Asia-Pacific Forum on Public-Private Partnerships for Transport Infrastructure Development

Mass Rapid Transport Systems Development through Private Sector Involvement - Experience from Thailand

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Bangkok

Area
- Bangkok: 1,569 sq.km
- Metropolitan Region: 7,761 sq.km.

Population:
- Bangkok: 5.7 mill. (2013)
- Metropolitan Region: 10.55 mill.

GDP
Per capita: ฿456,911 ($14,301)
## Mode of Transport in Bangkok and Vicinity (2008)

<table>
<thead>
<tr>
<th></th>
<th>Private Transport</th>
<th>Public Transport</th>
<th>Daily Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Car</td>
<td>MC</td>
<td>Taxi</td>
</tr>
<tr>
<td>Daily Trips</td>
<td>5.38</td>
<td>2.30</td>
<td>0.70</td>
</tr>
<tr>
<td>%</td>
<td>35.1%</td>
<td>15%</td>
<td>4.5%</td>
</tr>
</tbody>
</table>

Source: Rail Mass Transit Master Plan Adjustment in Bangkok and its Vicinities Study Project, 2010
Public Transportation in Bangkok (2)

Taxi

Tuk Tuk

Motorcycle Taxi

Boat

Express Boat
Public Transportation in Bangkok (3)

Subway

Sky Train

Airport Rail Link
2. The Office of Policy and Strategy, Ministry of Transportation
History of MRT Development in Bangkok

1975: the first Bangkok’s transport master plan completed
(public transport oriented → 50 km of MRT recommended to be completed in 1980)

1981: detailed design of the First Stage Mass Rapid Transit System completed

1986: the First Stage MRT system reduced to 34 km.

1990: Hopewell project (Bangkok Elevated Road and Train System) granted

1992: Bangkok Transit System (BTS Sky Train) project granted by BMA,
   First Stage MRT concession contract signed with Lavalin Group,
   Lavalin’s contract became null and void
History of MRT Development in Bangkok

1992 : Metropolitan Rapid Transit Authority (MRTA) established
       : First Stage MRT network revised
       : Blue Line Initial System Project (ISP) introduced
1993 : Call for ISP’s concession
1994 : MRT master plan formulated (238 km)
1995 : ISP changed from elevated to underground and concession was canceled
1998 : Hopewell’s concession cancelled
1999 : the first elevated MRT in Bangkok (BTS Sky Train) opened
2002 : new MRT master plan (375 km) formulated
2004 : the first underground MRT (MRTA Blue Line Initial System) opened
2010 : Airport Rail Link opened
Who’s Responsible for MRT Development in Bangkok

Bangkok Metropolitan Administration (BMA)  
(local city government of Bangkok)

State Railway of Thailand (SRT)  
(state enterprise operate national railway network)

Mass Rapid Transit Authority of Thailand (MRTA)  
(state enterprise responsible for MRT development)
Established on 21 August 1992. Initially, this state enterprise under the Prime Minister’s Office was called “Metropolitan Rapid Transit Authority.”

Subsequently in 2000, it was renamed “Mass Rapid Transit Authority of Thailand” under the Mass Rapid Transit Authority of Thailand Act B.E. 2543 (2000)

After the public sector reform in 2002, MRTA was transferred to be under the governance of the Ministry of Transport.
Mandate

1. To carry out the MRT business in Bangkok and any other provinces

2. To study, analyze and prepare a project or plan related to MRT business

3. To carry out business related to MRT business or other business beneficial to MRTA and passengers
Current MRT Network in Bangkok

<table>
<thead>
<tr>
<th>Owner</th>
<th>Operator</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMA</td>
<td>BTS</td>
<td>36 km</td>
</tr>
<tr>
<td>SRT</td>
<td>SRTET</td>
<td>28 km</td>
</tr>
<tr>
<td>MRTA</td>
<td>BMCL</td>
<td>20 km</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>84 km</strong></td>
</tr>
</tbody>
</table>
Planned MRT Network in Bangkok and Vicinity Area

Year 2029
Total 508 Km.

