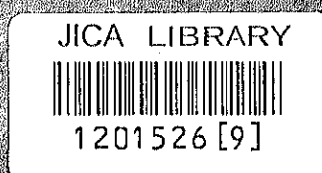


National Economic and Social Development Board  
The Kingdom of Thailand

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



August 2010

**JAPAN INTERNATIONAL COOPERATION AGENCY**

**KRI INTERNATIONAL CORP.**

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## **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:

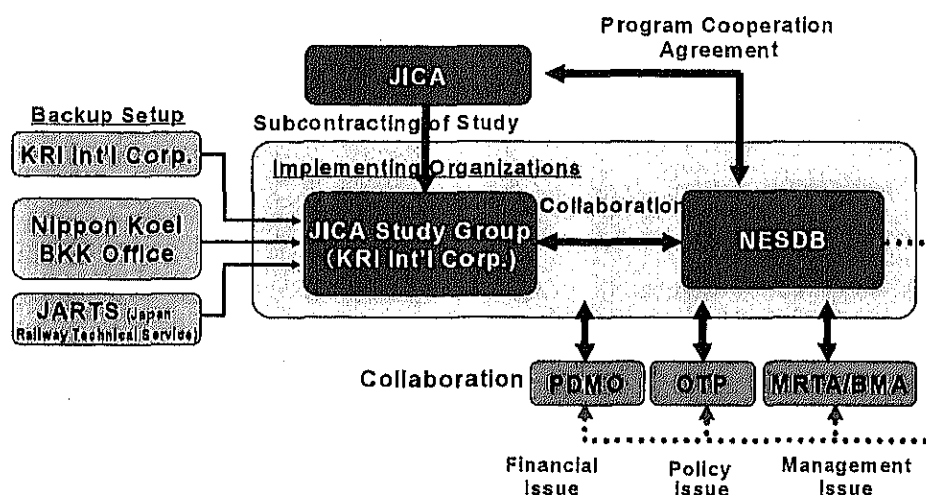
- a) To review various financial frameworks of MRT project, in the forms of PPP scheme and operation-by-state scheme, and to identify advantages and disadvantages of these financial frameworks from the viewpoints of financial burden and how to realize efficient, effective and sustainable construction & 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

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

## 1.4 Implementation Method

### 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 Thailand.

#### **1.4.2 Revised Implementation Methods**

The Study Team visited Bangkok in May 2009 to discuss current issues of financial framework of MRT projects with the stakeholders in Thailand. 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

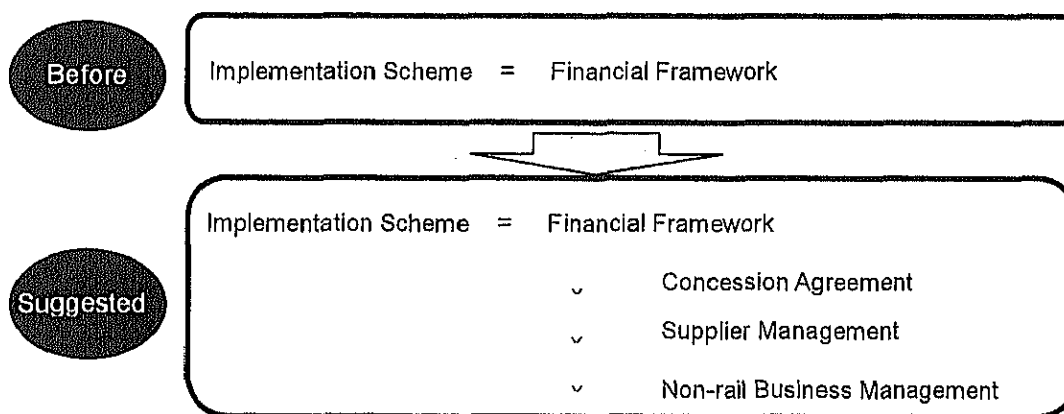
Tier3: Issues regarding each MRT line, which is about each line's implementation scheme

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

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)

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)

## **CHAPTER 2 REVIEW OF URBAN RAILWAY SYSTEMS IN THAILAND**

### **2.1 Basic Characteristics of Urban Railway Development**

The characteristics of urban railway development are significantly different depending on the scale and density of the city. Cities with large scale and population density will likely choose to build up an “urban railway network”, consisting of multiple lines (typically more than 4lines) that are inter-connected at several large terminal stations. Bangkok is clearly in this league. The following characteristics should be highlighted for urban railway network of large cities.

- Ridership forecast for line nodes in early stages of network building will be quite a difficult task.
- System standardization will become key to success.
- Terminal station will need to be large, accommodating multi-modal transport.
- City planning could be re-shaped according to plans for urban railway network.

In addition to characteristics described by city types, the following financial characteristics are also important to take into consideration for urban railway development.

- Capital intensive industry:
- Operational efficiency cost difference is not significant once the infrastructure is installed.
- Maintenance cost requires lifecycle point of view.
- Successful urban railway operations are typically supported by non-rail revenue source.

Urban Railway in Bangkok is to form urban railway network because of its size and population density. Bangkok’s urban railway specifically has the following characteristics.

- Sharp population increase and strong demand for mass transit system
- Ceiling to public debts
- Participation of a number of government agencies and operators in urban railway
- Heavy dependence on foreign suppliers for equipment, system and its technologies
- Lack of integration with city planning

PPP method has been adopted for urban railway development in Bangkok. Its characteristics are as follows.

- Thai government has adopted PPP for urban railway projects because their public borrowing is limited by ceiling.

- Government support and legal framework are quite important for success of railway projects under PPP.
- Vertical separation method is utilized in PPP urban railway project with ODA loan.

## **2.2 Review of Governance of Urban Railway in Thailand**

### **(1) Implementation of Urban Railway in Bangkok**

Three lines, SkyTrain (BTS, or Initially Green Line), MRT (Blue Line) and Airport Rail Link have developed in the Bangkok Metropolitan Region (BMR). Skytrain and MRT started operation in 1999 and 2003 respectively. Skytrain is operated by the Bangkok Mass Transit System Public Company Limited (BTSC) under the concession from the Bangkok Metropolitan Administration (BMA). Blue Line is operated by the Bangkok Metro Public Company Limited (BMCL) under the concession from the Mass Rapid Transit Authority (MRTA). Airport Rail Link has been constructed by the State Railway of Thailand (SRT) and is to be operated by a private operator.

There are three public responsible bodies for urban railway. SkyTrain is administered by BMA under the Ministry of Interior. MRT is by MRTA under the Ministry of Transportation, and Airport Rail Link by SRT under the Ministry of Transportation.

The integration of implementation bodies will facilitate the integration of safety standards certain safety and maintenance regulations, convenience improvement such as location of stations at node, common ticketing.

### **(2) MRT Act**

There is no regulatory agency of MRT clearly defined under the current public administration in Thailand.

MRTA was established on the basis of the MRTA Act (2000). According to MRTA Act, MRTA is supposed to administrate mass rapid transit system over the country. However, the current situation is quite different.

