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FEASIBILITY ANALYSIS AND SCENARIO FOR INFRASTRUCTURE PROJECTS WITH LOW RETURN ON INVESTMENT IN INDONESIA

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Abstract

As a developing country, Indonesia is currently rampant in implementing infrastructure development. However, there are infrastructure projects (especially toll road projects) that are included in the National Strategic Project (PSN) but have low financial feasibility. Despite this, they are economically and socially politically feasible, and require a particular strategy to ensure the project can still be implemented. The analysis will be conducted by conducting in-depth case studies on infrastructure projects with low investment feasibility in Indonesia. These case studies aim to obtain a clear picture of the problem and identify the best solution/strategy to improve the feasibility of the project, enabling its implementation. Additionally, the impact of implementing the best scenario on its financial feasibility will be determined. Based on the analysis results, shortening the toll road segment is the best scenario that offers the highest financial feasibility. The second alternative involves seeking construction support from the Government to complete the toll road from Besuki to Banyuwangi, which represents the final stretch of the toll road on Java Island. The provision of VGF (Viability Gap Funding) in the form of construction support aims to facilitate the connection of the Probolinggo-Banyuwangi toll road and ensure a profitable rate of return on investment for Toll Road Business Entities, who are the investors in this project.

Keywords: Infrastructure Projects, Financial Feasibility, Viability Gap Fund.

Introduction

Providing reliable infrastructure facilities is essential for enhancing connectivity and supporting national economic growth (David Banister, 2001). However, in practice, it has not been fully realized due to limited funding from the Government. Therefore, conducting a study to evaluate the feasibility of infrastructure projects, particularly from a financial perspective, is crucial. This is because one of the key requirements to attract

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private sector participation in the development and management of such projects is that they must be financially attractive (Mulyono Wraharjo et al., 2022)

One of the infrastructure projects currently under construction in Indonesia is toll roads. Toll roads have been utilized globally for several decades as a means to finance the development or enhancement of transportation infrastructure. Numerous studies have been conducted on the impact of tolls on traffic (Welde & Odeck, 2017). Nearly all developed countries primarily utilize tolls as tools to stimulate development pathways, and occasionally to manage demand. However, there is a scarcity of research on optimal toll roads and the costs associated with public and private financing.

It is not uncommon for toll road infrastructure projects in Indonesia to exhibit a low level of financial feasibility. Naturally, this factor must be taken into consideration when formulating investment schemes to make the project attractive to investors. Financing plays a crucial role in public-private partnership (PPP) projects. One of the breakthroughs made by the Government in the PPP (Public-Private Partnership) scheme is the provision of support in the form of cash funds for project construction costs called the Viability Gap Fund (VGF). The objective of this fund is to transform projects that were previously not financially feasible but economically feasible into financially feasible ones (The Ministry of National Development Planning, 2020). In terms of the economy, the current formula for tariff adjustments on national industrial roads contradicts one of the principles of efficient risk allocation. The practice of adjusting rates every two years implies that the business risk agency is implicitly burdened with inflation, even though it cannot absorb the risk. Therefore, it is necessary to develop an investment scheme scenario for toll roads that are not financially feasible, analyze appropriate alternative supports for each group, and conduct a sensitivity analysis to assess the relationship between financial feasibility conditions and the required level of support. (Nurhayati, 2020)

Based on this background, the research aims to conduct a feasibility analysis and scenario analysis for infrastructure projects that are indicated to have a low level of investment feasibility. Additionally, the research will analyze the effect of macroeconomic variables' sensitivity on changes in the level of investment feasibility.

Literature Review

A. The Role of Infrastructure in Economic Development

Economic growth is a crucial metric for assessing financial performance, the effectiveness of government policies, and the quality level of economic infrastructure (Ahmad, 2022). According to the size of Gross Regional Domestic Product (GRDP), economic growth corresponds to an increase in the production of goods and services within the local economy. The level of life and welfare for the population can improve when economic growth outpaces population growth (Todaro & Smith, 2012)

Even though Indonesia's economy has been growing from year to year, its growth rate has been slowing down. The economic growth rate was 5.56 percent in 2013, and it

declined to 5.07 percent in 2017 (BPS, 2018). The weakening performance of the primary, industrial, and service sectors in the business sector was the fundamental cause of the general slowdown in the rate of economic growth. Consequently, Indonesia requires a stimulus to bolster economic growth and reduce the country's poverty rate. Presently, Indonesia falls under the middle-income trap country category as its per capita income was USD 3,927 in 2018, which falls within the range of USD 2,786 to 8,625 (World Development Report, 2018).

