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[기본연구] 방콕 MRT건설관리 현황과 이슈

Status and Issues of Construction Management of MRT in Bangkok

: Comparison of MRT construction management contract Under public private partnership contract in Bangkok Case study

Krittanan Panapong

ABSTRACT

MRT Yellow Line and MRT Purple Line (Tao pun Rat Burana (Kanchanapisek road Purple line South)) are projects managed by the Mass Rapid Transit Authority of Thailand (MRTA), both operating under Public Private Partnership (PPP) contracts. MRT Yellow Line, a Straddle Monorail system with 23 stations over 30.4 km, its project cost approximately USD 1.5 billion. The PPP contract spans 33 years and 3 months, divided into design, construction, testing (3 years and 3 months) and operational maintenance (30 years) phases. MRT Purple Line (south), featuring both elevated and underground systems with 10 underground and 7 elevated stations across 23.6km, costs USD 3.3 billion. The study aims to compare the construction contracts of both projects, focusing on project management advantages and disadvantages. Challenges faced by the MRT Yellow Line during construction included power dynamics, complaints, litigations, consultant performance, and process misunderstandings. The Purple Line (south) is chosen for comparison due to shared PPP structure and design build contracts. The research highlights that private investment covers Yellow Line's civil work, while Purple Line (south) relies on public investment, making a direct comparison challenging. The study emphasizes the significant influence of financial aspects on construction project efficiency and aims to provide insights for future contract improvements.

태국 대중교통청(MRTA)이 관리하는 MRT Yellow Line과 MRT Purple Line (남쪽, Tao pun Rat Burana, Kanchanapisek road) 프로젝트는 모두 공공-민간 파트너십(PPP) 계약에 따라 운영된다. MRT Yellow Line은 30.4km 이상 23개 역의 스트래들 모노레일 시스템으로, 약 15억 달러가 소요될 것으로 예상된다. PPP 계약은 설계, 시공, 시험(3년 3개월) 및 운영 유지보수(30년)의 33년 3개월 기간으로 구분된다. 한편, MRT Purple Line (남쪽)은 23.6km에 걸쳐 10개의 지하역과 7개의 고가역을 포함하는 고가 및 지하 시스템이며, 33억 달러가 소요될 것으로 추정되고 있다.

이에 본 연구는 프로젝트 관리 측면에서 두 프로젝트의 건설 계약을 비교하고자 한다. MRT Yellow Line 건설 중 겪은 어려움에는 전력 역학, 불만 사항, 소송, 컨설턴트 성과 및 프로세스 이해 부족 등이 포함된다. Purple Line (남쪽)은 공유 PPP 구조와 설계 건설 계약으로 선정되었다. 본 연구는 Yellow Line의 민간 투자와 Purple Line (남쪽)의 공공 투자 차이로 인해 직접적인 비교가 어려움을 확인하였다. 그러나 건설 프로젝트 효율성에 대한 재정적 측면의 중요성을 강조하고, 향후 계약 개선을 위한 통찰력을 제공하고자 한다.

MRT Yellow Line [1] is the project under Mass Rapid Transit Authority of Thailand (MRTA). MRTA Yellow Line system is Straddle Monorail system, Elevated structure. There are 23 stations, 1 Depot and 1 Parking Building. Project's distance is 30.4km. The cost of the project is USD 1.5 Billion approximately. MRT Yellow Line is under PPP (Public-Private Partnership) contract with contract period is 33 years and 3 months, is divided into :

- Phase 1: Design, Construction, Testing and Commissioning period 3 years and 3months
- Phase 2: Operation and Maintaining period 30 years

MRT Purple line (Tao pun –Rat Burana (Kanchanapisek road))or MRT Purple line (south)[2]is also the project under MRTA. There are both elevated and underground systems. There are 6 contracts in the project. MRT Purple line (south) consists of 10 underground stations and 7 elevated stations. The distance of the project is 23.6 km, and the cost of project is USD 3.3 billion. The project's civil construction contract was signed on 11th March 2022.