MRTA Act is a act of incorporation of MRTA. MRTA stipulates no clauses concerning a policy for MRT, such as definition of MRT, administrator and operator of MRT, etc. The absence of an act governing MRT (as it were MRT Act) causes an ambiguous use of term MRT and existence of urban railway projects out of the administration of MRTA.

### **(3) PPP Act**

The Act on Private Participation in State Undertaking B.E. 2535 (1992) ("PPP Act") is the legal basis to utilize the private sector in implanting a public sector project. This PPP Act only stipulates procedures required for a PPP project.

#### **(4) Issues of Governance of Urban Railway Network Development**

The Office of Transport and Traffic Policy and Planning (OTP) under the Ministry of Transportation is responsible for planning and development of urban railway network. And MRTA is responsible for the construction and management of urban railway network. However, there exists no law regulating safety, system maintenance rules, fare structure, etc. Accordingly, the detailed regulations concerning railway management under PPP are currently decided by the concession agreements.

This situation can be allowed if the urban railway network remains to consist of existing lines. However, it will be necessary to unify the management of safety standards, operation and maintenance rules and the service level.

### **2.3 Review of Urban Railway Master Plan**

The first urban railway master plan for BMR, "Conceptual Mass Rapid Transit Implementation Master Plan Project (CMIP)", was formulated in 1996 by OCMLT (Office of Commission for the Management of Land Transport). CMIP and "Additional Feeder Routes Plans under the Mass Transit Feeder System Study" were integrated under the Urban Rail Transportation Master Plan (URMAP 1) in 2001 by OCMLT. 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.

The Cabinet approved the succeeding master plan "URMAP 2" formulated by OTP based on URMAP 1 in June, 2005. The plan aimed to develop 7 lines, namely the extension of BTS Skytrain and blue line, and new development of the dark green, red north-south, red east-west (Airport Rail Link), orange and purple lines by 2012, with total length of 277 km and total cost of 556 billion baht.

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

These master plans cover such issues as overall network development plan and investment plan. However, the situation of integrated planning is still far from desirable due to a lack of sufficient budget and insufficient coordination among the stakeholders having different interests. Especially, further improvement is necessary for the following issues.

- 1) Insufficient physical network integration among urban railways and other mode of transport
- 2) Insufficient fare/ticket system integration among urban railways and bus
- 3) Insufficient coordination between urban railway plan and other transport plan
- 4) Insufficient coordination between urban railway plan and urban plan/land use plan

## 2.4 Review of Implementation Scheme of Urban Railway in Thailand

### (1) PPP Model Adopted for Existing Urban Railway Projects

The PPP models adopted by the first two urban railway projects (Blue Line and SkyTrain) are as shown in the following table.

**Table2-1 PPP Models of Existing Urban Railway Projects**

Feature	Bangkok Transit System (BTS Green Line)	MRTA Initial System Project (Blue Line - East)
Start of Operation	December 1999	August 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, Prt 2, 2)

Source: Study Team

The characteristics of the current PPP models are as follows:

- The concessionaires were land developer/construction companies which had no experiences in railway business;
- It has been observed that ridership risk is too large to keep an urban railway 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;
- The risk concerning civil construction is under the concessionaires;



- There is no amendment or revision clause/section in concession agreement. An amendment of the concession agreement has been made yet.
- There is no clause regarding an extension of concession period is given to BMCL.
- Land development right provided to concessionaires is limited;
- The right of contractors (project owners) to control technical specifications such as signal, 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) Review of Blue Line**

### **1) Outline of Line**

The MRT Chaloen 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 thousand passengers on average every day on week days.

### **2) Operation and Service Level**

During five years since its operation commencement, Blue Line has gained its position as an indispensable transportation for Bangkok citizens.

Ridership is still lower than the estimation. In line with the increase in ridership since 2006, fare revenue has been also increasing. The actual ridership in 2008 was only 170 thousand persons even though the target in 2010 was set 793 thousand persons in the original forecast.

### **3) Financial Position**

#### **a. Income Statement (Consolidated Base)**

Total revenue of BMCL was 1,579 million baht in 2008 on a consolidated basis.. The average annual revenue growth rate during the period from 2005 until 2008 was 14.7%

Fare box revenue accounted for 87.1% of total revenue in 2008. Among other revenues, revenue from advertising services has the largest share of 7.3%.

During the last five years until 2008, the total expenses continued to largely exceed the total revenues. Therefore, BMCL has continued to report a huge net loss every year after financial cost payment. Net loss in 2008 was 1,457.0 million baht, equivalent to 92.3% of total revenues.

**b. Non-rail Revenue**

BMCL directly executes business with other companies by granting the rights of ATM service to commercial banks, public telephone service to True Corporation Public Company Limited, advertising media to How Come Media Co., Ltd and Ambient Media Co., Ltd. BMCL also grant the right of advertisement, retail space, and service and maintenance of telecommunications system equipment to its subsidiary, Bangkok Metro Networks Limited.

The revenue from commercial development significantly increased from 153.4 million baht in FY2007 to 199.4 million baht in FY2008. In FY2008, the revenue from commercial development occupies 12.9% of total revenue.

**c. Balance Sheet (Consolidated Base)**

As of December 31, 2008, total assets of BMCL on a consolidated basis were 19.19 billion baths, total liabilities were 13.68 billion baths, and shareholders' equity was 5.51 billion baht. 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. 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.

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 billion baht. 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 date, and MLR after the project completion date. The repayment will be started from March 2013.

**d. Change in Share Capital**

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. At the same time, 2,987.5 million ordinary shares (25% of the issued and paid-up capital) were allocated and offered to MRTA 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.

MRTA is the largest shareholder of 25% of BMCL. As of January 2006, CH. Karnchang group held around 40% of total shares. However, the share of CH. Karnchang group dropped to less than 30% as of April 2008. The share of Natural Park dropped from 18.8% as of January 2006 to 6.5% as of April 2008.

### **(3) 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. In 2008, average weekday ridership was 425 thousand trips.

#### **2) Operation and Service Level**

As well as Blue Train, Sky Train has obtained its position as an indispensable traffic mode for Bangkok citizens. Total annual rideship was 135.9 million trips in FY2008 (April 2008 until March 2009). Ridership has been increasing year by year. Fare revenue has been increased in line with the increase in ridership.

#### **3) Financial Position**

##### **a. Income Statement**

In FY2008, net fare box revenue was 3,288 million baht and other income was 821 million baht. The operating profit has tended to increase since FY2004 because the annual increase in cost of fare box and selling and administrative expenses is relatively low compared with that of revenue. 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. In FY2005 and FY2006, a huge non-operating expenditure occurred due to the accounting related to the rehabilitation plan. In FY2008, a huge gain on debt restructuring occurred.

##### **b. Non-rail Revenue**

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 recently intends to diversify its business into property development along SkyTrain routes. BTSC has acquired several land plots, which are located near or next to BTS stations. The revenue from non-rail business was 370 million baht in FY, which accounted for 9.0% of total revenue.

