



**Imperial College
London**

Railway and Transport Strategy Centre

The Operator's Story

Case Study: Bangkok's Story

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Community of Metros
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The Operator's Story: Notes from Bangkok Case Study Interviews

February 2017

Purpose

The purpose of this document is to provide a permanent record for the researchers of what was said by people interviewed for 'The Operator's Story' in Bangkok. These notes are based upon meetings at BEM (formerly BMCL) offices on 17th March 2016 and the authors' experience. This document will ultimately form an appendix to the final report for 'The Operator's Story' piece. Although the findings have been arranged and structured by Imperial College London, they remain a collation of thoughts and statements from interviewees, and continue to be the opinions of those interviewed, rather than of Imperial College London. Prefacing the notes is a summary of Imperial College's key findings based on comments made, which will be drawn out further in the final report for 'The Operator's Story'.

Method

This content is a collation in note form of views expressed in the interviews that were conducted for this study. Comments are not attributed to specific individuals, as agreed with the interviewees and BEM.

Acronyms

BTS is the Bangkok Mass Transit System, also known as Skytrain. The project sponsor is Bangkok Metropolitan Administration (BMA) led by the City Government. A full BOT concession contract, with no Government funding was awarded. The International Finance Corporation was lead financier with KfW (Germany's government-owned development bank). The 23km route is a first-world metro wholly elevated above Bangkok's premier commercial district.

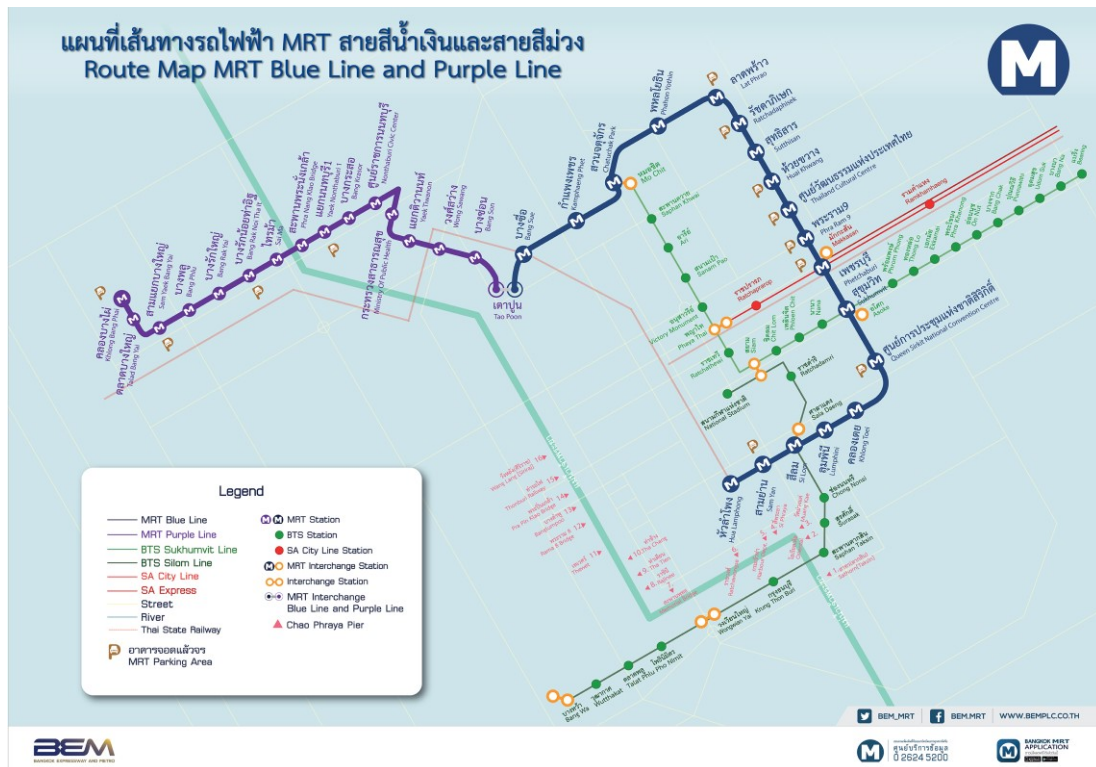
The Blue Line is known as Metro. The project sponsor is the Mass Rapid Transit Authority of Thailand (MRTA) under the National Government's Ministry of Transport. BMCL won the concession contract for E&M systems supply and O&M. The 20km route is a first-world metro wholly underground. BMCL merged with the Bangkok Expressway Public Company Limited (BECL) in 2015 to form BEM. When referencing pre-merger material, the acronym BMCL is used.

