

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 4.2-1: 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	Quality of Workmanship/ 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 concessionaire take risk, and ▲ = Private and public shares risk or risk allocation will be decided by concession agreement

Source: JICA Study Team

### 4.3 Key Implications from Financial Simulation

As redefined in Chapter 1, financial framework is one of the four key elements of implementation scheme. Nevertheless, decision on financial frameworks still holds an important weight in successful implementation. The Study Team conducted financial simulation of 6 patterns of financial framework. These patterns are basically a combination of three factors; 1) funding, 2) concession model, 3) O&M. The Study Team used these patterns for simulation purposes because these patterns are widely used in Thailand, as MAS.

It is important to note that this study simulation did not use the 'optimism bias' included in MAS. Rather, the Study Team genuinely took the capital cost difference and private risk premium margin requirements to identify the government's NPV gap between a state operation scheme and five private

participation schemes. In other words, the NPV gap should be interpreted as the efficiency gain target to achieve positive VfM. NPV gap results are highlighted in Figure 4.2-1~4.2.3 Chapter 4.2.

As the results of “Analysis 1 (public sector’s NPV gap calculation)” shows, the public sector’s NPV is negative in all scenarios. This is not surprising for mass transit infrastructure. Smallest negative NPV is state operation because there are no private margins and the cost of capital is lowest. This is also obvious. What is interesting is the degree of NPV gap. Key question is whether such gap can actually be filled by private participation. The Study Team also conducted sensitivity analysis of cash flow in all scenarios for such factors as ridership, O&M, and E&M construction efficiency. The results show that much efficiency gain should be achieved to justify private participation from a VfM point of view. The so called “optimism bias” may require further review. Difference in financial framework alone may not realize such degree of efficiency gains.

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. As described earlier, 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, as explained in Chapter 1.

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 mentioned previously, the Study Team has adopted six likely future patterns of financial framework for financial simulation. These 6 patterns of financial framework was formulated by combining three dominant parameter choices, i.e., funding, concession model and O&M as shown in Table 4.4-1.

Table 4.4-1: Financial Framework Patterns

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

Source: Study Team

Choices of funding consists of i) 100% public investment and ii) public and private joint investment, into civil works, electrical and mechanical works, rolling stock and operation.

Choices of concession model consists of i) net cost concession, ii) gross cost concession and iii) modified gross cost concessions. Under a net-cost concession, revenue goes to a concessionaire and the concessionaire pays concession fees to the contractor. As for a gross-cost concession, revenues directly comes to the government contracting agency and the concessionaire receives a pre-agreed service fee in return for transport availability and service provision. A modified gross-cost concession is same as for gross-cost concession model other than part of the incentive payment from the contracting agency to the concessionaire, which is linked to the number of passengers carried or other indicator(s).

Choices of O&M consists of i) privately managed O&M and ii) SOE managed O&M

The Study Team has basically followed the classification of standardized financial framework used by the Thai Government. It should be noted that each pattern, except Pattern 1, has several variations according to how the funding of the private sector is defined.

The characteristics of proposed six financial framework patterns are as follow:

**Pattern 1: State Operation Scheme** will be similar to Singapore or Delhi case. In Thai context, this choice is bound by the ceilings of public debt set by the government.

**Pattern 2: PPP Net Cost** is same as the existing Blue Line. Given the historical instability of MRT network master plan, this choice contains too much ridership risk due to uncertain future development of the network.

**Pattern 3: PPP Gross Cost** is considered more attractive to private investor than Pattern 1 because the ridership risk belongs to the government. Private sector needs to bear capital cost for E&M equipment/ rolling stock as well as O&M Cost, and they aim to gain profit by receiving service fee payment from government. The government must be careful with service fee negotiation.

**Pattern 4: PPP Modified Gross Cost** is the most attractive to the private sector from the viewpoint of ridership risk and has incentive mechanism to increase ridership.

**Pattern 5: PSC Gross Cost** carries a lowest risk to private sector than other private participation patterns, and private sector can expect stable calculated returns. While this pattern carries low risk to private sector, their expected return is, usually, also low. On the other hand, government needs to shoulder higher risk (such as risk of ridership, risk of cost overrun for capital investment) than the other private participation patterns.

**Pattern 6: PSC Modified Gross Cost** is similar in financial framework pattern 5. This pattern gives incentive and penalty mechanism to private sector, which will be calculated based on ridership. Partial ridership risk will be allocated to private under this choice.

#### 4.4.1 Choice of Funding: 100% Public Fund or Partially Private Fund

Thailand has already gone down the path of partial funding by the private. However, the reason for such choice needs to be clear. In urban city MRT network, it is quite difficult to prove or disprove that private party can provide efficiency gains. As discussed in the latter part of this chapter, the case study results do not bring about any evidence to prove that private can provide efficiency gains.

Therefore, 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.

Table 4.4-2: Comparison of Choices of Funding - Public and Private

		100% Public Fund	Partially Private Fund
Additional Financing Capacity	Speed of MRT Network Development	- Slow	+ Fast
	Gov't Debt Burden	- High	+ Low
Gov't Risk		- High	+ Low
Gov't Controllability		+ High	- Low
Gov't Capacity Requirement		+ Low	- High
Value for Money	Construction and Operation Efficiency	Not Proven which is better	

Source: Study Team

#### 4.4.2 Provisional Comparison of Choice of Concession Model: Net or Gross or Modified Gross

Another important choice is concession model. There are three choices; Net or Gross or Modified Gross. The characteristics of each model are as follow:

**Net Cost:** The objective of concessionaire becomes an entrepreneurial profit generation. Both BMCL and BTSC 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 contact 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.

**Table 4.4-3: Comparison of Choices of Revenue Model - Net or Gross and Modified Gross**

		Net	Gross	Modified Gross
Additional Financing Capacity	Attracting Private Investment (in early stage of network building)	- Difficult	+ Easy	+ - Med
Gov't Risk		+ Low	- High	- High
Gov't Controllability		- Low	+ High	+ High
Gov't Capacity Requirement		+ Low	- High	- High
Value for Money	Ridership Enhancement Incentive	+ High	- Low	+ - Med
	Operation and Maintenance Efficiency	Not Proven which is better		

Source: Study Team

**4.4.3 Comparison of Choice of O&M Model: SOE Operation or Private Operation**

The other choice is O&M. There are two choices; SOE operation or private operation. The characteristics of each model are as follow:

**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.

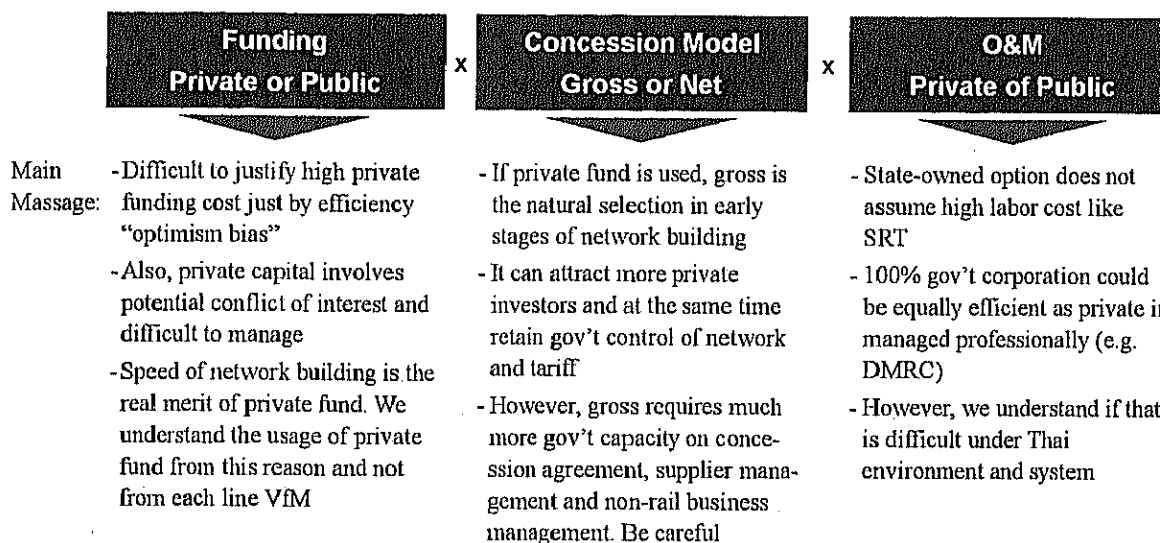
**Table 4.4-4: Comparison of Choice of O&M Model**

		SOE Operation	Private Operation
Additional Financing Capacity		- Low	+ Med
Gov't Risk		- High	+ Low
Gov't Controllability		+ High	- Low
Gov't Business Capability Requirement		- High	+ Low
Value for Money	Flexibility for Labor Management	- Low	+ High
	Operation and Maintenance Efficiency	Not Proven which is better	

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

**Message on funding:** The simulation results indicate the difficulty of justifying private funding cost just by efficiency “optimism bias.” For example, how can private consortium achieve construction efficiency of 30% better than state operation. Key to construction efficiency is to ensure integration between design, construction and O&M. This is to ensure lifecycle cost perspective. This can be well executed by state operation as well. Case of Delhi Metro is a good proof. In addition, as seen in Kuala Lumpur and London case, private consortium can bring in conflict of interests and actually achieve construction inefficiency.