12 MRT routes will start construction within 2015.
MRTA Projects

Total Length      203.9 km.

Investment Cost
- Land & Consult.     68,037 mB
- Civil Works        404,325 mB
- M&E Works          159,657 mB
- Total             632,019 mB
# MRTA Projects

<table>
<thead>
<tr>
<th>Line</th>
<th>Open</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Purple North</td>
<td>Dec 2016</td>
</tr>
<tr>
<td>2. Blue West &amp; South Extension</td>
<td>Apr 2019</td>
</tr>
<tr>
<td>3. Green South</td>
<td>Feb 2020</td>
</tr>
<tr>
<td>4. Green North</td>
<td>Feb 2020</td>
</tr>
<tr>
<td>5. Pink (Mono Rail)</td>
<td>Nov 2020</td>
</tr>
<tr>
<td>6. Orange East</td>
<td>Aug 2020</td>
</tr>
<tr>
<td>7. Orange West</td>
<td>Nov 2020</td>
</tr>
<tr>
<td>8. Purple South</td>
<td>Sep 2020</td>
</tr>
<tr>
<td>9. Yellow (Mono Rail)</td>
<td>Nov 2020</td>
</tr>
<tr>
<td>10. Blue West Extension</td>
<td>Mar 2021</td>
</tr>
<tr>
<td>11. Green South Extension</td>
<td>Dec 2022</td>
</tr>
<tr>
<td>12. Green North Extension</td>
<td>Dec 2022</td>
</tr>
</tbody>
</table>
Objectives of PPP

• PPPs allow access to the substantial financial resources of the private sector
• PPPs enable the public sector to benefit from private sector technical expertise, experience and efficiency
• PPPs enable the public sector to transfer project-related risks to the private sector
PPP Spectrum

CONCESSION CONTRACTS
- Investment into new or existing infrastructure by private sector
- Full system operation by private sector
- Ownership with private sector for duration of contract
- Risk profile: Budget-based revenue with government
- Revenue-based revenue risk with private sector; technical, financial, operational risks with private sector
- Duration: 15–50 years approx.

LEASE CONTRACT
- Private sector fully responsible for providing services and operational investments
- Ownership remains with public sector
- Risk profile: Revenue risk with private sector; major investments by public sector, some by private sector
- Duration: 10–30 years approx.

MANAGEMENT CONTRACT
- Facility and/or operational management
- Ownership remains with public sector
- Risk profile: Private sector receives fee, linked to performance; limited capital investment by private sector
- Duration: 5–16 years approx.

SERVICE CONTRACT
- Maintenance of assets and/or equipment
- Ownership remains with public sector
- Risk profile: Private sector receives fee for services
- Duration: 1–5 years approx.

Bangkok MRT’s PPP Models

• **Net Cost :**
  – The concessionaire pays for civil works and/or mechanical and electrical works (M&E) and pays for O&M and pertinent asset costs.
  – The concessionaire retains fare revenue and other revenue (e.g. commercial development).
  – The government will need to make payments to the concessionaire if fare and other revenue is less than the costs incurred by concessionaire,
  – Or the concessionaire will need to make payments to the government if the reverse should occur.

