



Analysis of Investment Sensitivity in The Construction of The Gelora Bung Tomo Surabaya Circuit

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ABSTRACT

Provision of Sports Prasarana is an attempt to fulfill the basic rights of the public to obtain services in sports activities, as listed in Law of the Republic of Indonesia Number 11 of 2022 concerning Sports 2022. The growing automotive industry is one important sector that significantly contributes to Indonesian economic growth. Based on the Surabaya City for 2021-2026 calls for the creation of an integrated area, with the Gelora Bung Tomo area serving as an international sports center and integrating with the growth of trade and service functions in Surabaya's surrounding areas. The aim of this study is to measure the amount of investment income and revenue limits in an effort to reduce the risks associated with the investment in the circuit. We carry out flow calculations using the Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (BCR), and Payback Period (PP) methods, and then analyze the sensitivity. We reviewed the sensitivity analysis based on several parameters, including commercial rent income and circuit management costs. The development of Tomo's Gelora Circuit is sensitive to a loss of income from the rental of business or commercial premises of 8%, which will affect a decline in profit, resulting in a negative net present value (NPV) and prolonging the rate of return. Additionally, it is sensitive to an increase in management costs by 12%.

Keywords: Sensitivity Analysis, Revenue, Investment, GBT Circuit

1. Introduction

In Indonesia, motor racing is becoming more varied from day to day. The alteration of permanent borders in more and more cities or regions serves as evidence of this trend. One example of these is the Mandalika International Motor Speedway in Lombok Tengah, NTB. In 2019, the construction of this bridge commenced and culminated at a cost of 1.1 trillion rupiah. The Mandalika mountain range is capable of supporting 200,000 people and has a height of 4.3 kilometers (Rahmadana & Prakoso, 2022). The development of the pit stop area, the paddock, the komersil area, and the Lintasan Road Race, which spans 650 meters with a lead of 10 to 12 meters, will inevitably involve track and pit building.

The provision of olahraga subsidies is an effort to meet the public's demand for assistance in olahraga-related activities. An investment analysis is known as a sensitivity analysis. Analyzing the impact of changes in production parameters on changes in the performance of the production system in generating profit is known as a sensitivity analysis. Analyzing sensitivity allows one to know what changes are likely to occur from these changes and prepares oneself to deal with any problems that may arise during the project. This analysis also takes into account the methods used to determine investment success, which are the net present value (NPV) and the internal rate of return (IRR). The next step is a sensitivity analysis. This investment

analysis will focus on the Sirkuit Gelora Bung Tomo project. This investment project in Sirkuit Gelora Bung Tomo requires a substantial budget.

Sensitivity analysis provides insight into the extent to which changes in parameters can prevent any potential losses in the planned project (Tenawaheng et al., 2021). This study aims to determine the magnitude of investment costs, investment returns, financing systems, and investment analysis. Additionally, the study aims to reduce the risks linked to rental income and management expenses in the investment activities, and pinpoint the factors that impact investment in the development of Gelora Bung Tomo Circuit in Benowo Village, Pakal District, Surabaya City..

2. Literature Review

2.1. Sensitivity Analysis

In order to understand how the previously determined dampak of investment parameters can change due to factors affecting the investment environment, sensitivity analysis is necessary. Therefore, the results of this change will have a significant impact on the decision that has already been made. Sensitivity analysis between other parameters in investment (Giatman, 2011) : 1. Investigate; 2. Gain or Advantage; 3. Belonging/Recognition ; and 4. Interest Rate.

Open sensitivity analysis assumes that only one parameter (variable) changes and the other parameters stay relatively constant within the same equation. To understand the sensitivity of other factors, correlations involving two, three, and four variables must be examined. You can perform a sensitivity analysis on two or more parameters simultaneously using dynamic equations, possibly through dynamic programming or computer simulation programs, when there are two or more variables involved. However, if one or more of the independent variables also contain the parameters assumed to remain unchanged in relation to other parameters, we can resolve the issue through combination (Giatman, 2011).

2.2. Previous Research

Arishaldi & Hendranastiti (2021) conducted a sensitivity analysis using interest rates ranging from 10% to 100% and a repetition interval of 5% to 10 (68.65%). According to the sensitivity analysis, when the proportion of debt increases while the interest rate remains constant, the net present value (NPV) increases. In contrast, the net present value (NPV) will be lower with a higher interest rate.

There was a correlation between the investment cost, yearly income, interest rate, and unit sales sensitivity analysis factors, as well as the cash flow NPV. The previously described sensitivity analysis identifies the total income decline as the most significant variable or parameter. That is according to Tenawaheng et al. (2021).