However, this does not mean Thai government should abandon PPP scheme. The real merit of PPP for large infrastructure is additional financing in addition to the government, which will speed up network building. Value of network building speed will benefit all players involved in each line implementation. In a network business, value of speed is significant. This is because network has a compounded effect on each line’s ridership. A virtuous cycle of increased convenience, increased ridership and non-rail business exists. Therefore, it is the study team’s view that PPP scheme could be justified from this point of view.

**Message on concession model:** If private fund is used for above reason, then, gross concession model is a realistic choice. This is not because “gross cost” is better than “net cost” indefinitely. This is because current situation in Thailand is still early stages of network building and ridership risk is uncontrollable by private party. The ridership is significantly affected by factors for which the government should be responsible, as Tier1 and Tier2 explained in Chapter 1. Therefore, as a matter of course, the government is expected to be an owner of ridership risk in early stages of network

building. In addition, “gross cost” allows government control on tariff and specifications related to network integration. This is again important in the early stages of network building.

Meanwhile “gross cost” has its disadvantages. It requires the government’s continuous management of concessionaire and suppliers. In other words, government cannot delegate everything to private party and lay back. This is because a concessionaire will be paid an annuity service fee from government with relatively low risk. Efficiency improvement needs to be monitored and managed carefully by government contracting agency. For example, specific KPI target need to be agreed upfront and included in the concession agreement. Also, government contracting agency needs to play a stronger supplier management role. This is because the cost of equipment and maintenance is included in the annuity service fee on a ‘cost plus’ basis. Therefore, stricter supplier cost management is an important government responsibility. Lastly, non-rail business requires attention. If government is taking ridership risk, then, government should be entitled to the revenue streams of non-rail business.

**Message on O&M:** It is a myth to assume that private company can manage O&M more efficiently than state operation company. When state operation company is referred, it is not proper to take for granted the high cost structure and inefficient mindset prevalent in SRT. There are ways to establish 100% government owned corporation with high efficiency, similar to the case of Delhi Metro Corporation. What is important is to hire professional top management team (preferably from the private sector) that can set the right corporate culture. Providing O&M concession to private company is also an attractive option if professional top management is guaranteed. Again, the key issue is not about a question of state operation company or private company. It is how to ensure conditions for professional top management team. If a option of operation by private company is easier to achieve such conditions under Thai environment and system, this option is understandable. However, in this case, it is important to make a parent company (or group parent companies) focus on O&M company’s profitability and success.





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

### 5.1 Lessons of Financial Framework Overseas Case

#### 5.1.1 Outline of six city cases in urban transport

For overseas cases, the Study Team looked at following six cases: Manila, Singapore, Kuala Lumpur, Delhi, Tokyo and London. The Study Team selected these cases with consideration of variety of PPP and state operation cases. Also, the Study Team tried to look into both success cases and failure cases basically from the financial point of view.

Table 5.1-1: Description of Overseas Cases in ITR1

City (Country)	Name of Railway	Operator	Type of Operation	ODA Project
Manila (The Philippines)	LRT 1	LRTA	State Operation	Yes (Belgium)
	LRT 2			Yes (Japan)
	MRT 3	MRTC	PPP	No
Singapore	LRT	SMRT / SBS Transit	State Operation/Private	No
	MRT	SMRT / SBS Transit	State Operation/Private	No
Kuala Lumpur (Malaysia)	LRT System I	STAR → RapidKL	PPP → State Operation	No
	LRT System II	PUTRA → RapidKL	PPP → State Operation	No
	Express Rail Link	Express Rail Link	PPP	No
	KL Monorail	KL Monorail → RapidKL	PPP → State Operation	No
Delhi (India)	Delhi Metro	Delhi Metro	State Operation	Yes (Japan)
Tokyo Metropolitan Area (Japan)	MIR (Tsukuba Express)	MIR	PPP	No
London (U.K.)	London Underground	Infracos (for Infrastructure Maintenance)	PPP	No

Source: JICA Study Team

#### 5.1.2 Comparison of Financial Performance in Six Cases

From the reports and data shown in the Appendix 5 and 6, the following can be extracted as the outline of urban transport in each city.

##### [Summary of Individual reports]

#### (1) Manila; Light Railway Transit Authority (LRTA, public) and Metro Rail Transit Corporation (MRTC, private)

LRTA had a big deficit in 2004. MRTC had a big deficit in 2003. Both Manila MRT (Line3, MRTC) and LRT(Line1 and2, LRTA) are governmental financial burden though they have been recognized as convenient means of transport in Metro Manila. This relatively high ridership brought reasonable revenue return but it is not enough to cover capital cost which is too heavy for the operator. In addition, low non-rail revenue (less than 1% of rail revenue) pressures

overall profitability. For LRT1 of Manila, with the existing number of passengers, its transportation capacity of train-sets is insufficient at peak time. Original capacity planning at design stage seems too conservative for large city like Manila.

**(2) Singapore; Singapore Mass Rapid Transit(SMRT, public)and SBS Transit(public)**

Singapore MRT (Other than North East Line, SMRT) and LRT (North East Line, SBS Transit) are successful case of 100% government development. Singapore MRT and LRT operated by government with its public entities are highly evaluated with its operational and financial efficiencies due to integrated transport planning by government.

Another salient feature is its implementation system by government agencies, i.e., MRTCC (Mass Rail Transit Corporation) to make efficient construction and SMRT and SBS Transit to manage operation under corporate governance system of global standard.

**(3) Kuala Lumpur; STAR Sdn Bhd (private), PUTRA (private) and KL Monorail (private)**

Malaysia PPP cases are negative examples for Bangkok urban transport system.

PPP operation for 4 lines were all facing deficit and, as a result, 3 lines were nationalized. The following are the main reasons of unprofitable operation.

- 1) Ridership were much lower than forecasted by the concessionaires
- 2) The government's failure to implement policies for promotion of public transport
- 3) Poor integration of urban railway systems and integration with other modes of transport

It is said that private parties, who are the shareholders of these companies, made profits during construction and did not pay much attention on operational profit

**(4) Delhi; Delhi Metro Rail Corporation(DMRC, public)**

DMRC is a success case. Key reasons are as follows:

Role definition between DMRC and government is clear. Government made full support to DMRC to ensure a defensible financial structure (e.g. tax exemption, land development rights and energy cost contracted).

DMRC built in-house capabilities by usage of consultants and suppliers (e.g. maintenance capability, system integrator role). DMRC set up corporate governance system of global standard and eliminated all political intervention.

**(5) Tokyo; Metropolitan Intercity Railway (Its major shareholders are public. Private sectors have a small portion of shares)**

The project is considered to be successful case, thus far. Key reasons for success are as follows.

- 1) Joint city and railway planning based on support by special law established for this project
- 2) Sound financial arrangements: Provision of fund without interests and large government equity amount
- 3) Introduction of advanced automation systems to minimize labor cost

**(6) London: London Underground (public) / Metronet (private)**

This is a unique case of PPP in which private sector does not operate railway itself but focuses on upgrading and maintaining infrastructure. One consortium has maintained profit every year. The other, Metronet, fell into financial difficulty and was nationalized. The main reason for the failure is said to be conflict of interest. The five shareholders of Metronet were suppliers to Metronet and had different interests. This also led to lack of management integrity.