• **Gross Cost :**
  – The concessionaire pays for civil works and/or electrical and mechanical works (E&M) and pays for O&M and pertinent asset costs
  – The government pays the concessionaire an amount equal to the costs the concessionaire incurs for the provision of agreed and services.
  – The government retains fare revenue and other revenue.
## Comparison of Net Cost and Gross Cost Concession Models

<table>
<thead>
<tr>
<th></th>
<th><strong>Net Cost</strong></th>
<th><strong>Gross Cost</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infrastructure</strong></td>
<td>Government provides civil infrastructure and some other infrastructure or none. Concessionaire provides trains and related assets or both civil infrastructure and trains.</td>
<td></td>
</tr>
<tr>
<td><strong>Risk Sharing</strong></td>
<td>Concessionaire assumes all ridership risk, and shares extra profits (if any) with the government</td>
<td>Risk is shared between the government and concessionaire. Optimum sharing of risk will minimize the concession cost</td>
</tr>
<tr>
<td><strong>Revenue</strong></td>
<td>Concessionaire keeps revenue</td>
<td>Revenue is given to the government</td>
</tr>
<tr>
<td><strong>Services</strong></td>
<td>Concessionaire determines services to be provided on the basis of profitability</td>
<td>Government sets service standards and the concessionaire determines services based on these standards</td>
</tr>
<tr>
<td><strong>Payments</strong></td>
<td>Concessionaire meets costs from its own revenue.</td>
<td>Government pays the concessionaire for services provided according to rates set on the basis of competitive tendering and quantity/quality of service provided.</td>
</tr>
<tr>
<td><strong>Government Role</strong></td>
<td>Government invites tenders &amp; establishes a concession; has only a small role thereafter; difficult to vary contract conditions.</td>
<td>Government invites tenders and establishes a concession; has a continuing major role in managing the concession agreement; can vary conditions when needed.</td>
</tr>
</tbody>
</table>
MRT Chaloem Ratchamongkhon Line
(Blue Initial System Project : Blue Line East)

Characteristics

- **Length**: 20 km. (all underground)
- **Capacity**: 50,000 pass./hr/dir.
- **Structure**: 5.7 m. inside dia. twin tunnel
- **Station**: 18 sta. with screendoor
- **Track**: 1.435 m.
- **Rolling stock**: 3.2 m. x 19-24 m., 6 cars train
- **Power supply**: 750V DC
- **Park & ride**: 2 Park & Ride (3,000 cars)
- **Depot**: 48 hectares
- **Fare**: 12 B + 2 B/sta.
- **Open**: 3 July 2004
**MRT Chaloem Ratchamongkhon Line**  
(Blue Initial System Project : Blue Line East)

## Investment Cost

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Government</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land Acquisition</td>
<td>25,335 mB</td>
<td>(20%)</td>
</tr>
<tr>
<td>Civil Works</td>
<td>78,038 mB</td>
<td>(62%)</td>
</tr>
<tr>
<td>Consultants</td>
<td>3,246 mB</td>
<td>(3%)</td>
</tr>
<tr>
<td><strong>Private</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M&amp;E Works (Private)</td>
<td>18,751 mB</td>
<td>(15%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>125,370 mB</td>
<td></td>
</tr>
</tbody>
</table>
Concession Contract (PPP Net Cost)

Concessionaire
- Bangkok Metro Company Limited (BMCL)

Type of Concession
- Build-Operate-Transfer (BOT), PPP Net Cost

Main Agreement
- Invest in M&E works (rolling Stocks, power supply, signaling, communication system, control center, automatic fare collection system, platform screen door) and operate the system for 25 years
- Have right to get revenue from fare and commercial development
- Share revenue to MRTA for lump sum amount and percentage (base on concessionaire’s ROE 14.75%)
- Be able adjust fare rate according to consumer price index for every 2 years
- Get no guarantee on ridership or revenue
Remuneration to MRTA

### Fares

**Percentage Remuneration**

- 1%
- 2%
- 5%

**Annual Remuneration**

- 43,567 mB

### Commercial Development

**Percentage Remuneration**

- 1%
- 2%
- 5%

**Annual Remuneration**

- 930 mB
Comparison of Projected vs Actual Ridership of Blue Line East (Subway)

Thousands pass/day

- **Projected Ridership by Concessionaire**
- **Actual Ridership**


- **Projected Ridership**
  - 2006: 650
  - 2007: 680
  - 2008: 730
  - 2009: 630
  - 2010: 680
  - 2011: 690
  - 2012: 730
  - 2013: 750