Key Messages: Relevance to International Learning about Metro Operators

This case study illustrates the following international lessons about metro operations:

- Public Private Partnership (PPP) is a **high-risk contract form** when it is applied without real understanding of the concept and risk-sharing from government. BMCL have experienced the difficulties of operating a private sector concession and serving customers without the institutional support necessary to make this contract form a success. The Blue Line concession form has not proved financially viable owing to lower than expected ridership and higher than expected operating costs.
- A **strategic long-term investor** in the metro can provide the longevity necessary to stabilise a turbulent environment with private actors. Arguably it is this stability in Bangkok that has kept BMCL afloat. The established authority must have a public sector ethos with experience in metro operation to sufficiently understand the complexities of such a system. The authority, as well as the operator, must be learning organisations.
- **Collaborative working** and/or mergers between companies can be a great asset for the public transport system when the involved parties have expertise and experience in different areas: in Bangkok's case, merging parties were cash-rich and project-poor and vice versa.
- The experience of **decision-making** between the two concessionaires in Bangkok demonstrates that decision-making in the interest of the metro is likely to be more successful at a lower level. The City Government via BMA is more agile at decision-making, favouring BTS Skytrain's concessionaire, whereas BEM's decision-making takes place at the National Government level. This has proven to be an extremely turbulent environment following years of political instability and other decisions have crowded out the metro.
- A **lack of integration hinders ridership potential**: lines that are integrated with one another and furthermore, integrated with other transport modes, will drive ridership and public transport mode share. This integration needs to be prioritised while the metro is still able to materially shape the development of the city.