**[Learning from foreign cases]**

**(1) PPP Cases**

From Successful Cases: MIR (Tokyo)

The size of deficit of MIR (Japan) is rather small. The major reason for this 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. High non-rail revenue and/or subsidy from government were needed. 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:

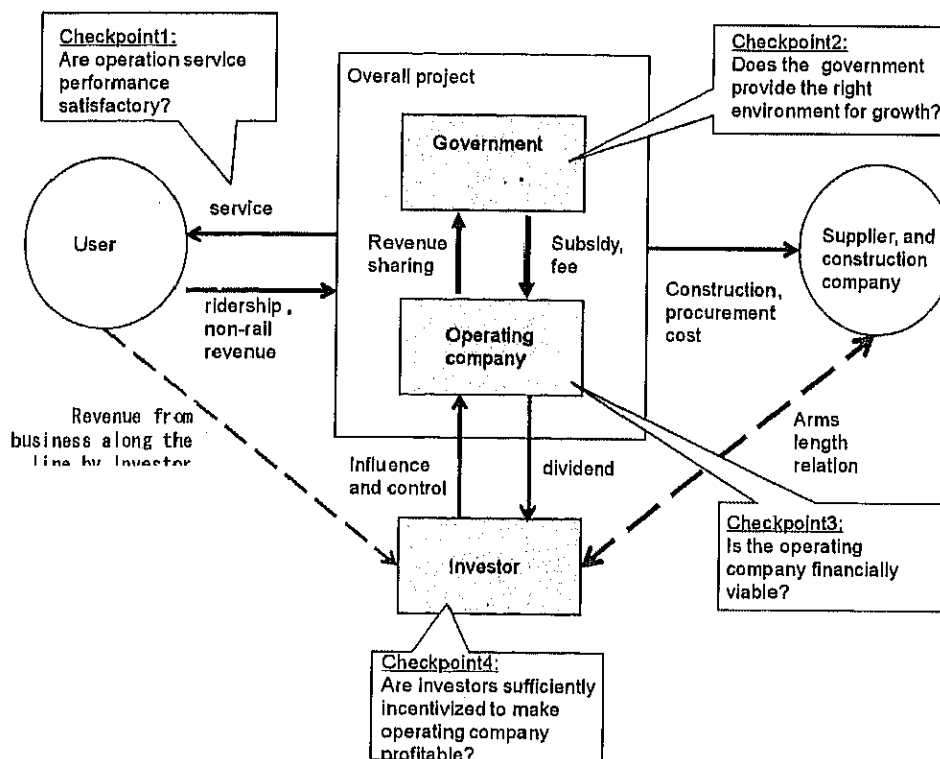
- 1) Integration of transportation and city planning.
- 2) Robust corporate governance, e.g. minimize political intervention
- 3) Government support, e.g. tax exemption, power supply contract.
- 4) High non-rail revenue ratio based on upfront planning

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

### 5.1.3 Key Lessons from Overseas Financial Framework Cases

The Study Team faced two key challenges in evaluating the overseas cases. First, a fundamental question on how to define success and failure of MRT project should be clarified. Second, there are natural limitations to what can be analyzed from publicly available information source. Nevertheless, the Study Team believes that examination of overseas cases has grave implications for Thailand.



Source: JICA Study Team

Figure 5.1-1: Checkpoints to Evaluate Success and Failure

In terms of how to define success and failure of MRT project, it is not an easy question to answer. This is because success can be different depending on the standpoint of stakeholder. For example, success for investor is the total return, which is not only dividends from the operating company but also could be in the form of their own business around the railways and construction/supplier margins if investors have such business portfolio. Therefore, a non-profitable operating company does not necessarily mean failure for the investors. For the governments, a non-profitable operating company would probably have negative effects. Government may need to bail out the company in order to maintain public transport operations. Perhaps, it is easier to grasp by looking at the diagram on

Figure 5.1-1.

The above diagram shows key players for MRT project, which are government, operating company, investors, users and suppliers/construction companies. In case of PPP, investors are private consortium. In case of state operation, an investor is the government. Since this is a public infrastructure project, the Study Team implicitly assumed that success should be defined for user and government. From this point, the Study Team has set four checkpoints to determine success/failure and synthesized case lessons from each of this view. The four check points are:

- **Checkpoint 1:** Are operation service performance satisfactory? This is clearly one of the critical factors to define success. After all, the infrastructure is made for the users. However, in the case study comparison of six cities, the Study Team could not clearly articulate differences in performance. This is partially due to limitations of data but also related to the characteristics of mass transit operation. MRT can be considered a huge centralized facility business with high degrees of technical automation. Therefore, service performance is typically stable and standardized. One potential failure case from this aspect is Manila. This is because trains are highly congested during peak hour with rather limited room to provide transportation capacity. Perhaps, the original capacity planning did not match the densely populated city like Manila.
- **Checkpoint 2:** Does government provide the right environment for growth? It is very often misunderstood that once PPP tender is finished and project is in the hands of private consortium, the government's role is complete. This is clearly not the case for mass transit. For example, shift from vehicle to public transport cannot be controlled well by the private. This is a policy matter. Also, in a network business model, one standalone line cannot survive without the rest of the network built. Changes in network planning and schedules due to political intervention can severely damage the original ridership assumptions. In the case study, two success cases, Singapore and Delhi, stand out in this aspect. Singapore is a great example of integrated planning. City plans are well aligned with MRT plans, in which real estate development is well planned and implemented surrounding stations. This will ensure stable ridership. Delhi is a great example of excellent corporate governance. Delhi Metro Corporation was given autonomy to make consistent and lasting decisions with minimal political intervention.
- **Checkpoint 3:** Is the operating company financially viable? This is perhaps the most obvious checkpoint. However, it is very important to note that negative profit does not necessarily mean poor operations. Actually, operating company's profitability is mostly determined during financial design, in the form of direct or indirect subsidy decisions. As already suggested, the fare level is decided by the affordability of passengers. It is not decided by the construction/operation cost. On the contrary, for the construction of urban railways, huge quantities of civil works are required and various computerized equipments and rolling stock need to be equipped. Hence operating companies cannot survive without some form of subsidy

in the early stages of network development when its ridership is low. A key is to set it at the right level. Too much subsidy will spoil operating company's own efforts to manage efficiency. Too little subsidy, on the other hand, will lead to red figures, which may damage staff morale and ultimately lead to some form of debt restructuring. In our case example, Tsukuba Express is a great case of government's funding support with high government equity ratio and interest-free loans. Delhi Metro had defensible financial structure with tax exemptions, access to low cost power supply and subordinated loans.

- **Checkpoint4:** Are investors sufficiently incentivized to make operating company profitable? This may sound like a strange question but the Study Team considers it quite relevant. In large infrastructure projects like mass transit, significant portion of cash-flow transactions are in the construction and installment of E&M facilities. In other words, from a genuine business point of view, this portion is much more attractive than potential profit gains from operations. Out of the six cities in the case study in the Study, Kuala Lumpur was a failure case in which the parent company of operating company was construction company and lacked construction efficiency. London is another such failure case, in which Metronet's parent company was supplier.

These checkpoints are not comprehensive and there are probably more points that define success. However, this is the Study Team's attempt to clarify the lessons from overseas and derive implications for Thailand. In theory, the notion of Value for Money should also be a part of measurement for success. However, especially in large infrastructure development projects, Value for Money calculations are made with too many assumptions and have the risk of misrepresenting what is really important in implementation design.

## **5.2 Learning from Overseas Cases on Governance/Law and Regulation Cases in Other Countries**

How to govern PPP scheme of the urban railway business? How to secure the safety of citizens who commute between their home and offices everyday as the government? In this section, from these two points of view, the foreign case studies were carried out.

### **5.2.1 Cases in other countries**

#### **(1) PPP in the Philippines**

Philippines' act to promote public-private partnership for development projects is Republic Act (R.A.) No. 7718 (May 1994, amendment of RA957), which is called the BOT Law. BOT is the abbreviation of Build-Operate-Transfer. The Philippine BOT Law consists of two main parts: "the Act" and "Implementing Rules and Regulations," and "Annex: Process Flow".

Section 1 of the Act, "Declaration of Policy" provides the following: "It is the declared policy of the State to recognize the indispensable role of the private sector as the main engine for national growth and development and provide the most appropriate incentives to mobilize private resources for the purpose of financing the construction, operation and maintenance of infrastructure and development projects normally financed and undertaken by the Government. Such incentives, aside from financial incentives as provided by law, shall include providing a climate of minimum government regulations and procedures and specific government undertakings in support of the private sector."

In Section 2 of the Act, "Definition of Terms" explains type of schemes to be applied, i.e., BOT, Build-Transfer (BT), Build-Own-Operate (BOO), Build-Lease-Transfer (BLT), Build-Transfer-Operate (BTO) and other schemes.