##### **c. Balance Sheet**

The financial structure of BTSC drastically changed in FY2006 when the company proposed the rehabilitation plan for debt restructuring. During the financial year FY2006, 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 as of March 2009. The capital deficit was resolved, and the financial ratios were also improved. The capital adequacy ratio increased to 61.5% as of March 2009.

#### **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.

The major capital restructuring taken for the business rehabilitation were i) reduction of paid-up capital by reduction the par value of 10 baht per share to 1 baht per share, ii) debt to equity swap at a conversion ratio of 15.8 baht to 1 ordinary share, iii) issuance of convertible bonds, and iv) issuance of 1,986.5 million ordinary shares to new investors for future business plan at a price of 1.6 baht each.

BTSC issued and offered zero coupon convertible bonds with a total value of 11,643 million baht. The 1,034.1 million ordinary shares were issued to convert debt to equity.

#### **(4) Lessons from Blue Lines and SkyTrain**

The implementation schemes of PPP for existing Blue Line and Skytrain were conducted as pioneers for urban city railway in Thailand. Therefore, much of the issues concerning the implementation schemes are in the detail contents of how public and private agreed to work together.

##### **a. Role Sharing**

- Action commitment from both party not clearly defined. For example, i) capability building plan commitment by private consortium (to build domestic industry), ii) Network building plan commitment by government (as basis for ridership forecast)
- Government intervention rights (to ensure public service) in case of non-performance, for example, how to intervene during debt restructuring, is not clear.

##### **b. Risk sharing**

- Revenue risk too heavy on private party although factors on the government side (i.e. build up of network) have a large impact on ridership.

**c. Target setting**

- Standard cost, service level KPI are not agreed in detail in the concession agreements. Therefore, government monitoring lacks a control on them.

**d. Network consideration**

- Inadequate considerations was paid on extension arrangements and linkages with other lines (e.g. AFC, Signal). Accordingly, Blue line extension could be costly and inconvenient.

**e. Other contractual terms**

- The contracts lacked flexibility despite at the early stages of mass transit network building. For example, revision clause was not clearly defined.

## **CHAPTER 3 SYNTHESIS OF CURRENT ISSUES REGARDING DEVELOPMENT OF URBAN RAILWAY SYSTEM IN THAILAND**

### **3.1 Three Tier Structure Approach Adopted for Identifying Issues**

Characteristics of urban railway in Thailand are quite sophisticated in terms of network, usage of PPP and organization. To synthesize current issues on urban railway in Thailand, the ‘three-tiered’ structure approach was utilized

- (1) Tier 1 is for the issues surrounding overall Urban Mass Transit Sector, including sector vision, governance and law and regulation.
- (2) Tier 2 is for the issues on MRT Master Plan, including integrated Bangkok city transit-oriented development (TOD) plan, integrated multi-modal plan and MRT network integration
- (3) Tier 3 is for the issues on each MRT line implementation scheme consisting of financial framework, concession agreement, supplier management and non-rail business management.  
(See Figure 3.1-1: Summary of Key Issues)

### **3.2 Issues of Tier 1**

Regarding Tier 1(Mass Transit Sector), three issues, namely sector vision, governance and law and regulation could be pointed out as follows.

**(1) Sector Vision**

Thailand has developed BTS and BMCL in a mode of trial and error. This is because mass transit was just introduced to the country without any form of sector related institution. Now it is worth

thinking through how to shape the mass transit sector in this country.

In shaping the mass transit sector, the key question is to think about who will own and drive each part of this value chain. There are three models, i. e. supplier-led model, operator-led model and fully in-house model. Selection of this value chain model is critical element in developing a sector vision. This selection will have implications on contracting agency's (e.g. MRTA) function and capacity building requirements. Through discussion with Thai stakeholders, the study team has found that the vision on future mass transit sector is unclear.

## **(2) Governance**

There are three Public Agencies which are operating MRA. The most serious issue relating to governance is the problems of responsibilities of them. According to the MRTA Act, MRTA can be an operator of the MRT System in Thailand, i.e., MRT can create and hold shares of a company engaging in MRT business and grant its right to the private individual in the form of concession.. However, there are several problems for MRTA to carry out its functions.

## **(3) Law and Regulation**

There are three relevant acts relating to MRT in Thailand, namely PPP Act, MRA Act and MRTA Act of which relevant issues are generally classified in 3 categories, unclear definition of key concepts, unclear roles and functions of the concerned entities and no specific stipulation on key concepts.

### **3.3 Issues of Tier 2**

As the issues relating Tier2, it is emphasized on the importance of integration of various plans to make overall master plan of MRT

#### **(1) Integrated Bangkok City TOD Plan**

Insufficient coordination between Urban Railway Plan and Urban Plan/ Land Use Plan is taking place. Transportation and land use has a close relationship; transportation affects land use and land use affects transportation. Accordingly, closed coordination between public transportation plan and land use plan is considered to be keys to alleviate traffic congestion in BMA.

#### **(2) Integration of Multi-Modal Plan**

There exists insufficient coordination between Urban Railway Plan and Other Transport Plan. Several agencies are responsible for various aspects of transportation in Bangkok. Coordination has improved since the Government's reforms announced in September 2002 whereby key road and rail functions of various government agencies were brought under the control of the MOT.

### **(3) MRT Network Integration**

The existing master plan covers issues, such as network development plan, cost estimate and investment plan, evaluation of financial and economic feasibility, and evaluation of potential environmental impact. In addition, various studies examined fare integration and ticket integration. Also concerned stakeholders in Thailand try to coordinate urban plan and transport plan. Although variety of efforts to improve urban railways have been made, the results are still far from desirable.

### **(4) Issues on Positioning of Plans**

There have been many studies and reports on components of the integrated master plan. However, the positioning of the plans is not so clear. Some are just reference materials and some are plans that go through multiple institution review. The latest MRT master plan (so called URMAPP3) is currently being drafted and will go through cabinet approval. However, other components, such as city planning, are not reviewed yet as part of the integrated plan for approval.

### **(5) Issues on Implementation Organization and Coordination Mechanism**

Each agency develops plan from its own viewpoint only. MRT components are under OTP and city planning components are under BMA and Public Works. PDMO plans for funding including PPP financial framework. The need for institution that can coordinate across ministries in this area has been discussed in the past. For example, IMAC report refers to the establishment of Urban Development Authority. However, no specific action has been observed.

## **3.4 Issues of Tier 3**

Relating to Tier3, various issues could be identified into four categories namely financial framework, concession, supplier management and non-rail business are pointed out as follows.

### **(1) Issues of Financial Framework**

It should be noted that there is a political necessity of PPP adoption in urban railway development due to debt ceiling in order to keep sound budget balance. Following issues relating to financial framework are identified in the discussion with Thai stakeholders.

- 1) Is there the best financial framework for urban railway in Thailand?
- 2) Can financial framework alone solve all the issues?
- 3) Is there such evidence that private party can better succeed in urban mass transit?

### **(2) Issues of Concession Agreement**

On existing urban railways in Bangkok, the Study Team identified several concessionaire management issues to be improved for future lines.



