crowded on the peak section between Silom and Sukhumvit.

Fare revenue has been increased in line with the increase in ridership.

Table 2.5-15: Yearly Ridership per Day of BTSC

Year	Working day		Overall	
	Passengers	Index*	Passengers	Index*
2000	176,246	100	161,146	100
2001	243,507	138	217,133	135
2002	300,683	171	264,360	164
2003	328,852	187	287,140	178
2004	370,547	210	324,561	201
2005	411,437	233	361,335	224
2006	434,813	247	379,600	236
2007	414,595	235	363,737	226
2008	425,076	241	372,438	231

Note: * The number of passengers in 2000 = 100

Source: BTSC Annual Reports

Table 2.5-16: Yearly Fare Revenue of BTSC

Year	Million Baht	Index*
2000/01	1,392	100
2001/02	1,779	128
2002/03	2,116	152
2003/04	2,284	164
2004/05	2,562	184
2005/06	2,807	202
2006/07	3,063	220
2007/08	3,221	231
2008/09	3,288	236

Note: * Fare revenue of 2000/01 = 100

Source: BTSC Annual Reports

3) Safety

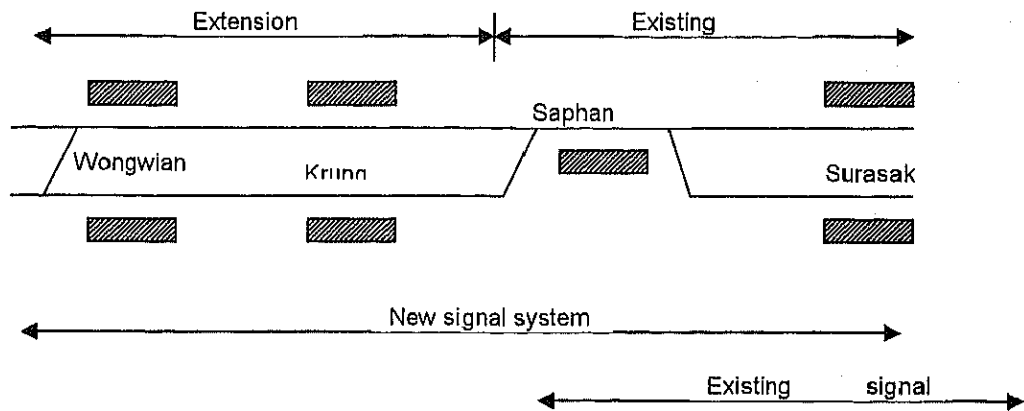
According to BTSC annual reports, passenger injuries were reported only in year 2004. The figure is 0.017 per million passenger trips. In this year, yearly ridership was 1,698 million trips. From these data, about 30 ($=0.071 \times 1,698$) people were injured by some incidents in 2004. Basically, train operation without incidents is required to the urban railway operators. Though the safety level of BTSC seems high, BTSC is still required to enhance safety by studying "What BTSC acquired a lesson for enhancement of safety through these incidents?"

4) Extension of BTSC

On May15, 2009, the extension section of Sky Train was opened. On this section, Communication Based Train Control system of which specification is quite different from the existing one was installed. In the morning of the second day, an incident happened, but basically this signal system conversion was successfully completed.

Previously, the headway of this line was 3 minutes 21 seconds, but after the extension, the headway extends to 4 minutes 50 seconds, and the travel time was also extended for more than one minute. This was caused by a single track layout of Saphan Taksin station located between the extension section and the existing section.

BTSC will replace the existing three-car train-sets to the new four-car train-sets in 2009 to make up the extension of headways, and the replaced train-sets will be transferred to Sukhumvit Line for congestion mitigation. Of course, BTSC is discussing with BMA the modification of track layout of Saphan Taksin station.



Source: JICA Study Team

Figure 2.5-8: Track Layout of Extension Section of Silom Line

b. Current Status of Operation Efficiency

1) Train Operation

The total number of drivers for two lines is 180 and the number of drivers on duty per day is 110. The average train-km per driver is 65.7km per day as expressed in the Table 2.5-4. This figure is smaller than that of BMCL, but this is almost same with those of Japanese metros. Hence, the Study Team considers that the work efficiency of BTSC has no problem to be raised.