Following the main body of the Act, "Implementing Rules and Regulations" stipulates detail terms of conditions of private sector participation for public projects. Section 2.2 is a list of eligible 18 sectors, e.g., highway, railway, non-rail mass transit, port, and airport. "Implementing Rules and Regulations" consist of 112 sections of 15 Rules<sup>27</sup>. Together with the Act and "Implementing Rules and Regulations," this BOT Law gives a 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.

## **(2) Railway Business Act in Japan**

Railway is a business which is utilized by a lot of people everyday and required to maintain its system safe at a high level. A railway operator should not stop its service according to their financial situation alone. Once the line is constructed, the operator has the exclusive power for the transport along the line. In Japan, such businesses are designated as a "Public business" and the government has to regulate these business operators by a law. These businesses cannot be freely started without permission from the government. The railway business law is one of the laws for the regulation of public business operators. In this law, as is shown in the following table, the procedures for the permission to a designated business operator and various articles for security of railway safety as the government are stipulated. Under these law systems, Railway Bureau of MLIT has been established as an organization for the railway regulator.

Under this law, "Ministerial Ordinance on the technical standards for railways" is stipulated for the regulations on the structures of equipments and rolling stock. "Procedures and rules to ensure safe and sound railway businesses" and "Railway transport regulation" are also stipulated for the settlement of tariff levels and related condition of transport.

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<sup>27</sup> Major Rules: Rule 3 The BOT Pre-Qualification, Bids, and Awards Committee; Rule 4 Bid/Tender Documents; Rule 5 Qualification of Bidders; Rule 8 Evaluation of Bids; Rule 10 Unsolicited Proposals; Rule 12 Contract Approval and Implementation; Rule 13 Investment Incentives and Government Undertakings

**Table 5.2-1: Major Contents of Japanese Railway Business Law**

Issues	Main articles
Permission of railway Business	<ul style="list-style-type: none"> <li>• Permission of the railway business</li> <li>• Items required for application of permission</li> <li>• Criteria for permission</li> <li>• Disqualification causes</li> </ul>
Implementation and construction	<ul style="list-style-type: none"> <li>• Modification of basic business plan</li> <li>• Permission on commencement of construction</li> <li>• Modification of construction plan and railway facilities</li> <li>• Confirmation of rolling stock specification</li> </ul>
Operation	<ul style="list-style-type: none"> <li>• Fare and charges</li> <li>• Operation plan</li> <li>• Report of incidents</li> <li>• Order of business improvement</li> </ul>
Closing of business	<ul style="list-style-type: none"> <li>• Transfer and taking over of business</li> <li>• Halting and closing of the railway business</li> <li>• Dissolution of a corporation</li> <li>• Halting and cancellation of permission</li> </ul>

Source: Railway Business Law (MLIT, Japan)

### (3) Roles of Regulator

It is useful to observe other sectors to understand the role of regulator to govern one sector. For example, electric power industries are one of the business fields where PPP is introduced actively. Now in the PPP scheme of the power industries around the world, normally Regulators are established. Its roles are as follows.

#### a. Issuance of business license and supervision of electric power industries

By the nature of this business like railway business, power transmission and power distribution companies carry out their business exclusively inside their franchise areas. Hence especially regulation by the Regulator is required.

#### b. Provision of technical regulation and its supervision

In the electric power system, power supply is carried out through consolidated networks of power generation, transmission and distribution. It needs consolidation of the technical standards among these three businesses.

#### c. Establishment and regulation on price mechanism for end users and trade rate between power companies

The above issues in electric power industries are also common to those in the urban railway business industries. When construction and operation of railways are entrusted to a private sector, the government has to establish a function of the regulator. In the Japanese Railway Business Law, which is introduced in the previous paragraph, the issues on what the railway regulator has to do are stipulated.



### 5.2.4 Lessons learned on Governance Cases in Other Countries

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

- a. PPP Law 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.

The regulator suggested here is so called a sector regulator. It should be noted that, in a PPP scheme, an independent regulator from the line ministry is also required to settle the conflict between the government contracting agency and the concessionaire.

- 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.

The relationship between the conditions for public transport designated in the act and ministry ordinance and the contents in the PPP contract is expressed in the following table by setting the railway signal as an example.

**Table 5.2-2: The Relationship between the Conditions in the Act and Ordinance and the Contents in the PPP Contract**

Issues	Act and ministry ordinance	Contract with Concessionaires
Current situation of urban railways in Bangkok	There is no act for urban railways	General description for the signal system is only expressed on the Appendix and no specific specifications are expressed on the contract.
Recommended governance system	The signal performance allowed for urban railways should be shown in the act and ordinance. Several alternatives for them are also to be expressed as examples	Signal specifications to be installed on the line are expressed.

Source: JICA Study Team

## 5.3 Learning from Integrated MRT Planning in Other Countries

### 5.3.1 Formation of Comprehensive Urban Transport Master Plan

#### (1) Designation of High Floor Space Ratio along Public Transport Alignment

The BRT (bus rapid transit) transport system of Curitiba in Brazil is often given as an example of the most successful integration of transport and land use. Curitiba was organized into transport corridors very early in its history.

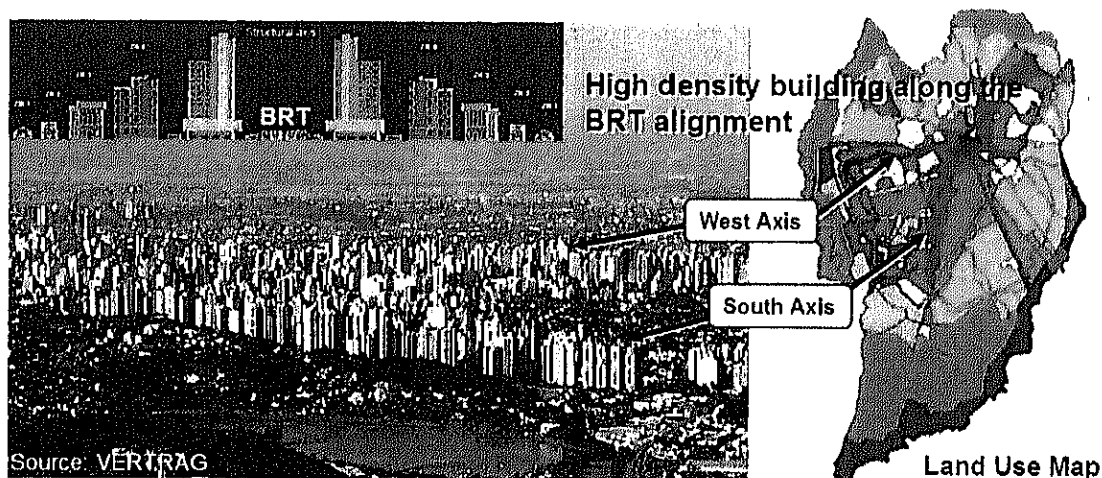


Figure 5.3-1: Relationship of Land Use Plan and MRT Alignment

Over the years, it has integrated its zoning and transportation to place high density development (designation of high space floor ratio to the area) along the alignment of public transportation. Since the failure of its first, rather ambitious, city plan with subway systems, due to lack of funding, Curitiba finally adopted more economical public transport, namely Bus Rapid Transit (BRT). Since then, high density development has been realized along the BRT alignment.

#### (2) Establishment of the Agency Responsible for Whole Urban Transport Policy and its Implementation

In September, 1995, the Singapore Government established the Land Transport Authority (LTA) as a statutory board of the Ministry of Transport by merging four agencies (Registry of Vehicles, Mass Rapid Transit Corporation, Roads & Transportation Division of the Public Works Department, and Land Transport Division of the then-Ministry of Communications). LTA is solely responsible for planning, developing and managing land transport in Singapore. In addition to formulation of road plan and urban railway plan, LTA recently took over the role of a central bus network planner from PTC (Public Transport Council). Since various urban transport related functions are gathered to LTA, LTA has been able to formulate comprehensive land transport master plan and coherent transport policy.

According to the Land Transport Masterplan, report issued in March 2008, LTA outlines the strategic thrusts to make the land transport system work for the people and the city. The three strategic thrusts are to: 1) Make Public Transport a Choice Mode, 2) Manage Road Use, and 3) Meet the Diverse Needs of Our People.