- 1) In terms of financial framework of existing concession agreement, most key risks were allocated to the private sector, despite early stages of network establishment.
- 2) Shareholder's healthy incentives to cherish operating company must be ensured.
- 3) Unclear conditions for the necessary revision, extension of concession and extension of the routes are stipulated in the concession agreement.
- 4) Revenue sharing mechanism of non-rail business is not clearly specified in Concession Agreement.

### **(3) Issues of Supplier Management**

The concessionaires in Thailand, who procured equipment and rolling stock from suppliers, have preferred "full turnkey" scheme for steady operation and have not carried out supplier management sufficiently. Some observed issues relevant are as follows.

- 1) Increase of construction cost because of leaving all supplier management task to engineering design consultants
- 2) Nondisclosure of specifications: Suppliers did not disclose the specifications of electric and mechanical equipments to concessionaires despite of concessionaires' request.

### **(4) Issues of Non-rail Business Management**

#### **1) Issues for Operators**

- a. The ratio of non-rail business to total revenue of BMCL and BTSC is similarly high to MRT operators in other cities (HK, Delhi) of which ridership however is higher than in Bangkok.
- b. There are high opportunities of diversifying non-rail business.
- c. Collaboration with affiliated companies could be strengthened

#### **2) Issues for Project Implementation Body**

- a. To maximize the benefit of MRT-related business
- b. To share the benefit of property development to MRT projects

## CHAPTER 4 FINANCIAL SIMULATION AND ANALYSIS OF FINANCIAL FRAMEWORK

### 4.1 Outline of the Financial Simulation of MRT Projects

The Study Team carried out a financial simulation of future MRT projects in Thailand in order to understand the effects of different financial frameworks. The Purple line (Bang Yai - Bang Sue Section), the Pink Line (Khae Lai - Minburi section) and the Orange Line (Bang Kapi - Bang Bamru Section) were analyzed under this study.

The Study Team has formulated six likely future patterns for financial framework by combining three dominant parameter choices, i.e., funding, concession model and O&M as shown in the following table. Financial simulation was made based on such 6 patterns of financial framework.

Table 4.1-1: Financial Framework Patterns

	Funding		Concession Model			O&M	
	100% Public	Partial Private	Net	Gross	Modified Gross	SOE	Private
Pattern 1: State Operation Scheme	●		●			●	
Pattern 2: PPP Net Cost		●	●				●
Pattern 3: PPP Gross Cost		●		●			●
Pattern 4: PPP Modified Gross Cost		●			●		●
Pattern 5: PSC Gross Cost	●			●			●
Pattern 6: PSC Modified Gross Cost	●				●		●

Source: Study Team

Financial Simulation was basically followed the MRT Assessment Standardization (MAS). However, optimism bias proposed under MAS was not adopted because of its weak evidence base. Instead of adopting optimism bias, following two kinds of analyses were made.

**Analysis 1 (Public Sector's NPV Gap Calculation)** aims to clarify the difference of public sector's net present value (NPV) without adopting the "Optimism Bias". Under this analysis, performance of the private sector (such as ridership, operation and maintenance cost) is assumed the same as that of public sector.

**Analysis 2 (Sensitivity Analysis)** aims to clarify degree of minimum performance to be achieved by the private sector under five private participation schemes, in order to achieve public sector's VfM (NPV under State Operation Scheme  $\leq$  NPV under private participation scheme). The Newton Raphson Method was adopted for this analysis.

### 4.2 Results of the Analysis 1 (Public Sector's NPV Gap Calculation)

Following figure shows the present value of public sector's net cashflow during the whole project life, namely public sector's NPV. As the below figure indicates, the public sector's NPVs under 6 patterns of financial framework are negative for all the analyzed projects, because, as the previous

studies clarified, all the analyzed projects themselves are financially not profitable as a whole.

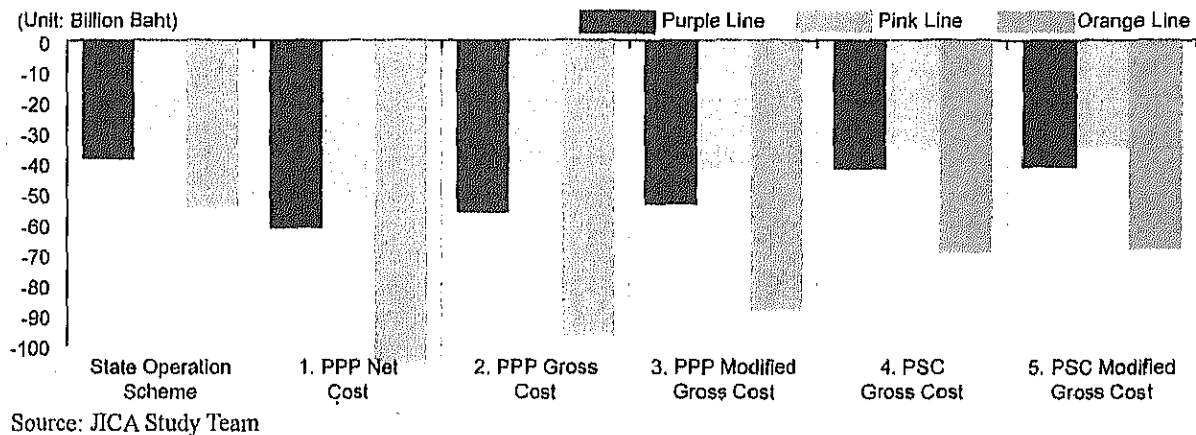


Figure 4.2-1: Public Sector's NPV Gap under 6 Patterns of Financial Framework

Financial burden of the public sector of each line is the smallest when adopting state operation scheme. The NPV gap shown in the above figure can be interpreted as the efficiency gain target to achieve positive VfM.

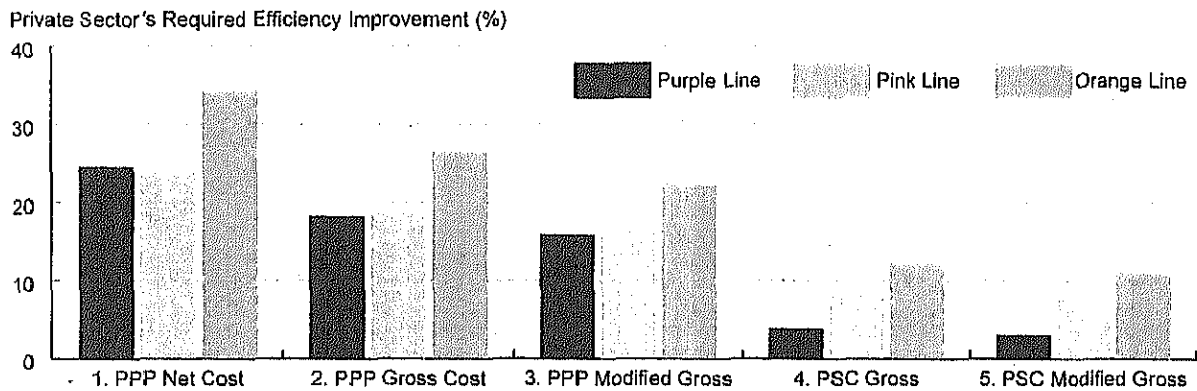
In implementing a project under PPP net or PPP (modified) gross scheme, financial burden of the public sector is reduced during inception stage of the project. On the other hand, since analyzed projects are unprofitable, the public sector may need to assist the private sector through the provision of subsidy after the commencement of commercial operation. Therefore, even though the public sector's financial burden for capital expenditure is smaller, continuous subsidy payment can result in larger financial burden for public sector in the long term.