MRT Yellow line and MRT Purple line (south) are both under Public-Private Partnership (PPP) contract. During the construction of MRT Yellow line, it faced many problems and challenges for example

- Bargain power between public & private during the construction.
- Many complaints and litigations issued.
- Performance of consultant cannot be extracted.
- Misunderstanding in many processes during construction.

The objective of the study is to compare the construction contracts MRT Yellow line project and MRT Purple line (south) project to define the advantages and disadvantages of each project in terms of project management. The reasons to select MRT Purple line (south) contract to compare with MRT Yellow line are both are under PPP that was mentioned before, some of contract in MRT Purple line (south) is design and build that same as MRT Yellow line contract, and normally the contract should be enhanced so, in this context, MRT Purple line (south) contract is the latest contract that contract itself has been improved from previous. The result of the study will be used for contract improvement in MRT construction project in the future.

In this comparison, the researcher chose the process in contract which led to the investment and legal ownership of PPP contract classification. The type of investment and legal ownership of PPP contract [3] consists of Build-Operate-Transfer (BOT), Build-Own-Operate-Transfer (BOOT), and Build-Transfer-Operate (BTO) etc.

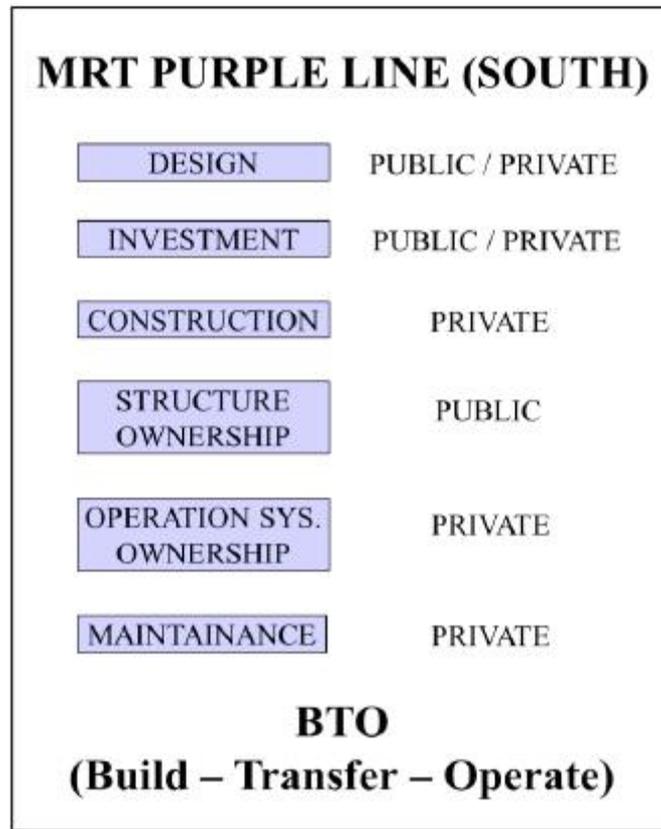
After studying the relationship between public and private sector in MRT Yellow line contract [1] as [Fig.1] found that the preliminary design of the project was designed by MRTA or public sector. However, for private sector involved by designing the detail design so, in the design stage belonged to both. For investment and construction, it is private sector's responsibility. After the project construction is completed, the structure ownership will be transferred to public so, in this case, the project's structure ownership belongs to the public sector. After private transfers the assets to public, the public will deliver 'the right' for operation and maintenance to private that is the start of phase 2 in MRT Yellow line with 30 years of operation and maintenance. So, the investment and legal ownership of PPP contract classification of MRT Yellow line is BTO.

MRT YELLOW LINE	
DESIGN	PUBLIC / PRIVATE
INVESTMENT	PRIVATE
CONSTRUCTION	PRIVATE
STRUCTURE OWNERSHIP	PUBLIC
OPERATION SYS. OWNERSHIP	PRIVATE
MAINTAINANCE	PRIVATE

BTO
(Build – Transfer – Operate)

