The Viability Gap Funding (VGF) Scheme in Construction Assignment LRT Jabodebek Phase 2 Project Economic and Financial Analysis

Satriadi Ery and Murtaqi Isrochmani

**ABSTRACT**

The development of transportation infrastructure is very necessary for the process of developing connectivity between regions and an effort for regional equity in Indonesia. This necessity doesn’t align with Indonesia’s financial capacity to finance the infrastructure. This gap creates financing innovations between the Government of Indonesia and business entities, such as the Viability Gap Fund. This research used secondary data from PT. Adhi Karya (Persero) Tbk. A further financial calculation has implemented discounted cash flow method to analyse the financial feasibility of LRT Jabodebek Phase 2. Financial feasibility without the Government of Indonesia support is economically feasible but not financially feasible. Therefore, project financing support from the Government of Indonesia is required. The result of the analysis consisted of NPV of 2,255.9 billion rupiahs and IRR of 10.15% which is higher than the project’s WACC of 9.26%. Therefore, the project is financially feasible, although the IRR of the project might be less attractive for some private investors. In order to make this project more attractive to private investors, it is recommended to increase non-farebox revenue, and create concessions to build TOD (Transit Oriented Development).

**Keywords:** Financing scheme, LRT Jabodebek Phase 2, PPP/KPBU, Railways, VGF.

I. INTRODUCTION

Developing infrastructure to connect cities has been linked with its role to the country’s development and its economic growth. Bambang Susantono, ADB Vice President for Knowledge Management and Sustainable Development, said “Cities as engines of growth and urbanization feeds economic growth”. Economic growth increases through urbanization that increase productivity, where more firms and households are attracted to move into cities, increasing their size. Transport infrastructure development needs to keep up in order to avoid congestion and gridlock. According to a study from the Republic of Korea, a 10% increase in jobs within an hour’s travel time is related with a 10% improvement in labour productivity (Remy Prud’homme and Chang-Woon Lee, 1999). This emphasizes the need of cities developing efficient, cost-effective, and integrated transportation systems.

The Light Rapid Transit (LRT) Jabodebek Project Phase 2 (Line 5: Cibubur-Bogor) is continuation of LRT Jabodebek Phase 1 with the split of lines as follows: Line 1 (Cibubur-Cawang), Line 2 (Cawang- Dukuh Atas), and Line 3 (Cawang-Bekasi Timur). This project will be built side by side with the Jagorawi Toll Road and connected directly to the LRT Jabodebek Phase 1 which might be an alternative transportation for residents of Bogor and its surroundings. The new line (Line 5) of LRT project, connecting Jakarta and Bogor area, becomes an addition to the existing modes of transportation, namely rail-based transportation (private vehicles, buses, public transportation, etc.).

On this research will be discussed about the calculations of financial and economic matters such as: (1) Determine and analyse economic feasibility using Vehicle Operating Cost (VOC) Saving, Vehicle Operating Time (VOT) Savings, and Greenhouse Gas (GHG) Emissions Cost Savings on LRT Jabodebek Phase 2. (2) Determine and analyse financial feasibility using Net Present Value (NPV), and Internal Rate of Return (IRR). (3) Determine whether Viability Gap Funding (VGF) through financial model on LRT Jabodebek Phase 2 can make the project financially viable.

II. LITERATURE REVIEW

A. Rail Infrastructure Review

Rail infrastructure development will be carried out in two stages, where in Phase 1 (Year 1-4), the construction of rail infrastructure (track, viaduct, bridge) and depo will be built. In Phase 2 (Year 13-14), additional stations will be built in the following year in line with the development of demand in the area.

<table>
<thead>
<tr>
<th>TABLE I: RAIL INFRASTRUCTURE CIVIL WORKS</th>
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B. Financial Indicators

Project valuation analysis in this project using the Discounted Cash Flow, or DCF for short, is the fundamental valuation methodology which useful for investment project appraisal and corporate valuation. The Net Present Value (NPV) and Internal Rate of Return (IRR) are indicators of the project appraisal.

