Operation Maintenance Contract Scheme in Railway Infrastructure Project

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Abstract: ***Railway plays a significant role in improving connectivity and generates economic growth of a nation. The contract in railway has been discussed to improve industry railway competitiveness in the past decades not only in developed countries but also developing countries such as Indonesia. The country attempt to build railway tracks across the country, but the contract for operation and maintenance remain a question. The paper attempts to support the mechanism of operation and maintenance contract and use railway project in the country as the case study. The research uses a combination of qualitative and quantitative approaches through the in-depth interview and questionnaire survey. It distributed to key stakeholders related to railway and infrastructure project consist of a government institution, private investor, a state-owned enterprise, and local-owned enterprise. The result shows that performance-based contract is the most suitable for the railway industry. It shall consider duration and the contract value to select the best contract. The project prefers to be managed by private investors or local-owned enterprise. Business entity selection shall consider their company reputation, licensing requirement, and healthy financial structure.***

Keywords: ***Contract, Infrastructure, Maintenance, Operation, Railway.***

I. INTRODUCTION

The railway is one means of transportation that offer higher mobility for the user [1]. Many countries have been relying on this type of transportation as the backbone for economic growth and job creation. Researchers have been discussed topics related to railway development in term of technical, financial, market, social, and many others [2, 3, 4]. However, little evidence shows discussion about partnership and contract particularly for developing countries. The government of Indonesia currently attempt to improve railway competitiveness by encouraging private investors to be involved in the railway industry [5]. To date, the railway operator in the country holds by a state-owned enterprise in railway and its subsidiaries.

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Although the government regulated Law No 23 in 2007 about railway operation in Indonesia, private investors tend to hesitate for investment. A collaboration between the government and private sector is then proposed as one of the solutions to mitigate minimum involvement of business entity in the railway project development. It acts as an initiative towards multi-operator in the industry. The parties may collaborate in any forms and particular stages such as planning, construction to post-construction. Operation and maintenance contract is the most straightforward collaboration between the government and private entity in short-term phase.

In the contract, the government will build the infrastructure and further private sector operate and manage the infrastructure for a specified period [6, 7]. The type of contract has been applied in many other countries and sectors such as road and port development. With benefits may generate from this type of contract, railway industry needs to implement it shortly.

This paper will examine South Sulawesi Railway Development as one of strategic railway project that attempts to use the operation and maintenance contract. It will investigate the variables that might significantly affect the railway development. It is expected that the result may benefit related stakeholders from government institutions, operator and many other for decision-making process about railway industry.

II. LITERATURE REVIEW

A. Operation and Maintenance Contract Scene

In most European countries, routine maintenance of railway infrastructure is contracted to an external party. This contract targeted the quality that should be achieved by the contractors/agents. Infrastructure Manager as government extension uses measurable instruments to evaluate and to monitors contractor's performance [8]. For the maintenance of railway infrastructure, there are several factors such as strategic factors, markets, services, and technology as well as economic factors [9, 10, 11]. Strategic factors identify essential competencies which should be held by contractors. Many kinds of literature stated that core competencies should be held by in-house while non-core business may be contracted to external parties. The market factor shall link to the availability of qualified contractors. If the contractor is less qualified, maintenance should be managed internally and vice versa.

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In term of service and technology factor, maintenance activity can be outsourced based on modular system or small parts system. Modular system divided the components into more substantial parts and much more manageable for tendering/procurement. On the other hand, economic factors are a significant preamble which should be considered. Labor costs are expected to be significantly reduced through this type of contract.

B. Lesson Learned Railway Enterprise and Industry

Japan has developed market liberalization in the railway industry [12]. It is marked by an extensive opportunity for investors to initiate new infrastructures development even on the same route. However, it might be different from countries in Europe such as Sweden. Swedish Transport Administration (STA) is a government extension who responsible for planning and building new infrastructure [13]. STA also have a role in managing capacity and traffic management as well as maintenance. In other words, private operators or state-owned enterprises in Sweden only responsible for operating the infrastructure railway. While in Japan, there is no organization similar to STA. They have supervisory functions but separate from regulators and planning, development, management as well as maintenance of infrastructure. The comparison of railway structure can be seen in table 1.