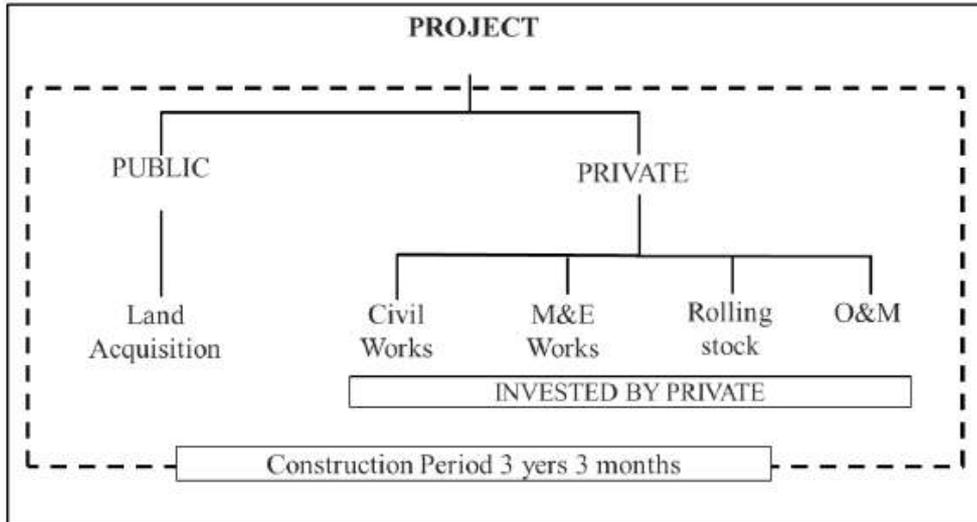
[Fig. 1] The relationship between public and private sector in MRT Yellow line contract

From the research in the relationship between public and private sector in MRT Purpleline (south) [2] contractas shown in [Fig.2], the relationship is almost thesame as MRT Yellow line contract but there is adifference in investment. The investment of MRT Purple line belongs to both.However, the structure ownership after completion still belongs to public section. So, the investment and legal ownership of PPP contract classification of MRT Purpleline(south)is also BTO.



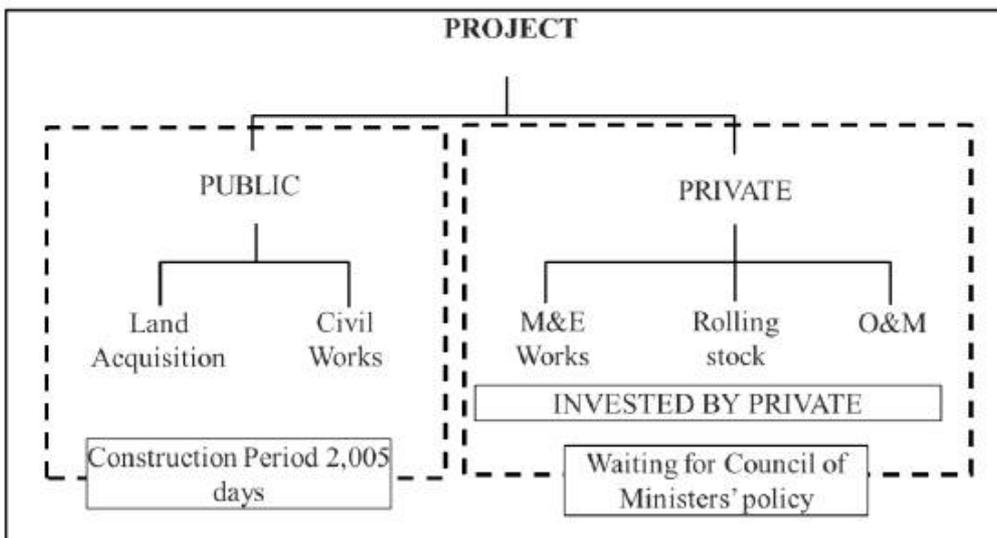
[Fig. 2] The relationship between public and private sector in MRT Purple line (south)contract

The investment structure of MRT Yellow line contract[1], land acquisition is under public sector’s responsibility. However, for the private sector’s responsibility consistsof civil works, M&E works, rolling stock and Operation and Maintenance (O&M)as shown in[Fig.3].



[Fig. 3] Investment structure of MRT Yellow line project.

