JMI
Jurnal Multidisiplin Indonesia

Volume 3 Number 12 December 2024
E-ISSN: 2963-2900 | P-ISSN: 2964-9048
https://jmi.rivierapublishing.id/index.php/rp

Financial Feasibility Study for The Construction of The Pulo Gebang–Joglo Light Rail Transit (LRT) Project

Adi Ariyanti, Harun Al Rasyid Lubis, Rudy Hermawan Karsaman
Institut Teknologi Bandung, Indonesia
Email: adiariyanti13@gmail.com[1]

Abstract

The DKI Jakarta Regional Government is evaluating a rail Public-Private Partnership (PPP) proposal for the Pulo Gebang-Joglo Light Rail Transit (LRT) under the Unsolicited Local Government and Business Entity Cooperation (KPDBU) scheme. This thesis examines the project's feasibility, focusing on financial and risk aspects. The proposal is currently under review by the DKI Jakarta Provincial Government. Passenger forecasts include pessimistic, moderate, and optimistic scenarios to estimate potential revenue. Investment costs (capex) and service revenue are calculated for a 30-year concession period. A financial feasibility study, assuming 4% inflation and a 9.15% benchmark interest rate, utilizes Net Present Value (NPV), Internal Rate of Return (IRR), Profitability Index (PI), and payback period metrics. The project is deemed financially viable under the Availability Payment (AP) scheme, yielding an NPV of Rp14.23 trillion, an IRR of 11.77%, and a PI of 1.035. The payback period is projected at twelve years, with annual AP payments of Rp1.94 trillion over the concession period. Risk analysis identified 16 risks across six categories, with 44% classified as very high, 38% high, and 19% medium. Financial aspects based on VAT Regulation No. 2 of 2020 scored 52.5%, the PPP aspect 41.7%, and government support/government guarantees 50%. Despite its financial feasibility, the unsolicited KPDBU proposal requires further refinement, particularly regarding AP financing and tariff revenue accountability. Separate audit mechanisms are needed to ensure transparency and alignment with government regulations.

Keywords: light rail transit, financial feasibility, KPDBU unsolicited

Corresponding Author; Adi Riyanti
E-mail: adiariyanti13@gmail.com

INTRODUCTION

Regional development is an integrated part of the national development process for the utilization of potential resources to improve community welfare in a sustainable manner. Infrastructure is very influential in improving the quality of life and human welfare in increasing consumption value, labor productivity, access to employment, and macroeconomic stability. Transportation infrastructure in relation to the development of land transportation systems, population growth, and urbaniasai tendencies, according to the provision of reliable transportation facilities and infrastructure that can serve the mobility needs of urban residents.

Population growth has not been able to be matched by the existing transportation system. The problem of congestion arises in cities whose population reaches more than 2

(two) million people. DKI Jakarta is a metropolitan city that is the center of business, politics, culture and government with a population density of 10.5621 million people (BPS DKI Jakarta Province, 2021). DKI Jakarta's economic level is recorded as the highest with GDP on the basis of prevailing prices reaching Rp 2,772.38 trillion rupiah (BPS DKI Jakarta Province, 2021). With a very high level of population density and economic growth, the mobility of passengers and goods is increasing and has attracted a high flow of urbanization. Reflecting the interaction between the improvement of living standards and the mobility needs of the population, the growth rate of motor vehicles reaches 9.93% per year with a transportation system dominated by national and municipal highway systems that cover 90% of the total supply to serve travel needs, and the rest is fulfilled by rail transportation. The high growth rate of motor vehicles in DKI Jakarta is caused by the imbalance between the demand and supply of transportation services as well as the integrity of public transportation modes in DKI Jakarta which is not optimal.

The high density of the population and the growth of motor vehicle ownership increase traffic density on the highway, causing several congestion points in several places. The very high growth rate of movement cannot be inhibited, while transportation facilities and infrastructure are very limited, which results in accessibility and mobility being disrupted. This has an impact on decreasing productivity, environmental quality due to carbon emissions, and inefficient economic activities. An efficient, safe, comfortable and affordable mode of mass transportation is the best solution to overcome the problem of traffic density and high population mobility in DKI Jakarta. The government's efforts in solving urban transportation problems have been carried out a lot, both by increasing the capacity of the road network, engineering and traffic management to regulate the efficiency of public transportation transportation and adding its fleet. One of the mass transportation facilities that is considered in meeting the needs of urban community transportation is the Light Rail Transit (LRT). The quality of LRT services provided includes carrying capacity, safety, travel speed and comfort for passengers. LRT is a rail-based means of mass transportation in moving and transporting passengers or goods (urban passenger transportation). LRT is a form of transformation of transportation modes that can improve quality in various aspects of transportation, urban planning and improve the economy. In this case, the countermeasure carried out by the government is to build a Light Rail Transit (LRT) which is proposed using the Government and Business Entity Cooperation (PPP) scheme.

LRT has a special line that operates on the road surface with a lighter fleet shape. LRT has the advantage of being able to reduce congestion, safe, comfortable, no emissions on the road, and can decompose pollution, energy conversion and decrease in public health as an environmental impact caused by the movement of motor vehicles on the highway.

With the Light Rail Transit (LRT), it is hoped that it will be able to reduce the density of vehicles on the road and divert people who use private vehicles to move to mass transportation and can make Jakarta a better city in terms of management and spatial planning.

In the following research analysis, a feasibility evaluation will be carried out in accordance with Presidential Regulation number 38 of 2015, where the KPDBU Unsolicited Project must meet 3 (three) criteria, including being technically integrated with the master plan in the relevant sector, economically and commercially feasible, and the Business Entity that submits the initiative has adequate financial capabilities to finance the implementation of infrastructure provision. With the KBPU scheme,

development can be sustainable and overcome the limitations of implementation capacity. To find out how feasible the construction of the Light Rail Transit (LRT) is and how the economic development of the surrounding residents is, a comprehensive evaluation of the project is carried out to assess the extent to which the feasibility level is implemented in such a way. What is studied is the comparison between money expenditure and revenue whether the allocation of the necessary funds can be allocated appropriately, efficiently and effectively.