### **(3) Singapore's Measures and Policies for Promotion of Use of Public Transport and Management of Road Traffic**

In Singapore, LTA formulated the strategy which consists of "promotion of use of public transport" and "restrict use of vehicle". The former includes expansion of urban railway network, increase in number of feeder buses operations, development of integrated multi-modal transport hub, introduction of bus priority traffic signaling system, expansion of bus lanes, and introduction of Integrated Multi-Modal Travel Information System.

"Restrict use of vehicle" includes introduction of electronic road pricing system (ERP), which charges fee on motorists based on the quantity, place or time of the use of their vehicles, introduction of high vehicle related taxes, limitation of number of private vehicle through Vehicle Quota System, and limitation of parking space.

Since urban railway systems has been well developed in Bangkok, the introduction of the above-mentioned measures needs to be examined.

## **5.3.2 Physical Network Integration among Urban Railways, Bus, and Other Mode of Transport**

### **(1) Integrated Transport Hubs for Seamless Connectivity among Public Transport**

LTA in Singapore has been introducing fully integrated transport hubs where bus interchanges and MRT/LRT stations are co-located with retail and commercial facilities. Such integrated transport hubs allow transfers to be done comfortably and provide additional convenience as commuters can do some shopping before transferring to their connecting bus or train.

There are four bus interchanges which are fully integrated with the MRT/LRT stations and adjoining commercial developments. Two more integrated bus interchanges are under construction and will be completed by 2011. Over the next 10 years, LTA plans to build another five integrated interchanges with re-development in the respective areas, to better integrate our transport hubs with the surrounding facilities.

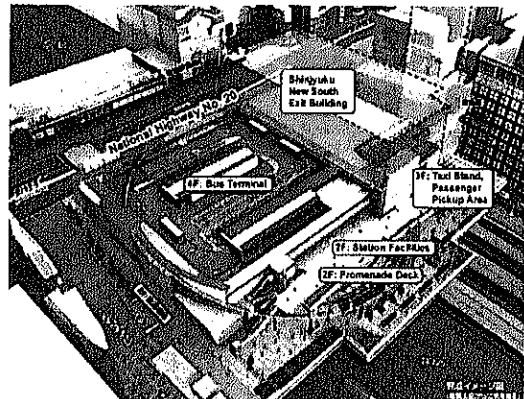
LTA is introducing more retail spaces to induce more passengers into these transport nodes. According to Land Transport Masterplan, LTA plans to transform these places into lifestyle hubs, making them fun and exciting places and accessible meeting points among friends and family.

## (2) Shinjuku South Entrance Re-development Project

Sinjuku station is located in the major commercial and administrative center of Tokyo, and is served for 8 urban railway lines (4 JR lines and 4 private railway lines). After the development of new JR Line (Saikyo Line), lots of large-scale commercial buildings have been developed around station's south entrance. Along the development of surrounding areas of the south entrance, the number of passengers using the south entrance has sharply increased. Although the station's south entrance was congested, since the station's south entrance faced onto the road bridge maintained by Tokyo Metropolitan government, there was no space for station square and/or pedestrian deck.

When reconstruction of the decrepit road bridge project was raised, the Tokyo Metropolitan government and JR formulated re-development project around the south entrance area through discussion, to ease congestion at the area.

Central government and the Tokyo Metropolitan government are responsible for constructing the new road bridge as well as developing station square and bus terminal on the newly constructed artificial ground above JR's existing rail track. While construction of artificial ground usually needs huge capital investment, since JR provides right of way above rail track to Tokyo Metropolitan government for free, project cost for artificial ground was substantially reduced.



Source: JR East

On the other hand, JR plans to relocate the existing station building on the newly constructed artificial ground, and then construct high rise commercial building at the land where currently a station building is situated. JR expects to earn profit from non-rail business at the new commercial building.

### Shinjuku South Entrance Redevelopment Plan

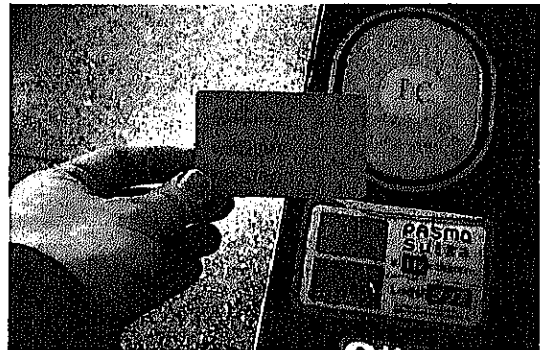
In this case, both JR and the Tokyo Metropolitan government obtain benefits. Corporation and Joint development among stakeholders enabled to bring about win-win outcome. Passengers are also received benefits from convenient station square and integrated station and bus terminal building. Now reconstruction of the road bridge and construction of artificial ground have already completed. Station square and bus terminal on the artificial ground are currently under construction. Construction of JR's high rise building will be started after completion of new station building.

In the case of Bangkok, while construction of artificial ground above rail track may not be required, role sharing between public sector and railway operator in Shinjuku station serves as a useful reference for Bangkok's station square development.

### (3) Fare Integration and Common Ticket System among Urban Railways and Other Public Transport

Urban railways in Tokyo are operated by various railway operators, including JR East, Tokyo Metro, the Tokyo Metropolitan Government and other private railway operators. As same as the fare structure adopted for Blue line and SkyTrain, the fare of urban railways in Tokyo consists of boarding charge and distance charge. In the past, passengers needed to purchase ticket and pay boarding charge whenever they transfer between the lines operated by different companies. Passenger suffered inconvenience in such different ticketing system. Moreover, the systems also imposed higher financial burden on passengers.

To ameliorate these problems, a rechargeable contact-less smart card ticketing system for public transport called SUICA has been introduced since November 2001 by JR East. Also, in March 2007, the private railway, bus, and subways operators in the Tokyo metropolitan area introduced a similar smart card system (PASMO card) using same radio frequency identification (RFID) technology of SUICA to replace the former magnetic card system (Passnet). Through the collaboration between JR East, private railways and bus operators, passengers can use SUICA cards wherever PASMO cards are accepted to ride any railway or bus. In addition, after the introduction of PASMO/SUICA system, boarding charge at transfer has been partially reduced. In order to introduce common ticketing system, urban railways and bus operators established a joint equity holding company.



PASMO and PASMO Reader on the Ticket Gate



Soft Drink Vending Machine compliant with PASMO/SUICA System

In Bangkok, IC card ticketing system has already been introduced by BTSC and BMCL. To introduce common ticketing system and common fare structure, establishment of a joint equity holding company among railway operators will be expected.

#### 5.3.4 Lessons Learned on Integrated MRT Planning

##### (1) Coherent Network Development

It is recommended that overall MRT/LRT network should be planned with enough consideration of feeder bus services, so that passengers can reach the transfer MRT/LRT stations quickly. Also, it is recommended to develop integrated transport hub where MRT, LRT and bus

stations are co-located with retail and commercial activities. Integrated transport hubs are expected to contribute not only to increase in ridership of public transports, but also to increase in the non fare revenue of railway operators.

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

## **(2) Establishment of the Agency Responsible for 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 growth and restraining usage.

In order to formulate comprehensive urban transport planning, it is recommended to strengthen functions of existing agency (such as OTP) or to establish the new agency in charge of making whole urban transport policy and responsible for its implementation

## **(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**

For establishment of the sound operation, what the contracting agencies have to do in preparation for the Concession? From these points of view, the case studies in other countries were done as shown in the following sentences. It should be noted that in the Gross concession, as all risks will be shouldered by the governments, the contracting agencies will have to directly manage suppliers in effect.

### **5.4.1 Cases in other countries**

#### **(1) Decision makers of specifications in Asian successful urban railways**

In successful urban railways in Asia, decision makers for specifications were General consultant on behalf of the project owner or invited railway experts involved in their project. In failure cases in Asia, railway operators select specifications from those provided by suppliers.

- a. Since there was no urban railway in Singapore when their first project was implemented, foreign experts of General Consultant planned and managed the project on behalf of the project owner. Nowadays as Singapore metro has fully acquired the technology for urban railways, they arrange the specifications of their Metro project by themselves and procure required products for their specifications from suppliers.
- b. In the Delhi Metro case, railway experts from Indian Railways have taken leading parts in the project. They listened to the explanations of the experts from Hong Kong Metro which was employed as an advisor to Delhi Metro. Then, Delhi Metro selected specifications after careful consideration by themselves.
- c. In Japan, railway operators select the specifications of equipments and rolling stock for their railways by themselves. Japanese suppliers produce equipments and rolling stock based on the specifications issued by railway operators. Hence, railway operators' experience obtained in the course of their operation and maintenance are fully reflected on the specifications of Japanese equipments and rolling stock.
- d. In Line 1 of Manila, the LRTA selected their specification from those recommended by the fund donor. This is similar to a selection system in procurement of automobile or aircraft. As the result, they have been suffered with the lack of capacity of rolling stock.