2) Maintenance

BTSC holds 107 staff members for maintenance. BTSC takes charge of civil works, automatic fare collection (AFC) system maintenance. The maintenance of E & M is subcontracted to Siemens. BTSC fulfills a role of contract supervision regarding E&M maintenance.

The cost of maintenance works by foreign contractors tends to be high. BTSC has been obliged to place an order to Siemens for maintenance works since the start of operation. BTSC could not maintain its equipments by itself because the supplier did not agree to disclose the information required for maintenance tasks.

BTSC has recently changed a contractor of AFC because a new contractor had promised BTSC to transfer the knowledge of AFC maintenance to BTSC. BTSC has also changed the contractor of rolling stock from Siemens to new one under the situation same as AFC. The reduction of AFC maintenance cost is estimated at 30%. Therefore, it is expected that the cost of maintenance works to be soon decreased when the new maintenance scheme is established.

c. Current Status of Service Level

1) Customer Satisfaction

Table 2.5-17 shows the survey result of customer satisfaction. Scores of all the items exceeded the target.

The Study Team considers that these results basically correspond to the Study Team's evaluation of service level based on hand-on boarding on SkyTrain.

Table 2.5-17: Survey Result of Customer Satisfaction

Item	Target	2004	2005	2006	2007	2008
Security & Safety	3.50	4.10	3.93	4.11	4.12	4.09
Punctuality (service reliability)	3.50	3.91	3.84	3.97	4.01	4.13
Station facilities	3.50	3.82	3.84	3.97	4.02	4.10
Staff attitude & manner	3.50	3.87	3.80	3.79	3.78	3.90
Value for Money	3.50	3.67	3.72	3.77	3.72	4.11
Overall	3.50	4.01	3.98	3.94	3.97	4.12

Source: BTSC

2) Number of Train Operation

The passenger number of Sky Train has been gradually increasing year by year. Therefore, the ratio of actual number of passengers to the train capacity at peak time zone was surveyed. As the following table indicates, there is still place to absorb more passengers even at peak time zone, but BTSC has already decided the introduction of 12 new four-car train-sets in order to respond to the increasing number of passengers and the increase of travel time of train-sets due to line extensions.

Table 2.5-18: Capacity and Actual Number of Passengers at Peak Time Zone

Lines		Sukhumvit	Silom
Number of Trains per Hour	A	23	18
Capacity per Hour	B	19,618	15,421
Actual Number of Passengers per Hour	C	16,753	11,163
Ratio	D=C/B	85%	72%

Source: BTSC

3) Availability

Regarding the availability, the following data is available from the annual report of BTSC. The figure of train delay in 2007 was under the target. The annual report of BTSC says that in 2007 train delays were brought about by some troubles at the morning peak time due to the general aging of rolling stocks. Nowadays BTSC maintains its facilities and rolling stock with intensive and continuous improvement of maintenance. Train km per fault in 2007 increased from the previous year by 21%. It is expected that train delay due to train fault will soon decrease.

Table 2.5-19: Yearly Result of Indicators of Availability

Year	Trip number per a train delay equal to or more than 5 minutes	Train km per fault
	More than 1,100 trips	Not less than 36,000 km
2001	1,044	19,655
2002	1,505	36,323
2003	1,579	44,607
2004	1,698	56,623
2005	1,503	42,837
2006	1,796	42,891
2007	1,079	51,873
2008	960	41,282

Source: BTSC Annual Reports

d. Issues to Be Tackled

BTSC has started to tackle with issues required to establish the sound train operation as follows:

- a) To increase the efficiency in operation and maintenance;
- b) To increase the train-capacity by increasing the number of cars in a train-set; and
- c) To improve the track layout of Saphan Taksin station.

(4) Analysis of Financial Position

a. Income Statement

Net fare box revenue increased from 1,392 million baht in 2000/01 to 2,318 million baht in 2003/04, and to 3,288 million baht in 2008/09. Net fare box revenue recorded an average annual growth rate of 13.2% during the period from 00/01 until 03/04 and 9.72% during the period from 03/04 until 06/07. However, the annual growth rate was decreased to 5.2% in 07/08 and 2.1% in 08/09. Revenue from non-rail business, i.e., revenue from advertising and merchandising space rental and from utility services, showed a favorable growth of 13.1% during the period from 03/04 until 08/09.