Ispratiwi et al. (2023) found from a sensitivity analysis that the method of calculating changes in these costs is ineffective when construction prices rise by 30% or more. According to research (Nathanael & Indryani, 2023) sensitivity analysis to changes in the sale price ceases to make sense when the price drops by 23.7 percent from its current fixed level. After a decrease of 47.4 percent from the existing rate, hotel rental rates are no longer eligible. Hotels that meet the requirements may see their occupancy rate drop by up to 45 percent from their anticipated level. There is a yearly cap of 22.6 percent of the original anticipated sales for units sold in order to qualify.

3. Methodology

3.1. Research Design

This research incorporates quantitative methods that refer to secondary data. Secondary data used includes RAB, relevant laws, ministerial regulations, regional regulations, etc. The location of this research is in benowo village, pakal kecaatan Surabaya city, East Java. This research analysis uses sensitivity analysis. The construction of the circuit at Gelora Bung Tomo Road Race Track is 650 m long with a width of 10-12m, Pit Stop Area, Spectator Tribune, Paddock area and commercial area.

3.2. Investment Cost Analysis

Analysis of investment costs at Gelora Bung Tomo Circuit in Benowo Village, Pakal District, Surabaya City is done by analyzing data on the components that make up the investment costs. Based on the need for investment cost components for the development of the Gelora Bung Tomo circuit construction, the planning costs, construction costs and supervision costs or construction management.

3.3. Income Analysis

This revenue analysis is obtained from circuit rental for motorcycle and car training, business or commercial space rental, events and supporting costs such as electricity and water. In determining the circuit rental rate, it can be guided by (Surabaya City Regional Regulation Number 7 of 2023 concerning Regional Taxes and Regional Levies). The retribution rate for the use of the Gelora Bung Tomo Circuit of Surabaya City Government is as follows:

Table 1. Gelora Bung Tomo Circuit Rental Fee

No	Usage Type	Retribution rate (Rp)	Description
1	Motorbike Training Monday to Friday	35.000	Per hour per motorbike
2	Motorbike Training Saturday to Sunday	40.000	Per hour per motorbike
3	Car Training Monday to Friday	40.000	Per hour per car
4	Car Training Saturday to Sunday	45.000	Per hour per car
5	Circuit Events	10.000.000	Per day
6	Indoor and outdoor space utilisation	100.000	Per m ² , per day
7	Use of the area around Gelora Bung Tomo for activities other than parking	4.500.000	Per block (1380 m ²)

Source: Author's Processing, 2024

3.4. Expenditure Analysis

Expenditure Analysis Expenditure costs are obtained from management costs, namely operational costs, maintenance costs and maintenance costs. In determining the value of management costs, it can be approached with various sources. The first data source approaches similar projects. Meanwhile, the second source is also obtained from existing data as stated in PMK no. 60 of 2021. Management cost analysis functions to determine the amount of costs required to manage Rusunawa Tambak Wedi for 1 year.

3.5. Investment Evaluation

In the calculation of this investment analysis, several Discounted Cash Flow Methods are used, namely as follows (Zainuri, 2021) :

1. One way to figure out how much an investment is worth minus how much money you may expect to get from it in the future is to use the Net Present Value (NPV) formula.
2. The Internal Rate of Return (IRR) technique is one method for determining the rate of return that compares an investment's worth to future net cash receipts.
3. The Benefit Cost Ratio (BCR) is commonly used as an additional study to validate the outcomes of evaluations that have been carried out with other methodologies or as part of the initial evaluation phase of investment planning.
4. The method of period payback If you want to know when your investment will pay for itself, you can use the payback period (PP) technique. It is beneficial to use this option if the retur.

3.6. Sensitivity Analysis

Sensitivity Analysis Sensitivity analysis is done by changing the value of a parameter at a time to see how it affects the investment revenue. Parameters that are reviewed in the form of variables one by one with the assumption that other parameters are constant, then the problem can be solved with ordinary simple equations (Giatman 2011). The parameters used in this study are circuit management fees and commercial space rental income. For changes in management costs are assumed to increase and commercial space rental income to decrease until the investment valuation limit.

4. Results and Discussion

4.1. Investment Cost Analysis

Analysis of investment costs at Gelora Bung Tomo Circuit in Benowo Village, Pakal Subdistrict, Surabaya City is done by analysing data on the components that make up the investment costs. Based on the needs of investment cost components of the construction of Gelora Bung Tomo Circuit in Benowo Village, Pakal District, Surabaya City is presented in the table below:

Table 2. Construction cost of Gelora Bung Tomo Circuit

No.	Year	Investment Cost Component	Total Cost (Rp.)
1	2025	Physical Planning Fee/DED	588.378.920
		Physical Construction Cost (Earthwork)	21.980.606.224
		Supervision Fee (Construction Management Fee)	729.021.742
		Total	23.298.006.886
2	2028	Physical Construction Cost of Earthwork	27.267.026.183
		Supervision Fee (Construction Management Fee)	753.734.400
		Total	28.020.760.583

Source: Disbudporapar Kota Surabaya, Author's Processing, 2024

4.2. Income Analysis

Based on the rental rate that has been set, it is then necessary to calculate the rental income. Revenue projections for 2026 are presented in the table below.