Table 1. Comparison in The Structure of Railway Function in 3 Countries

	Sweden	Japan	Indonesia
Initiative	Government	Government and Railway Companies	Government and State-Owned Enterprise
Construction	STA	Private Companies and JRTT	Government
Management	STA	Railway Companies, either private or State-Owned Enterprise	State Owned Enterprise for Railway
Maintenance	STA	Railway Companies, either Private or State-Owned Enterprise	State Owned Enterprise for Railway i
Operation	Railway Companies, either Private or State-Owned Enterprise	Railway Companies, either Private or State-Owned Enterprise	State Owned Enterprise for Railway
Supervision	STA, Swedish National Audit Office	MLIT and Japan Transport Safety Board	Ministry of Transportation

From the above table, railways in Indonesia have a similar situation in Sweden. Most initiatives and railway construction become government responsibility. However, unlike the two countries whose the operations have a competitive mechanism, Indonesia only has a sole operator through PT KAI. Furthermore, Sweden and Japan have different treatment of operation where Sweden use vertical separation, and Japan adopted vertical integration system.

C. Overview of Makassar-Parepare Railway

Makassar - Pare-pare is one of the high priority routes which is proposed in a study on the Master Plan of Railway Development in Sulawesi. The route may affect the pattern of industrial development, trade, mining and agriculture, and shall contribute to economic development of regions. Also, to serve the existing needs, the construction of a railway will generate new travel demand as a result of changes in the pattern of improved activity. Railway development of Makassar-Parepare Route can be seen in figure 1.

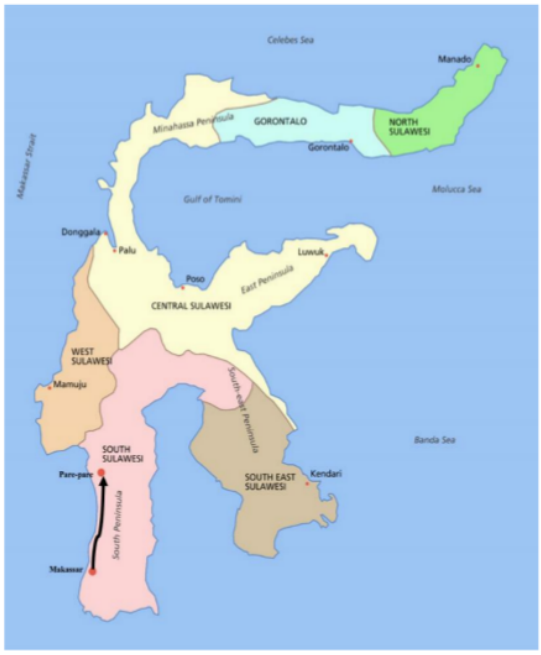

Figure 1 Railway Development Plan of Makassar-Parepare Route

Length of the railway is 136.3 km and expected to have 16 stations consist of 5 major stations and 11 small stations. The project feasibility shows low financially rate of return of about 5.06% and below the expected minimum rate of return from investor perspective as about 12%. However, the economic feasibility shows higher percentage as about 10.38%. It means the project requires government support for initial investment. Thus the project may come into realization.

Government as the primary investor may form a consortium with provincial, district/City in South Sulawesi or other private investors such as Semen Tonasa, Semen Bosowa, Kalla Group and others to realize the construction of Makassar - Parepare railway.

D. Paper Submission Criteria

1 Any one author cannot submit more than 05 papers for the same volume/issue. The authors of the accepted manuscripts will be given a copyright form and the form should accompany your final submission. It is noted that:

- Each author profile along with photo (min 100 word) has been included in the final paper.
- Final paper is prepared as per journal the template.

- Contents of the paper are fine and satisfactory. Author (s) can make rectification in the final paper but after the final submission to the journal, rectification is not possible.

III. METHODOLOGY

The research uses a combination of qualitative and quantitative approaches. A qualitative approach is conducted using benchmarking process and literature review. It aims to formulate a grounded theory or case study from a similar project that previously existed nationwide and abroad [14]. In-depth interviews are used to generate respondent's ideas and input about the operation and maintenance contract in the country [15]. It only considers Indonesian nationality to obtain similar context and uniformity of understanding. A semi-structured interview was used to accommodate respondent interest in expressing their comments and valuable input to the industry.

The quantitative approach is used by using questionnaire survey. It distributed to a various institution such as government institution, private investors, a state-owned enterprise and local-owned enterprise. The background of respondent was selected based on their experience in infrastructure or railway project. It uses the multiple-choice question to generate sequentially ordered data, with a known number of answer options [16, 17]. This type of question provides a standardized result and easily transfer for statistical analysis [18].