Based on the background that has been described, there are several problems that need to be studied in the construction of the KPDBU Unsolicited Light Rail Transit (LRT) Pulo Gebang - Joglo project. First, how feasible is the construction of this project from a financial perspective. Second, what are the results of the risk analysis that may occur during the implementation of the project. Third, what are the results of the review of the construction of this project based on the Regulation of the Minister of National Development Planning Number 2 of 2020, which is an important guideline in the evaluation of the KPDBU project. Referring to the formulation of the problem above, this study aims to achieve several things. First, to find out the feasibility of the construction of the KPDBU Unsolicited Light Rail Transit (LRT) Pulo Gebang - Joglo project from a financial aspect. Second, to understand the influence of risks that may arise during the construction process of the project. Third, to conduct a review and evaluation of the feasibility of the construction of this project based on the provisions stipulated in the Regulation of the Minister of National Development Planning Number 2 of 2020.

RESEARCH METHODS

This research is located in the Eastern to Western Corridor area. With a track length of 32.15 km and the potential for TOD as many as 9 locations. The following is the line that is passed by the LRT from the starting station (Pulo Gebang) to the final station (Joglo). In this study, data collection was carried out from secondary data (related agencies) taken from LRT feasibility studies that had been carried out by PT. Pembangunan Jaya and other data sources. The data include the following.

1. The rise and attraction of east-west LRT passengers is in accordance with the DKI Jakarta Regional Regulation 1/2012 concerning RTRW 2030.
2. Passenger prediction for the Pulo Gebang – Joglo Corridor and vice versa in 2024.
3. The unit price of railway infrastructure development in Indonesia which is adjusted to PM 78 of 2014.
4. The price of urban railway facilities used on the Jabodebek LRT.
5. Bank Indonesia interest rates.
6. The results of the ATP and WTP survey conducted by PT. Pembangunan Jaya.
7. Basic rates for renting space from the DKI Jakarta Provincial Government.
8. Digital Billboard Tariff Runs on Vehicles.

The data that has been compiled is then analyzed using financial feasibility analysis and risk analysis.

Financial Feasibility Analysis

Financial studies are basically studies from certain parties, such as individuals, the private sector, and project managers. In this case, the financial aspect that is studied concerns the project components that require funding and those that are predicted to generate profits (*revenue*). The main thing to be studied is the comparison between money expenditure and project revenue. In addition, the study carried out is whether the project

will be guaranteed funding for the life of the project. The funds in question can be obtained from financial institutions or from the government. Another thing that is quite important to consider is whether the project will be able to repay the funds spent or the project will develop so that it can be financially sustainable.

In the feasibility analysis study of the Pulo Gebang – Joglo *Light Rail Transit* (LRT) Project, four (4) scenarios were used, including pessimistic passenger predictions, moderate passenger predictions, optimistic passenger predictions, and scenarios with *Availability Payment* (AP). The feasibility analysis stage is a stage to determine the feasibility of a plan with several considerations such as NPV, IRR, PI and BEP. The calculation of NPV is carried out by making all the eligibility factors that have been obtained into *a present form*. If the NPV value > 0 or positive, the project can be said to be financially viable. The calculation of IRR is carried out by equating *the present value* of expected *cash outflow* with the *present value* of expected *cash inflow*. If the IRR value is greater than the applicable interest rate (*discount rate*), the project can be said to be feasible. PI is a comparison between revenue and cost at the end of the project's concession period. If the PI value is > 1, the project can be said to be financial, which means that the income obtained is greater than the costs incurred. BEP will be determined using a graphical method where the x-axis shows the time and the y-axis shows the difference between income and expenditure in the present value. The BEP point is the point where the revenue difference line passes through the y=0 line.

Risk Analysis

Risk is defined as the possibility of undesirable things happening during the continuity of a project. These risks can be assessed qualitatively or quantitatively. The purpose of conducting a risk analysis is to increase added value for stakeholders through a risk management process that includes eliminating, minimizing, diverting, and absorbing/accepting these risks.

RESULTS AND DISCUSSION

Pulo *Gebang – Joglo* Light Rail Transit (LRT) Project Status

The construction of *the Pulo* Gebang – Joglo Light Rail Transit (LRT) project is planned with a cooperation scheme. The DKI Jakarta Provincial Government in its plan is willing to pay 83% of infrastructure development. The scheme used in the construction of this project is the Cooperation between the Regional Government and Business Entities (KPDBU) initiated by the private sector or *unsolicited.* Availability *Payment guarantee* is very necessary in the construction of *the Pulo Gebang – Joglo Light Rail Transit (LRT) project, which uses the KPDBU scheme to balance* the affordability of the government/service users and the feasibility of the project.

Until now, the Pulogebang-Joglo LRT concession for 33.5 years is still in the preparation stage and the proposal documents already exist, but are still in the review stage by the Jakarta Provincial Government. The Pulogebang-Joglo LRT polemic occurred from the cost burden that was considered to deviate from Presidential Regulation Number 38 of 2015 and Governor's Regulation Number 22 of 2018 Article 14 paragraph 3 letter c, where the business entity that submitted the initiative had adequate financial capabilities to finance the implementation of infrastructure provision. The rule that is considered to have been violated by the DKI Jakarta Provincial Government is Governor's Regulation 22 of 2018 Article 50 paragraph (3) letter b, which states that the criteria for KPDBU projects initiated by business entities do not require government support in the form of fiscal contributions in the form of financial contributions. If you follow

Presidential Regulation 38 of 2015 and Governor's Regulation 22 of 2018, then all infrastructure and facilities investment costs must be financed by the private sector. The Jakarta Provincial Government must not issue a budget for KPDBU projects initiated by the private sector (*unsolicited*).

Demand Forecast

The framework of analysis and prediction of socio-economic growth is a vital element in forecasting future traffic demand. Various socio-economic data have been aggregated based on the zone system. To produce accurate demand projections until the end of the operational year, up-to-date historical data is required. The database used in this demand forecast study is sourced from JUTPI 2010. Other transportation studies used include *the Study on Integrated Masterplan* (SITRAMP) in 2001-2002 and the Jabodetabek *Public Transport Policy Implementation Strategy* (JapTrapis) in 2011-2012. Calibration and Validation of the database is acknowledged by conducting various primary surveys including surveys of existing public transportation system services, *boarding and lighting surveys of* public transportation passengers, O-D surveys of public transportation passengers and travel characteristics surveys using other public transportation.