On the other hand, in case of PSC gross cost and PSC modified gross cost, while the public sector finances all infrastructures, the public sector can receive some revenue share and/or annuity from the private sector. Even though, public sector's NPVs under PSC schemes are smaller than state operation scheme.

### 4.3 Results of the Analysis 2 (Sensitivity Analysis)

"Analysis 2" aims to examine the efficiency to be achieved by the private sector quantitatively to reduce the public sector's financial burden in comparison with the state operation scenario. In analyzing the cashflow, i) ridership demand, ii) capital expenditure for E&M equipment and rolling stock, and iii) operation and maintenance cost are adopted as the variables. Changes in the variables affect the profitability of the private sector as well as subsidy payment or revenue share between the public and the private sector, which eventually affects public sector's NPV.

Following figure illustrates the results of the simulation for 5 patterns of financial framework. For example, in the case of Purple line under PPP net cost scheme, private sector needs to achieve at least 24% improvement in all three variables in comparison to public sector's implementation.



Source: Study Team

Figure 4.3-1: Required Level of Improvement Achieved by Private Sector

The results of financial simulations for the three lines are concluded as follows:

- As the results of “Analysis 1” shows, smallest negative NPV is state operation because there are no private margins and the cost of capital is lowest.
- In achieving the public sector’s VfM, the private sector should achieve high level of performance than the public sector. If the private sector fails to achieve such efficiency, the public sector’s financial burden under the private participation will be larger than that under state operation scheme.
- It is quite difficult for public sector to achieve VfM, when they asking private sector to invest capital cost for E&M equipment/rolling stock. Public sector’s VfM is considered to be difficult to achieve under PPP gross cost concession, and PPP modified gross concession. And, it is no exaggeration to say that public sector’s VfM cannot be achieved under PPP net cost concession scheme.
- On the other hand, PSC gross cost and PSC modified gross cost have a greater likelihood of achieving public sector’s VfM than other 3 private participation schemes. If public sector successfully attracts enough skilled and experienced private concessionaire, and given reasonable incentive and penalty to them, public sector’s VfM can be reasonably achievable for the Purple and Pink line.

In understanding above mentioned results, attention should also be paid for the allocation of risk between public sector and private concessionaire. As shown in the following table, public sector’s risk is the highest when selecting state operation scheme, and lowest when selecting PPP net cost concession. If state operation scheme is selected as financial framework, all the risks need to be taken by the public sector. The higher the public sector’s business risk, the higher the public sector’s NPV, and vice versa. Therefore, if the public sector wishes to increase NPV, the public sector needs to take greater risk. On the other hand, if the public sector wishes to reduce risk allocation, they have to shoulder higher financial burden.

**Table 4.3-1: Probable Risk Allocation between Public Sector and Private Sector**

Risk Factor		State Operation	PSC Gross Cost	PSC Modified Gross	PPP Gross Cost	PPP Modified Gross	PPP Net Cost
Funding, Construction Stage	High Financing Cost	●	●	●	▲	▲	▲
	Inflation Risk during Construction activity	●	●	●	▲	▲	▲
	Design Deficiency	●	●	●	▲	▲	▲
	Construction Delay	●	●	●	▲	▲	▲
	Insolvency of Suppliers/ Contractors	●	●	●	▲	▲	▲
	Construction Cost Overrun	●	●	●	▲	▲	▲
	Exchange Rate Risk for Construction Activity	●	●	●	▲	▲	▲
Operation Stage	Low Operating Productivity	●	▲	▲	▲	▲	▲
	Forced Outage of Rolling Stock/ E&M Equipment	●	▲	▲	▲	▲	▲
	Operation Cost Overrun	●	▲	▲	▲	▲	▲
	High Maintenance Cost	●	▲	▲	▲	▲	▲
	Low Ridership	●	●	●	●	▲	▲
	Low Fare Level	●	●	●	▲	▲	▲
	Low Non-rail Revenue	●	▲	▲	▲	▲	▲
	Exchange Rate Risk during Operation Stage	●	▲	▲	▲	▲	▲
Public Sector's Risk	← HIGH						LOW →
Public Sector's probable NPV	← HIGH						LOW →

Note: Risk on funding and construction stage in above table refers only to E&M equipment and rolling stock  
 Legend: ● = public sector take risk, ▲ = private sector take risk, and ▲ = private and public shares risk or risk allocation will be decided by concession agreement

Source: JICA Study Team

Investment of MRT projects and its financial framework should not be decided merely by VfM comparison. In reality, there is no such thing as the best financial framework. There are so many factors regarding merits and demerits of financial framework, such as additional financing capacity, network controllability, government obligation for public transport (e.g. bail-out upon private party default), likelihood of private participation in early stages of network building, etc. Furthermore, successful implementation of MRT project has too many other factors beyond financial framework. Whichever pattern is selected, the most important is to understand the characteristics and consider upfront actions to maximize 'pros' and minimize 'cons'.

#### 4.4 Characteristics of Financial Framework Patterns

As previously mentioned, six patterns of financial framework was formulated by combining three dominant parameter choices, i.e., funding, concession model and O&M. The characteristics of each choice of three dominant parameters are as follow:

**Table 4.4-1: Pros and Cons of Each Choice of Three Dominant Parameters**

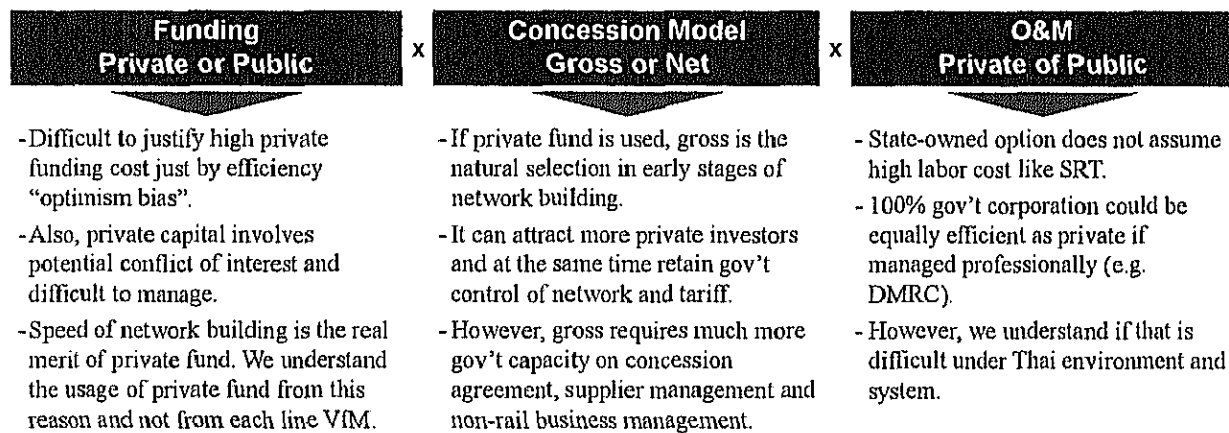
Choice of Funding	Pros and Cons
100% Public Funding	The merits of 100% public funding are considered a) accessibility to concessional loan provided from international donor agencies, b) high government controllability, and c) simple funding structure. On the other hand, its demerits are such as a) strict budget and borrowing sealing, and b) time consuming decision making process and budget sealing resulted in delay in network development.
Partial Private Funding	The merits of private funding are considered a) to prioritize the speed of MRT network development, b) to reduce the government debt burden and c) to share the risks At the same time, private funding has its demerits. First of all, the cost of capital is much higher. More importantly, government controllability of the MRT network is compromised and the complexity of project implementation becomes much higher if private party is involved.