For MRT Purple line (south)[2], the investment structure is different to MRT Yellow line. The civil work investment is under public sector as shown in [Fig.4]. So, in this comparison it was found that, the authority in construction management of MRT Purple line is under MRTA, bit for MRT Yellow line, the influence of management is under private sector.

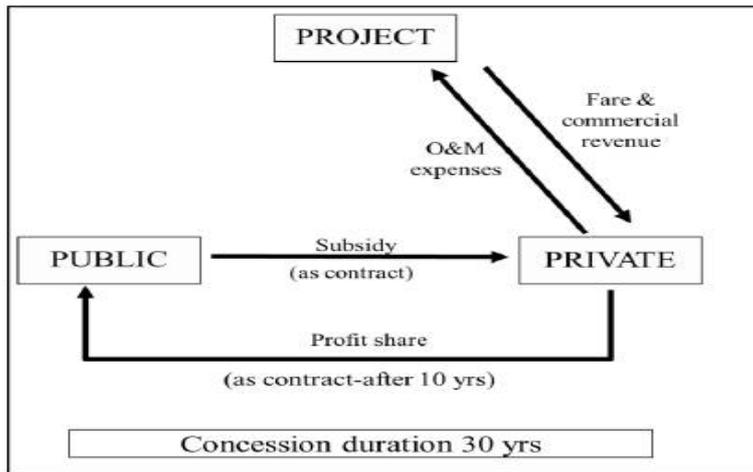


[Fig. 4] Investment structure of MRT Purple line (south) project.

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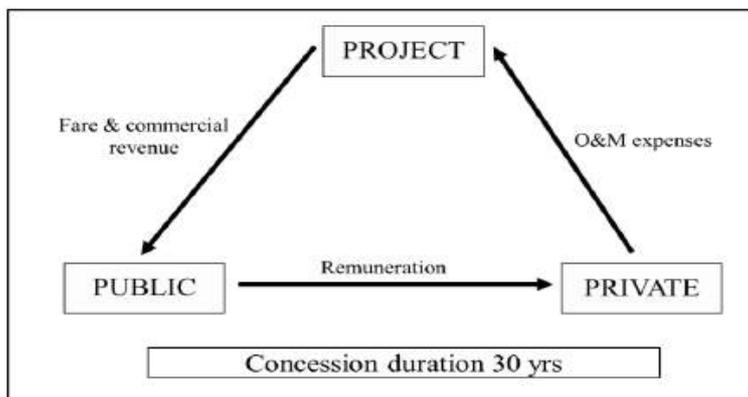
Financial relationship between Public and Private

In MRT Yellow line contract[1], Private sector hold the concession contract that means they can collect fare and commercial revenue, but they have to pay for operation and maintenance cost. At the same time, MRT Yellow line defined that the government must subsidize to concessionaire in the first year after operation for 10 years and the amount of subsidy is defined by contract. However, after 10 years, private have to share the profit with government as the rate which is defined in contract as shown in [Fig.5]and this kind of investment contract is called 'PPP Net cost'.



