

FINANCIAL FEASIBILITY STUDY AND ECONOMIC IMPACT OF YOGYAKARTA KRL ELECTRIFICATION PROJECT DEVELOPMENT

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Abstract:

The purpose of writing this article is to have a better understanding of the differences between Islamic and conventional banking as well as the relevance of Islamic banking principles in the current global economic context. The research method used is qualitative method, this study is descriptive analytic, this is to describe and analyze the system of Islamic financial institutions with the system of conventional financial institutions. Results: Sharia banks serve as a means to accumulate public savings and develop them. The point is that Sharia Bank is an institution that functions to invest public funds in accordance with Islamic recommendations effectively, productively and for the benefit of Muslims. The main objective of Sharia Bank, which is to unite Muslims, restore the strength, role, and position of Islam on this earth can be achieved. Conventional Banks are established to obtain maximum material benefits, while Islamic Banks are established to provide material and spiritual welfare. This material and spiritual welfare is obtained through halal funds collection and distribution. This means that Sharia Bank will not distribute funds to liquor factories or other businesses that cannot be guaranteed that the results come from halal activities. Therefore, it can be said that the concept of profit in conventional banks is more inclined, focusing on the angle of material profits, while the concept of profit in Islamic banks must pay attention to profits from the worldly and ukhrawi (hereafter) angles.

Keywords: Fundamentals, Islamic Banking, Conventional Banking

Introduction

The Yogyakarta-Solo Electric Rail Train (KRL) is one of the transportation facilities that has an important role in connecting two main cities in Central Java, namely Yogyakarta and Solo (Hidayatullah, 2020). The presence of this KRL has had a significant impact on the community, both in terms of ease of accessibility and economic development in the surrounding area (Mudaryanti, 2016). The rail-based transportation system plays a very important role in supporting transportation needs in major cities in Indonesia (Aminah, 2018). This is due to the fact that railway lines tend to go through areas with high population density (Magiorakos et al., 2012)

The Yogyakarta-Solo KRL was inaugurated by President Joko Widodo on March 1, 2021 along with the enactment of the 2021 Train Travel Chart (Gapeka) as of February 10, 2021

(Magiorakos et al., 2012). With the operation of the Yogyakarta-Solo KRL, people can enjoy a more efficient and comfortable trip between the two cities (Aminah & Kinasih, 2006). This KRL brings the benefits of avoiding traffic jams that often occur, provides an environmentally friendly transportation alternative by using electrical energy as a source of power. (Haryoto, 2014). By improving connectivity between Yogyakarta and Solo, this KRL opens up new opportunities for the growth of the tourism, trade, and investment sectors around its path. Business actors can benefit from increasing the mobility of residents who use KRL as the main means of transportation.

The Yogyakarta-Solo Electric Rail Train (KRL) has proven its important role in connecting Yogyakarta and Solo and has a positive impact on the community (Nugraha, 2020). Over time, this KRL continues to experience development to meet the increasing transportation needs (Primastuti & Puspitasari, 2022).

One of the significant changes made is the extension of the KRL electrification line to reach Palur Station. Previously, the line only reached Balapan Station. This extension provides greater benefits to the community, especially in terms of affordability and efficiency of travel between Yogyakarta and Solo.

However, the extension of this line also has consequences in terms of investment in the implementation of the Yogyakarta-Solo KRL. This increase in investment needs to be carefully calculated, because it has an impact on the financial viability of this project. Financial feasibility is a crucial aspect in considering the sustainability and benefits of transportation projects such as the Yogyakarta-Solo KRL (No, 2011). Adjustments to financial calculations are important to accommodate additional capital costs incurred due to the extension of the electrification line (Purba, 2018).

In addition to financial calculations, it is also necessary to conduct in-depth research related to the economic impact generated by the extension of the Yogyakarta-Solo KRL line to Palur Station. This study involves analyzing the impact on regional economic growth, investment opportunities, tourism, and job creation (Sukmana, 2018). By understanding the overall economic impact, policymakers can plan more effective measures to optimize the social and economic benefits of the extension (Asri, 2020).