Choice of Concession	Net Cost	The objective of concessionaire becomes an entrepreneurial profit generation. Both BMCL and BTSCL operate under this choice. However, under the current uncertain economic situation, this choice may not attract private players to participate. The ridership risk is just too high. Also, this choice gave the government limited control over important topics such as signal system and AFC specification.
	Gross Cost	This choice has the largest attractiveness to private investors since the government takes majority of risk and a concessionaire can expect stable calculated returns. For the Thai government, this choice must be coupled with a well defined concessionaire management contract and monitoring.
	Modified Gross Cost	This choice balances out the largest demerit of Gross, which is the lack of concessionaire incentive to enhance ridership. This choice provides such incentive by sharing a portion of revenue flow with concessionaire.
Choice of O&M Model	SOE Operation	Under this choice, operation and maintenance activities are wholly executed by state owned entity. It is easy for government to control implementation schedule of reinvestment & refurbishment of infrastructure, fare setting, and transport schedule. On the other hand, this choice requires government side to develop business acumen. As the case of SRT shows, this choice sometime resulted in rigidity of personnel system and payment system.
	Private Operation	This choice asks private concessionaire to execute operation and maintenance activities. Introduction of performance-based payment system and personnel evaluation system is deemed easier under this choice. Private sector is believed to bring operational efficiency. However, in the case of urban railway project, the past experiences in other countries indicated that private operation does not necessarily show superior performance than SOE operation.

Source: Study Team

### 4.5 Overall Message on Analysis of Financial Framework

Based on lessons from overseas cases and financial simulation exercise, the Study Team has synthesized overall message on analysis of financial framework. Messages are disaggregated based on the three factors of financial framework; 1) funding, 2) concession model, and 3) O&M.



Source: Study Team

Figure 4.5-1: Overall Message on Financial Framework

## CHAPTER 5 EARNING FROM OVERSEAS CASES OF URBAN RAILWAY DEVELOPMENT

### 5.1 Lessons of Financial Framework Overseas Case

The Study Team looked at following six cases: Manila, Singapore, Kuala Lumpur, Delhi, Tokyo and London.

#### (1) PPP Cases

##### From Successful Cases: MIR (Tokyo)

The major reason for success was the government special treatment to reduce the construction cost and provide interest-free loans. It should be noted that the share portion of private is small (10%). In reality mainly the governments (central and along the line) have taken care of this railway.

##### From Failure Cases: Kuala Lumpur LRT and London Metro

Most of urban railways under PPP scheme tended to suffer with a huge deficit. Structurally, just rail revenue may not justify high capital cost of private investment. Specifically for KL and London, conflict of interests was observed as a critical reason of failure. KL case had conflict with construction and London case had conflict with suppliers.

#### (2) Operation-by-government Cases

##### From Successful Cases: SMRT (Singapore) & Delhi Metro

Commonly observed success factors are as follows:

- 1) Integration of transportation and city planning.
- 2) Robust corporate governance, e.g. minimize political intervention
- 3) Government support, e.g. tax exemption, power supply contract.
- 4) High non-rail revenue ratio based on upfront planning

##### From Failure Case: LRT (Manila)

Government did not provide a defensible financial support despite maintaining relatively low tariff level. (In the LRTA's annual report of 2007, the government subsidized 1,034 Million Pesos to LRTA and its P/L turned a profit.)



Capacity planning of rolling stock did not match the population density of large city like Manila

## **5.2 Learning from the Governance in other countries**

In this section, PPP Act in the Philippines, the Railway Business Act of Japan and the regulator for the power electric business were introduced.

For the improvement of governance systems on urban railways in Bangkok, the following were extracted from the experience of foreign countries;

- a. PPP Act should have articles on comprehensive understanding of the government policy, definition of terms, eligible and priority sector/project, bidding and evaluation procedures of private sector participation in public project.
- b. The organization for regulation of urban railways has to be established.

As the case study of the electric power industries shows, the government has to have an organization for regulation of urban railways and settlement of fare level.

- c. Urban railway business act and the related ministry ordinance should be established.

Since urban railways are the public transport which citizens ride on everyday, the government has to supervise its safety from the viewpoint of security of passengers' safety. It should not be allowed for the operator to stop its service due to their financial situation alone. Passengers will be embarrassed if the fares level changes suddenly. Therefore, the conditions required to the public transport have to be clarified by the government.

## **5.3 Learning from Integrated MRT Planning in Other Countries**

In this section, for examples of designation of high floor space ratio along public transport alignment in Critiva, establishment of the agency for whole urban transport policy and its implementation in Singapore and the measures and policies for promotion of use of public transport and management of road traffic in Singapore were introduced. For the physical network integration among urban railways and other transport modes, Singapore's integrated transport hubs among public transport, Sinjuku South Entrance re-development project and fare integration and common ticket system among urban railways in Tokyo were introduced. The case of MIR (Tokyo) where Japanese Government established an act for its development can also provide good implications though this case is expressed in the Appendix.

For the improvement of MRT planning in Bangkok, the following were extracted from the

experience of foreign countries

**(1) Coherent Network Development**

Overall MRT/LRT network should be planned with feeder bus services and development of integrated transport hub with retail and commercial activities.

To encourage the use of public transit, it is recommended to establish strategic urban planning organization covering both land use and transport. In making land use plan along the line, appropriate ordinance needs to establish to maximize ridership of urban railway and revenue from real estate development.

**(2) Establishment of Whole Urban Transport Policy**

In order to make public transport more attractive and competitive with car, it is recommended to formulate policy to promote the use of public transport. The policy should include not only improvement of service level of each public transport and their integration, but also management of demand for road use by controlling vehicle usage.

**(3) Introduction of common ticketing system and fare structure**

Common ticketing and fare integration between urban railways have already been examined in Thailand. As same as Tokyo, the establishment of joint equity holding companies among railway/bus operators for managing ticket system is one of the effective solutions. Introduction of gross model concession in Bangkok is expected to facilitate fare/ticket integration.

**5.4 Learning from Concession Agreement and Supplier Management in Other Countries**

In this section, selection of the specifications in Singapore and Delhi Metro, controllable maintenance cost in Japan, technology transfer in Cairo Metro, disclosure of information in Japan were introduced.

