

DEVELOPING ALTERNATIVE CONCEPT FOR RAILWAY OPERATION AND MAINTENANCE CONTRACT

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Most of Indonesia's railway investment is supported from the government budget where the operation and maintenance conducted by PT KAI – a sole state owned enterprise in railway industry. Currently, the government attempt to attract private sectors in railway infrastructure by contracting out operation and maintenance. However, limited experience in formulating suitable contract makes the progress relatively slow. The objective of this research is to examine alternative contract in operation and maintenance for Indonesia's railway transportation by taking Greater Jakarta Light Rail Transit (LRT) as the case study. It will consider financial components that consist of net present value, internal rate of return and payback period to produce targeted output. This research generates two simulations; (1) a simple contract where the government covers investment cost; procurement of rolling stock; and construction of stabling yard and depot. Meanwhile, the winner from tendering process have to conduct operation and maintenance for both the infrastructure and rolling stock; (2) a lease contract where a winner from tendering process require to pay lease fee through selected government body to run the operation and maintenance. The result shows simple contact where the operator only responsible for operating and maintaining the infrastructure and rolling stock is more favorable to attract private investment.

Keywords: Internal rate of return, Management contract, Lease contract, Simulation.

1 INTRODUCTION

Railway sector as one means of transportation has significant role to support economic life for the people particularly in developing countries such as Indonesia (Berawi *et al.* 2015). Railway enabling people to travel from one place to the other with greater speed compared to other modes of transportation such as private vehicles in urban area. It also has the ability to transport goods and individuals for greater volume in single travel time (Jones *et al.* 2014). According to statistics of Indonesia (2012), railway passenger volume has been increase for 2.16% or about 102.1 million passengers in 2012, while freight transport around 19.59% or about 11.5 million ton compared to the same period from previous year.

Government of Indonesia attempt to increase railway contribution in future years by publishing strategic program through National Railway Master Plan. It is expected in 2030, railway market increase for about 13% and 17% for passenger and freight transport respectively. In order to achieve those target, the needs for investment in railway transportation in 2015 – 2019 period estimated around 234.33 trillion rupiah or equal to US\$

16.74 billion. It will consist of the construction and management of railway infrastructure and its supported facilities, rolling stock procurement, formulating safety in railways and other related significant programs. Government of Indonesia has limited funds to support railway infrastructure network in the country. Therefore, collaboration with related stakeholders is encouraged to ensure public demands in railways development (Berawi *et al.* 2014, Patil and Laishram 2016).

Indonesian Law No 23 in 2007 has fundamentally created opportunities for other parties from either private sector or local government to participate in railway industry. Their investment will create multi – operator system and therefore gradually improve services for the users. Government as the regulator has the obligation to generate supporting regulation and compact investing mechanism.

Currently, the government attempt to attract private sectors in railway infrastructure by contracting out operation and maintenance. However, limited experience in formulating suitable contract makes the progress relatively slow. The objective of this research is to examine alternative contract in operation and maintenance for Indonesia' railway transportation by taking Greater Jakarta Light Rail Transit (LRT) as the case study.

LRT Jakarta is one of promising urban rail – based transportation that aims to reduce congestion and travel time uncertainty in Greater Jakarta. Government of Indonesia select PT. Adhi Karya – a state owned enterprises through a direct appointment supported by presidential law no 98/2015 to construct only the infrastructure. It then given out to the government prior to completion for tendering process for its operation and maintenance.

2 METHODOLOGY

In order to achieve targeted output this research was combining both desk research and in – depth interview as research methods. Desk research is a technique to collect related data according to the project that being studied. The data gained from various resources from statistics of Indonesia, Government report, manuals, handbooks, previous studies and research as well as other related public records. It will be compared, digested and combined to generate semi – structured instrument for in – depth interview.

The semi – structured interview comprises of three parts. The information about respondents, railway operation and maintenance contract in Indonesia and public – private partnership scheme in railway contract. The first part of instrument identified respondents' general information about institution, academic background, position and work experience. Second part of the instrument collected information about type of contract, benefits, and optimum contract. Last part provides information about government support and division of responsibility in operation and maintenance contract.

The interview were conducted by the semi – structured instruments to 10 respondents that ranging from academics, Indonesia – China High Speed Train Corporation, government bodies and practitioners. All respondents hold a minimum of master degree in transportation, experienced in railway project for more than 10 years and have been involved in public private partnership in Indonesia. With such qualifications, it enables them to validate the research findings and to formulate robust contractual framework for railway transportation.