The method used is based on a transportation planning model with various assumptions as follows:

- The data on the movement of people used is the Matrix O-D produced by JUTPI/JAPTRAPIS in the form of Matrix O-D for public transportation *mode*;
- *The zoning system* developed from JUTPI/JAPTRAPIS consists of 896 zones including external zones;
- Zone along the corridor with a radius of 500 m;
- The model development is based on the generated base year O-D Matrix and the available socio-economic parameters in each zone;
- The rise and pull of travel is the result of the 2008 forecast (JUTPI) and JAPTRAPIS (2010) then updated for the existing conditions in 2019, and the forecast for 2024, 2026, 2028 and 2030.

Forecast of the Number of Passengers (*Ridership*) of the Pulo Gebang – Joglo Corridor in 2024

In the modeling used, *the assignment* has been carried out in 2024 after previously the OD Matrix was validated in 2020 based on the results of the survey that had been carried out previously. Some of the assumptions used to get a ridership on the LRT Pulo Gebang – Joglo Corridor are in the following table.

Table 1. Basic Assumptions of Pulo Gebang-Joglo LRT Modeling

Criterion	Assumption
Database	- Jabodetabek Road Network (Including Toll Road) - Jabodetabek Mass Public Transportation Network (KRL, BRT Transjakarta with its feeder, MRT, Jabodebek LRT, Jakpro LRT)
FROM The Matrix	896 Zones including External Zones
Track Length	32.15 km
Number of Stations	26 Stations

Headway	6 Minutes (2024)
LRT Speed	Maximum speed: 25 Km/h Average speed: 20-25 Km/h
Time Value	Rp. 1,050,-/minute

Source: Doc. FS PT. Pembangunan Jaya

Furthermore, the burden will be carried out in the planned year in the first year of operation, namely 2024. There are 26 stations along the 32.15 km length of the Pulo Gebang-Joglo corridor track. Projected Movement Needs using the results of the existing preliminary Feasibility Study. The use of the Movement Needs Projection method consists of four steps, namely trip generation, trip distribution, mode selection, and route selection, the use of previously predicted data in terms of making rips and distribution forecasts.

Boarding and Alighting

The Pulo Gebang-Joglo LRT corridor is divided into two directions of movement, namely the Pulo Gebang direction and the Joglo direction where to facilitate the analysis of boarding and *alighting* passengers at the station.

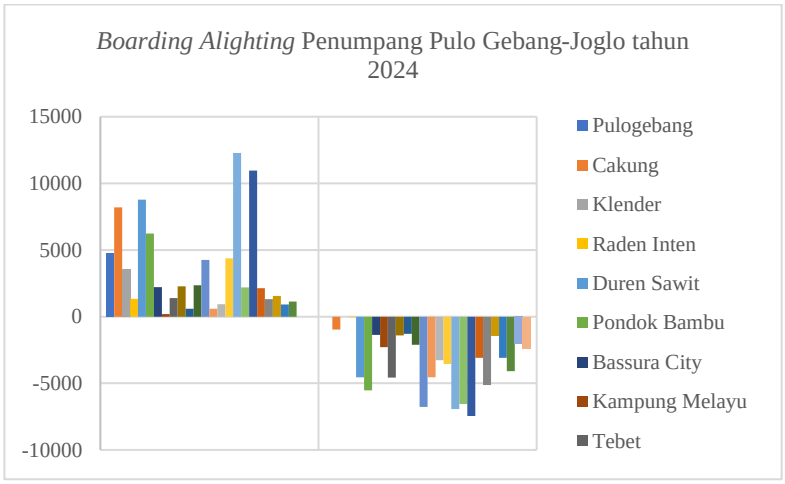

Figure 1. Chart of Passengers Going Up to Pulo Gebang and Passengers Getting Down in Joglo in 2024

Source: Doc. FS PT. Pembangunan Jaya

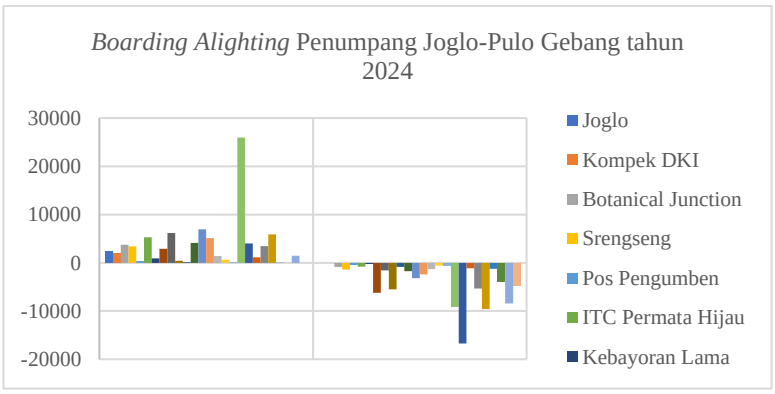

Figure 2. Chart of Passengers Ascending to Joglo and Passengers Descending to Pulo Gebang in 2024

Source: Doc. FS PT. Pembangunan Jaya

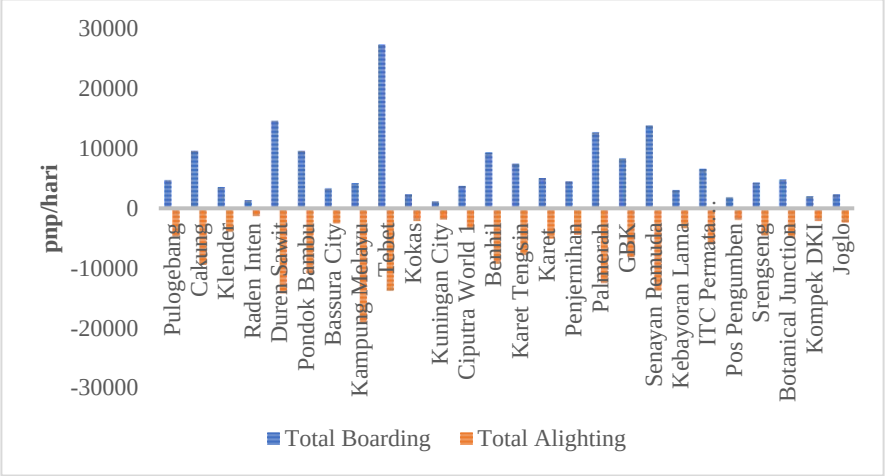

Figure 3. Total *Boarding Alighting* in Both Directions in 2024
Source: Doc. FS PT. Pembangunan Jaya

