



Financial Feasibility Study Batara Kresna Pioneer Train

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Abstract. Railbus Batara Kresna is a subsidized pioneer train with a combination of rail and bus construction. The railbus serves a 37km route from Purwosari Station to Wonogiri Station. With a ticket price of only Rp4,000, the railbus has the opportunity to become a feeder train. This pioneering public transport will not always be a pioneer and can turn into commercial public transport. This research aims to analyze the amount of revenue and operational expenses of the railbus as well as to analyze the financial independence and financial feasibility in the future as a transportation business project. The study uses secondary data and will be processed to determine financial independence during the economic life of the facility, which is 30 years. The analysis was conducted using the NPV, IRR, PP, B/C Ratio, and PV/K methods through scenarios of increasing ticket prices ranging from Rp4000, Rp5000, Rp6000, to Rp70,114 by considering PDRB from year to year. The increase in ticket prices aims to reduce the value of subsidies provided by the government. Based on the results of the analysis with scenario 1, scenario 2, scenario 3, and scenario 4, it is known that all results from the NPV, IRR, PP, B/C Ratio, and PV/K methods of the transportation business project show negative results, which means the project is not feasible. The unviability is due to the imbalance between revenue and expenditure. But it does not rule out the possibility, this project in the future can become a commercial railway with the support of increasing the number of passengers and replacing the R.42 rail to R.54 rail where the travel time offered is faster and trying to hold the public to use railbus in mobilizing in various ways through promotional activities.

Keywords: pioneer train, *Railbus Batara Kresna*, financial feasibility

1 Introduction

In terms of propulsion or driving force, trains can be divided into steam trains, diesel trains, and electric trains. [1]. One of the diesel trains is the Batara Kresna Pioneer Train or better known as the Batara Kresna Railbus. Railbus is a combination of rail and bus construction [2] which serves a 37 km travel route from Purwosari Station to Wonogiri Station. This train has a travel time of 1 hour 45 minutes using R.42 type rail construction and in the future will be upgraded to R.54 type rail so that the travel time of Railbus Batara Kresna will be 1 hour 15 minutes [3]. Railbus Batara Kresna has an increasing level of busyness and line capacity, if in the future the Purwosari - Wonogiri line which was originally single track is converted into a double track, the travel time will be faster so that it can attract tourists and public interest in rail transportation [4]. Pioneer public transport will not always be a pioneer, increasing PDRB [5] of the region

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encourages the use of transportation due to the increasing economic level. It is of interest to explore the independence of railbus transportation business projects into commercial public transport through financial feasibility.

2 Research Methods

The data will be further processed to perform financial calculations using the NPV, IRR, PP, B/C Ratio, and PV/K methods with respect to interest rates. The results of the calculation are used to analyze financial independence with the description of the method as follows:

a. *Net Present Value* (NPV)

A method that compares the present value of net cash inflows (proceeds) with the present value of an investment's outlays. [6] with the condition that $NPV > 0$ as follows:

$$NPV = \sum_{t=1}^n \frac{Bt - Ct - Kt}{(1 + i)^t}$$

Where:

Kt: capital used in the investment period

Bt: revenue received each year

Ct: expenses that occur each year

i: discount rate *Internal Rate of Return* (IRR)

An interest rate calculation method that equates the present value of all revenues with the cash flow of an investment project with a feasible criterion if the IRR value $> i$. This method is used to calculate the actual rate of return by trial and error or called the trial and error method or interpolation method [7] with the following formula:

$$IRR = i' + \frac{NPV'}{NPV' - NPV''} \times (i'' - i')$$

Where :

i : discount rate of return

b. *Payback Period* (PP)

A method used to calculate how quickly it will take to recover the initial outlay from the annual cash inflows generated by the project [8] with the following formula:

$$Payback\ Period = \frac{I}{A_0}$$

Where:

I: the amount of investment costs

A0 : cash flow each year *Benefit–Cost Ratio* (B/C Ratio)

Method by comparing the value of benefits that have been presented value-ized with the sum of operating costs that have been presented value-ized [9]. The project will be selected if it meets the requirements of B/C Ratio > 1.