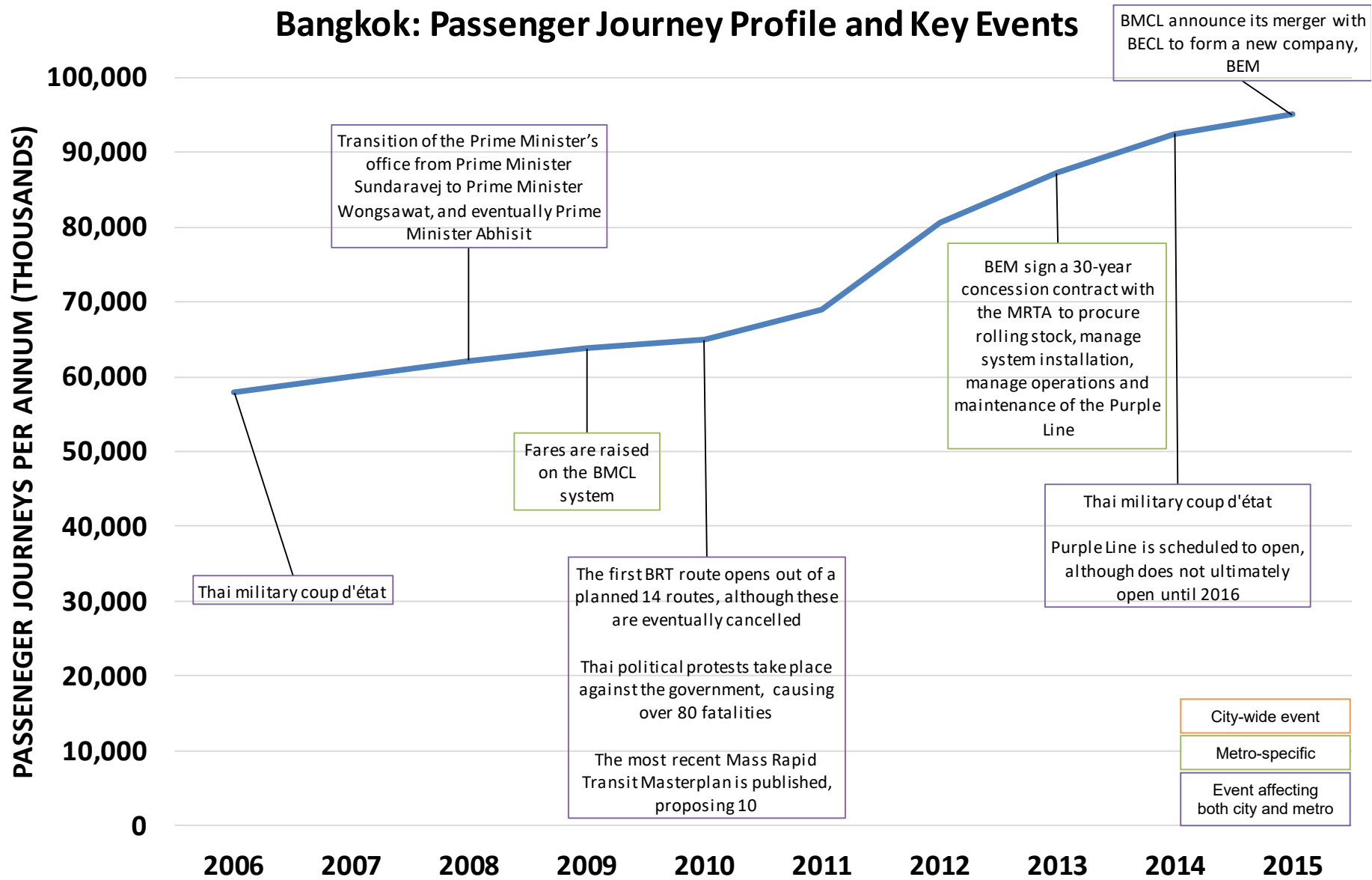
Transit Map



Growth in Passenger Journeys and Key Events in Bangkok

The following graph demonstrates BMCL/BEM's growth in passenger journeys from 2006 – 2015 and includes selected key surrounding events that took place in Bangkok or nationally in Thailand, and selected events in the history of BMCL/BEM.

Bangkok: Passenger Journey Profile and Key Events



General Summary of Bangkok BEM

GENERAL SUMMARY		
Background and history		<ul style="list-style-type: none"> ▪ The system opened in 1999 with the Bangkok Mass Transit System (BTS) Skytrain, a 37km fully-elevated metro, operated by Bangkok Mass Transit System (BTSC) under City Government administration. ▪ The rail system expanded upon the opening of the Blue Line in 2004, operated by BMCL. BMCL opened the Purple Line (23km) in 2016 and it is expected this line will increase Blue Line ridership by 15%. ▪ BMCL merged with Bangkok Expressway Public Company Limited (BECL) in 2015 to form a new company, Bangkok Expressway and Metro Public Company Limited (BEM). BEM's portfolio includes the Blue and Purple Lines, and Bangkok's approximate 208km expressway network. ▪ Projects currently underway include two Blue Line extensions totaling 27km to the west and south of the existing alignment, and a 19km fully elevated extension to the Green Line. These changes are important because the network will then be of a size where connectivity improves and ridership may increase substantially. ▪ Two all-elevated monorail projects, the Pink Line (34km) and Yellow Line (30km) are also under development.
	1973-1976	Privately-owned buses are purchased by the state after rapidly increasing oil prices threatened their withdrawal from the market. The government intends to set up a public-private joint venture, the Metropolitan Transit Company to manage this new bus system. This is eventually replaced in 1976 by the Bangkok Mass Transit Authority.
	1990	Construction starts on the Bangkok Elevated Road and Train System, designed to deliver expressway and elevated rail between Bangkok and the international airport. No feasibility study or programme was conducted in the preparation for this project.
	1992	The Mass Rapid Transit Authority (MRTA) is established to oversee implementation and operation of metro rail in Bangkok.
	1994	The first version of a Mass Rapid Transit Master Plan for the Bangkok Metropolitan Region is published. This includes 135km of metro extension.
Key dates and why they matter	1996	Construction begins on the Blue Line after Bangkok Expressway and Metro Public Company Limited (BEM) bids for the service concession contract to operate the line. No other companies bid for the contract.
	1997	The Asian Financial Crisis affects Bangkok's economy, forcing the cancellation of the Bangkok Elevated Road and Train System. At the time of its cancellation it is estimated that approximately 10% of the project had been delivered in the 7 years since the project began construction. The International Monetary Foundation intervenes to protect the collapsing baht.
	1999	BTS Skytrain begins operations, signifying the country's return to economic growth following the Asian financial crisis. The system consists of a fully-elevated 37km metro. The system is formally opened by Princess Srinthorn.
	2004	Thailand's southern coastal regions are heavily affected by a major tsunami.