3 RESULT AND DISCUSSION

There are various type of collaboration in public private partnership (PPP) scheme from build-operate-transfer (BOT), design-build-operate and maintain (DBOM), design and build (DB), contract management, as well as operation and maintenance (O-M). From those varied

concept of PPP, private investors has the rights to own, maintain, or operate the infrastructure, facilities and services that mostly dominated by public entity. The privilege in managing the railway transportation depends on PPP contract considering numerous factors such as scope of task, payment, and revenue generation (Evenhuis and Vickerman 2010).

Operation and maintenance contract is conducted where government built infrastructure then operated and maintained by the private sector. This type of contract is part of public private partnership scheme that aims to improve railway competitiveness especially in developing countries such as Indonesia. In this research the contract will simplified into a simple contract and a lease contract of operation and maintenance.

In calculating the financial analysis, several assumptions and supporting data has been made as follows:

- Investment cost to develop the LRT system is about US\$ 1,226,800,000.
- Rolling stock procurement and depot estimated for about US\$ 146,870,000.
- Overhaul activity conducted every 10 years. In 2027 the cost is about US\$ 1,628,000 for 37 unit rolling stock and US\$ 2,464,000 in 2042 for 56 unit of rolling stock.
- Operation and maintenance cost estimated around US\$ 24,515,154 in the first year of operation and increase 5.46% every year.
- The analysis use pessimist scenario of passenger demand with 35% from existing planned (210,000passengers/day) and estimated for about 73,500 passengers per day.
- Ticket price is about US\$ 1.07 with exchange rate 1 US\$ = Rp. 14,000.

A simple contract assumed that rolling stock depot and rolling stock procurement supported by the government through a sunk cost. Meanwhile operator expected to operate and maintain the infrastructure and rolling stock. In case, cost of renewal is required, it will be subjected to the operator. Simple contract produce internal rate of return for more than 20% with payback period in the fourth year of operation. Timeline of the project and cash flow diagram visualize in Figure 1.

On the other hand, operation and maintenance cost simulation using lease contract is a BOT contract variation where the government lease their asset to private sector. They oblige to manage and maintain the infrastructure according to mutual agreement between two parties. This type of contract has been implemented in Japan following JNR (Japan National Railways) reformation.

Prior 2003, the construction of railway in Japan particularly for its high speed train networks both for existing and new track was developed through Japan Railway Construction, Transport and Technology Agency (JRJT). They not only manage to construct the infrastructure but also given ownership rights to be leased for other interest parties (Mizutani and Shoji 2004, Kurosaki 2013). Operator shall pay for lease fee around 30% from total budget of investment. Meanwhile, one third portion will be covered by local government and the rest supported by central government (Transport Analysis 2014).

In this research, lease fee scheme to operator comprises of 5 scenarios including 10% up to 30%. It also assumed that the operator has rights of rolling stock, therefore the procurement for about US\$ 126 million dollar subjected to the operator. In these schemes rolling stock depot for about US\$ 20.87 million supported by government. More detail simulation of tariff and lease fee simulation to generate expected IRR can be seen in following table.