On the other hand, cost of fare box and selling and administrative expenses including directors' remuneration grew rather modestly at the average annual rate of 3.1% during the period from 03/04 until 08/09. Therefore, BTSC continued an increase of operating profit since 04/05 when BTSC suffered high maintenance contract fees.

The size of net interest expense continued to be much larger than profit from operation. This is the major factor which made BTSC's business unprofitable.

Major items of non-operating income and expenditures were related to gain and loss due to a change in exchange rate, a re-assessment of BTSC's asset value, and the rehabilitation plan.

Table 2.5-20: Income Statement of BTSC

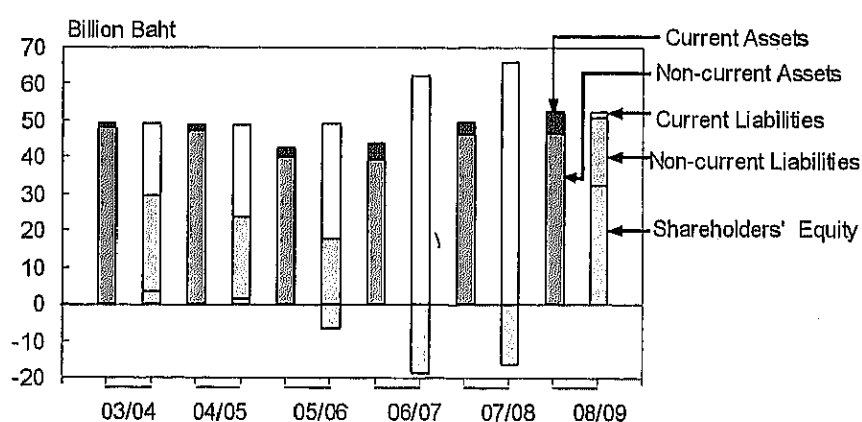
Unite: Million Baht

	03/04	04/05	05/06	06/07	07/08	08/09
Fare box revenue - net	2,318	2,562	2,807	3,063	3,221	3,288
Other income	186	260	263	277	340	821
Of which revenue from non-rail business	199	215	228	248	309	370
Costs of fare box	-1,896	-2,808	-1,749	-1,769	-1,899	-2,108
Selling and administrative expenses	-383	-422	-603	-380	-527	-545
Operating Profit (Loss)	225	-407	717	1,191	1,135	1,457
Non-operating income	2,332	217	249	579	4,689	29
Non-operating expenditure	0	0	-6,335	-10,401	-9	0
Earnings before interest	2,557	-190	-5,368	-8,631	5,815	1,486
Net interest expense	-1,635	-1,770	-2,657	-3,368	-3,415	-1,930
Gain on debt restructuring	0	0	0	0	0	22,447
Net Profit	922	-1,959	-8,025	-12,000	2,400	22,003

Source: BTSC

b. Balance Sheet

The financial structure of BTSC drastically changed in 06/07 when the company proposed the rehabilitation plan for debt restructuring. During the financial year 06/07, two major changes in accounting processing were made. Firstly, most of liabilities were moved to the account of creditors per rehabilitation plan as current liabilities. Secondly, par value of ordinary share was reduced from Baht 10 per share to Baht 1 per share. Due to the progress capital restructuring and debt restructuring according to the rehabilitation plan after October 2008, the balance sheet of BTSC drastically improved. The capital deficit was resolved, and the financial ratios were also improved.



Source: BTSC

Figure 2.5-9: Balance Sheet of BTSC

The major item of assets is "project cost" in non-current assets, which accounted for 82.4% of total assets as of March 31, 2009. The breakdown of net project cost was as shown in the following table.

Table 2.5-21: Breakdown of Project Cost

Items	March 31, 2004		March 31, 2009	
	Amount (Million Baht)	Share (%)	Amount (Million Baht)	Share (%)
Right to use of civil works transferred to authorities	20,060	40.1%	20,211	40.6%
Electrical and mechanical works	23,817	47.6%	23,981	48.2%
- Rolling stock	8,855	17.7%	8,855	17.8%
- Other machinery and equipment	14,961	29.9%	15,125	30.4%
Other project costs	5,454	10.9%	5,454	11.0%
Items awaiting for transfer	705	1.4%	132	0.3%
Total gross project cost	50,035	100.0%	49,778	100.0%
Accumulated amortization and allowance for diminution in value	3,192	-	7,657	-
Net project cost	47,636	-	42,120	-

Source: BTSC

The changes in liabilities and shareholders' equity are shown in the following table.