IV. RESULT AND DISCUSSION

Respondents consist of three type of background such as government institution, state-owned enterprise/local-owned enterprise and private investor. Respondents from government institution and private investor share similar percentage for about 37.5%. On the other hand, state-owned enterprise/local-owned enterprise is about 25%. Level of education mostly holds master degree followed by undergraduate and others. Respondents with managerial level are about 37.5% followed by superintendent and director with 25% and 13.5% respectively. They mostly have experience in the transportation sector whether 11-20 years or more than 20 years.

In term of selecting the contract for an infrastructure project, duration and the contract value are the most significant factor. Respondents from government institution prefer to select the duration of the contract as the critical issue to be considered in a project, while private investor chose the contract value. Government perspective may suggest the shorter operational stage; then the government can serve lower tariff for the people to access infrastructure. In contrary, every business style attempt to hold the contract duration as long as possible to generate revenue for the company. Thus, contract proportion that balancing each interest between the parties play a significant role to achieve the optimum contract. Contract selection consideration can be seen in figure 2.

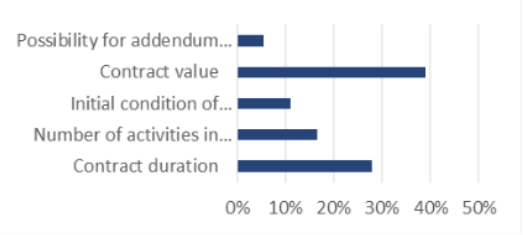

Figure 2 Consideration for Contract Selection

Operation and maintenance of railway project for Makassar – Parepare can be managed by the state-owned enterprise, private investor, local-owned enterprise, special autonomy body in railway and ministry of transportation. The result shows that the project managed by private investors or local-owned enterprise. Respondents from government institution argue that local-owned enterprise is the best party to manage the project. The project is for public interest and located in eastern part of Indonesia which less developed from western part of the country. Transferring the obligation of management to the local-owned enterprise is the best way to encourage local participation and release political issue that central government unwillingly distribute mega infrastructure project to others. However, the capability of the local-owned enterprise to handle such huge project should also be considered. The concession is one of the options that might be suitable to accommodate budget constraint in the future. Preference of respondent for railway management can be seen in figure 3.

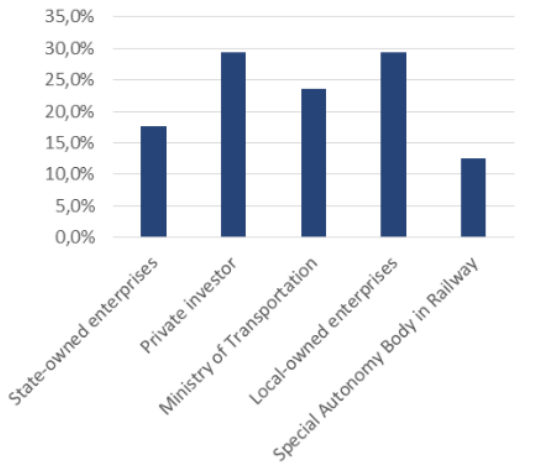

Figure 3 Preference to Manage the Railway Project

In a business perspective, they expect to have a significant role by combining resources with the local private investor. Private entity argues offer professionalism in management, provide better accountability and transparency. With profit-based management, the company shall maximize the potential to generate revenues and propose optimum service for the user with reasonable price.

However, it should be supported by robust policy and regulation from the government. Otherwise, the price will be compensated for the end-user to access the infrastructure.

From the type of contract, most of the respondents select performance-based contract as the most suitable contract for the railway industry. Despite respondents agreement about the needs to implement this type of contract, the industry encounter obstacle such as limited knowledge and inadequate policy. Road sectors in the country have performed this type of contract and have been quite successful in improving infrastructure performance. Identifying critical success factors and other considerations in the performance-based contract of road sector should then investigated to implement the contract for railway sector further. Type of contract result can be seen in figure 4.