The selection system of urban railways' specification in Bangkok seems similar to Manila's case. Of course, in Bangkok, the shortage of capacity has not been brought about. However, since they adopted the full turnkey system, even a selection of specifications was handed to suppliers. By referring to the methods in other countries, the problems, which urban railways in Bangkok have, can be overcome.

## **(2) Controllable cost in urban railway operation**

Direct operation cost in urban railways tends to be in proportion to the operation factors, such as a traveling kilometer. Only the replacement costs of equipments or rolling stock or its parts for maintenance can be varied in coordination to the cost management policy.

In Japanese railways, when a big profit is foreseeable in the mid course of the year, front loaded replacement of aged or frequently troubled parts of equipments/rolling stock is planned actively in order to reduce the replacement cost in coming years and the corporate tax of the year. When a profit volume seems to be smaller than expected, planned replacement of parts of equipments/rolling stock is postponed. As seen in the above instances, these replacement costs of aged equipments/rolling stock parts are controllable expenditures which are rare within operation expenditure.

Replacement timing of equipments or rolling stock also can be postponed or front loaded from the long term financial viewpoint and safety/service level.

Suppliers to whom maintenance tasks are outsourced may utilize this method for increasing their own profit. When designing the structure of annuities for Gross model for PPP Concession, checking system against excessive expenditures should be carefully prepared.

### **(3) Technical knowledge transfer**

#### **a. Dispatching staff to a maintenance outsourcer**

Technology is possessed by the staffs involved in real maintenance tasks. Normally, the salaries of engineers in foreign companies are higher than those in local companies. Hence if workers are directly employed by foreign suppliers' company, skilled engineers may not come to the local railway operators after the completion of maintenance outsourcing.

Cairo metro outsources their maintenance tasks to the suppliers in order to carry out good maintenance. In this scheme, the local staffs for the maintenance tasks have been dispatched from Cairo metro. With this system, basically Cairo metro can secure staffs with good maintenance skill even after completion of maintenance outsourcing.

It is worth for Bangkok urban railway operators to consider the adoption of this measure for a technology transfer.

#### **b. Exchange of information with other railway operators**

Railway is an empirical technology of experience and a railway operator cannot obtain every experience for all cases by themselves.

Generally speaking, suppliers who cherish their own technology tend to stick to keep their technology secret. On the contrary, the railway operators are not competitors each other, but are good information resources. Railway operators should exchange their technical specifications, operation and maintenance data mutually.

In Japan, railway technical journals are issued for each railway technical field. On these journals, outlines of construction projects and newly developed technical methods for construction works are introduced, moreover, specifications on newly installed equipments /rolling stock are also described in detail.

In Japan, Ministry of Transport requires each railway to report their revenue and expenditure in detail to the Ministry for estimation of a proper fare level and the Ministry publishes these data as the annual railway statistics.

Experiences which each railway operator can have are limited. By consolidating other railway operators' experience to their own experience, each railway operator can make more proper decision.



Since each urban railway in Bangkok has adopted “Full turnkey system”, railway operators have depended upon suppliers and they have followed the suppliers’ policy to keep information secret. In the coming years, the railway operators have to get out of “Full turnkey system” and step up to the next stage where consideration of the technical specifications by themselves is required. From this viewpoint, it is indispensable to establish the experience changing system with other railway operators and it is also important to carefully check up the articles in the contract with suppliers on keeping the information secret.

#### **5.4.2 Lessons Learned on Concession Agreement and Supplier Management from the cases in the other countries**

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

The railway operators in Bangkok have to step up to the next stage from “Full turnkey system” and make a plan and selections on specifications for sound management scheme by themselves.

BTSC and BMCL have adopted “Full turnkey system” since they did not have any experience on urban railways. Adoption of this system has been successful from the viewpoint of the realization to secure operation, but it brought about the conflict around “the excessive additional cost for extension of their line” between suppliers and railway operators. After all, it has been identified that “Full turnkey system” is not proper at the stage where evolutionary network formation is carried out.

Singapore Metro and Delhi Metro, successful urban railway operators in Asia, have invited foreign urban railway operators as an advisor to their projects respectively. These 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 of the asset cost on the operation stage. It is suggested that even on the construction stage, involvement of experts from urban railway operators are required.

Bangkok urban railways have operated their railways for ten years and they have accumulated much knowledge through these experiences. Now it is important for the railway operators to step up to the next stage, where they have to consider the specifications by themselves for the realization of the sound management, from “Full turnkey system”.

When there is anxiety on the lack of experience for the railway operator, they tend to hire the foreign consultant. It is agreeable, but it is important to select experts who have enough experience in sound urban railways from the human resource stock of consultants.

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

One of important lessons from other countries is the controllable cost on maintenance.

It suggests that in the maintenance cost, there are costs which suppliers/operators can control their volume according to their own interest.

When maintenance tasks are outsourced to suppliers, 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 to consider on the maintenance of the safety but it is also important for Contracting agency, i.e., MRTA, and Concessionaire, i.e., BMCL, to have ability to clarify if it is truly aimed for enhancement of safety, or enhancement of increase in sales.

For clarification of the real aim to replace aged or frequently troubled equipments/rolling stock or its parts earlier than the scheduled plan, provision of various maintenance data and elaborate hearing from the operators/suppliers may be major tools.

### **(3) Localization of maintenance**

It is effective to transfer the maintenance tasks from the companies with foreign engineers to the local engineers of the railway operator or local companies without foreign engineers for the reduction of operation cost.

For this purpose, 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.

Cairo case suggests to us the importance of securing skilled staff on maintenance for transferring of maintenance technology to their side.

In case of Bangkok urban railways, the purpose for the outsourcing of the maintenance tasks to suppliers was to secure stable operation at the initial stage. At the same time, from the viewpoint of establishment of the sound financial frame work, the establishment of the scheme, where maintenance tasks can be carried out only by local staff, is required. From such a point of view, outsourcing of maintenance tasks can be regarded as the On-the-job Training for transferring of maintenance skill to local staffs. Since nowadays in Bangkok, maintenance has been carried out without trouble, the railway company can carry out maintenance tasks by themselves if they can take over the following from the suppliers

- 1) Maintenance manuals
- 2) Historical maintenance data
- 3) Local staff who have been engaged in maintenance tasks daily.

### **(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. To acquire information from other

railways, it is required to disclose its original information positively since mutual exchanging of information is normally required.

Urban railways in Bangkok have been obliged to keep their information, especially that on maintenance, secret strictly in the contracts with suppliers. Therefore, most of their specifications and operational information are not disclosed.

To disclose their own information, it is important to get rid of obligation in the contract with suppliers for keeping secret. Of course, the information protected by the law, for example, source code of software, has to be excluded.

Through positive information disclosure and exchanging of opinions, information and data with other railway operators, the railway operators in Bangkok can step up to the new stage from the "Full turn-key system" without big risks.

When Gross cost model is adopted for revenue share scheme at PPP, annuity designing is important.

Annual reports are issued by the operators in Bangkok since they are listed or to be listed. However, these reports are aimed for investors. The figures on this report are too rough for annuity estimation, and more detailed ones are required.

Japanese reporting system of detailed cost for fare level settlement, which is introduced as an example of information disclosure in (3) b of the previous section, can be utilized for this issue.

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

### **5.5.1 Cases in other countries**

With the purpose of benchmarking non-rail business, non-rail businesses of eight MRT operators in six cities in the Asian countries were studied. The results are shown in Appendix 6.

#### **(1) Types of Non-rail Business**

The non-rail business of MRT business can be largely classified into the following three types:

- i) Business based on MRT operation,
- ii) Diversification of transportation business, and
- iii) Business related to MRT business.