1) The Net Present Value (NPV)

According to Ross et al (2010), “Net Present Value (NPV) is a measure of how much value is created or added today by undertaking an investment. Given the goal of creating value for the investors, a valuation process can be viewed as a search for investment with positive net present values.” The formula of NPV is:

$$NPV = \sum_{t=0}^{n} \frac{CF_t}{(1 + r)^t} - CF_0$$

Source: Gitman et al. (2014).

where:
- CF0 = Project’s initial investment;
- CFt = Present value of its cash inflows discounted;
- R = Discounted rate;
- t = Year of Investment period.

2) The Internal Rate Return (IRR)

The IRR is used to determine whether or not an investment should be made, and it is frequently used as a benchmark for whether or not the investment should be increased rather than the minimal rate of return that investor would undertake or not. IRR can be done through the following formula:

$$IRR = \sum_{t=1}^{n} \frac{CF_t}{(1 + IRR)^t} = CF_0$$

Source: Gitman et al. (2014).

where:
- CF0 = Project’s initial investment;
- CFt = Present value of its cash inflows discounted;
- T = Year of Investment period.

C. Economic Feasibility

Economic feasibility in this final project uses an approach from cost-benefit analysis. This method focuses on comparing costs and benefits of a project that maximize value to society overall (Directorate of Government of Indonesia Support and Infrastructure Financing Management. n.d. Final Section Review Report on the Urban Infrastructure Sector). The social-benefit analysis obtained from benefit cost of avoidable vehicle operating cost (VOC), avoidable vehicle operating time (VOT), and avoidable greenhouse gas (GHG) emissions benefit cost.

1) Avoidable Vehicle Operating Cost (VOC) Benefit

Based on the project’ coverage assumption, the LRT project will replace some part of transportation mode, such as private transportation (car, motorcycle). The number of passengers who in the ‘without project’ scenario is assumed to use cars and motorcycle will be multiplied by the avoided cost (VOC).

$$\text{Avoidable Cost of Vehicle Operating} = \text{Total passengers} \times \text{VOC}$$

where:
- Vehicle Operating Cost = Total Consumption of (Fuel + Oil + Tire + Spare Parts + Mechanics)

2) Avoidable Vehicle Operating Time (VOT) Benefit

This benefit relates to the savings time that LRT passengers get from time spent driving avoidable cost.

$$\text{Avoidable Cost of Operating Time} = (\text{time ‘without project’} - \text{time ‘with project’}) \times \text{average wage/ hours}$$


D. Project Overview

On this research will be discussed about the calculations of financial and economic matters such as: (1) Determine and analyse economic feasibility using Vehicle Operating Cost (VOC) Saving, Vehicle Operating Time (VOT) Savings, and Greenhouse Gas (GHG) Emissions Cost Savings on LRT Jabodebek Phase 2. (2) Determine and analyse financial feasibility using Net Present Value (NPV), and Internal Rate of Return (IRR). (3) Determine whether Viability Gap Funding (VGF) through financial model on LRT Jabodebek Phase 2 can make the project financially viable.

III. METHODS

In this final project will focus on PPPs model of LRT Jabodebek Phase 2 project to be implemented in Indonesia. The analysis conducted in this project is to determine whether this project can give benefits to the public and financially feasible.
IV. RESULTS

A. Financial Feasibility Analysis Without VGF

This analysis will show the financial feasibility of the project model structured without Government of Indonesia support. The project is feasible when the project NPV is positive and IRR is greater than WACC.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>WACC</td>
<td>9.26%</td>
</tr>
<tr>
<td>Internal Rate Return (IRR)</td>
<td>7.05%</td>
</tr>
<tr>
<td>Net Present Value (NPV)</td>
<td>-8,408.7 billion Rupiah</td>
</tr>
</tbody>
</table>

**Conclusion**: Not Feasible

B. Financial Feasibility Analysis Without VGF

This analysis will show the financial feasibility of the project model structured without Government of Indonesia support. The project is feasible when the project NPV is positive, and IRR is greater than WACC.