Table 2.5-22: Liabilities and Shareholders' Equity of BTSC

		Unit: Million Baht					
Item		03/04	04/05	05/06	06/07	07/08	08/09
Current liabilities	Creditors per rehabilitation plan	0	0	0	59,197	59,197	0
	Accounts payable	2,350	3,595	4,219	408	812	193
	Accounts payable - related parties	0	0	33	34	40	13
	Current portion of long-term loans	9,850	13,225	17,595	0	0	0
	Current portion of finance lease liabilities	0	0	0	5	5	4
	Current portion of liabilities under rehabilitation plan	0	0	0	0	0	1,094
	Loan from shareholders	275	275	275	0	0	0
	Other current liabilities	7,456	7,961	9,090	2,624	5,949	336
Total	19,931	25,056	31,212	62,269	66,003	1,640	
Non-current liabilities	Finance lease liabilities - net current portion	0	0	0	13	7	3
	Liabilities under rehabilitation plan - net of current portion	0	0	0	0	0	13,627
	Unsubordinated convertible bonds - liability component	0	0	0	0	0	4,958
	Long-term loans - net of current portion	22,569	19,037	14,498	0	0	0
	Loan from contractor	356	353	350	0	0	0
	Subordinated convertible debentures	2,740	2,740	2,740	0	0	0
	Liabilities from related party	396	396	396	0	0	0
Total	26,061	22,526	17,985	13	7	18,589	
Share-holders' equity	Share capital	12,159	12,159	12,159	1,216	1,216	10,058
	Share premium	2,773	2,773	2,773	0	0	16,639
	Unsubordinated convertible bonds - equity component	0	0	0	0	0	1,089
	Deficit	-11,594	-13,553	-21,579	-19,862	-17,462	4,541
Total	3,337	1,378	-6,647	-18,647	-16,247	32,327	

Source: BTSC

Major items of liabilities before the implementation of rehabilitation plan were long-term loans, subordinated convertible debentures and accrued interests. BTSC procured funds for the

MRT project under the loan agreements and issuance of debentures. Original amounts of long-term loans and debentures are as shown in the following table.

Table 2.5-23: Original Long-term Loans and Debentures for the Project

Type	Currency	Conditions and Lenders	
Loans	Domestic Currency	Amount	Baht 12.42 billion
		Lenders	A group of domestic lenders led by the Siam Commercial Bank Public Company Limited
		Interest rate	MLR + 1.25% per annum due monthly
	Foreign Currency	Amount	US\$689.7 million
		Lenders	Foreign lenders led by KfW and IFC
		Interest rate	LIBOR + 2.375% per annum due semi-annually
	Foreign Currency	Amount	US\$6.0 million (Siemens, contractor, arranged this subordinated loan)
		Lender	KfW
		Interest rate	LIBOR + 2.375% per annum due semi-annually
Bonds	Subordinated convertible debentures	Amount	Baht 2.74 billion (17.34 million debentures at par value of Baht 158 for each debenture)
		Interest	Zero coupon
		Conversion price	Baht 15.80 per one ordinary share (10 ordinary shares per one debenture)
		Issuance date	November 11, 1996
		Maturity	November 11, 2012

Source: BTSC

At the start of rehabilitation plan, long-term loans were moved to “Creditors per rehabilitation plan” account in the current liabilities in 06/07. However, due to the implementation of rehabilitation plan, liabilities to be repaid over years were moved to the non-current liabilities.

The shareholders’ equity turned from negative to positive as the results of the issuance of shares to new investors and share premium from debt to equity swap in 08/09.

c. Financial Ratios

The trend of BTSC’s major financial ratios is as shown in the following table. Because BTSC were in a difficult financial position as mentioned above, the company could not satisfy the financial ratios stipulated in the loan agreements. However, because of the rehabilitation plan, key financial ratios such as current ratio and fixed ratio were significantly improved.