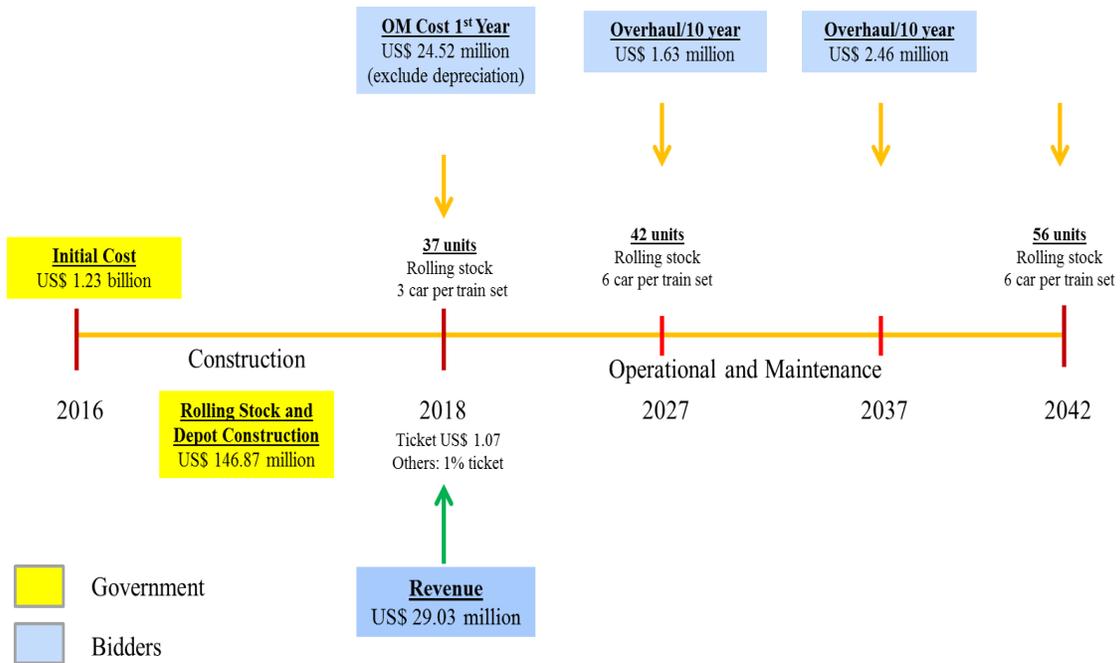


Figure 1. Cash flow diagram with project timeline.

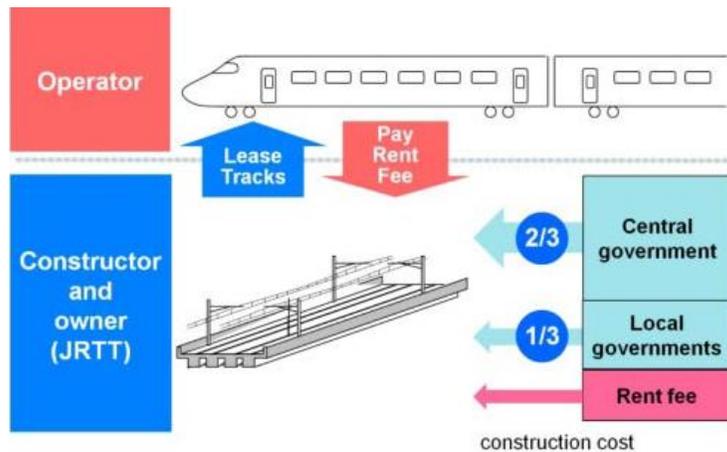


Figure 2. Financial scheme in Japanese high speed train using lease fee. (Transport Analysis 2014).

Table 1. Lease fee scheme for LRT.

Lease fee scheme	Tariff (US\$)			
	1.07	1.43	1.79	2.14
	Internal Rate of Return (%)			
Simulation 10%	2.75	10.05	15.63	20.63
Simulation 15%	1.56	8.24	13.20	17.51
Simulation 20%	0.60	6.86	11.38	15.25
Simulation 25%	-0.21	5.73	9.95	13.50
Simulation 30%	-0.90	4.79	8.78	12.09

Based on table above, the tariff of about US\$ 1.07 were unable to provide optimum feasibility for the project. Maximum IRR that can be achieved is 10% lease fee with 2.75% of IRR. Similar situation also applied to US\$ 1.43 tariff. Although, it produce higher IRR, yet still gained maximum 10.05% of IRR or below targeted minimum attractive rate of return (MARR) for investor (12%). This scheme only feasible if the tariff had reached US\$1.79 with maximum 20% of lease fee scheme and US\$ 2.14 tariff.

Considering two alternatives of contract simulation, simple contract required a huge amount of investment for the public with estimated cost around US\$ 1.3 billion. However this type of contract where the operator only responsible for operating and maintaining both infrastructure and rolling stock of LRT system generate more profits and surely attract more investors compared to lease fee contract. It also produces a short term contract, thus more manageable to be evaluated. World Bank (2015) also supporting the argument that simple contract commonly used by the authority for a short period of time (2 – 5 years) and can be used either for task specific and input – based or output and performance – based.

4 CONCLUSION

Railway development plays significant role in increasing productivity and creating alternative accessibility for people. Based on the analysis of two scenarios from simple and lease fee contracts, simple contract produce more benefits in term of financial feasibility.

Operation and maintenance using lease contract is conducted through mutual agreement between two parties both government and private entity. In detail, the government leases their asset to private sector. They will oblige to manage and maintain the infrastructure as the contract agreement. The contract only feasible for investor with tariff for about US\$1.79 and 20% of lease fee scheme; or US\$ 2.14 tariff and varied lease fee can be used to produce optimum IRR.

In simple contract, rolling stock depot and rolling stock procurement supported by the government through a sunk cost. Meanwhile operator expected to operate and maintain the infrastructure and rolling stock. Furthermore, Simple contract produce internal rate of return for more than 20% with payback period in the fourth year of operation. This type of contract is more profitable and able attract more investors compared to lease fee contract. It also produces a short term contract, thus more manageable to be evaluated by the public.

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