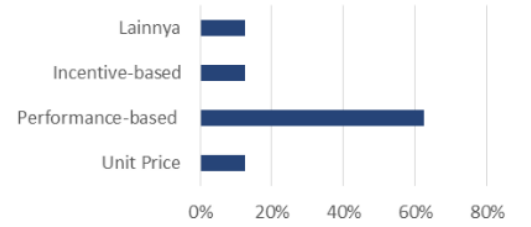

Figure 4 Type of Contract

A business entity that manages the project in the future shall meet the requirements of a business entity before being involved in project tendering process. Five requirements have been identified consist of good reputation, has required licensing, offer competitive tariff and cost, healthy financial structure, has insurance from the third party. Most of respondent select three variables as the highest influence to contract performance consist of good company reputation, licensing requirement, and healthy financial structure. The requirement of business entity to be involved in tendering process can be seen in figure 5.

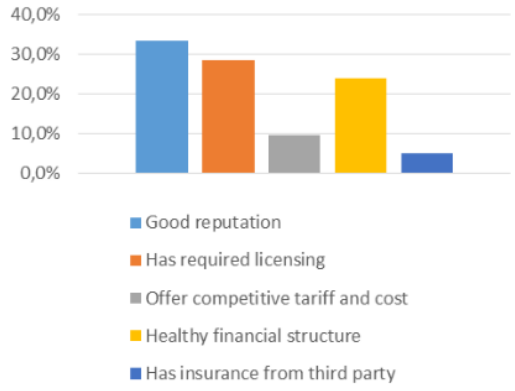

Figure 5 Requirement of Business Entity to be Involved in Tendering Process

In general, the regulation in Indonesia itself has set the needs for regulations related to business entities to be involved in the railway sector such as Ministerial Regulation of PPN No. 4 of 2015 as well as the Regulation from LKPP No. 19 of 2015. However, local business entities are not well socialized from the central government about the documents to be prepared for tendering process. Thus, a gap of knowledge should be minimized to increase participation in rail infrastructure projects. Result of duration of contract can be seen in figure 6.

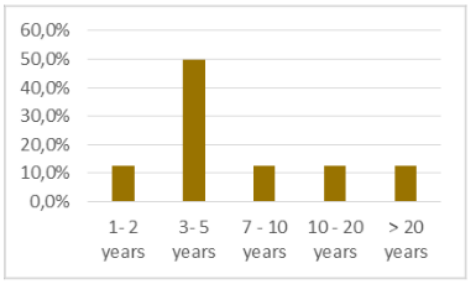

Figure 6 Duration of Contract

In term of the optimum period in managing the operation and maintenance of the railway project, most of the respondent argues 3 to 5 years is the best period. Road sector in several countries has similar duration. Alberta in Canada uses output-based contract with duration about five years that consider 78% of cost performance in selecting contractors. Estonia adopts both output and performance-based contract with five years contract. Tendering process consider 70%-80% of the cost performance. Finland has three type of durations from 3 years, five years and seven years. The tender use output and performance-based contract. The United States also use performance-based contract with five years of management that consider 50% of cost performance [19].

V. CONCLUSION

The research investigates potential implementation of operation and maintenance contract in railway development. The study uses Makassar-parepare route in Indonesia as the case study. The result shows that performance-based contract is the most suitable for the railway industry. It shall consider duration and the contract value to select the best contract. The project prefers to be managed by private investors or local-owned enterprise. Business entity selection shall consider their company reputation, licensing requirement, and healthy financial structure.

Despite differences opinion from government institutions and a private party in particular issues of the contract, most of them agreed to develop robust framework of the contract shall be supported by all related stakeholders in the project. The government should support comprehensive policy and regulation, while private participation through investment is mostly encouraged. Further research will attempt to examine components that shall be considered in developing OM contract and potential railway elements for contracting out to the private party.

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VI. RESULT AND DISCUSSION

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Authors should consider the following points:

1) Technical papers submitted for publication must advance the state of knowledge and must cite relevant prior work.
2) The length of a submitted paper should be commensurate with the importance, or appropriate to the complexity, of the work. For example, an obvious extension of previously published work might not be appropriate for publication or might be adequately treated in just a few pages.
3) Authors must convince both peer reviewers and the editors of the scientific and technical merit of a paper; the standards of proof are higher when extraordinary or unexpected results are reported.
4) Because replication is required for scientific progress, papers submitted for publication must provide sufficient information to allow readers to perform similar experiments or calculations and use the reported results. Although not everything need be disclosed, a paper must contain new, useable, and fully described information. For example, a specimen's chemical composition need not be reported if the main purpose of a paper is to introduce a new measurement technique. Authors should expect to be challenged by reviewers if the results are not supported by adequate data and critical details.

VII. CONCLUSION

A conclusion section is not required. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

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