Table 2.5-24: Key Financial Ratios of BTSC

	03/04	04/05	05/06	06/07	07/08	08/09
Current ratio	6.3%	6.3%	7.3%	6.5%	5.4%	364.3%
Fixed ratio	1440.5%	3438.0%	-605.7%	-212.2%	-284.2%	144.1%
Fixed assets capitalization Ratio	163.5%	198.2%	355.1%	-212.3%	-284.4%	91.5%
Debt Service Coverage Ratio (DSCR)	1.57	-0.09	-2.00	-2.46	1.69	0.81
Assets turnover	0.10	0.06	0.07	0.09	0.18	0.08
Return on assets	1.9%	-4.0%	-17.5%	-27.8%	5.1%	43.0%
Return on equity	21.7%	-83.1%	304.6%	94.9%	-13.8%	273.7%

Source: Calculated by the Study Team based on the financial statements of BTSC.

d. Rehabilitation Plan

BTSC had been in a difficult financial situation until the Central Bankruptcy Court approved the debt restructuring plan in October 2008, because BTSC had become insolvent due to a huge burden of installment and interest payment. While the first installments of long-term loans were due in July 2002, BTSC could not pay to creditors.

BTSC filed a request to the Central Bankruptcy Court for a business rehabilitation of BTSC upon the approval by the Central Bankruptcy Court on July 7, 2006, BTSC started negotiations with creditors for its business rehabilitation plan. A business rehabilitation plan which BTSC presented to a meeting of creditors was accepted on December 22, 2006 and the Central Bankruptcy Court approved BTSC's rehabilitation plan on January 31, 2007. On October 29, 2008, the Central Bankruptcy Court ordered the termination of the business rehabilitation.

Capital restructuring taken for the business rehabilitation were as follows¹⁷:

- 1) Reduction of registered capital by canceling the un-issued portion.
- 2) Reduction of paid-up capital to offset with deficit by reduction the par value of Baht 10 per share to Baht 1 per share. BTSC registered the change in the par value of its shares with the Ministry of Commerce on February 23, 2007. As the results, the paid-up share capital decreased from 12,158.7 million Baht on March 31, 2006 to 1,215.9 million Baht on March 31, 2007.
- 3) Debt to equity swap at a conversion ratio of Baht 15.8 to 1 ordinary share (per value of Baht 1). The 1,034.1 million ordinary shares were issued to convert debt to equity.
- 4) Issuance of convertible bonds. On October 8, 2008, BTSC issued and offered zero coupon convertible bonds with a total value of 11,643 million Baht.
- 5) Issuance of 1,986.5 million ordinary shares to new investors for future business plan at a price of 1.6 Baht each.

Debt restructuring was implemented in parallel with capital restructuring. The BTSC's debts were 67,751 million baht, consisting of 16,469 million baht for secured creditors, 46,080 million baht for unsecured creditors, and 5,203 million baht for creditors receiving settlement under existing contracts. Among the total of 67,751 million baht, the amount of 8,554 million baht was considered to have no legal obligations and future obligations. The adopted debt restructuring was as shown in the following table.

¹⁷ BTSC Annual Report for 2008/09

Table 2.5-25: Method of Debt Restructuring

Type of Credit	Measure
Secured creditors	
1) Financial institutions	To be repaid in the amount of 10,401 million baht within 120 days after the date of capital increase.
2) Guarantors under letters of guarantee	To be receive the debt repayment when the liabilities under the letters of guarantee occur. BTSC paid 10,401 million baht to this group of creditors on October 22, 2008.
Unsecured creditors	
1) Financial institutions	To be repaid 100% of the principal amount. The 47.58% of the principal amount (10,016 million Baht will be repaid by 8 annual installments. The rest of the principal amount will be repaid by the debt to equity swap at a conversion rate of 15.8 Baht to 1 ordinary share. On October 9, 2008, The amount of 11,035.2 million baht was converted to 698.4 million ordinary shares.
2) Guarantors under letters of guarantee	To be receive the debt repayment when the liabilities under the letters of guarantee occur.
3) Loans from principal shareholders	To be repaid 100% of principal amount. The 50% of the principal amount (2,564.4 million baht) was repaid in cash on October 22, 2008. The rest was to be repaid by the debt to equity swap at the conversion rate of 15.8 baht to 1 ordinary share. BTSC converted deBTSC of 2,564.4 million baht to 162.3 million ordinary shares on October 9, 2008.
4) Advisory fees, a creditor subject to dispute under concession contract, a government authority, and creditors subject to disputes in connection with torts	To be repaid in cash by 50 - 100% of the principal amount.
5) Creditors under subordinated convertible debentures	To be repaid 100% amount by the debt to equity swap at the conversion rate of 15.8 baht to 1 ordinary share. BTSC converted deBTSC of 2,739.9 million baht to 173.4 million ordinary shares on October 9, 2008.
6) Creditors and guarantors having obligation to give financial support to BTSC under the Principal Shareholders Subordinated Debt Facilities Agreement	To terminate the agreement
Creditors receiving settlement under existing contracts	
1) Creditors under maintenance agreement and spare supply services agreement	To be repaid in cash at the rate of 100% of the principal amount.
2) Creditors under performance guarantees for construction contracts	To be repaid in cash at the rate of 100% of the principal amount.