Indonesia needs to develop at a faster pace in order to break free from the middle-income category. Sri Mulyani (2018) emphasized that enhancing the quality of human resources (HR), through initiatives such as improving education, skills, and population health, can aid Indonesia in moving beyond the middle-income group. Additionally, infrastructure development is crucial for increasing productivity and fostering competition. By evaluating the impact of different types of infrastructure, it becomes evident which ones significantly contribute to the growth of Indonesia's per capita Gross Regional Domestic Product (GRDP).

Adequate infrastructure facilities are one of the key capital factors (Palilu, 2019). Infrastructure must, therefore, be developed to facilitate ongoing economic expansion, which can be accomplished through one of two approaches. The first strategy is on-demand provisioning, which focuses on the need to maintain existing infrastructure. The second strategy involves implementing measures designed to stimulate economic activity and expansion (supply approach). Both strategies are dependent on the availability of funds. In the first strategy, infrastructure provision takes priority when funds are limited. Conversely, when the economy improves, infrastructure development is intended to stimulate and support further economic expansion (Simanjuntak, 2015).

B. The Role of Toll Roads in Economic Development

Toll roads are public roads that are integrated into the road network system and serve as national roads where users are required to pay tolls. Tolls refer to a specific amount of money paid for utilizing toll roads, and the toll funds are allocated towards return on investment, maintenance, and further development of the toll road (Welde et al., 2020).

The construction of toll roads is undertaken to enhance traffic flow in developed or developing areas, improve the effectiveness and efficiency of goods and services distribution, support economic growth, alleviate the burden on the government, and promote the equitable distribution of development outcomes (Recky, 2021). Constructing a road network funded by road users enables the implementation of toll roads, thereby achieving equitable distribution of development outcomes and fostering balanced regional development while considering justice. Toll roads are constructed to enhance the efficiency of distribution services, thereby promoting economic growth, particularly in highly developed areas. The scope of this Government Regulation encompasses the management of toll roads, the responsibilities of the Toll Road Regulatory Agency (BPJT), and the rights and obligations of toll road business entities and users (Wibowo, 2016).

The development of freeway infrastructure or toll roads in a country serves as a benchmark to gauge the extent of its economic progress, both at a macro and micro level. Furthermore, the toll road industry can serve as evidence of a country's preparedness to embrace a civilization that emphasizes ease and speed in every activity. (Welde et al., 2020)

The Government asserts that the Trans-Java Toll Road project offers numerous advantages as it enables more efficient and faster transportation of goods. Lower transportation costs will have a positive impact on the added value of various goods, particularly agricultural commodities. (Ahmad, 2022)

C. Infrastructure with a High Economic Rate of Return and Low IRR

For projects that are economically and marginally financially feasible, financing can be obtained through the Public-Private Partnership (PPP) scheme with government support. In the case of projects that are economically feasible but not financially viable, the PPP financing scheme with Availability Payments or the involvement of State-Owned Enterprises (SOEs) can be considered. Additionally, for projects that are economically viable but financially unviable, and when no other financing alternatives are available, funding can be sourced from the State Budget (APBN) or Regional Budgets (APBD) (Ministry of Public Works (PUPR), 2020). Massive infrastructure support from the Ministry of Public Works and Public Housing (PUPR) for five super-priority tourism destinations.

According to the Ministry of National Development Planning/Bappenas, Public-Private Partnership (PPP) projects are attractive to the private sector due to their relatively competitive returns, appropriate risk allocation, and comprehensive regulations (Darmawan, 2018). In terms of the Government's contribution to cooperation, the first aspect is partial PPP financing by the Government, also known as partial construction. Under this scheme, business entities are involved in providing a portion of the government-financed infrastructure. The second aspect is Feasibility Support. This support aims to enhance financial feasibility and the effectiveness of Public-Private Partnership (PPP) projects. One form of assistance is the Viability Gap Funding (VGF) or tax incentives approved by the Minister of Finance. VGF serves as a facility to provide financial and fiscal contributions from the government. The maximum provision of VGF is 49% of the project investment value. The third aspect is the Government Guarantee scheme, which aims to enhance the bankability and creditworthiness of PPP projects (Ministry of Finance, 2020).

Research Method

The research focuses on the Probolinggo-Banyuwangi Toll Road Development Project. A mixed method approach is employed for this study, and purposive sampling is the chosen sampling method. The purposive sampling method has several limitations (Sugiyono, 2016). Sugiyono (2016) selected this sampling method because it can be applied to both quantitative and qualitative research that does not aim for generalization.