Table 3. Revenue of Gelora Bung Tomo Circuit in 2026

Components	Total	Rental Rate Per Hour/day (Rp.)	Total Revenue (Rp.)
Motorbike	640	35.000	22.400.000
Cars	320	40.000	12.800.000
Event	4	10.000.000	40.000.000
Blocks	1	4.500.000	4.500.000
Electricity	32	180.000	5.760.000
Water	4	450.000	1.800.000
Estimated Circuit Rental Income Monthly			87.260.000
Estimated Circuit Rental Income Annually			1.047.120.000

Source: Author's Processing, 2024

Based on table 3 shows that the income from training for motorbikes is Rp. 22,400,000 per month, for cars is Rp. 12,800,000 per month, for events is Rp. 52,060,000 for 1 event per month for 4 days. As for the projection of income in 2029 can be seen in table 4.

Table 4. Revenue of Gelora Bung Tomo Circuit in 2029

Rent	Total	Rental Rate Per Hour/day (Rp.)	Total Revenue (Rp.)
Motorbike	640	35.000	22.400.000
Cars	320	40.000	12.800.000
Event	4	10.000.000	40.000.000
Blocks	0	4.500.000	0
Electricity	32	180.000	5.760.000
Water	4	450.000	1.800.000
Paddock	48	3.600.000	172.000.000
Estimated Circuit Rental Income on a Monthly Basis			251.240.000
Estimated Circuit Rental Income Annually			3.014.880.000

Source: Author's Processing, 2024

Based on table 4 shows that the income from training for motorbikes is Rp. 22,400,000 per month, for cars it is Rp. 12,800,000 per month, for events it is Rp. 216,040,000 for 1 event per month for 4 days.

4.3. Expenditure Analysis

A management fee analysis is used to estimate how much it costs to manage a circuit for one year. This is done by calculating the actual operational, maintenance, and care costs. The results of the circuit management cost analysis in 2026 can be presented in table 5 below.

Table 5. Analysis of the cost of managing the Gelora Bung Tomo Circuit in Benowo Village every year

No.	Management Fee Component	Total Cost (Rp.)
1	Operational Costs	236.640.561
2	Maintenance Cost	210.991.797
3	Maintenance Cost	5.665.473
Total Management Cost (Rp.)		453.297.834

Source: Author's Processing, 2024

Table 5 shows that the annual cost of managing the Gelora Bung Tomo Circuit in Benowo Village is Rp. 453,297,834, consisting of operational costs of Rp. 236,640,561, maintenance costs of Rp. 210,991,797, and maintenance costs of Rp. 5,665,473. While the management costs required in 2029 are described in table 6 below;

Table 6. Analysis of the cost of managing the Gelora Bung Tomo Circuit in Benowo Village every year

No.	Management Fee Component	Total Cost (Rp.)
1	Operational Costs	640.447.829
2	Maintenance Cost	492.193.913
3	Maintenance Cost	25.321.433
Total Management Cost (Rp.)		1.157.963.175

Source: Author's Processing, 2024

Table 6 shows that the annual cost of managing the Gelora Bung Tomo Circuit in Benowo Village is Rp. 1,157,963,175, consisting of operational costs of Rp. 640,447,829, maintenance costs of Rp. 492,193,913, and maintenance costs of Rp. 25,321,433.

4.4. Sensitivity Analysis

Sensitivity analysis is needed in order to determine the extent to which the impact of investment parameters has been determined previously can change due to factors of situations and conditions during the

life of the investment, so that the changes will significantly affect the decisions that have been taken. Sensitivity analysis is reviewed based on several parameters of business or commercial space income and management costs of Gelora Bung Tomo Circuit in Benowo Village, Pakal District, Surabaya City presented in table 7 below:

Table 7. Circuit Sensitivity Analysis Parameter 1.

Parameter	Investment Indicators				Results
	NPV (Rp.)	IRR	BCR	PP (Year)	
Parameter 1 Circuit Management Fee (Increase):					
102 %	12,804,362,244	7.581%	1.1762	30.98	Feasible
104%	11,733,706,042	7.461%	1.1591	31.98	Feasible
106%	10,127,721,738	7.277%	1.1344	33.98	Feasible
108%	7,986,409,333	7.025%	1.1030	35.98	Feasible
110%	5,309,768,827	6.698%	1.0662	38.99	Feasible
112%	2,097,800,219	6.284%	1.0251	44.99	Feasible
114%	-1,649,496,489	5.767%	0.9810	> 50	Not Feasible
116%	-5,932,121,299	5.118%	0.9350	> 50	Not Feasible
118%	-10,750,074,210	4.283%	0.8882	> 50	Not Feasible
120%	-16,103,355,222	3.218%	0.8414	> 50	Not Feasible

Source: Author's Processing, 2024

Table 8. Sensitivity Analysis of Parameter Circuit 2.