Source: BTSC

After the restructuring, new major shareholders are Siam Rail Transport and Infrastructure Ltd. (63.7%) and Siam Capital Development Ltd. (23.8%). The majority shares of Siam Rail Transport and Infrastructure are owned by Mr. Keeree Kanjanapasm, current, executive chairman & CEO of BTSC.

Table 2.5-26: Composition of Major Shareholders of BTSC

Unit: %

Shareholders	Percentage of Shares		
	Mar 2007	Mar 2008	Mar 2009
Siam Rail Transportation and Infrastructure Ltd.			63.65
Siam Capital Development Ltd.			23.76
CTF Resources Ltd.	17.27	17.27	2.09
Thai Asset Management Corporation (TAMC)	6.25	6.25	1.61
Tai Fuk Asset Management (Thailand) Ltd.	9.05	9.05	1.09
Mr. Wiroj Tangjedtanaporn			1.01
Keen Leader Investment Ltd.	3.6	3.82	0.81
Connaught Road Ltd.			0.61
Siamthanee Real Estate Co.Ltd. (Land & Houses)	3.13	3.6	0.61
Kiatnakin Bank Pcl.	4.88	4.88	0.59
Citibank Nominees Singapore Pte Ltd.	3.82		0.46
Tanayong Pcl.			0.38
International Finance Corporation	1.3	1.3	0.32
Perkasa Holding Co.,Ltd.	10.89	10.89	
ADRC Ltd.	8.23	8.23	
Mr. Chanthong Patthamapong		5.19	
Mr. Paiboon Benjarit		5.19	
The ADM Maculus Fund L.P.	4.43	4.43	
Others	27.15	19.9	3.01
Total	100.00	100/00	100.00

Source: BTSC

(5) Non-rail Business of BTSC**a. Provisions of Non-rail Business in Concession Agreement**

In the concession agreement between BMA and BTSC ("Clause 3"), BTSC is authorized to undertake the Project, to realize and to solely operate and maintain the BMA Transit System, and to earn income from activities relating to the BMA Transit System, including advertisement, franchising, fare with the BMA Transit System.

b. Types of Non-rail Business

Non-rail business of BTSC is largely separated into two categories, i.e., advertising and merchandising space rental revenues, and revenues from utility services.

BTSC has granted VGI Global Media Co., Ltd. (VGI Global) a 15-year exclusive license to market all commercial areas and advertising in the Sky train in June, 2001. BTSC received the minimum guaranteed revenue or 50% of gross revenue from the use of advertising space and merchandising areas, whichever was greater. VGI was responsible for all investments and operating expenses¹⁸. In March, 2009, BTSC agreed to purchase all VGI Global shares from FN Asia Co., Ltd. for Bt 2,500 million¹⁹.