- **Actual Ridership**
  - 2006: 158
  - 2007: 164
  - 2008: 168
  - 2009: 173
  - 2010: 180
  - 2011: 191
  - 2012: 209
  - 2013: 232
The Problem of PPP Net Cost Concession
The Case of Blue Line East (1)

• Low competition (2 bidders only)
• Service launch has been delayed (13 months) due to a long negotiation period.
• Return on investment is below the concessionaire’s expectation. (BMCL is in an accumulated deficit for 12,700 MB as at 2013.)
• 85% of investment is funded by the government but the right of operation management belongs to concessionaire.
• The government is not able to control the fare rate.
• There is a threat of unsatisfactory service complaints because the private concessionaire needs to reduce its operating cost.
The Problem of PPP-Net Cost Concession
The Case of Blue Line East (2)

- The government is at risk of not receiving investment return from the concessionaire as agreed on the business deal because of the concessionaire accumulated deficit.
- The government lacks the information, knowledge and direct technology transfer.
- The different interpretation of business agreement can cause a problem for the management of project agreement.
MRTA Purple Line North

Characteristics

Length  23 km. (all elevated)
Station  16 sta.
Park & ride  3 Park & Ride
Open  2016
<table>
<thead>
<tr>
<th>Category</th>
<th>Amount (mB)</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land Acquisition</td>
<td>8,283</td>
<td>13%</td>
</tr>
<tr>
<td>Civil Works</td>
<td>38,398</td>
<td>62%</td>
</tr>
<tr>
<td>Consultants</td>
<td>1,692</td>
<td>4%</td>
</tr>
<tr>
<td>Private</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M&amp;E Works</td>
<td>13,243</td>
<td>21%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>61,616</strong></td>
<td></td>
</tr>
</tbody>
</table>
Concessionaire
- Bangkok Metro Company Limited (BMCL)

Type of Concession
- Build-Transfer-Operate (BTO), PPP Gross Cost
- 30 years contract including construction period
Main Agreement

• The Concessionaire will finance, procure and install of all M&E System (Rolling Stock, Signaling, Communication, Automatic Fare Collection, etc.)

• The Concessionaire will do Operate and Maintenance.

• The Concessionaire will receive the fixed payment from MRTA to cover their Operation & Maintenance cost and some profit as agreed in the Contract.

• MRTA will collect and take all the farebox revenues.

• MRTA has the sole right to undertake all commercial development in stations.

• MRTA will repay the investment cost of M&E system and financial cost to the Concessionaire equally on yearly basis 10 years after the commencement of services.
The Problem of PPP Gross Cost Concession
The Case of Purple Line

• Low competition (2 bidders only)
• PPP Gross Cost does not actually reduce the investment burden and the cost for the government. It only temporarily reduces the public debt.
• It takes a long time to negotiate (almost 2 years) and results in project delayed.
• The project consists of various types of work (system providing, train operating, maintenance), which requires high budget then make it difficult to find the qualified bidder.
• Since the MRTA has never procured and operated the train by themselves, therefore, there is no data or benchmark for comparison to make sure that PPP is better.
BTS Sky Train System

**Characteristics**

- **Length**: 23.5 km. (all elevated)
  - Sukhumvit Line 17 km.
  - Silom Line 6.5 km.
- **Structure**: elevated
- **Station**: 23 sta.
- **Track**: 1.435 m.
- **Power supply**: 750 V DC
- **Park & ride**: 1 Park & Ride
- **Fare**: 15 – 52B (2013)
- **Open**: 5 Dec. 1999
Concession Contract (PPP Net Cost)

Concessionaire
- Bangkok Mass Transit System PCL (BTSC)