Sampling is performed by selecting subjects based on a specific purpose rather than stratification, randomness, or location. Due to various factors, such as limited resources (financial, human resources, and time), it was not feasible to obtain a large sample size. Therefore, this method was utilized (Arikunto, 2006).

The research variables employed in this study consist of financial aspects, which include Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period (PP). The analysis will be conducted through in-depth case studies of infrastructure projects exhibiting low investment feasibility in Indonesia. Case studies are conducted to obtain a comprehensive understanding of a problem and to identify the best solutions or strategies for enhancing the feasibility of the project. The aim is to ensure successful implementation and assess the impact of implementing the optimal scenario on its financial feasibility. The process involves collecting and integrating quantitative data to derive interpretations and gain insights into specific situations. (Sekaran & Bougie., 2016).

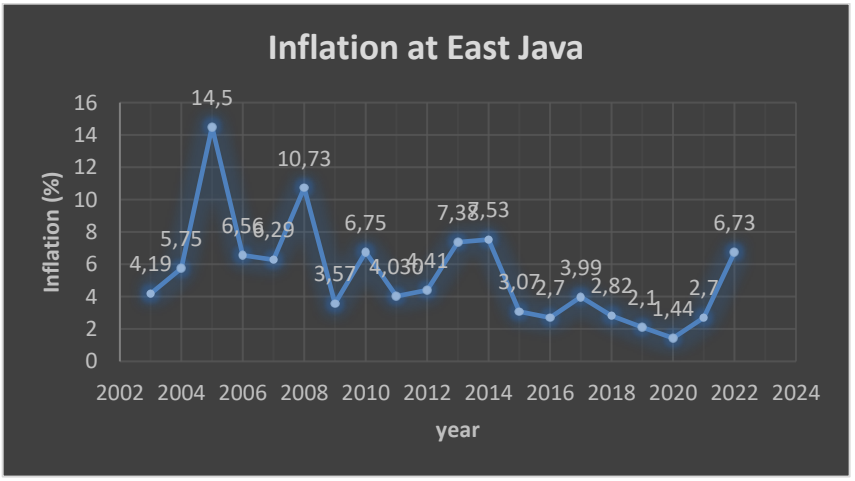
Furthermore, the level of financial feasibility will be assessed for the current conditions as well as each determined scenario. This evaluation will help provide scenario recommendations and identify the necessary support to ensure the financial feasibility and successful implementation of the project.

Based on the obtained results, a sensitivity analysis is conducted to determine the parameters that exert the most significant influence on changes in the level of financial feasibility for this investment.

Results & Discussion

Probolinggo Banyuwangi (Probowangi) Toll Road is the toll road which is the end of the Trans Java Toll Road series with a length of up to 172 KM; the Probowangi Toll Road concession is owned by PT Jasamarga Probolinggo Banyuwangi, which is a subsidiary of PT Jasa Marga (Persero) Tbk.

Based on data obtained from the Central Statistics Agency (BPS), the following are the inflation figures for East Java Province:



Based on the inflation rate data in East Java Province, the average inflation rate for the last 5 years was 3.158%.

Subsequently, the discount rate is determined through the calculation of the Weighted Average Cost of Capital (WACC). Each category of capital is weighted proportionally. The agreed funding scheme comprises 30% of own capital and 70% of a bank loan.

Based on the calculation results using the given parameters, the discount rate employed to calculate the Net Present Value (NPV) of the project is 8.23%.

A. Analysis of the Existing Financial Feasibility of the Probolinggo – Banyuwangi Segment

The conditions of various macroeconomic parameters discussed earlier will impact the level of investment feasibility for the Probolinggo-Banyuwangi toll road project. Based on the predetermined assumptions, the feasibility of the project for the Probolinggo-Banyuwangi segment can be evaluated using metrics such as Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period.

Segment	**Gending – Banyuwangi**
Concession Period (years	50
Traffic	Traffic Study 2020
Initial Tariff	Rp 1.540,-
Toll Road Trace Revenue	Gending - Banyuwangi
Operation & Maintenance	30% of Revenue (Avg)
Inflation	3.16%
Rate Increase / 2 Years	7.32%
IRR	5.39%
NPV (Rp Million)	(19,535,971)
Payback Period	28 Years
Construction Cost Gending - Banyuwangi (Million, Exclude Tax)	40,905,055

Based on the analysis results, it was determined that the Internal Rate of Return (IRR) was still below the Weighted Average Cost of Capital (WACC), and the Net Present Value (NPV) value was negative. These investment parameters do not meet the eligibility requirements and are deemed unacceptable to investors. However, considering the socio-political aspect and the community's need for this toll road infrastructure, a strategy is necessary to make the project implementable.