Thus, the extension of the Yogyakarta-Solo KRL electrification line to Palur Station is one of the important issues that need to be examined in the context of financial feasibility and economic impact. Through careful research, benefits and challenges can be identified, so that the development of KRL can continue to contribute to improving connectivity between cities, encouraging economic growth, and improving community welfare (Nurhadi & Kafaa, n.d.).

RESEARCH OBJECTIVES

The objectives in this study are:

1. To evaluate the calculation of the financial feasibility of the Yogyakarta-Solo KRL after the extension of the electrification line to Palur Station.
2. To analyze the economic impact generated by the extension of the Yogyakarta-Solo KRL line to Palur Station.

METHOD

This research was conducted by looking for secondary data and calculating to determine the financial feasibility of implementing the Yogyakarta-Solo KRL using the following parameters:

Net Present Value (NPV)

Net present value can be interpreted as the present value of income streams generated by investment investment. NPV is the result of deduction from revenue at discounted costs. Mathematically, the calculation of NPV can be formulated as follows:

$$NPV = \sum_{t=0}^n \frac{Bt - Ct}{(1 + i)}$$

Information:

NPV = *net present value* (Rp)

Bt = *benefit* in the t-th year

Ct = cost in the t-th year

i = interest rate used

t = t-year

The feasibility indicator is: if the NPV is positive (NPV>0) then the business is worth running. Conversely, if the NPV is negative (NPV<0) then the business is not feasible to run.

Internal Rate of Return (IRR)

Internal Rate of Return (IRR) is the maximum interest rate that can return the costs planted. The IRR value usually cannot be obtained directly but can be obtained by trial and error called the *trial and error* method or also by the interpolation method. This method of interpolation is usually performed using the following procedure:

Determining the interest rate (i) that is considered close to the correct IRR value, is then used to calculate NPV. If a positive NPV result is obtained, this means that the experimental value is too low. The next step is to determine again the interest rate (i) which is higher than the interest rate (i) of the first, until a negative NPV value is obtained. In this case, what needs to be noted is that the difference between the values of i should not exceed 5%, because if it is more than 5%, then this method of interpolation does not give the correct number result.

If the value of the first i is denoted by i_1 and the value of the second experiment is denoted by i_2 and the NPV of the first experiment is denoted by NPV1 and the NPV of the second experiment is denoted by NPV2, then the estimated IRR close to accuracy can be determined by the following calculation formulation:

$$IRR = i_1 + \frac{NPV_1}{NPV_1 - NPV_2} \times (i_1 - i_2)$$

Information:

IRR = internal rate of return

i_1 = interest rate resulting in *positive* NPV

i_2 = interest rate resulting in *negative* NPV

NPV1 = *positive* NPV

NPV2 = *negative* NPV

The feasibility *indicator* is: if the IRR is greater than the prevailing bank interest rate (IRR > i) then the business is worth working on. Conversely, if the IRR is smaller than the prevailing interest rate (IRR < i) then the business is not worth working on.

Benefit Cost Ratio (BCR)

B/C ratio is a comparison of benefits that have been present value with the sum between operating costs that have been present value and investment costs. This criterion provides a guideline that the project will be selected if the B/C ratio > 1. Conversely, if the B/C ratio is < 1, then the project will not be selected. The B/C ratio is formulated as follows:

$$\text{Net } B/C \text{ Rasio} = \frac{\sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t}}{\sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t}}$$

Information:

Net B/C= *net benefit cost ratio*

B_t = benefit in the t-th year

C_t = cost in the t-th year

i = interest rate used

t = 1st year to 10th year

The feasibility indicator is: if Net B/C is greater than one (Net B/C>1) then the business is feasible to run. Conversely, if Net B/C is smaller than one (Net B/C<1) then the business is not feasible to run

Economic Impact

Fuel Cost Savings

Fuel savings in this study were calculated using the 1998 PCI method approach with the following formula:

$$Y = 0,005693 S^2 - 6,42593 S + 269,18567$$

Information:

Y = fuel consumption (litres/1000km)

S = speed (km/h)

Time Saving

Time savings in this study were calculated using an income *approach* for Yogyakarta, Klaten and Solo regions because these 3 areas were passed by KRL. The formula used in the calculation of time saving is:

$$\text{Nilai waktu} = \frac{\text{Pendapatan Domestik Regional Bruto} / \text{Jmh Penduduk}}{\text{Waktu}}$$

The Beruto Regional Domestic Product (GRDP) used in this study is GRDP based on prevailing prices for Yogyakarta, Klaten and Solo regions.