Type of Concession
- BTO (civil works), BOT (M&E works), PPP Net Cost

Main Agreement
- Design, invest and construct Civil Works and M&E works (Gov. provide right-of-way)
- Operate the system for 30 years
- Have right to get revenue from fare and commercial development
- No revenue sharing
- Be able adjust fare rate base on CPI, interest rates, ect.)
- Get no guarantee on ridership or revenue
Forecast Ridership (on first year operation)

1995 forecast : 788,000 pass./day
after 1997 crisis : 600,000 pass./day

Actual Ridership

1999 : 150,000 pass./day (first year operation)
2005 : 361,300 pass./day
2012 : 511,600 pass./day
MRTA Blue Line Extension

Characteristics

- Length: 27 km.
- Station: 21 sta.
- Park & ride: 2 Park & Ride
- Open: 2017
## MRTA Blue Line Extension

### Investment Cost

<table>
<thead>
<tr>
<th>Component</th>
<th>Cost</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Government</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land Acquisition</td>
<td>5,900 mB</td>
<td>7%</td>
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<tr>
<td>Civil Works</td>
<td>51,747 mB</td>
<td>63%</td>
</tr>
<tr>
<td>Consultants</td>
<td>2,580 mB</td>
<td>3%</td>
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<tr>
<td><strong>Private</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M&amp;E Works</td>
<td>22,141 mB</td>
<td>27%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>82,368 mB</td>
<td></td>
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</table>
Blue Line Extension Concession

Type of Concession
- Build-Transfer-Operate (BTO), PPP Gross Cost
- 30 years contract including construction period

Concessionaire
(under selection process)

**Issue:**
Who should be an operator of the blue line extension (existing operator or another)
# Summary of Bangkok MRT’s PPP

<table>
<thead>
<tr>
<th>Project</th>
<th>PPP type</th>
<th>Civil Works</th>
<th>M&amp;E Works</th>
<th>Operate</th>
<th>Fare</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Project</th>
<th>PPP type</th>
<th>Civil Works</th>
<th>M&amp;E Works</th>
<th>Operate</th>
<th>Fare</th>
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<table>
<thead>
<tr>
<th>Remark</th>
<th>Project</th>
<th>PPP type</th>
<th>Civil Works</th>
<th>M&amp;E Works</th>
<th>Operate</th>
<th>Fare</th>
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<tbody>
<tr>
<td>No revenue share</td>
<td>1. BTS</td>
<td>PPP</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td></td>
<td>- Initial System</td>
<td>PPP</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td></td>
<td>- Extension Line</td>
<td>Service contract</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td></td>
<td>2. Airport Rail Link</td>
<td>SOE*</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<td></td>
<td>3. MRTA Blue Line</td>
<td>PPP</td>
<td>✔</td>
<td>✔</td>
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</tr>
<tr>
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<td>- Initial System</td>
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<td>- Extension Line</td>
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<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td></td>
<td>4. MRTA Purple Line</td>
<td>PPP</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>

* State Own Enterprise

Gov. payback investment and pay for operation

Gov. payback investment and pay for operation

Gov. payback investment and pay for operation

Gov. payback investment and pay for operation

Gov. payback investment and pay for operation

Gov. payback investment and pay for operation
Lesson Learned

- PPP is a complex issue and consumes a lot of time to select concessionaire.
- It requires the balance of responsibility for the project risks between public and private sectors to receive the most effective result.
- It should consider the impacts of PPP from every perspective, not only the financial aspect.
- The MRT project requires a high investment, which causes a low competition.
- The concession has to be done project by project. Therefore, the railway, system and maintenance center need to be implemented separately causing duplicated investment, various spare parts which make inefficient.
• The government should firstly operate the project by themselves before enable the private enterprises to do in order to collect the data, experiences and knowledge base to compare with.

• In case that the project is planned to be extended in the future, the O&M investment model of the extended route should also be taken into consideration at the beginning of the project.

• There is a possibility of getting a low quality service because the private enterprises want the highest financial return.

• One key succession factor is the consultant.
Q&A