	2004	Service on the Blue Line begins under a 25 year net-cost contract. The system is an underground 32km line with 18 stations, concentrated in central Bangkok. The operator, BMCL, carries E&M systems implementation, operational and revenue risk. Fares are to change every 2 years according to a formula linked to the Bangkok non-food CPI. The system is formally opened by King Bhumibol Adulyadej and Queen Sirikit.
	2005	The Government approve a fourteen-route Bus Rapid Transit (BRT) network to be delivered by BTSC. The system would include island platforms, enclosed station areas and integrated ticketing with the BTS Skytrain.
	2006	Thailand's military stage a coup to replace a political vacuum left when a general election is cancelled and Prime Minister Shinawatra takes a short retirement from office.
	2008	Transition of the Prime Minister's office from Prime Minister Sundaravej to Prime Minister Wongsawat, and eventually Prime Minister Abhisit, takes place between September and December.
	2009	Fares are raised for the Blue Line system from 14-36 baht to 16-41 baht based on distance travelled.
	2009	The ASEAN summit is cancelled when anti-government demonstrations overtake the summit venue. Army soldiers are stationed in Bangkok to break up an ongoing protest sit-in against Prime Minister Abhisit.
	2010	Ongoing protests are held for three months in Bangkok as protestors demand Prime Minister Abhisit's resignation. This exacerbates road congestion and inaccessibility to services in Bangkok throughout this time and 91 fatalities are recorded.
	2010	The first BRT route opens two years later than expected. This is the only BRT route to successfully open from the original masterplan.
	2013	The government cut the guaranteed price of rice, a major source of nutrition in Thailand, prompting protests in Bangkok in support of national farmers. A rice subsidy scheme had been introduced in 2011 to ensure that rice farmers were fairly paid. This substantially increased government debt and reduces Thai rice exports internationally.
	2013	A large demonstration consisting of tens of thousands of supporters protest a political amnesty bill.
	2014	A general election is held but the result is declared invalid. The government falls under the rule of the military following the removal of Prime Minister Shinawatra from office over corruption.
	2015	BMCL announce its merger with BECL. The new company- BEM - is one of the 50 largest on the stock exchange and is in the process of being credit rated.
	2016	A public vote approves a new constitution, continuing the military's involvement in government.
	2016	King Bhumibol Adulyadej dies after 70 years as the reigning monarch, a major event in Thailand.
Current ownership and oversight		<ul style="list-style-type: none"> ▪ BEM is listed on the Bangkok stock exchange with major shareholders Ch. Karnchang (30%), the Government authority MRTA (8%) The remaining 62% is held in mutual funds and private investors.