$$B/C \text{ Ratio} = \frac{PV \text{ Benefit}}{PV \text{ Cost}}$$

c. *Profitability Ratio (PV/K)*

The method of measuring project profitability that shows the comparison between revenue (benefits) and the cost of capital (investment) used after being presented value-kan with feasible criteria if $PV / K > 1$ [7] with the formula:

$$PV/K = \frac{PV \text{ of Future Cash Flows}}{\text{Initial Investement}}$$

3 Results and Discussion

Research using the ARIMA model [10] to project passenger numbers for the next 30 years, starting in 2015. Forecasting uses monthly passenger data from 2018 to 2022. The following are the projection results:

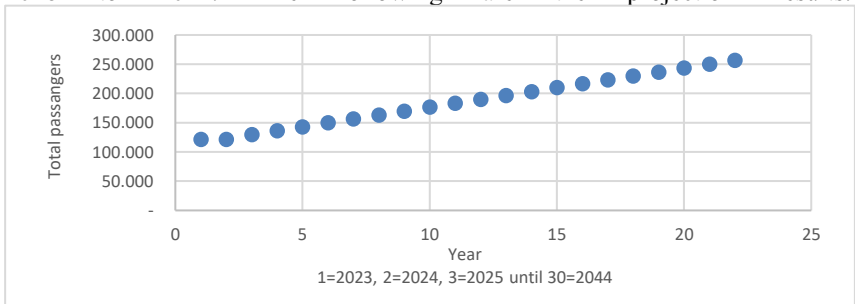


Figure 1. Passenger forecasting results

The projected number of passengers is used to calculate the revenue earned. Furthermore, the initial investment value of Railbus Batara Kresna is Rp179,155,200,000 [11] with projected operating costs considering an inflation factor of 3.8% [12]. Here are the operational costs [13]:

Table 1 Operational cost 2015 – 2022

No	Year	Principal Cost
1.	2015	Rp8,958,444.475
2.	2016	Rp8,396,763.172
3.	2017	Rp10,871,630.000
4.	2018	Rp9,754,925.000
5.	2019	Rp7,515,353.149
6.	2020	Rp6,879,395.632

No	Year	Principal Cost
7.	2021	Rp6,449,262.432
8.	2022	Rp9,529,111.719
Average		Rp8,544,360.697

The revenue obtained to determine financial independence through the scenario of increasing ticket prices is as follows:

Table 2 Ticket price scenario

No	Scenario	Price	Approach
1.	Skenario 1	Rp4,000	Existing
2.	Skenario 2	Rp5,000	Upper and lower fare limits for economy buses [14]
3.	Skenario 3	Rp6,000	
4.	Skenario 4	Rp70,114	Unsubsidized with basic tariff calculation [15]

The above scenarios are used to calculate the projected revenue from the project. Estimated revenue is calculated from passenger projections multiplied by the predetermined ticket price scenario. The average revenue obtained in 2023 to 2044 in scenario 1 is Rp746,411,364, scenario 2 is Rp933,014,205, scenario 3 is Rp1,119,617,045, and scenario 4 is Rp13,083,472 with an average base cost of Rp19,045,151,861.

The following is the calculation of financial feasibility:

A. *Net Present Value (NPV)*

The following is the calculation of NPV with an interest rate of 5.34% with scenario 1, scenario 2, scenario 3, and scenario 4:

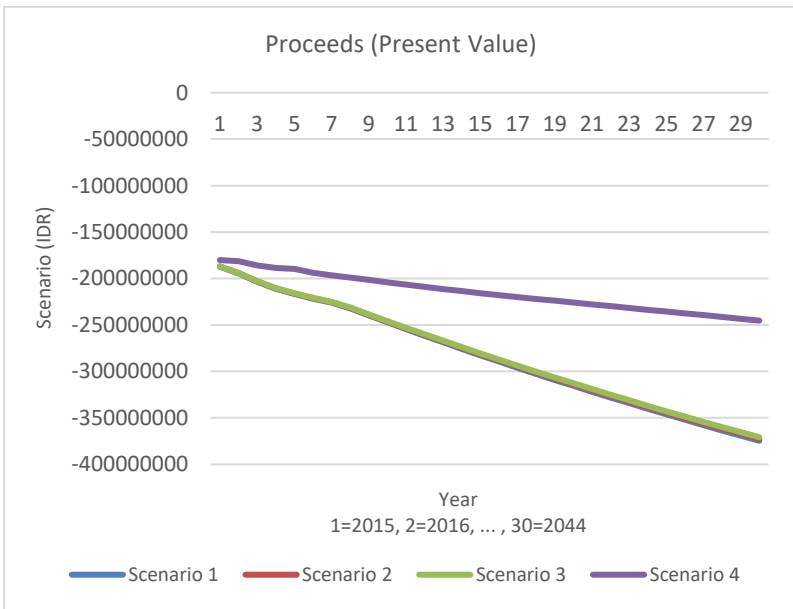


Figure 2 NPV (in thousands)