Concession agreement and suppliers management should be improved based on the capacity enhancement of the MRTA and BMCL with following suggested learning from foreign countries.

**(1) Stepping up from Full turnkey system**

Singapore Metro and Delhi Metro cases show the fact that for establishment of the sound operation scheme, it is important to select specifications after consideration of not only the operation cost but also the financial burden on the operation stage.

Now it is identified that “Full turnkey system” is not proper at the stage where evolutionary network formation is carried out.

**(2) Proper replacement of equipments/rolling stock and its spare parts**

Suppliers may recommend an employer to replace the equipments/rolling stock or its parts at an early stage for the enhancement of safety. It is important for MRTA and BMCL to have ability to clarify if a recommendation from suppliers is truly aimed for enhancement of safety, or enhancement of increase in sales.

For clarification of the real aim of the recommendation, provision of various maintenance data and elaborate hearing from the operators/suppliers may be major tools.

**(3) Localization of maintenance**

For localization of maintenance, it is important to secure not only manuals and maintenance data but also local staff who have been engaged in the maintenance tasks under supervision of foreign engineers and have acquired maintenance skills to themselves.

In case of Bangkok urban railways, the railway company can carry out maintenance tasks by themselves by taking over the manuals, maintenance data and the skilled local staff from the suppliers

**(4) Disclosure of information**

Railway is an empirical technology and it is important to select better decision based on plenty of information gathered from other railway activities. The railway operators in Bangkok can step up to the new stage from the “Full turn-key system” without big risks if they can obtain such information.

To disclose their own information, it is important to get rid of obligation in the contract with suppliers for keeping secret.

When Gross cost model is adopted for revenue share scheme at PPP, service fee designing is important. Japanese reporting system of detailed cost break down for fare level settlement can be utilized for this issue.

## **5.5 Learning from Non-rail Business in Other Countries**

In this section, non-rail business in major Asian urban railway operators was introduced.

**(1) Outline of non-rail business**

Major findings from the benchmarking study are as follows:

- Advertisements and space rental of railway facilities are very common source of revenue from non-rail business.
- Some operators engage in other mode of transportation and consultancy service.
- Some operators adopt the rail + property business model.
- Business through subsidiaries is common method of business diversification.
- The share of revenue from non-rail business to total revenue varies according to the difference in scope of affiliated business.

## (2) Rail + Property Business Model

The major purpose of “rail + property business model” is to cover large project cost of new MRT line by raising funds from the development and sales of properties along the line. Another reason for “this business model is to increase the passengers with integrated city development which needs involvement of MRT operator.

The development business has the following constraints, such as necessity of large funds, long run up period for development, higher business risk and so on.

Therefore, the requirements for successful property development by MRT operator are as follows:

- MRT master plan integrated with urban development planning
- Establishment of laws and regulations
- Availability of land for property development
- Collaboration with the private sector

## CHAPTER 6 SUGGESTED SOLUTION DIRECTION AND ROADMAP

In this last chapter, the Study Team will bring all findings from this study and suggest recommendations on solution direction and describe the action roadmap on Thailand’s path forward.

### 6.1 Tier1: Mass Transit Sector

Tier 1 is the fundamental basis for mass transit sector to prosper. Starting from sector vision, governance of the sector as well as law and regulations need to be refined and upgraded in Thailand.

**(1) Sector Vision (Tier1)**

**Issues:** Lack of clear vision on future mass transit sector structure.

**Solution Direction:** Shift out from supplier-led model. The supplier-led model is perhaps not suitable for large cities like Bangkok, with plans for large network with many different lines. The operator (concessionaire) and contracting agency (e.g. MRTA) will need to build capacity to take more control of system integration and maintenance management.

**(2) Governance (Tier1)**

**Issues:** Weak governance structure of mass transit sector.

**Solution Direction:** Establish sector regulator, PPP regulator and integrated planning function. Strengthen contracting agency (MRTA) function and revitalize SRT.

**(3) Law and Regulation (Tier1)**

**Issues:** Sector specific law and regulation for urban mass transit does not exist.

**Solution Direction:** Develop MRT Act, refine PPP Act and MRTA Act.

**6.2 Tier 2: Integrated MRT Master Plan**

Tier2 is all about integrated planning. It is not just about plans for each mass transit lines. It is about how mass transit lines integrate with each other, with other modes of transport and with city planning.

**(1) Integrated Bangkok City TOD Plan (Tier2)**

**Issues:** Degree of integration is weak between MRT plan and city plan

**Solution Direction:**

- 1) **Organization:** Set up an oversight committee with neutral secretariat function to ensure integration between MRT plan and city plan
- 2) **Financing:** Establish a PPP scheme for station and surrounding city development
- 3) **Policy:** Special development zones around station allowing easier land consolidation (e.g. tax breaks)

**(2) Integrated Multi-modal Plan (Tier2)**

**Issues:** Degree of integration is weak between MRT plan and other modes of transport

**Solution Direction:**

- 1) **Organization:** Set up an oversight committee with neutral secretariat function to ensure integration between MRT plan and plans for other modes of transport
- 2) **Financing:** Establish cost sharing schemes government and transport operators for multi-modal access facilities such as pedestrian deck, park and ride facilities and bus bay
- 3) **Policy:** Strengthen policy guidelines for multi-modal accessibility and convenience requirements to avoid adhoc planning

### **(3) MRT Network Integration (Tier2)**

**Issues:** Degree of integration is weak between different MRT lines

**Solution Direction:**

- 1) **Organization:** Set up an oversight committee with neutral secretariat function to ensure integration within different MRT lines (i.e. integration between SRT, MRTA, BMA)
- 2) **Financing:** Establish cost sharing schemes between different lines on investment and management of common assets (e.g. depot, transit access facilities)
- 3) **Policy:** Strengthen policy guidelines for areas such as fare integration and technical performance specification of M&E systems

## **6.3 Tier3: Each MRT Line Implementation Scheme**

Tier3 is about the implementation scheme of each MRT line, which consists of financial framework, concession agreement, supplier management and non-rail business management.

### **(1) Financial Framework (Tier3)**

**Issues:** There seems to be several “myth and realities” regarding PPP financial framework for urban railway in Thailand.

- 1) **Myth:** Best financial framework exists  
**Reality:** There is no such thing as a best financial framework. Merits and demerits exist for each financial framework option.
- 2) **Myth:** Selection of financial framework can solve many of the issues in the past  
**Reality:** Financial framework alone cannot solve much. Financial framework selection needs to be packaged with concession agreement, supplier management and non-rail business management
- 3) **Myth:** Involvement of private party will achieve better construction efficiency and

operation efficiency

**Reality:** For urban mass transit, there is no evidence that private can achieve better efficiency. The “Optimism Bias” used for current value for money calculation is not recommended.