<p>Complementary public transport and non-motorised transport services</p>	<ul style="list-style-type: none"> ▪ <u>Buses:</u> Buses are an important form of transport in Bangkok and the bus network is exclusively operated by the Bangkok Mass Transit Authority (BMTA). BMTA are able to monopolise services through licencing private operators on its existing routes. There is also one 16km Bus Rapid Transit (BRT) line in operation of a planned five lines, operated by Bangkok Mass Transit System (BTSC) under the City Government administration. A substantial network of long-distance and intercity buses also connect wider Thailand to Bangkok. ▪ <u>Pedestrian infrastructure:</u> Most pedestrian infrastructure is the responsibility of the Department of Public Works within the City Government (BMA). ▪ <u>Car sharing:</u> HaupCAR, a Thai car sharing brand is available in Bangkok. Uber operates both car and motorcycle ride-hailing, while Grab operate taxis, car sharing, as well as motorised freight delivery on motorcycles. ▪ <u>Cycling:</u> There are approximately 230km of cycle routes although these are mostly shared surfaces with pedestrians. ▪ <u>Taxis and other ride sharing schemes:</u> Taxis, rickshaw-style taxis and motorcycle taxis operate in Bangkok. Taxis are operated privately or through co-operatives. Motorcycle taxis are ranked and have been regulated since 2003. ▪ <u>Surface trains:</u> The national rail network, operated by State Railway of Thailand (SRT), connects into Bangkok providing long-distance services nationally and internationally in south-east Asia. SRT also operate limited peak-time commuter rail services serving long-distance suburban districts. There is also an Airport Rail Link connecting to the international airport. ▪ <u>River:</u> Water buses, long-tail boats and passenger ferries operate in the city.
<p>Technical and operational summary as of 2015 (BEM only)</p>	<ul style="list-style-type: none"> ▪ 43km under management – 47% underground, 0% at-grade, 53% elevated ▪ 142km of new lines under development ▪ 34 stations ▪ 57 train cars (not including Purple Line consisting of 63 train cars, which opened in 2016), 0 buses under management ▪ 0 bus routes managed directly, with approximately 100km of bus lane in the city, 16km of which is Bus Rapid Transit (BRT) ▪ 97 million passenger journeys per yearⁱ ▪ ฿2,374 million (USD 67 million equ.) in annual farebox revenues (2015/16) ▪ ฿2,923 million (USD 83 million equ.) in total rev. / yr (2015/16) (excluding revenue from expressway business activities) ▪ Approximately 2000 employees ▪ 0km of network length opened between 2005-2015 (the 23km Purple Line opened in 2016)

<p>Regulatory, oversight, and policy bodies:</p>	<p><u><i>Bangkok Metropolitan Administration (BMA)</i></u>: Grants concession to BTSC and is the major decision-maker for non-BMCL/BEM operators.</p> <p><u><i>Mass Rapid Transit Authority of Thailand (MRTA)</i></u>: This Government agency oversee the implementation and operation of metro rail in Bangkok and administer BEM's contract. MRTA were responsible for building the Blue Line with BMCL taking over under a service concession to operate the line. MRTA only oversees and regulates metro operated by BEM (Blue Line and Purple Line) rather than across all operators.</p> <p><u><i>The Office of Transport and Traffic Policy and Planning (OTP)</i></u>: Develops and owns transport and traffic plans, masterplans, safety projects and co-ordinates transport bodies. The OTP report to the National Transport Policy Board and the Commission for the Management of Land Traffic.</p>
<p>Summary of legal and policy framework:</p>	<p><u><i>Ministerial Regulation on Internal Organization of the Office of Transport and Traffic Policy and Planning Ministry of Transport (2002)</i></u>: Establishes the mission of the Office of Transport and Traffic Policy and Planning (OTP) to carry out project analysis, manage transport agencies and report to the Government.</p> <p><u><i>Mass Rapid Transit Masterplan (2010)</i></u>: The Office of Transport and Traffic Policy and Planning (OTP) produced a Mass Rapid Transit Master Plan for Bangkok Metropolitan Region in 2010. This identifies 10 projects for implementation by 2019. This is unquestioned, no alternative proposals are welcomed, and it sets the future agenda.</p>
<p>Key stakeholders:</p>	<ul style="list-style-type: none"> ▪ <u><i>Mass Rapid Transit Authority of Thailand (MRTA)</i></u>: And the associated National Government, with duties as described above. ▪ <u><i>Bangkok Mass Transit Authority (BMTA)</i></u>: A fully state-owned company within the Ministry of Transport and Communications operating the network of public buses in Greater Bangkok.

Summary of Key Views from Interviews

This is an important case study of a private concessionaire delivering good service to its customers often despite the efforts of National Government (to which it reports), and in marked contrast to the other Bangkok metro operator (BTSC) that is under the City Government (BMA). Its case study importance lies in the trend in some geographies towards PPP for new-build metro projects, and because it offers new insights into the conditions for success.

Thailand is a democracy which, since May 2014, has been under the control of the military. It has a history of political instability but a vibrant economy that has managed to weather past shocks. Bangkok is a sprawling megacity of approximately 10 million people, extending along an arterial road system. It is low-lying with a high water table making tunnelling challenging.