The figure shows that the PV proceeds with a DF of 5.34% are still negative. The NPV of scenario 1 is -Rp374,634,199, scenario 2 is -Rp372,677,741,

scenario 3 is -Rp370,721,282, and scenario 4 is -Rp245,284,886. All scenarios have negative NPV results or $NPV < 0$ which means the project is not feasible, but scenario 4 is better than the other scenarios.

B. Internal Rate of Return (IRR)

The calculation of IRR with scenario 1, scenario 2, scenario 3, and scenario 4 with respect to interest rates, through trial and error or interpolation, shows irrational results. The IRR of this project is affected by the excessive negative NPV results.

C. Payback Periode (PP)

The results show that this project's return on capital costs falls short of expectations as follows:

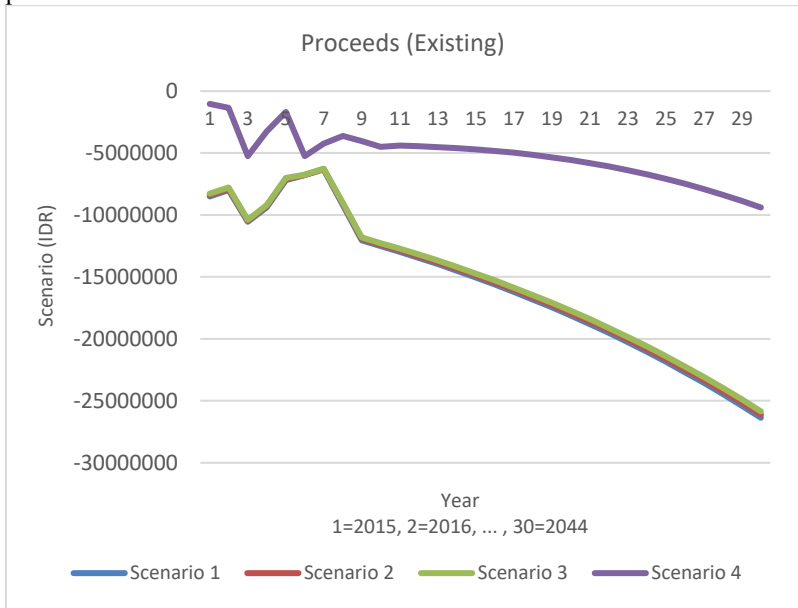


Figure 3 PP (in thousands)

Based on the table, it shows that up to an economic life of 30 years with a capital cost of Rp179,155,200,000 cannot be paid because of expenses greater than revenue as evidenced by the calculation of PP with the results of scenario 1 -0.3824, scenario 2 -0.3863, scenario 3 -0.3903, and scenario 4 -1.1421. This negative result is calculated with reference to the economic life of the facility, which is only 30 years.

D. Benefit-Cost Ratio (B/C Ratio)

The calculation of the B/C Ratio with respect to revenue and expenses is as follows:

Table 3 Results of B/C Ratio

Present Value	Ticket Price Increase Scenario			
	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Benefit	Rp7,825,835	Rp982,294	Rp11,738,752	Rp137,175,148
Cost	Rp203,304,834	Rp203,304,834	Rp203,304,834	Rp203,304,834

Hasil	0.0384	0.0481	0.0577	0.6747
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The results of the B / C Ratio based on revenue and expenditure in all scenarios resulted in a B / C Ratio > 1 or not feasible.