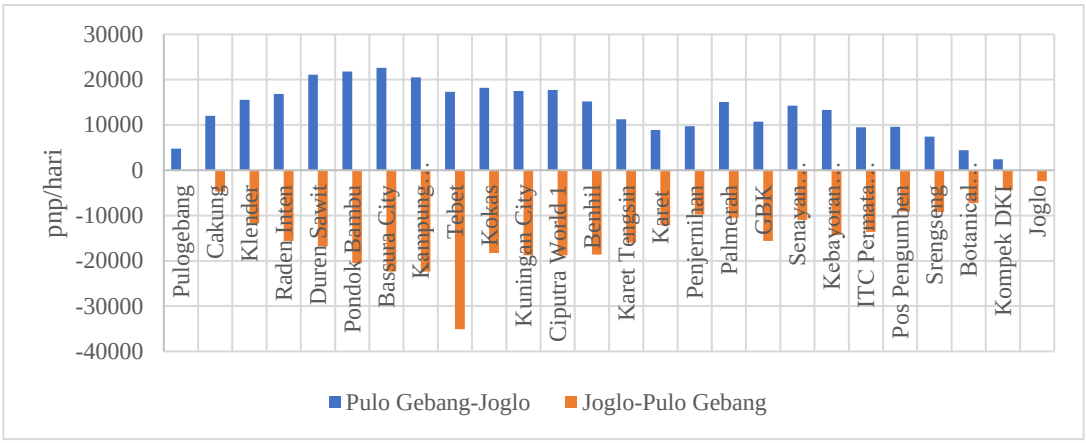

Figure 1. Indications *of Passenger Flow* LRT Pulo Gebang – Joglo in 2024
Source: Doc. FS PT. Pembangunan Jaya

Results of Financial Feasibility Analysis

Scenario 1 Pessimistic Passenger Prediction

The financial feasibility analysis in scenario 1 uses psychic passenger predictions, which is assumed to be less than 25% of the existing passenger predictions. With low passenger predictions, of course revenue in this scenario will also be low. In scenario 1, the basic ticket fare is IDR 1,553 and with a station kiosk occupancy of 30%. In this analysis, the inflation rate is 4% and the benchmark interest rate is 9.15%. The financial feasibility parameters in scenario 1 are shown in the table below.

Table 2. Aspects of Financial Feasibility in Scenario 1

Financial Feasibility Aspect	Results of Analysis	Standard	Information
Net Present Value (NPV)	(20.157.240.408.623,6)	>0	Not Eligible
Internal Rate of Return (IRR)	-2,8%	>9.15%	Not Eligible
Profitability Index (PI)	0,356	>1	Not Eligible
Payback Period	>30	≤30 Years	Not Eligible

Source: Analysis Results

After calculating the feasibility analysis with a *discount rate* of 9.15%, the value of the NPV feasibility indicator during the 30-year review period with the source of service revenue in the form of ticket revenue, kiosk rental and advertising, stated that this project was not financially feasible. This indicates that the value of revenue obtained is smaller than the amount of investment value and *costs* incurred.

Scenario 2: Moderate Passenger Prediction

In scenario 2, a moderate passenger prediction is used with a prediction equal to the number of existing passengers. The revenue in scenario 2 is larger than scenario 1, but with the increase in the number of passengers, it certainly increases the number of facilities needed. In scenario 2, the basic ticket fare is IDR 1,553 and with a station kiosk occupancy of 50%. The financial feasibility parameters in scenario 2 are shown in the table below.

Table 3. Aspects of Financial Feasibility in Scenario 2

Financial Feasibility Aspect	Results of Analysis	Standard	Information
Net Present Value (NPV)	(16.440.103.569.073,8)	>0	Not Eligible
Internal Rate of Return (IRR)	0,3%	>9.15%	Not Eligible
Profitability Index (PI)	0,476	>1	Not Eligible
Payback Period	31	≤30 Years	Proper

Source: Analysis Results

After calculating the feasibility analysis with a *discount rate* of 9.15%, the value of the NPV feasibility indicator during the 30-year review period with the source of service revenue in the form of ticket revenue, kiosk rental and advertising, stated that this project was not financially feasible.

Scenario 3: Optimistic Passenger Predictions

In scenario 3, using optimistic passenger predictions, it is assumed that the number of passengers is greater than 25% of the existing passengers. With the same basic ticket fare as scenarios 1 and 2 and with a station kiosk occupancy of 90%.

The financial feasibility parameters in scenario 3 are shown in the table below.

Table 4. Aspects of Financial Feasibility in Scenario 3

Financial Feasibility Aspect	Results of Analysis	Standard	Information
Net Present Value (NPV)	(12.650.315.520.331,8)	>0	Not Eligible
Internal Rate of Return (IRR)	2,8%	>9.15%	Not Eligible
Profitability Index (PI)	0,597	>1	Not Eligible
Payback Period	26	≤30 Years	Proper

Source: Analysis Results

After calculating the feasibility analysis with a discount rate of 9.15%, the value of the NPV feasibility indicator during the 30-year review period with the source of service revenue in the form of ticket revenue, kiosk rental and advertising, stated that this project was not financially feasible. The IRR value obtained was 3.5%. In this analysis, it is assumed that the MARR value is 9.15%. With this assumption, the IRR value obtained is not feasible because the IRR value is smaller than the MARR. Therefore this project is not feasible to build.

Scenario 4 Implementation of PPP with *Availability Payment* Mechanism

The *Availability Payment* (AP) scheme is one of the performance-based PPP BOT schemes that is generally applied to social infrastructure where the investment return system is carried out periodically every year during the cooperation period. This is to provide a strategic choice from the investor's point of view by considering the public nature of the LRT project, the financial capacity of the Indonesian local government, and the Government-to-Business Cooperation (PPP). The following is the PPP *availability payment scheme*.

Tabel 5. Skema KPBU *Availability Payment*

	Government	Badan Usaha
Build	Granting of LRT management rights by the Government	Investment by Business Entities
Operate	Refund of availability of infrastructure facilities and services	- Concession Period - Return on investment, operations, and expected rate of return
Transfer	Return of assets at the end of the concession period by the Business entity	

By Cooperation scheme that has been described in 5, The government cooperates with Business Entities by providing the right to build, operate, and hand over assets to government after the cooperation period ends. While the business entity is responsible Answer for the implementation of the project in providing facilities and services infrastructure. During the cooperation period, the government also has obligations return all costs incurred by business entities including investments, operations, as well as the expected rate of return that has been set when the agreement is periodic. And at the end of the concession period, the business entity must return assets to the government. By implementing the PPP scheme *availability payment*, the projection of the operating income of the business entity during the cooperation period needs to be calculated based on the return component. The following are the components project returns.