There had been strenuous efforts for many years by Government to develop a Mass Rapid Transit (MRT) project in the face of chronic traffic congestion, but this has experienced repeated setbacks. Against this backcloth and worsening transport problems the BTS opportunity was recognised by then BMA Governor Maj. Gen Chamlong. At that time there was a brief interlude when a technocratic government determined to restore economic credibility to Thailand after unrest. It terminated a long-delayed project developed by SNC-Lavalin using its Vancouver technology, and identified the Blue Line, creating the Mass Rapid Transit Authority of Thailand, and on its last night in office also approving BTS.

Thailand was an early leader in private sector participation in infrastructure provision, and this remains Government's continuing policy. National Government dominates decision-making and sector coordination is sometimes problematic. In the transport sector there are many plans but these are often aspirational and remain unimplemented. Today mass transit is widely supported and there is deep commitment to expanding and improving Bangkok's metro system – that is after many years happening.

There are 2 separate transit systems in Bangkok, and a separate state-run bus system. Today there is no through ticketing; each transit operator has his own ticketing, as do the buses. Integration is as follows:

Integration measure	Implemented/operational?
Physical integration between BTS Skytrain and Blue Line	One initiative linking the 2 stations at Silom. And one at Sukhumvit
Buses	No change to bus routes or operations
Integrated fares / ticketing	Proposed – but implementation is not clear
Single system branding	None

Background

BTS 'Skytrain' arose from Bangkok Governor's frustration at Central Government's inability to develop a metro system to decongest Bangkok. It was developed by a Thai property conglomerate with close Hong Kong SAR, China contacts, and with International Finance Corporation (IFC) leading the financing. The development period from 1990 -1999 covered the Asian economic crisis that would have tested any financial structure. Additionally, it faced severe depot problems that changed the route substantially. Despite this it opened in 1999: a 37km fully elevated first-world metro above many of Bangkok's premier commercial streets. Today it carries about 600,000 passengers per day.

The Blue Line was very different. It was developed by Central Government, who hired Professor Tony Ridley of Imperial College¹, London to identify a feasible route during a period of technocratic government. The project identified took 12 years to develop, and entered into service in 2004. Government funded the civil works and an E&M / operations concession was let to concessionaire Ch. Karnchang, a major Thai civil engineering contractor. The concession company BMCL is part of the Nova benchmarking group, and reports to the Mass Rapid Transit Authority (MRTA) – a new institution recommended by Professor Ridley. The Blue Line is a 20km all-underground first world metro that carries about 300,000 passengers per day.

Why are the 2 systems built in the same city at the same time so different?

Skytrain's sponsor was BMA, the concessionaire sought technical advice from MTR in Hong Kong SAR, China, and IFC was lead financier along with KfW. The result is an all-elevated high capacity metro, with robust non-fare revenues, high visibility, and linkages to adjacent property development. It was aligned above the major commercial corridors in the city.

The Blue Line origins were a technocratic government determined to demonstrate government could develop a metro to restore credibility. After rapid search the best feasible option that was implementable and bankable was the Blue Line – a less good alignment but one that met government's requirements. Then during implementation a 1995 Cabinet decision was taken to underground all megaprojects in central Bangkok. This led to the Blue Line being wholly undergrounded increasing its capital and operating costs substantially; meanwhile expressways and Skytrain were exempted. In fact no other project was impacted.

Since 2004 the BMA has extended Skytrain several times by 1-2 stations as BMA's finances allowed. No extensions took place on the Blue Line. The systems were and are not integrated. Nor is either system integrated with the bus network that was unchanged when the metro systems were opened. This has dampened beneficial network effects, such as buses feeding passengers to the metro and driving ridership.

BMCL

BMCL was listed on the Bangkok stock exchange in 2006 with major shareholders Ch. Karnchang (30%) and the government authority MRTA (8%). The remaining shares are divided between mutual funds and other private investors.