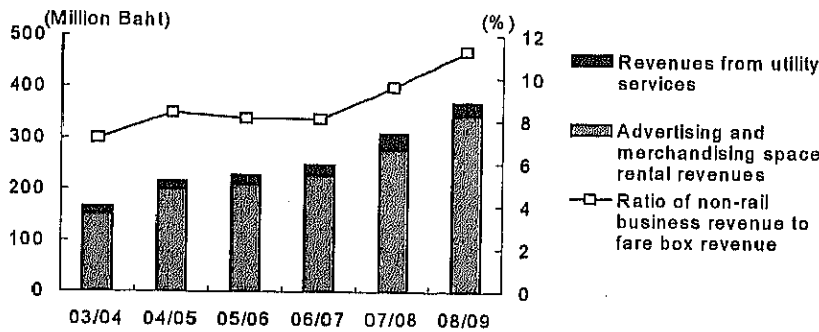
¹⁸ Chadamas Chinmaneevong, "Transit, in-store continue to shine" Article on Bangkok Post on September 15, 2009. <http://www.bangkokpost.com/business/telecom/20259/transit-in-store-continue-to-shine>

¹⁹ TRIS Rating, "TRIS Rating Assigns "A/Stable" Ratings to "BTSC" and Debentures " <http://www.thaipr.net/nc/readnews.aspx?newsid=EF649A1095E541C81FE01DB72EF1C4D7>

BTSC recently intends to diversify its business into property development along MRT routes through its subsidiaries, Nuvo Line Agency Co., Ltd. (Nuvo Line) and UniHolding Co., Ltd. (UniHolding). BTSC has acquired several land plots, which are located near or next to Sky Train stations. According to the newspaper, BTSC's first property development project will be a four-star hotel located on South Sathorn road, close to the Sky Train Surasak station.

c. Revenue of Non-rail Business

The revenue from commercial development has tended to increase since FY2007/08. In FY2008/09, the revenue from commercial development occupies 11.2% of total revenue. Among revenue from commercial development, advertising and merchandising space rental revenues account for 93.3% and revenues from utility services, 6.7%).

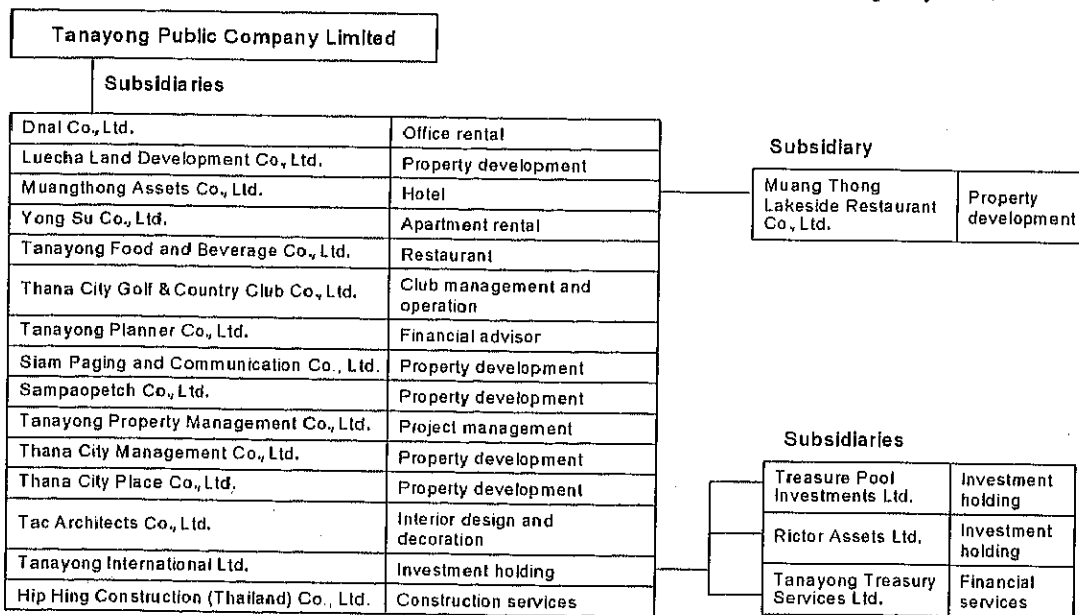


Source: Annual Reports of BTSC

Figure 2.5-10: Non-rail Business Revenue of BTSC

d. Parent Company

After the rehabilitation, Siam Rail Transport and Infrastructure Co., Ltd. (SRTI) held 63.65% and Siam Capital Developments (Hong Kong) Ltd. (SCD) held 23.76% of shares of BTSC. Mr. Keeree Kanjanapas, executive chairman and CEO of BTSC, holds the majority shares of SRTI.



Source: Annual Reports of Tanayong Public Company Limited

Figure 2.5-11: Simplified Organization Chart of Tanayong Group