Table 5.5-1: Major Types of Non-rail Business

Type		Examples
Business Based on MRT Operation	Use of Railway Facility (Rental of Space or Own Operation)	Advertisement at stations and trains Operation of shops at stations and related facilities Operation of food service at stations and related facilities Operation of parking lot Rental of space at stations Telecommunication service
	Use of Holding Technology & Hard Equipment	Lease of railway track Civil work and & electrical works for external customers E& M and rolling stock maintenance service for external customers Telecommunication service
	Use of MRT Management Capability	Consulting of MRT management Management of other MRT projects
Diversification of Transportation Business		Horizontal diversification (provision of transportation service such as bus) Vertical diversification (travel agency, etc.)
Business Related to MRT Business		Real estate development (idle land, station vicinities, theme park, shopping mall, etc.), Card business Good sales & service to railway users

Source: JICA Study Team

### 5.5.2 Learning from Non-rail Business

#### (1) Lessons Learned on Non-rail Business from the cases in the other countries

Major findings from the benchmarking study are as follows:

- i) Advertisements and space rental of railway facilities are very common source of revenue from non-rail business.

All the MRT operators studied engage in advertisement business and rental of space for shops.

- ii) Some operators engage in other mode of transportation.

One reason for transportation business of other mode is that a public corporation responsible for urban transportation engages in MRT operation as well as bus and/or taxi (SMRT and SBS Transit in Singapore, Tokyo Metropolitan Bureau of Transportation in Tokyo). Another reason is that the provision of feeder bus service increases the convenience of passengers and contributes to the increase in ridership. DMRC (New Delhi) has supplied buses for feeder bus service.

- iii) Some operators adopt the rail + property business model.

MTR Corporation (Hong Kong) and DMRC (New Delhi) engage in large-scale property development. Other operators engage in small-scale property development such as the construction of station building and/or office building for own-use, construction of underground

shopping mall. For MTR and DMRC, the major purposes of this model are to stabilize the financial position of operator in the long run and keep fares at competitive market prices.

iv) Some operators engage in consultancy service.

MTR (Hong Kong), SMRT (Singapore), and DMRC (New Delhi) provide engineering and consultancy services for MRT projects in other cities/countries. Especially, MTR (Hong Kong) has invested in MRT projects in China and undertaken the operation concessions from other countries.

v) Business through subsidiaries is common method of business diversification.

Many operators have established subsidiaries to manage and operate affiliated businesses. The major reasons for establishing subsidiaries are to promote the specialization according to the nature of each business.

vi) The share of revenue from non-rail business to total revenue varies according to the difference in scope of affiliated business.

The share of revenue from non-rail business to total revenue is significantly high, over 40%, for Tokyu Corp. (Tokyo), MTR (Hong Kong) and DMRC (New Delhi) which engage in large-scale property development. As for other operators, the ratio ranges from 2.6% to 11.0%.

**Table 5.5-2: Comparison of Non-rail Business of MRT Operators in Major Asian Countries**

	Thailand		Singapore		Hong Kong	Taipei	Seoul	Tokyo		New Delhi
	BMCL	BTSC	SMRT	SBS Transit	MTR	TRTC	SMRT	Tokyo Metro	Tokyu Corp.	DMRC
Ratio of Revenue from Non-rail Business to Total Revenue	12.9	11.2	10.6	6.1	48.6	11.0	9.4	2.6	86.4	45.2
Share of Property Development	-	-	-	-	20.9	-	-	-	16.4	34.1
Type of Affiliated Business	Advertising	X	X	X	X	X		X	X	X
	Rental of Shop Space or Other Real Estate within/ around Stations	X	X	X	X	X		X	X	X
	Engineering & Consultancy			X		X	X	X	X	X
	Property Development					X			X	X
	Operation of Bus, Taxi, etc.			X	X		X		X	
Remark: Year	2008	2008/09	2008	2008	2008	2008	2008	2008/09	2007/08	2007/08

Source: JICA Study Team

## (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 such as station building and residential estates along the line. Another reason for “rail + property business model” is that

more integrated city development is possibly achieved with the property development by MRT operator.

MTR in Hong Kong has adopted the “rail + property” business model. Under this model, MTR is granted the rights to develop own and manage properties adjacent to/along rail lines. The major purpose of this model is to sustain MTR’s profitability, to enable investment in new rail lines, and to keep fares at competitive market prices as long-term financial strategy. MTR’s properties include shopping centers, residential, office and hotel developments.

In such countries as Hong Kong and Singapore, the government acts as a developer of city. Therefore, the parallel implementation of urban development and urban transportation development can be realized. Moreover, New Delhi has also introduced the “rail + property” business model.

In the case of DMRC, 6% of project cost was to be sourced from revenue from property development in the approved financial plan. Necessary land of government ministries and agencies was transferred to DMRC.

From the cases of “rail + property” business model of MRT project, the following lessons can be obtained.

The development business has the following constraints:

- i) Necessity of large funds to acquire land
- ii) Diverse ownership of land in the center of city
- iii) Long run up period for development
- iv) Susceptibility to business cycle and higher business risk
- v) Necessity of planning and development capability for property development

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

- i) Formulation of MRT master plan integrated with urban development planning and urban transportation planning

The well-planned property development linking MRT construction and urban development lowers the risk of property development and increases the return. With a construction of a MRT line, business opportunity along the line is expected to raise land prices. Urban development planning in advance of or in parallel with the preparation of MRT construction is necessary.

- ii) Introduction of laws and regulation which facilitate property development

A legal system which is important for apt property development includes land use regulations, regulations regarding land procurement, traffic regulations, tax incentives, etc.

- iii) MRT-related laws and regulations which enable a MRT project implementation body or a MRT operator to engage in property development

It is also necessary to give a MRT project implementation body, e.g., public authority in charge of urban transportation, city development authority, etc., a legal basis to undertake property development. For example, in Korea, the law regarding urban railway prohibits a rail operator from engaging in non-railway business.

- iv) Availability of land for property development

In the center of city, the ownership of land is segmented and complicated. In most cases, a large part of land is owned by the private. Therefore, the areas from the center of city to the suburb are more potential for integrated property development.

- v) Collaboration with the private sector

Property development requires a big funds and capability of managing the development process. In Hong Kong, MTR collaborates with private developers to share financial burden and project risk.

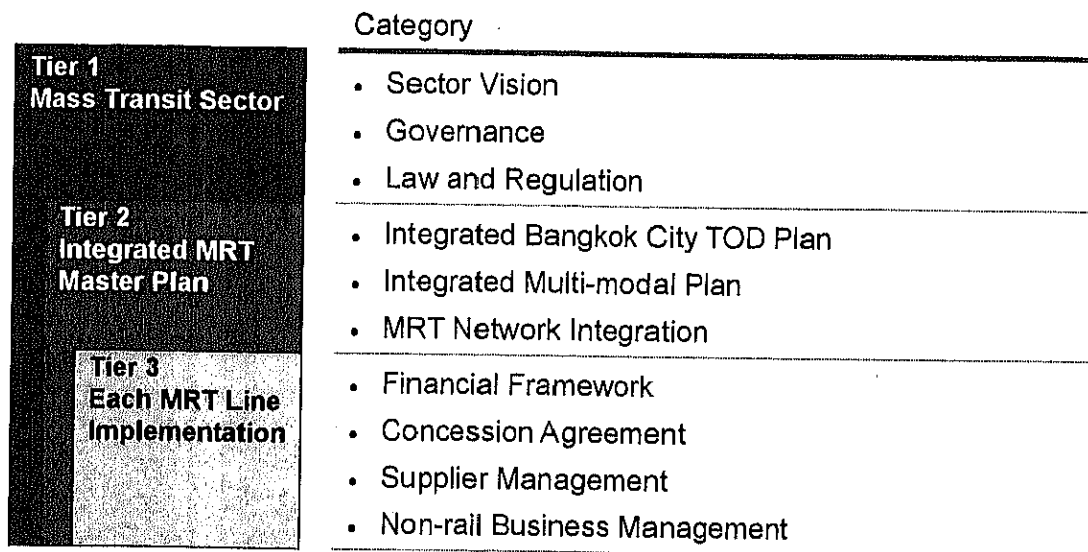
- vi) Profit sharing between the public and private sector

An appropriate organization which undertakes property development is a MRT project implementation body. A project implementation body may be public authority in charge of urban transportation, city development authority, etc. When an implantation body collaborates with private developers, the appropriate profit sharing should be considered.

When a project implementation body carries out a MRT project on a PPP scheme, the concession of property development becomes a method to make a project viable. In the case of MRT3 in Manila, the concession of the project was given to the private sector on a build-lease/operation-transfer (BLT) basis. The commercial development right was also awarded to the private sector to make the project commercially attractive though the financial result of the railway is not profitable in reality.