In December 2015, BMCL announced its merger with BECL. The new company, BEM, is one of the 50 largest on the stock exchange and is in the process of being credit rated. According to interviews, the rationale for the merger is that BECL is cash-rich and project-poor (most expressways have been built) while BMCL is cash-poor and project-rich. BMCL's Managing Director is one of BEM's two Managing Directors. BEM's vision is "*to become a leading, fully-integrated transportation service provider in Thailand and ASEAN*". It has 3 business divisions: expressways, metros and commercial development.

The concession of the Blue Line is halfway through its 25-year life and the farebox ratio has grown with ridership to a level that is sustainable (covering operating costs and asset replacement costs). Ridership in 2016 is approximately 300,000 passengers per day.

¹ Former Managing Director of London Underground and CEO Hong Kong SAR, China MTR

BMCL are supported by a strategic long-term investor, Ch. Karnchang, which understands future metro opportunities in Bangkok and has supported BMCL keeping these opportunities in sight.

The Concession Contract

Under the net cost contract BMCL carries all major E&M systems implementation and operational risks, notably including revenue risk. It has the right to develop non-fare sources. Fares are to change every 2 years according to a formula linked to the Bangkok non-food CPI. The contract runs for 25 years from starting of revenue service in 2004 to 2029.

The Purple Line, a 23-km fully elevated metro line, is expected to modestly increase Blue Line ridership (by about 15%). This concession won by BMCL has a scope similar to the Blue Line (encompassing E&M systems supply and operations for 30 years through to 2043); but different in one important respect - while the Blue Line is a net cost contract, the Purple Line is gross cost. It is thought that this change in contract form has been proposed partly in response to the alignment of the Purple Line, and to mitigate any potential ridership risk that might occur. This is a strategically important project for BMCL as its Blue Line concession ends in 2029.

The provision relating to asset replacement is that assets should be handed over to MRTA 'in good working condition' 2 years before the end of the contract documentation and training should take place to allow a smooth handover.

BMCL / BEM influence over MRTA

BMCL / BEM have little influence over MRTA. MRTA neither seek nor discuss views BMCL may have. This is unusual in the metro world, as authorities are at least nominally open to technical advice from operators. Another city involved in the Operator's Story, for example, suggested that using PPP to develop new metros allows new technical expertise into the process that may not be otherwise present in the existing environment, improving the likelihood of project success.

Government Policy

The Office of Transport and Traffic Policy and Planning (OTP) produced a Mass Rapid Transit Master Plan for Bangkok Metropolitan Region in 2010 (the consultancy firm Halcrow produced a forerunner plan in 1995). This identifies 10 projects for implementation by 2019 without consideration for how all 10 projects would be realistically delivered simultaneously.

Government is said to be committed to implementing a common ticketing system covering all public transport modes in Bangkok, and OCT has awarded a contract. No stakeholder has yet addressed how a clearing-house system would work, and how individual operators would be confident their revenues are secure. According to interviews, this core institutional issue will need to be resolved upfront to ensure this project can move forward.

Future Procurement Strategy – Delivering New Projects

- BMA (the Skytrain sponsor) policy is clear. When funding allows, it negotiates directly with the concessionaire BTSC for incremental network additions. The result is that incremental extensions have been approved and implemented. National Government has not been involved.
- For other lines MRTA has insisted on competition, however small the extension, resulting in fragmentation between projects. The result of its existing policy is:

- A 1-station gap between the ends of the Blue and Purple Lines with E&M systems not complete and the Purple Line scheduled to open in August, as MRTA negotiates with BMCL, the only feasible party; and
- A stand-off whereby the Blue Line Extensions are being developed as completely separate systems such that passengers would have to exit the Blue Line and walk to the Extension trains; because MRTA insists on competition.

Government's procurement policy can best be described as a Public Private Partnership approach. A financial model was developed to inform this decision, by modelling the alternatives; but unfortunately when first used this missed the preferred solution. Thereafter policy has varied between projects:

- The Blue Line was a net-cost contract with Government undertaking the civil works, while the concessionaire undertakes E&M works and adopts revenue risk. This was shown to be a stretch, even for a long-term strategic investor like Ch. Karnchang;
- The Purple Line is a gross cost contract with the same problematic division between civil works and E&M equipment/operations, although this contract allows BMCL to adjust its service fees when the actual inflation rate or electricity rate change;
- Yellow and Pink monorail lines are to be net cost contracts for the whole systems (given the proprietary nature of monorails), because it is impossible to separate civil works and E&M systems; and
- No decisions have been taken yet on Blue Line extensions.