Table 6. Avilablity Payment *Scheme Simulation Assumptions*

Variable	Value	Unit
Capex Value	IDR 26,551,874,610,188.60	Rp
Opex Value	IDR 14,761,649,000,000.00	Rp
Equity	30,00%	
Receivables	70,00%	
Bank Interest Rate	14%	
Equity Financed Investment	IDR 12,394,057,083,056.60	Rp
Debt Financed Investment	IDR 36,885,028,910,188.60	Rp
Debt and Interest	IDR 5,163,904,047,426.40	Rp
Margin Value	7%	
PPP Margin Fee	IDR 3,811,009,302,847.01	Rp
AP Revenue	IDR 58,253,999,343,518.60	Rp
Payment Term	30	Year
Total AP Revenue	IDR 1,941,799,978,117.29	Rp

By Table 6. It can be known that the operating income of business entities with the scheme *availability payment* resulting from the return of all cost components incurred during the cooperation period by using *discount rate* by 9.15%. Availability payments are made based on the performance carried out by the business entity, so it is assumed that the performance is carried out according to the standards that have been agreed upon in the agreement so that there are no penalties or bonuses.

Financial Feasibility Aspect

Table 7. Financial Feasibility Aspect

	Results of Analysis	Standard	Information
Net Present Value (NPV) 9.15%	14.233.836.487.307	>0	Proper
Internal Rate of Return (IRR)	11,77%	>9,15%	Proper
Profitability Index (PI)	1,035	>1	Proper
Payback Period	12	≤30 Years	Proper

After calculating the feasibility analysis with *a discount rate* of 9.15%, the value of the financial feasibility indicator was determined to be financially feasible during the 30-year review period with AP revenue sources obtaining a Net Present Value *(NPV) of Rp 14,233,836,487,307,* an Internal Rate of Return *(IRR) value of 11.77% and* a *Profitability Index (PI)* value more than 1, which is 1,035 and *the Payback Period* is obtained for 12 years.

Sensitivity Analysis

In the sensitivity analysis to *Net Present Value* (NPV) and *Internal Rate of Return* (IRR), the parameters for the change value are determined at +20% and -20% with *demand*, capex, and *operation cost factors*. The following are the results of the sensitivity test to the rate of change in NPV and IRR.

Table 8. NPV Sensitivity Analysis

	NPV Changes	
Factors	**+20%**	**-20%**
Demand	38,87%	-43,87%
Capex	-26,38%	27,86%
Operation Cost	-2,84%	3,65%

Source: Analysis Results

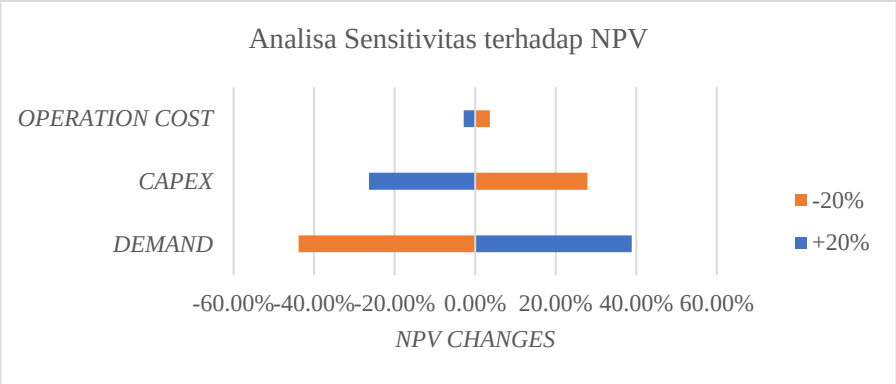

Figure 5. NPV Sensitivity Analysis
Source: Analysis Results

Table 9. IRR Sensitivity Analysis

	IRR Changes	
Factors	+20%	-20%
Demand	25,60%	-23,05%
Capex	-38,71%	57,90%
Operation Cost	-2,14%	2,13%

Source: Analysis Results

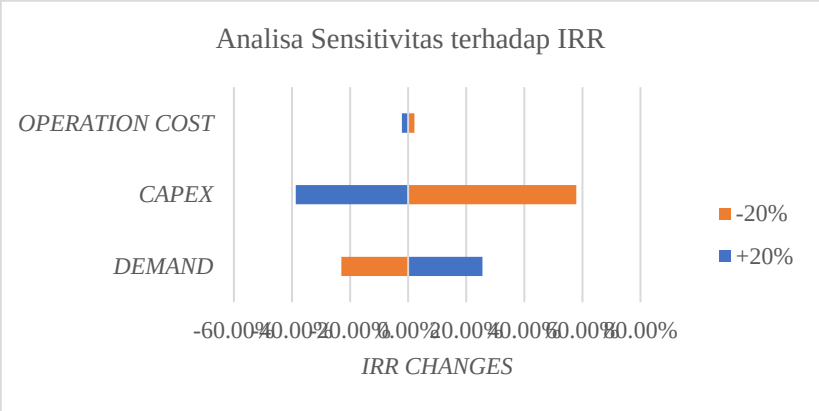

Figure 6. Sensitivity Analysis to IRR
Source: Analysis Results

Risk Analysis

At the risk identification stage, all risks that may occur in the construction plan of the KPDBU Unsolicited *Light Rail Transit* (LRT) Pulo Gebang – Joglo Project are determined. The table below shows a list of risks that can occur in the Construction of KPDBU Unsolicited Projects.

Table 10. Risk Identification of KPDBU Unsolicited LRT Pulo Gebang – Joglo Project

Risk Categories	Risk Events	Description
1. Location Risk	Delays and increases in land acquisition costs	Delays and increased costs due to the prolonged land acquisition process.
	Land cannot be freed	The failure to acquire the project land location is due to the difficult land acquisition process.
	Land cannot be used after liberation	Difficulty in accessing land due to social disturbances
	Land Status Risk	Dual land certificate ownership was found when the project was implemented.
2. Risks of Design, Construction and Operation Test	Unclear output specifications	Delays and cost increases due to output specifications are unclear.
	Rising construction costs	The increase is due to changes in the volume of work or material prices.
	Poor performance of contractors/subcontractors	The contractor/sub-contractor is unable to perform the work according to the contract.
	Default contractor/subcontractor	Failure to complete the contract by the contractor/subcontractor due to internal management & financial factors.