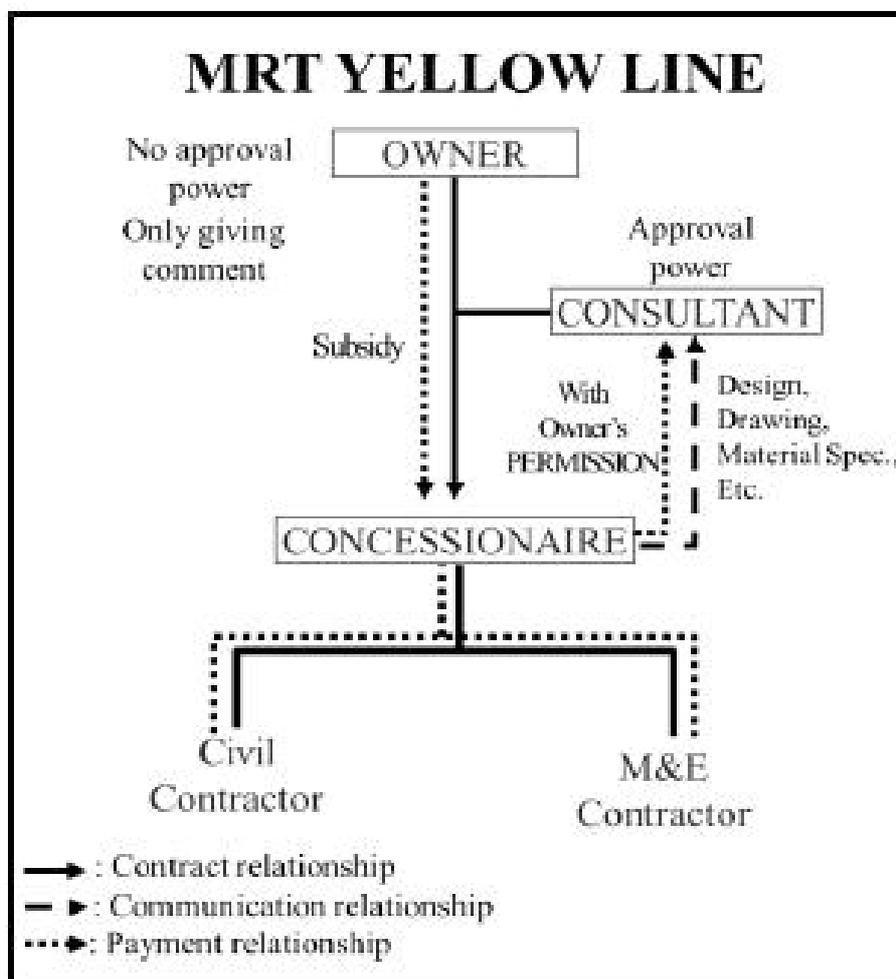
[Fig. 5] Financial Relationship of MRT Yellow line project.

For MRTA Purple line (south)[2]contract is different. MRT Purple line (south) is PPP Gross cost that means all the fare and commercial revenue would be collected by MRTA. However, MRTA or public sector will share to private sector as remuneration. Private sector's responsibility is only operate and maintenance as shown in [Fig.6]. So, in terms of financial relationship, the power of concessionaire in MRT Yellow line is under private more than MRT Purple line (south).



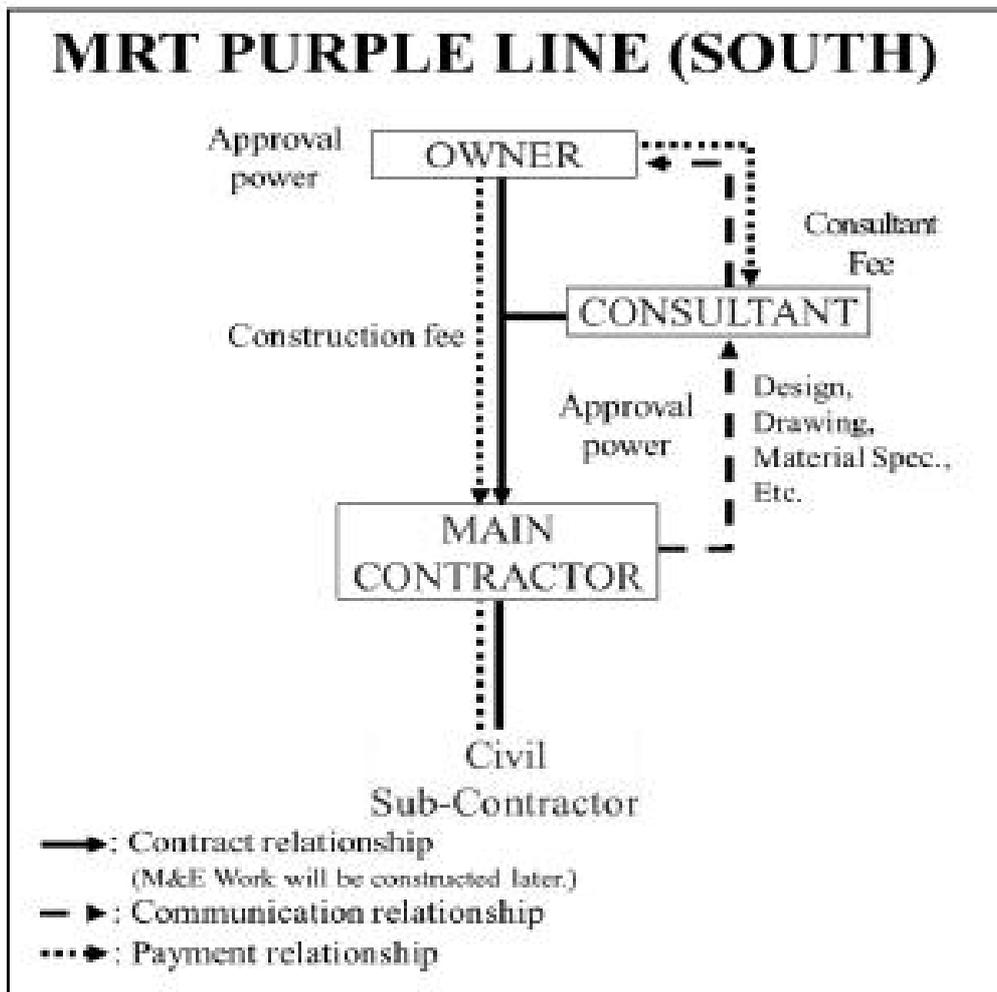
[Fig. 6] Financial Relationship of MRT Purple line (south).