**Solution Direction:** Refine the assessment guideline. Financial framework option comparison should be made more on government trade-offs between additional financing capacity/controllability versus additional business risks. It is not recommended to use value-for-money calculations based on current ‘optimism bias’ assumptions. Practically speaking, there is no such thing as the best answer. Each option has its merits and demerits. If government decides to adopt ‘gross cost’ model, it is a natural choice in the early stages of network building because the ridership risk is too big for private investors and government can have more control for network integration purposes. However, under ‘gross cost’ model, government’s capacity requirements are much higher and the other elements of Tier3 (i.e. concession agreement, supplier management, non-rail business) will need to be carefully implemented.

**(2) Concession Agreement including Tender Preparation (Tier3)**

**Issues:** Tender preparation and concession agreement were not optimal in the past. Going forward, under ‘gross cost’ model, level of sophistication will further escalate.

**Solution Direction:** Develop a ‘gross cost’ model tender document and concession agreement template for M&E system installation, operation and maintenance.

**(3) Supplier Management (Tier3)**

**Issues:** Supplier management was not optimal in the past.

**Solution Direction:** Develop a ‘supplier management guideline’ to be included in the concession agreement.

**(4) Non-rail Business Management (Tier3)**

**Issues:** Government has not exploited the full potential of non-rail business revenue sharing in the past

**Solution Direction:** Decide on roles and responsibilities of MRTA and concessionaire for each non-rail business types.



### 6.4 Suggested roadmap for Thailand

Thus far, we have explained the issues, solution direction and suggested next steps for each of the components within Tier1, Tier2 and Tier3. To put everything into perspective, we have developed a suggested roadmap for Thai stakeholders. It is in three steps:

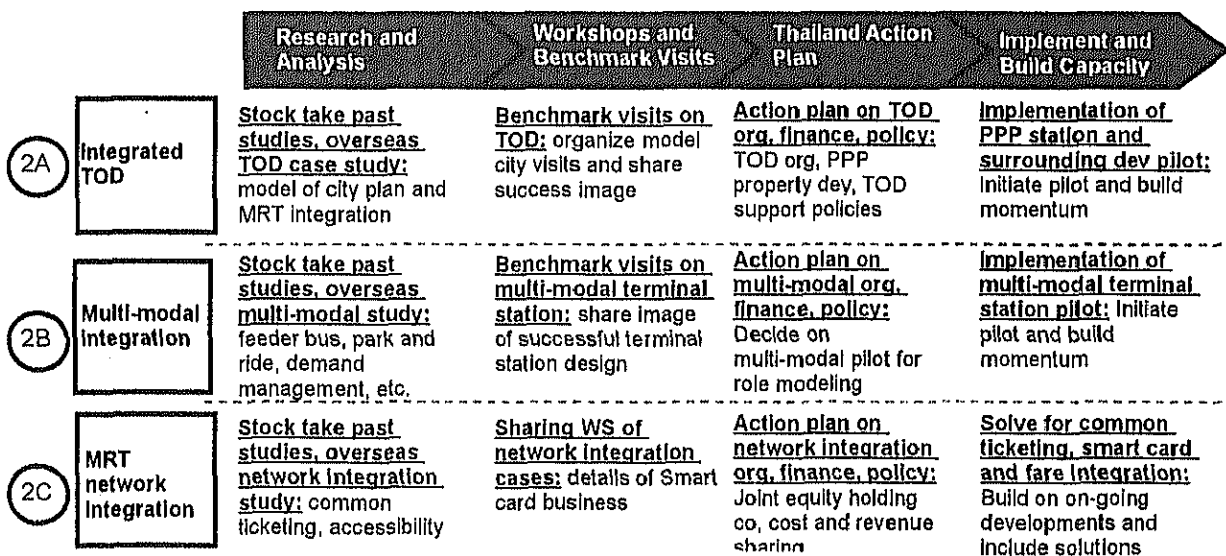
**STEP1: Establish a mass transit committee with neutral secretariat function**

**STEP2: Hold first working committee meeting and decide on priorities on the following 10 action streams along the three tiered structure.**



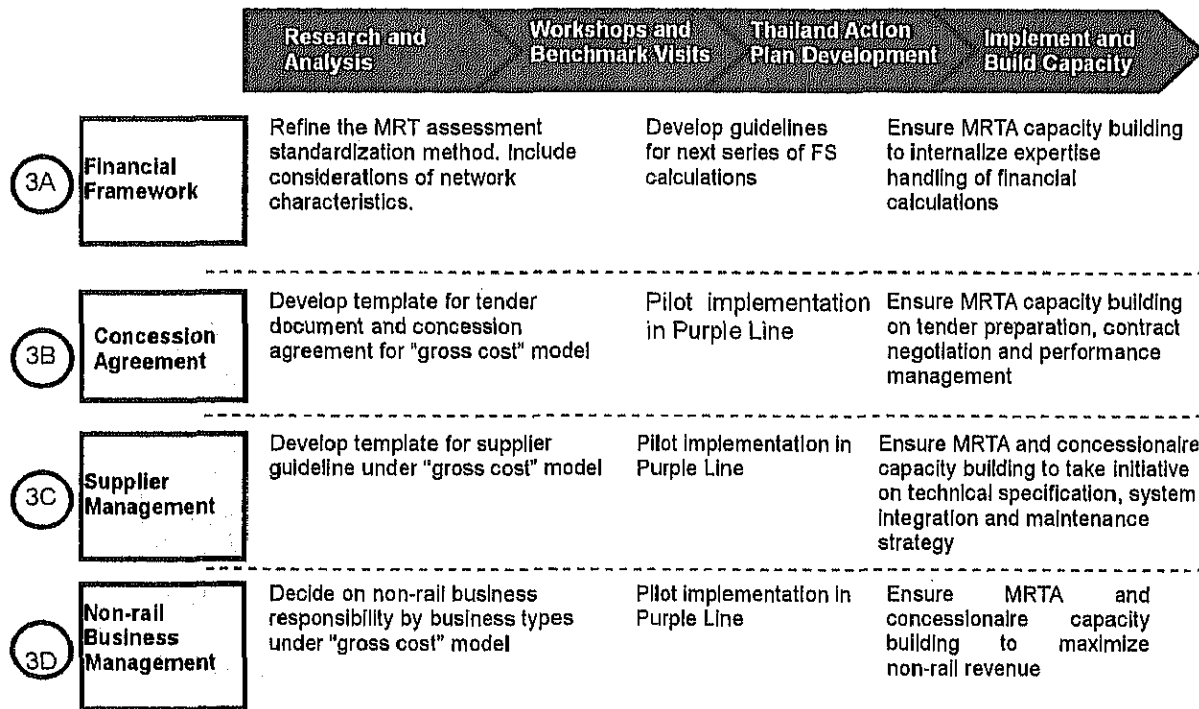
Source: JICA Study Team

Figure 6.4-1: Tier1 Next Steps



Source: JICA Study Team

Figure 6.4-2: Tier2 next steps



Source: JICA Study Team

Figure 6.4-3: Tier3 next steps

**STEP3: Launch series of action programs and monitor progress.**

After the first working committee, the secretariat should prepare to launch series of action programs. Actions could be in various forms. For example,

- Pilot initiatives within committee member organizations
- Sub-committee discussions
- Research projects by consultants