Risk Categories	Risk Events	Description
4. Financial Risk	Failure to achieve financial close	The failure to achieve *financial close* is due to the uncertainty of market conditions or the project's capital structure that is not optimal.
	Risk of cost overrun	The risk of increasing construction costs will have an impact on the rate of return on BUP investment.
	Failure of the proposed fare adjustment	The risk of not making the tariff adjustment proposed by BUP during the operational period due to not being approved by PJPK to set the tariff, has an impact on the project's revenue and financial viability.
5. Operational Risks	Rising O&M costs	As a result of an incorrect estimate of O&M costs or an unexpected increase.
	Increase in energy costs due to unit inefficiencies	Energy costs are rising due to inefficient operating performance.
6. Income Risk	Risk of passenger volume below the projected *demand study*	The risk of a volume of passengers that does not meet the estimate will have an impact on the project's revenue and financial viability.
	Estimation errors from previous models	Parameter input and model design errors so that the estimation results deviate.
	Failure to apply for a fare adjustment	As a result, BU is unable to meet the minimum agreed standards.
8. Risiko Interface	Risk of inequality of time and quality of work	Inequality in time and quality of government support work and those carried out by BU.
	Risk of service standards/method differences	*Substantial rework* related to standard differences.

Furthermore, determine the *Likelihood level*, Consequences level and Risk Level for each risk.

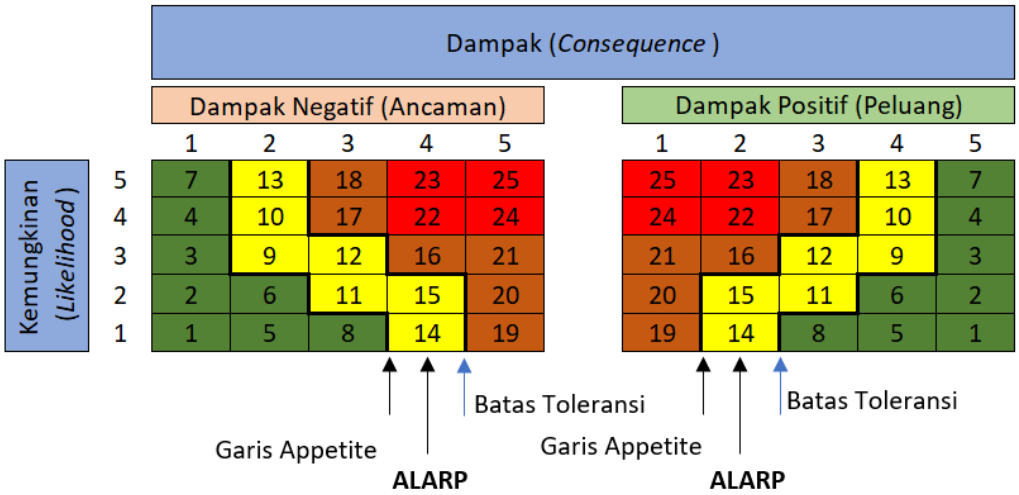

Figure 7. Risk Map

The following is a proposed rating scale for the likelihood of a specific risk event, with alternative interpretations related to the indicative frequency of events and the

indicative probability of events over the duration of the project.

Table 11. Proposed scale of likelihood of occurrence of risk events and Risk Consequences

Probability	**Risk Consequences**
Almost Certain to Happen	Not important
It may happen once	Light
Possible	Keep
Rare	Big
Almost impossible	Serious

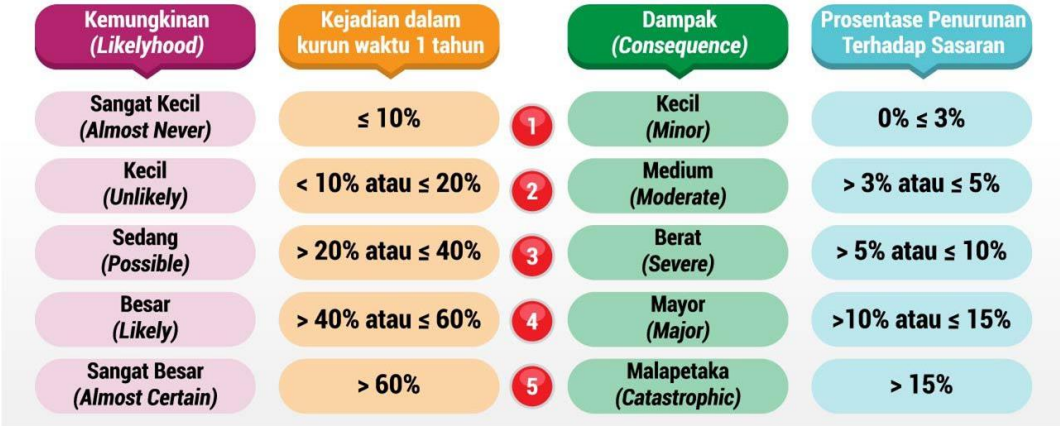

Figure 8. *Risk Appetite* and *Risk Tolerance*

Table 12. Probability Values

	Likelihood	Incident Within 1 Year	Frequency	Qualitative Criteria
1	**Almost *Never***	≤ 10%	1 time in a period	almost impossible to happen
2	**Small *(Unlikely)***	10% < n ≤ 20%	1-2 times in a period	Less likely to occur
3	**Sedang *(Possible)***	20% < n ≤ 30%	3-4 times in one period	The likelihood of happening and not happening is the same
4	**Large *(Likely)***	30% < n ≤ 40%	4-5 times in one period	most likely to occur
5	**Almost *Certain***	> 50%	>5 times in a period	Almost certainly happens

Table 1 Allocation for KPDBU Unsolicited LRT Pulo Gebang – Joglo Project

Risk Categories	**Risk Allocation**	
	PJPK	Badan Usaha
1. Location Risk	√	
2. Risks of Design, Construction and Operation Test	√	√
4. Financial Risk	√	√
5. Revenue Risk		√
6. Risiko Interface	√	√

From the qualitative assessment for these risks, the following risk categories are obtained.