The construction management relationship of MRT Yellow line is complicated. From [Fig.7] is shown that the owner of public sector has signed contract to concessionaire directly. Moreover, the owner also has a direct contract with a consulting service. Whereas the consultant fee is paid by concessionaire as be defined by contract [1] with permission from owner. So, in this case the power and enforcement of consultant cannot be fully though consultant has power to approve the document from concessionaire. However, because the money that the owner have to pay to concessionaire is only subsidy, the owner still has no any power to enforce the concessionaire in policies.



[Fig. 7] Construction management relationship of MRT Yellowline

For the Construction management relationship of MRT Purple line (south)[2], its relationship make sense. Because of the civil work is invested by government so, they have more power to enforce their consultant and main contractor as shown in [Fig.8].



[Fig. 8] Construction management relationship of MRT Purple line (south)

From the research it was found that civil work in MRT Yellow line is under investment by Private but Purple Line (south) is invested by Public. So, between these contracts cannot be fully compared to finding out the solution of problems which lead to contract improvement.

From researcher's point of view, the main factor still be the money that affect to the efficiency of the construction project management. For the solutions of each problem that was mentioned before can be concluded are :

6.1. Bargain power between public & private during the construction.

Because all the investment comes from Private's sector, so all of the management is under their control. Although there is some power to be distributed to consultants, but public cannot fully manage the construction. And from the study of MRT Yellow line contract and MRT Purple line (south), not found any phases or any measures those mention about policy enforcement by Public directly. However, Purple line (south), the management power still be under public section, because the construction fee is paid by government. Researcher have to study and compare with other contracts which look more similar to MRT Yellow line project in the future.

6.2. Many complaints and litigations issued.

Because the MRT Yellow line's investment belongs to Private's responsibility, all delays are their cost. Private has to accelerate the construction progress against the time. So, it's unavoidable to affect people around the construction side. However, this is not an excuse for neglecting the people's affliction. So, from the researcher's point of view, consultants should enforce their power to improve the problem and in the future public sector should put more measures, policy, or penalty to contract.

6.3. Performance of consultant cannot be extracted.

For MRT Yellow line, because of the consultant fee payment is under Private's responsibility. Although Public's sector has direct contract with consultant. To improve this problem, need to improve the contract or add another party to regulate and oversee consultant which paid by Public's section. This problem needs to study more in the future.

6.4. Misunderstanding in many processes during construction

For this issue, from researcher's point of view, the misunderstanding and work process duplication occur from the unclear workflow during the construction. Solution of this case may add workflow process in contract as appendix. However, this problem is rarely found in MRT Purple line (south) because the management system is clearer. Because the investment in construction comes from the public sector and the main factor is still money.

References

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[3]

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