According to interviews, many issues have faced BMCL:

- During implementation there were interface issues between the MRTA civil works and BMCL E&M equipment contracts. After agreement that BMCL would be the concessionaire MRTA took 2 years and 9 months to negotiate a detailed contract, during which time BMCL could not mobilise. Meanwhile MRTA proceeded with the civil works. So BMCL faced civil works that were committed, without operator influence on key decisions – a major problem. The Purple Line has faced similar interface problems.
- The Blue Line concession form has not proved financially viable. Ridership was much too low mainly because the network did not come as planned (in part impacted by the Asian economic crisis) from its opening and operating costs are high because of the air conditioning costs of underground stations.
- Regulation: There is uncertainty over whether BMCL's contract has been fairly administered by MRTA. Major decisions that impact BMCL have been affected, such as a necessary fare increase being implemented after protracted delay.

Impact of the Purple Line

Interviewees suggested that winning this gross-cost contract has been important to BMCL, extending their metro horizon to 2043. The Purple Line will also impact the Blue Line finances beneficially. But because the ridership impact is expected to be modest (an increase of 15%) and no decision has been taken on the concessionaire for the Blue Line Extensions. BMCL have not been able to place an order for more trains.

Conclusions: Two Central Insights

The 2004 report 'A Tale of Three Cities' Report showed Kuala Lumpur and Bangkok to be at similar chaotic stages in their metro development. For example, the Kuala Lumpur case study highlights that Kuala Lumpur has moved forward rapidly by creating an impressive *system* from 3 failed concessions, and committing to further major expansion. By contrast little significant has been implemented in Bangkok as its substantial population expands and the city sprawls outwards. Major expansion of its network is now ongoing and will happen incrementally, developing a public transport system which will certainly be useful and used extensively. However, much more could have been achieved if the Government authority bodies had acted earlier and managed its development proactively. It is now too late for public transport and metro development to materially shape this growing city.

There are two central insights to the nature of the problems facing BMCL that do not affect the Skytrain concessionaire:

1. *The differing cultures and roles of BMA, Central Government and MRTA*

There are several noticeable differences between the actions of, and outcomes from, the two concessionaires in Bangkok. These are mainly caused by the differing decision-making structures between them: BMA reports to the City Government, a much closer decision-maker to the metro "product", compared to BMCL who report to the National Government, with the involvement of MRTA. BMAs governance structure contains a more noticeable public sector ethos and understands the role of the metro in improving the city and its citizens' lives. This same public sector ethos is still developing in MRTA.

Major Government decisions in Thailand go to the Cabinet and securing key decision can be a protracted process. Above this, whether the right decision is made can be a risk, as other pressing Government matters may crowd out the metro. The City Government, the decision-maker for the BMA concession, is able to make more agile decisions, favouring the development of this concessionaire's system.

2. *MRTA's role could be expanded and its performance improved*

MRTA is a sizeable organisation with approximately 900 staff (compare this to BMCL's workforce of approximately 2000). However, the technical competence to manage and oversee a metro system effectively is not widespread in MRTA, and the organisation has not yet demonstrated itself to be a learning one to improve upon its previous mistakes.

The Nova benchmarking group has 3 concession operators: Metrovias in Buenos Aires has long faced challenges with its sponsor authority repeatedly failing to honour the terms of its contract. Metro Rio has parallels with Bangkok in an inexperienced and uninformed Government authority. Bangkok's BMCL is, from a public policy viewpoint, a considerable success, but has been achieved fortunately because of its key shareholder's commitment and staying power within a challenging enabling environment.

Postscript

The Nation article of 23/03/16 '*Maintenance failure blamed for airport train breakdown*' highlights how far Thailand/ Bangkok are from creating a mass transit system. It has good operators in BTSC and BEM, but institutional failure at the heart of Central Government holds back the scale of improvement that has been achieved in Kuala Lumpur.

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ⁱ This figure is an average annual ridership calculated by applying an annualisation factor of 360 to BMCL's average daily weekday ridership in March 2015.