Parameter	Indikator Investasi				Results
	NPV (Rp.)	IRR	BCR	PP (Year)	
Parameter 2 Circuit Business Room Rental Income (Decrease):					
99.00%	13,020,147,555	7.605%	1.1805	30.98	Feasible
98.00%	12,381,061,976	7.534%	1.1716	31.98	Feasible
97.00%	11,422,433,606	7.426%	1.1583	31.98	Feasible
96.00%	10,144,262,446	7.279%	1.1406	32.98	Feasible
95.00%	8,546,548,496	7.092%	1.1184	34.98	Feasible
94.00%	6,629,291,757	6.861%	1.0919	36.99	Feasible
93.00%	4,392,492,227	6.582%	1.0608	39.99	Feasible
92.00%	1,836,149,908	6.250%	1.0254	44.99	Feasible
91.00%	-1,039,735,201	5.854%	0.9855	> 50	Not Feasible
90.00%	-4,235,163,101	5.384%	0.9412	> 50	Not Feasible

Source: Author's Processing, 2024.

Based on table 8 above, it can be concluded that Parameter 1 is declared not feasible and quite sensitive if there is a decrease in revenue from business or commercial space rental by 8% while Parameter 2 is declared feasible and quite sensitive if there is an increase in management costs by 12%. Changes in NPV and BCR values due to the sensitivity of the 2 parameters can be presented in the following graph:

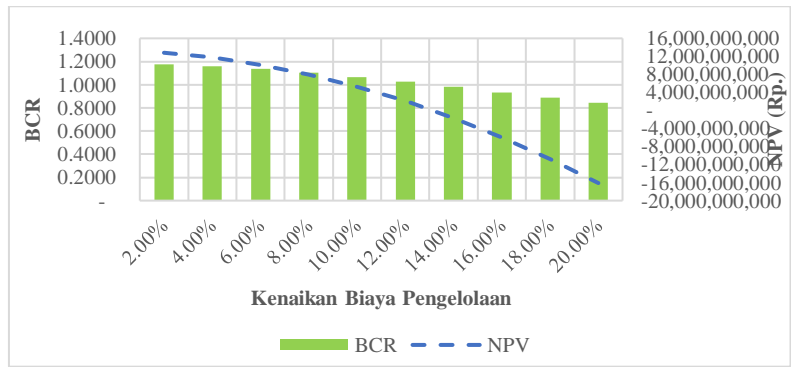


Figure 1. Sensitivity Graph (Parameter 1)

Source: Author's Processing, 2024

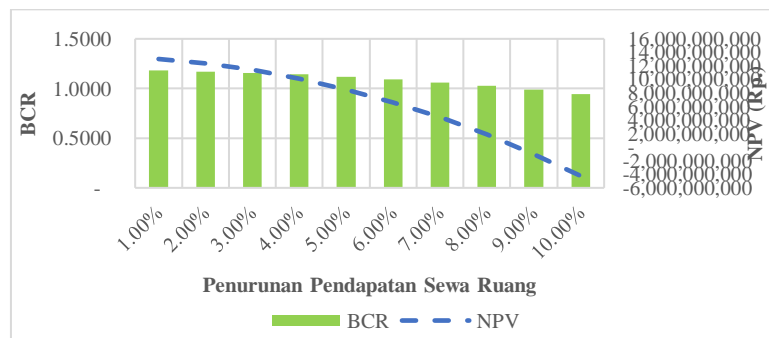


Figure 2. Sensitivity Graph (Parameter 2)

Source: Author's Processing, 2024

5. Conclusion

After calculating the investment analysis, it is found that the investment made is profitable and can return the investment capital issued because the NPV value is greater than zero, the IRR value is greater than the predetermined, the bcr value is more than 1 and the payback period is faster than the investment period. In addition, sensitivity analysis was also carried out in this study in order to find the limits that could change the investment results. Sensitivity analysis is carried out on changes in management costs and business/commercial space rental income. Based on this, the sensitivity analysis is as follows. In the calculation of business space rental income sensitivity, it is found that the NPV value will be less than zero when there is a decrease in income greater than 8% of the previously planned income. In the calculation of the sensitivity of management costs, it is found that an increase in management costs exceeding 12% of the previous determination can change the NPV value to less than zero. For further researchers, it is recommended to add other income variables that can increase income so that it can affect the payback period.

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