E. *Profitability Ratio (PV/K Ratio)*

The rentability measurement of a project's feasibility is determined as follows:

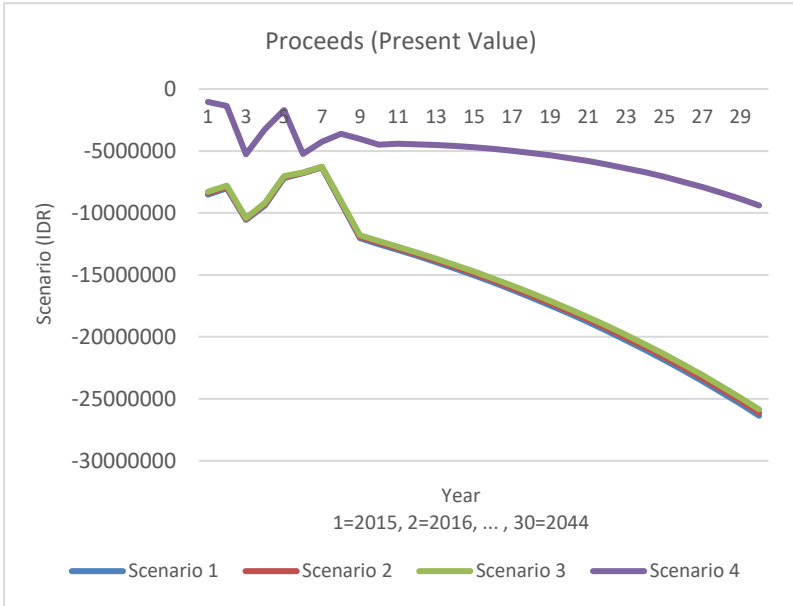


Figure 4 PV/K Ratio (in thousands)

The capital cost of Rp179,155,200,000 is quite large and there are expenses that are greater than the revenue as evidenced by the calculation of PV / K with the results of scenario 1 -47.5664, scenario 2 -47.3916, scenario 3 -47.2168, and scenario 4 -36.0107 causing this project not feasible or not feasible to run because PV / K < 1.

4 **Conclusion**

Based on the research results, the following conclusions can be drawn:

1. Revenue and expenditure show that the modal cost is Rp179,155,200,000 including depreciation costs. From 2022 to 2044, the average revenue of scenario 1 is Rp746,411,364, scenario 2 is Rp933,014,205, scenario 3 is Rp1,119,617,045, and scenario 4 is Rp13,083,472, and the average cost is Rp19,045,151,861. Thus it is known that the cost of expenditure is still greater than the revenue during the operational period of economic life.
2. Financial independence shows the NPV of the project in scenario 1 -Rp374,634,199, scenario 2 -Rp372,677,741, scenario 3 -Rp370,721,282,

and scenario 4 -Rp245,284,886. Based on the NPV results, the project is not feasible. The IRR of the project through trial and error calculations, from the four scenarios showed that the IRR could not be processed because the IRR showed negative results. The PP of the project produces negative results, namely scenario 1 -0.3824, scenario 2 -0.3863, scenario 3 -0.3903, and scenario 4 -1.1421 so that this project cannot be. The B/C ratio of the project in scenario 1 is 0.0384, in scenario 2 0.0481, in scenario 3 0.0577, and scenario 4 is 0.6747. Thus there is an imbalance between income costs and expenditure costs. The PV/K of this project in scenario 1 is -47.5664, scenario 2 is -47.3916, scenario 3 is -47.2168, and scenario 4 is -36.0107. The PV/K of this project is not feasible because the results of the calculation of proceeds with outlays show $PV/K < 1$. Based on the results of NPV, IRR, PP, B/C Ratio, and P/V K with various scenarios, it shows that the railbus transportation project during the 30-year economic life is still not feasible because the expenditure is still greater than the revenue obtained. From the results of the analysis, this project research is not feasible, but because it has a function as a public service run by the government with the help of PT KAI, the project will still be carried out because of the large benefits that cannot be monetized.

5. Suggestion

Based on the results of research, discussion, and conclusions of this final project, there are several means of building as follows:

1. The government and PT KAI further cooperate with the public to use the railbus in various ways through promotional activities in order to increase the number of passengers to balance the revenue and expenses earned so that it can be released from the sub-subsidy and become a commercial train.
2. With the support of infrastructure improvements, namely the replacement of the R.54 rail which affects the travel time from 1 hour 45 minutes to 1 hour 15 minutes and the opportunity for other trains to pass through the crossing, it is a supporting factor for the public to use this mode.

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