Table 14. Risk Assessment

NO	Risk Description	Category	Janis Risk	*Inhaled risk*			Risk Respons e	*Residual Risk*			*Action Plan*
				Likelihood	*Consequence*	Level Risk		*Likelihood*	*Consequence*	Level Risk	
1	Delays and increases in land acquisition costs	Location	Threat	3	5	TALL	Mitigation	1	2	LOW	The government provides project land before the procurement process
	Land cannot be freed		Threat	3	5	TALL	Mitigation	3	1	LOW	Clear land legal status and procedures in project land acquisition
	Land Status		Threat	3	5	TALL	Mitigation	3	1	LOW	Carry out validation and settlement of land ownership status
2	Unclear output specifications	Design, Construction and Operation Test	Threat	4	3	TALL	Mitigation	2	1	LOW	Clarification during the tender process
	Rising construction costs		Threat	5	5	VERY HIGH	Mitigation	3	1	LOW	Accommodating the calculation of the price escalation factor in the contract
	Poor performance of contractors/sub contractors		Threat	2	3	KEEP	Mitigation	1	1	LOW	Credible contractor & subcontractor selection process
3	Failure to achieve financial close	Financial	Threat	5	5	VERY HIGH	Mitigation	3	1	LOW	Develop financial models and structures using assumptions that are generally applicable in the market

NO	Risk Description	Category	Janis Risk	*Inhaled risk*			Risk Response	*Residual Risk*			*Action Plan*
				Likelihood	*Consequence*	Level Risk		*Likelihood*	*Consequence*	Level Risk	
	Risk of cost overrun		Threat	3	4	TALL	Mitigation	2	2	LOW	Allocating reasonable value for contigency
	Failure of the proposed fare adjustment		Threat	4	4	VERY HIGH	Mitigation	3	1	LOW	Constructing a financial model using conservative tariff assumptions
4	Rising O&M costs	Operation	Threat	4	5	VERY HIGH	Mitigation	3	1	LOW	Escalation factors in contracts
	Increase in energy costs, due to unit inefficiencies		Threat	3	3	KEEP	Mitigation	1	1	LOW	Maintain the unit regularly and follow the
5	Increase in energy costs due to unit inefficiencies	Income	Threat	3	2	KEEP	Mitigation	1	1	LOW	Good quality and specifications of the unit
	Estimation errors from previous models		Threat	4	4	VERY HIGH	Mitigation	3	1	LOW	Reliable traffic surveys
	Failure to apply for a fare adjustment		Threat	4	3	TALL	Mitigation	2	1	LOW	Business Entities Continue to Improve Operational Performance in order to Meet the Minimum Service Standards (SPM)
6	Risk of inequality of time and quality of work	Interface	Threat	5	5	VERY HIGH	Mitigation	3	1	LOW	Coordination and integration of project implementation schedules
	Risk of service standards/method differences		Threat	4	4	VERY HIGH	Mitigation	3	1	LOW	Standard/ method agreement that will be applied by the parties as

NO	Risk Description	Category	Janis Risk	*Inhaled risk*			Risk Response	*Residual Risk*			*Action Plan*
				Likelihood	*Consequence*	Level Risk		*Likelihood*	*Consequence*	Level Risk	
											early as possible

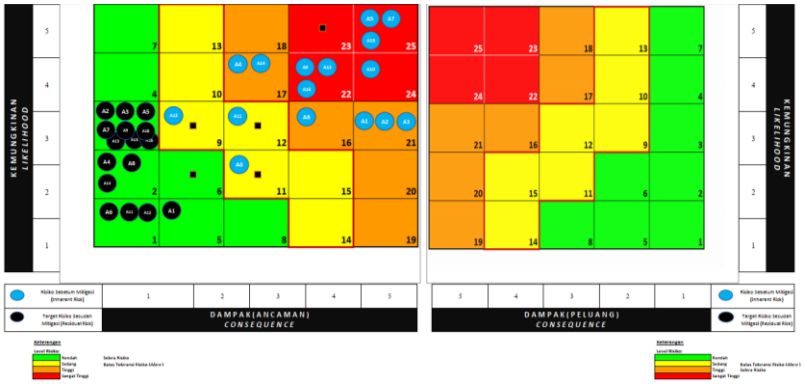

Figure 9. Risk Maps of Feasibility Study Review Results

To implement the provisions of Article 46 paragraph (1) of Presidential Regulation Number 38 of 2015 concerning Cooperation between the Government and Business Entities in the provision of Infrastructure, the Regulation of the Minister of State for National Development Planning/Head of the National Development Planning Agency Number 2 of 2020 concerning Amendments to the Regulation of the Minister of National Development Planning/Head of the National Development Planning Agency Number 4 of 2015 has been stipulated. So that in the Pre-Feasibility Study Preparation stage, the following things must be contained.

CONCLUSION

Based on the results of the analysis that has been carried out, the conclusions obtained are as follows. In the analysis of the financial feasibility of the construction of the KPDBU Unsolicited Light Rail Transit (LRT) Pulo Gebang - Joglo project, an inflation rate of 4% and a benchmark interest rate of 9.15% were used. In scenarios 1, 2, and 3, all costs are borne by the private sector with an estimated passenger scenario of less than 25% and an optimistic scenario of more than 25% of the predicted number of passengers indicating that the financial feasibility parameters are not feasible, but if implemented with the Availability Payment scenario, the Net Present Value (NPV) feasibility parameter of Rp 14,233,836,487,307 or a positive value is obtained, The eligibility parameters IRR is 11.77% or greater than the benchmark interest rate, and the Profitability Index (PI) is more than 1 of 1.035 and the Payback Period is obtained for 12 years, with the value of these eligibility parameters, the Availability Payment (AP) scenario can be said to be financially feasible.

The results of the risk analysis identification obtained 16 risk factors from the construction of the KPDBU Unsolicited Light Rail Transit (LRT) Pulo Gebang - Joglo project, which is divided into 6 risk groups. Of the total risks identified, the majority of these risk factors can be classified into high risk levels of 38%, medium risk of 19% and very high risk of 44%. Of the factors identified, there are risk factors that are likely to be high, including delays and increases in land acquisition costs, land cannot be cleared, increase in construction costs, failure to achieve financial closes, increase in O&M costs and errors in estimates from previous models.

The results of the review of the construction of the KPDBU Unsolicited Light Rail Transit (LRT) Pulo Gebang - Joglo project based on the Minister of National Development Planning Regulation No. 2 of 2020 in three aspects, namely finance with 20 indicators, a document readiness value of 52.5% was obtained, the KPDBU aspect in Infrastructure Provision with 12 indicators 41.7% met, and the aspect of government support and/or government guarantee needs with 2 indicators 50% met.