RESULTS AND DISCUSSION

FINANCIAL FEASIBILITY

Financial Net Present Value (NPV)

Net cash flow is derived from the present value of sales minus the present value of costs for 30 years or until 2050 using an interest rate of 4.59%. The results of the calculation of net financial cash flow of the Yogyakarta-Solo KRL project can be seen in the following table.

Table 7 Financial net cash flow

Tahun	<i>Net present value</i>		
	Skenario 1: Tiket 8.000	Skenario 2: Tiket 9.000	Skenario 3: Tiket 10.000
2020	-1.258.553.403.400	-1.258.553.403.400	-1.258.553.403.400
2021	-1.320.724.719.900	-1.319.045.912.175	-1.317.367.104.449
2022	-1.365.663.557.041	-1.359.876.104.083	-1.354.088.651.125
2023	-1.400.684.317.121	-1.388.785.996.839	-1.376.887.676.558
2024	-1.420.351.600.297	-1.400.472.912.509	-1.380.594.224.720
2025	-1.426.074.636.090	-1.396.521.938.294	-1.366.969.240.498
2026	-1.419.167.941.741	-1.378.411.614.427	-1.337.655.287.113
2027	-1.400.856.923.844	-1.347.520.235.852	-1.294.183.547.859
2028	-1.372.283.170.716	-1.305.131.805.996	-1.237.980.441.277
2029	-1.334.509.451.853	-1.252.441.661.027	-1.170.373.870.201
2030	-1.288.524.440.006	-1.190.561.782.046	-1.092.599.124.086
2031	-1.235.247.170.572	-1.120.525.811.781	-1.005.804.452.991
2032	-1.175.531.252.279	-1.043.293.791.487	-911.056.330.696
2033	-1.110.168.842.397	-959.756.632.941	-809.344.423.485
2034	-1.039.894.399.038	-870.740.339.665	-701.586.280.292
2035	-975.347.269.498	-786.969.037.829	-598.590.806.160
2036	-907.083.551.488	-699.077.255.073	-491.070.958.658
2037	-845.616.526.479	-617.650.747.831	-389.684.969.183
2038	-781.513.143.560	-533.323.356.809	-285.133.570.058
2039	-725.099.101.198	-456.482.439.221	-187.865.777.244
2040	-676.681.480.287	-387.491.832.303	-98.302.184.319
2041	-626.918.335.378	-317.061.756.083	-7.205.176.788
2042	-585.876.923.087	-255.307.335.424	75.262.252.240
2043	-544.189.878.107	-192.905.052.741	158.379.772.625
2044	-511.765.505.991	-139.803.301.482	232.158.903.028
2045	-479.275.274.252	-86.710.122.779	305.855.028.695
2046	-456.477.991.361	-43.417.615.696	369.642.759.969
2047	-434.089.801.017	-672.149.214	432.745.502.589
2048	-421.638.603.447	31.971.011.539	485.580.626.525
2049	-419.293.290.897	54.318.276.950	527.929.844.797
2050	-427.149.605.637	66.251.693.488	559.652.992.613

Sumber : analisis penulis

Based on the data above, the Yogyakarta-Solo KRL project during the 30-year projection resulted in the following net cash flow values:

- a. At the ticket price of Rp. 8.000,- obtained NPV value of Rp. - 427.149.605.637,-
- b. At the ticket price of Rp. 9.000,- obtained NPV value of Rp. 66.251.693.488,-
- c. At the ticket price of Rp. 10.000,- obtained NPV value of Rp. 559.652.992.613,-.