## 5.6 Overall Implication for 3 Tiered Structure

Overseas case studies, both successful and failure cases, have provided abundant reference and hints on implications for Bangkok's urban railway development. As a summary of Chapter 5, we have described implications along the 3 tiered structure introduced earlier in this report. Categories within the 3 tiered structure are described again in figure 5.6-1 for reference.



Source: JICA Study Team

Figure 5.6-1: Categories within 3 tiered structure

### 5.6.1 Implications for Tier 1: Mass Transit Sector

Tier1 is the fundamental basis for mass transit sector to prosper. Mass transit is clearly different from inter-city railway and requires its own sector environment. It consists of sector vision, governance and law & regulation.

**Sector Vision:** Urban railway, the so called mass transit, for large city like Bangkok will ultimately grow to a scale and network of a distinct sector. Overseas cases indicated different patterns of sector growth and evolution. In Europe, the sector has been pre-dominantly shaped by selected M&E supplier groups, with operators focusing on day-to-day operations. In Japan, the sector has been shaped by the railway operator, which develops own system specifications and ask suppliers to comply. This is the same for cities like Hong Kong, Singapore and Delhi. For Bangkok, the trial and error phase is over. Now is the time to proactively think through the sector vision and shape its own path.

**Governance:** Mass transit sector will need to be governed by a clearly defined set of independent organizations; planning agency, sector regulator, contracting agency and concessionaire. In many of overseas cases, we observed issues related to organizational silos between city planning and transport planning. Such sub-optimal governance structure leads to unnecessary friction and inconvenient mass



transit network. Singapore is a role model with organization that can truly provide integrated planning function. For Bangkok, without a conscious effort to shape ideal governance structure, the city can easily fall under sub-optimal case.

**Law & Regulation:** Inter-city railway and urban railway (mass transit) are different in characteristics. A general railway law is just not good enough. As seen in overseas cases such as Delhi, successful countries developed MRT Act. This provides standards in terms of safety, security, service and environmental requirements. Also, integration with city planning should be supported by a robust legal framework. As seen in the Tsukuba Express case, joint city and railway development law can trigger and accelerate TOD. PPP related regulations for station and surrounding development is also important. DMRC was able to absorb the value created from urban railway infrastructure by managing concession rights for private property development. For Bangkok, this is the ideal time to refine and add appropriate law & regulations for mass transit sector, as new line designs and constructions will further proceed in the coming years.

### 5.6.2 Implications for Tier 2: Integrated MRT Master Plan

Tier2 is all about integrated planning. Without it, mass transit infrastructure will be ‘sub-optimal’ in terms of efficiency, convenience and sustainability. There are three types of integration: 1)Integration between city planning and transport planning: “Integrated Bangkok City TOD Plan”, 2)Integration between different modes of urban transport: “Integrated Multi-modal Plan”, 3)Integration across different MRT lines: “MRT Network Integration”.

**Integrated Bangkok City TOD Plan:** Integration between city planning and transport planning is perhaps the most obvious but often neglected area when it comes to implementation. This is because city planning is typically under municipal government and transport planning is under central ministry. Lack of coordination between these organizations must be overcome. In Singapore, perhaps due to the size of the country, this coordination works very well. Also, as seen in the case of Curitiba, strong TOD vision led by the city mayor can make a difference in overcoming organizational barriers. For Bangkok, organizational mechanisms to integrate between transport planning by OTP and city planning by BMA will need to be considered.

**Integrated Multi-modal Plan:** Integration between different modes of urban transport (e.g. LRT, BRT, feeder bus, park & ride, waterways) is an essential part of making mass transit successful. One of the key is to plan for a well designed terminal station. In the newly planned Shinjuku station case example, there are dedicated floors for feeder bus, pedestrian path, JR and Odakyu/Keio line, Tokyo Metro and Toei. Cost sharing scheme between Tokyo municipal government, central government, JR and Odakyu was necessary to enable such implementation. We also observed failure cases in countries such as Malaysia and Philippines. Line transit is sometimes more than 500metres apart with inconvenient feeder bus access and limitation of park & ride capacity. Bangkok has three implementing agencies for MRT (MRTA, BMA, SRT) with plans for BRT and various feeder bus

underway. Without strong mechanisms to integrate, for both organization and funding, the city could end up with a rather inconvenient network.

**MRT Network Integration:** Integration across different MRT lines are often seen to be rather simple and the efforts required are underestimated. This includes areas such as fare integration, common ticketing and signage standardization. This could also include more technical areas such as performance and functional specification for rolling stock, signal and telecommunication systems. In Japan's SUICA/PASMO case, joint equity holding company was created to manage common ticketing across so many different railway operators. Tokyo Metro network has its own performance and functional specification shared across multiple lines. Based on PPP scheme for each different lines, Bangkok may need to deal with many concessionaires with different ownership structures. In addition, SRT has its own plans. Without strong mechanisms to integrate, Bangkok's MRT network may not have the appropriate integrated features required for users.

### **5.6.3 Implications for Tier 3: Each MRT Line Implementation Scheme**

Tier3 is about each MRT line implementation scheme. As defined in this study, implementation scheme consists of financial framework, concession agreement, supplier management and non-rail business management.

**Financial Framework:** There are three key components to financial framework, which are funding, concession model and O&M.

In terms of funding, the key reason for private sector funding is for government to have additional financing capacity, which will speed up the overall network building process. Conventional wisdom that private entity can generate more business efficiency does not seem to be applicable in mass transit. Delhi Metro case has proven that state-owned entity could be equally efficient if managed well. Also, as seen in Kuala Lumpur and London case, private consortiums can bring in conflict of interests and achieve various inefficiencies.

In terms of concession model, selection of "net cost" or "gross cost" depends on the circumstances of the city. There have been many overseas "net cost" model failure cases due to low ridership in early stages of network building. It is the study team's belief that, in early stages of network building (first several line nodes), ridership risk is too big for private parties to absorb. Therefore, "gross cost" model is a natural choice. However, this model requires MRTA to play a much more active role in managing the installation, operation and maintenance by concessionaire.

In terms of O&M, the high cost structure and inefficiency prevalent in SRT cannot be replicated. However, this does not mean state-owned operation is poor. Our overseas case analysis did not indicate service level or operational inefficiency difference between private and state-owned. For Bangkok, under PPP scheme, it is important to make sure that the shareholder of O&M concessionaire has an interest in the long-term operational excellence and maintenance sustainability.

**Concession Agreement:** Key aspect of concession agreement is that it defines the responsibilities and rights, commercial structure and risk allocation between concessionaire and the contracting agency. Overseas success cases indicated the importance of defining the details, but at the same time, maintaining flexibility to revise the content in case of unforeseen findings. Bangkok's lessons from BTS/BMCL also indicate the need for significant improvements in this area. For example, current concession agreement does not include specific KPIs for operation reliability, availability or maintenance efficiency. Going forward, if Bangkok decides to shift to "gross cost" model, importance of concession agreement will further increase. Key items to be carefully described are: annuity calculation method, risk allocation, capacity adjustment responsibility, KPI, incentives and penalties, supplier management guidelines, non-rail business treatment, network integration, revision clause and conditions precedent.

**Supplier Management:** Suppliers play a key role in the implementation of urban railway. This is especially true for rolling stock, signal, telecommunications, OCC and AFC system suppliers. For line extension, similar signal and communication specification need to be used. This means suppliers need to commit to sufficient information disclosure to allow for competitive tender based on similar system specification. Alternatively, fair price agreements could be reached for line extension. Another important area is technology transfer arrangements. For example, maintenance management and workflow should be handled by local concessionaire staff overtime. Methodologies and KPIs should be defined to ensure this is done within a given timeframe. Overseas success cases indicated the importance to specify the details in this area. Bangkok has relied heavily on suppliers in the past. In the early stages of network building, this was perhaps the natural choice. Going forward, Bangkok needs to shift from 'supplier reliance' to 'supplier management'.

**Non-rail Business Management:** Financial sustainability is an important element of urban railway success. Operations are not healthy if it needs to rely on continuous government subsidy. Non-rail business management will be a critical factor in achieving financial sustainability. Overseas success cases, such as HK MTR, Delhi Metro and Tokyu Railways, showed a benchmark of non-rail revenue ratio that is higher than 40%. For Bangkok, BTS and BMCL levels for non-rail revenue ratio are less than 15%. There is still much room for improvement. Going forward, if Bangkok decides to shift to "gross cost" model, treatment of non-rail business rights must be chosen. Thereafter, the organization responsible for non-rail businesses must be fully incentivised to maximize revenue and contribute to reduce government's subsidy burden.