<table>
<thead>
<tr>
<th>Cost Category</th>
<th>Benefit (Rp Billion)/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Vehicle Operational Cost</td>
<td>12,199</td>
</tr>
<tr>
<td>2 Passenger Time Saving</td>
<td>957.73</td>
</tr>
<tr>
<td>3 Unavoidable Emission GRK</td>
<td>874.03</td>
</tr>
<tr>
<td>Total Benefit Cost</td>
<td>14,030.76</td>
</tr>
</tbody>
</table>

Based on the result above, it can be concluded the project will give social benefit to local area. Therefore, the construction of LRT Phase 2 is feasible.

V. DISCUSSION

A. Financial Feasibility Analysis with VGF

In this project, it assumed that the Government of Indonesia support PPP project by providing support with Viability Gap Funding (VGF). VGF is a form of subsidy of Capital Expenditure or lowering the investment that will spent by investors. While the form of Government of Indonesia Guarantee is to mitigate risks related primarily to political risks.

Referring to PMK 223, 2013, the VGF may be given during the construction period of the PPP Project in accordance with the completion date agreed in the public-private partnership contract. The support given in the form of subsidy fund for project construction costs, equipment cost, installation cost, interest cost during construction, and other related to construction (exclude land acquisition and tax incentive). Herewith, the financial analysis with viability gap fund (VGF).

**TABLE IV: INDICATOR OF PROJECT FEASIBILITY WITH VGF**

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<tr>
<td>Net Present Value (NPV)</td>
<td>2,225.9 billion Rupiah</td>
</tr>
</tbody>
</table>

**Conclusion**: Feasible

VI. CONCLUSION

A. Implementation Plan

In this study, an unsolicited Public Private Partnership (PPP) scheme will be used. The procedure will be carried out with the submission process from Business Entity to Penanggung Jawab Proyek Kerjasama (PJPK). The submission is in the form of a pre-FS document as a PPP proposal to PJPK. PJPK will conduct an in-depth evaluation of the pre-feasibility study documents submitted by Business Entity which should the economically and financially feasible. After the Business Entity passes this stage, further the business entity should be completed the feasibility document. Feasibility document will be used as the basis for issuing an approval letter as an unsolicited project which is then procured for project construction work.

A. Implementation Plan

Although, this project received funding support from the Government of Indonesia in the form of Viability Gap Fund (VGF), the cooperation scheme offered was less attractive to investors. There are several recommendations from the author to give added value for this LRT Project Phase 2:

- There are some requirements to be proper regulations for vehicle user so that people can switch to using public transportation modes.
- TOD (Transit Oriented Development) is needed to increase the passenger demand.
- Initiative in developing non-ticket income by adding several locations or points that can be used for commercial use such as banners and others that can be installed at station or on trains and some banner that will be passed LRT Line 5.

![Unsolicited Proposal Process](Fig. 2. Unsolicited Proposal Process)
VII. LIMITATION

The paper limitations are:
- Financial feasibility analysis using Net Present Value (NPV) and Internal Rate of Return (IRR) with or without Government of Indonesia support (VGF) scheme on the Jabodebek LRT Phase 2.

ACKNOWLEDGMENT

This paper is used to publish the feasibility of LRT Phase 2 that is located in Jakarta, Indonesia. As a means of promoting public transportation and providing social and economic benefits, it uses a Public-Private Partnership (PPP) scheme.

REFERENCES

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Ery Satriadi was born in Jakarta, Indonesia on March 12, 1978. He finished his college education in 2001 at Universitas Indonesia with civil engineering majority. Then he continued his education and achieved his masters’ degree in 2022 at the Institute of Technology Bandung with a business administration major.
He is a manager of Railway Departments in a Stated-owned enterprise company. He has been working for this company for 20 years ago. His ongoing project is Light Rail Transit Jabodebek Phase 1 in Jakarta, Indonesia. He is eager to research the railway infrastructure, including its project feasibility aspects.

Ir. Ery Satriadi S.T. M.T. is a member of the Institute of Technology and the Universitas Indonesia Community. He is always invited as a special guest speaker to give his knowledge and experience. One of them is that he has invited Universitas Indonesia to share his knowledge about the construction mindset phase during pandemic situations.