2. Internal Rate of Return (IRR) financial

In calculating the internal rate of return (IRR) of finance, the rate of return is used at 4.59%. The calculation results in the rate of return in each scenario of:

- a. At a ticket price of Rp. 8.000,- obtained an IRR value of 2.37%
- b. At the ticket price of Rp. 9.000,- obtained IRR value of 4.87%
- c. At the ticket price of Rp. 10.000,- obtained IRR value of 6.70%

3. Financial Benefit Cost Ratio (BCR)

The financial Benefit Cost Ratio (BCR) is derived from the present value of sales divided by the present value of costs over 30 years. The calculation results in BCR values in each scenario of:

- a. At a ticket price of Rp. 8.000,- obtained a BCR value of 0.90
- b. At a ticket price of Rp. 9.000,- obtained a BCR value of 1.02
- c. At the ticket price of Rp. 10.000,- obtained BCR value of 1.13

ECONOMIC IMPACT

1. Fuel Cost Savings

Based on the calculation of fuel consumption (liters / 1000 km) for the Yogyakarta, Klaten and Solo regions using the 1988 PCI method, an average value in 2021 and 2022 of 0.092 lt / km was obtained. If this figure is multiplied by the price of premium type of fuel now at Rp. 10,000,- per liter, then the cost of fuel per person is Rp. 920,2947 / km.

If the Yogyakarta-Solo distance is 64.8 km and the Yogyakarta-Solo cross rail road is 60 km long. This means that there is a gap of 4.8 km shorter than the rail road compared to the highway. The difference of 4.8 km when multiplied by the fuel cost of Rp. 920.2947 / km obtained fuel cost savings of Rp. 4,417.41 / km per person if using KRL.

2. Time Saving

Based on the results of the calculation of the time value with an income approach for the Yogyakarta, Klaten and Solo regions, the time value for 2021 is Rp. 27,237 per person and in 2022 is Rp. 30,062 per person.

If the Yogyakarta-Solo trip uses the AKDP Bus takes approximately 2 hours while the KRL takes 1.5 hours. This means that there is a time difference of 0.5 hours faster KRL than the AKDP bus. The difference of 0.5 hours if multiplied by the average time value of IDR 28,649 is obtained a time value savings of IDR 14,324.5 per person if using KRL.

Since its operation, the Yogyakarta-Solo KRL has increased the number of passengers. However, this figure is still far from the occupancy rate of the facilities provided. The increase in the number of passengers in 2022 is directly proportional to the extension of the Yogyakarta-Solo KRL electrification line to Palur Station. Based on financial feasibility analysis using 3 (three) price approaches, the net cash flow results of Yogyakarta-Solo KRL showed positive values at rates of Rp. 9,000 and Rp. 10,000,-. The existence of this positive value shows that the Yogyakarta-Solo KRL project is financially feasible. This shows that the revenue generated from KRL ticket sales at a fare of Rp. 9,000 and Rp. 10,000 is enough to cover the operational and

maintenance costs of the KRL, as well as provide additional profits. Furthermore, in the calculation of the internal rate of return (IRR), it can be seen that the Yogyakarta-Solo KRL has a better potential return when applying tariffs of Rp. 9,000 and Rp. 10,000, - with an IRR value above 4.59%. In addition, the results of the benefit cost ratio (BCR) calculation also show a value above 1, which indicates that the Yogyakarta-Solo KRL is feasible to be applied at a rate of Rp. 9,000 and Rp. 10,000

In addition to being declared financially viable, the implementation of the Yogyakarta-Solo KRL also has a significant economic impact on the community. This happens through the savings in fuel costs that can be experienced by KRL users as well as the reduction in the value of time in their trips. By using KRL, people can reduce spending on buying personal vehicle fuel, which in turn will have a positive impact on their personal budget and purchasing power. In addition, reducing the value of travel time also provides economic benefits, because people can allocate more efficient time for other productive activities, such as work or business. Thus, the implementation of the Yogyakarta-Solo KRL not only provides financial benefits, but also encourages economic growth through cost savings and optimization of time use.

CONCLUSION

The extension of the Yogyakarta-Solo KRL electrification line to Station-Palur encourages adjustments and more in-depth studies on the feasibility of its implementation. Yogyakarta-Solo KRL during the project life of 30 years is declared financially feasible if it makes tariff adjustments from Rp. 8,000 to Rp. 9,000, - or Rp. 10,000,-. In addition, the implementation of the Yogyakarta-Solo KRL for 2 (two) years of operation has had a positive impact on the community's economy, including saving fuel costs and reducing travel time.

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