BIBLIOGRAPHY

Aditiya, R. (2020). Analisis Pendanaan Pembangunan Infrastruktur Daerah Dengan Obligasi Daerah dan Availability Payment. *Accounting and Business Information Systems Journal*, 3(2).

Adnan, M. (2018). Perencanaan Ulang LRT Jabodebek Lintas Pelayanan 3 (Cawang-Bekasi Timur) dengan Modifikasi Alinyemen Ditinjau Dari Segi Kelayakan Ekonomi dan Finansial. Surabaya: ITS

Banzon, E. P., Young, F. J., Ho, B. L., Puyat, M. E., & Factor, P. A. (2014). *Assessing the Feasibility of Public-Private Partnerships in Health in the Philippines*. *PIDS Discussion Paper Series Constitutes*, *49*(December).

BAPPENAS. (2019). *Buku Saku KPBU dalam Penyediaan Infrastruktur*.

Berrada, A. (2022). *Financial and economic modeling of large-scale gravity energy storage sistem*. *Renewable Energy*, *192*, 405–419.

BPS Provinsi DKI Jakarta. (2021). Provinsi DKI Jakarta Dalam Angka 2021. *BPS ProvinsiDKIJakarta*,842.https://jakarta.bps.go.id/publication/2021/02/26/bb7fa6dd5e90b534e3fa6984/provinsi-dki-jakarta-dalam-angka-2021.html

BPS Provinsi DKI Jakarta. (2023). Provinsi DKI Jakarta Dalam Angka 2023.

BPS Provinsi DKI Jakarta. (2020). Realisasi Pendapatan Pemerintah Provinsi DKI Jakarta Menurut Jenis Pendapatan (ribu rupiah) 2018-2020.

Dhaniswara, A., 2021. Skema Pembiayaan Kereta Api Perkotaan Borobudur – Yogyakarta – Samas (Koridor : Tempel – Yogyakarta – Samas), Yogyakarta: UGM.

Dikareva, V., & Voytolovskiy, N. (2016). *The Efficiency and Financial Feasibility of the Underground Infrastructure Construction Assessment Methods. Procedia Engineering*, 165, 1197–1202.

Direktorat Bina Investasi Infrastruktur. Pelaksanaan KPBU dengan mekanisme pembayaran ketersediaan layanan (*availability payment*) bidang pupr, Jakarta: Kementerian Pekerjaan Umum Dan Perumahan Rakyat.

Griffin, K. W. (2004). Building Type Basics for Transit Facilities. New York, United States: John Wiley and Sons Ltd.

Gubernur DKI Jakarta. (2017). Peraturan Gubernur Provinsi Daerah Khusus Ibukota Jakarta Nomor 31 Tahun 2017 tentang Tarif Layanan Parkir, Denda Pelanggaran Transaksi dan Biaya Penderekan/Pemindahan Kendaraan Bermotor.

Guoqian Ren, Li, H., Ding, R., Zhang, J., Boje, C., & Zhang, W. (2019). *Developing an information exchange scheme concerning value for money assessment in Public-Private Partnerships. Journal of Building Engineering*, 25(June), 100828.

Japan Railway Technical Service & Japan International Cooperation Agency. (2001). *The Study on the Standardization for Integrated Railway Network of Metro Manila*. Japan International Cooperation Agency (JICA).

Kementerian Perhubungan Direktorat Jenderal Perkeretaapian. (2020). Buku Statistik Bidang Perkeretaapian Tahun 2020. Jakarta: Kementerian Perhubungan Direktorat Jenderal Perkeretaapian.

Light Rail Transit, data diperoleh melalui situs internet: LRTJakarta.co.id. Diunduh pada tanggal 20 November 2022.

Lubis, H. al-R., & Majid, N. N. (2013). *Developing a Standardized Assessment for PPP Infrastructure Project.* The Second International Conference on Sustainable Infrastructure and Built Environment (SIBE-2013), 9, 295–314.

Mahani, I., Tamin, R. Z., Pradoto, R. G., & Meifrinaldi, M. (2022). Kajian Penerapan Kerjasama Pemerintah Daerah Badan Usaha(KPDBU) dalam Penyelenggaraan Infrastruktur. Jurnal Teknik Sipil, 29(3), 303–310.

Mauludi, S. (2021). *Analisis Kelayakan Finansial Proyek Kerjasama Pemerintah Badan Usaha Dalam Penyediaan Infrastruktur Rumah Sakit Umum Daerah Kabupaten XYZ*. Yogyakarta: UGM

Nafisah, M. (2021) Studi Kelayakan Finansial pada Proyek Bus Rapid Transit (BRT) dengan Menggunakan Skema Kerjasama Pemerintah Dengan Badan Usaha (KPBU). Bandung: ITB

Nurnadhifa, H., & Latifah, H. N. (2021). Sistem Mass Rapid Transit (MRT) DKI Jakarta: Studi Kasus Transfer Kebijakan Pendapatan Non-Farebox di Indonesia. *Public Inspiration: Jurnal Administrasi Publik*, 6(2), 97–106.

PT PII, 2020. Acuan Alokasi Risiko 2020

Suhendra, M. (2017). Penyediaan Infrastruktur Dengan Skema Kerjasama Pemerintah Dan Badan Usaha (*Public-Private Partnership*) Di Indonesia. *Jurnal Manajemen Keuangan Publik*, *1*(1), 41–46.

Surachman, E., & Setiawan, H. (2017). *The Application of Availability Payment In Indonesia: Case Study On Palapa Ring Project*. *International Journal of Business Research*, *17*(2), 125–142.

Susanto, N. B., Muthohar, I., & Utomo, S. H. T. (2021). Analisis Kelayakan Skema KPBU pada Penyelenggaraan Kereta Api Parangtritis-Bandara Yogyakarta International Airport. Prosiding Forum Studi, 4–6

Tamin, Ofyar Z. (2019). Perencanaan, Pemodelan, dan Rekayasa Transportasi. Bandung: ITB Press

Volden, G. H. (2019). *Assessing public projects' value for money: An empirical study of the usefulness of cost–benefit analyses in decision-making*. *International Journal of Project Management*, *37*(4), 549–564.

Zhao, J., Greenwood, D., Thurairajah, N., Liu, H. J., & Haigh, R. (2022). *Value for money in transport infrastructure investment: An enhanced model for better procurement decisions. Transport Policy*, *118*(September 2021), 68–78.