B. Scenario Analysis for the Construction of the Probolinggo - Banyuwangi Toll Road

To enhance the financial feasibility of the Probolinggo-Banyuwangi Toll Road project, scenario analysis is employed to identify the optimal strategy or scenario that can be implemented.

The Probolinggo-Banyuwangi Toll Road project can be considered economically feasible but financially unviable. The toll road concession scheme utilizes the Government and Business Entity Cooperation (Public-Private Partnership or PPP) scheme. In this scenario, the project is economically feasible but financially unviable. To enhance its financial feasibility, the Government contributes by financing a portion of the PPP, specifically the construction phase.

The Probolinggo-Banyuwangi toll road scheme utilizes the user charge scheme, where funding and return on investment are generated through user charges in toll rates for the services provided by business entities. However, solely considering the ability and willingness of road users to pay fares is insufficient to achieve financial feasibility for the Probolinggo-Banyuwangi toll road project.

Another scheme that can be employed is the availability payment scheme, often abbreviated as the AP scheme. In this PPP project scheme, the return on investment for business entities is derived from periodic payments made by the Government to these entities based on the availability of infrastructure services. These payments are contingent upon meeting quality criteria and output specifications, including service performance indicators such as the Minimum Service Standards (SPM) for toll roads.

Based on the previously obtained results, strategies are required to enhance the financial feasibility of the Probolinggo-Banyuwangi Toll Road. This study will consider several scenarios, including the following:

1. Phase 1 Development: carried out until Besuki in 2023
   Phase 2 Development: Besuki to Banyuwangi in 2025
2. Phase 1 Development: carried out until Besuki in 2023
   Phase 2 Development: Besuki to Situbondo in 2029
   Phase 3 Development: Situbondo to Banyuwangi in 2033
3. Phase 1 Development: carried out until Besuki in 2023
   Phase 2 Development: Not Done (Termination of Concession only up to Besuki)
4. Phase 1 Development: carried out until Besuki in 2023
   Phase 2 Development: Besuki to Banyuwangi in 2029 by calculating the support from the Government needed so that the Project is financially feasible

Based on the analysis of the above scenario, the following results were obtained :

Uraian	**A Gending – Banyuwangi**	**B Gending - Banyuwangi**	**C Gending – Besuki**	**D Gending - Banyuwangi**	**E Gending – Banyuwangi**
Road Length (KM)	**175.4**	**175.4**	**49.88**	**175.4**	**175.4**

	Uraian	A Gending – Banyuwangi	B Gending - Banyuwangi	C Gending – Besuki	D Gending - Banyuwangi	E Gending – Banyuwangi
	Length of BUJT Portion of the Road (KM)	175.4	175.4	49.88	56.44	175.4
	Length of Government Support Portion of the Road	-	-	-	118.96	-
Financial Aspect						
1	**Total Construction Cost of BUJT (Million Rp)**	40,844,891	40,844,891	7,900,807	8,988,219	40,844,891
	Value of Government Construction Support (Million Rp)	-	-	-	31,856,672	-
2	Total Investment Cost (Million Rp)	76,118,697	44,139,661	27,649,808	43,035,569	76,118,697
3	WACC	8.23%	8.23%	8.23%	8.23%	8.23%
4	IRR on Project	5.34%	5.59%	9.23%	11.17%	8.23%
5	*Net Present Value* (NPV) (Rp Juta)	(20,088,214)	(13,724,448)	2,203,779	3,075,390	0
6	*Payback Period* (tahun)	28	31	18	15	21
Notes :					There is government construction support along a 119 km stretch.	It receives an Availability Payment (AP) of Rp. 7.4 trillion for a period of 20 years.

Based on the conducted scenario analysis, it is determined that the project can still be implemented (with IRR > WACC and NPV > 0) by considering three alternative scenarios:

1. Following scenario C, the development is limited to Besuki in this scenario, and no government support is required.
2. Following Scenario D, the development is carried out in its entirety up to Banyuwangi, with Stage 1 (Probolinggo-Besuki) commencing construction in 2023 and Stage 2 (Besuki-Banyuwangi) starting construction in 2025. Additionally, construction support from the Government is required, amounting to Rp. 31 trillion or construction support covering a distance of 119 km.
3. Following Scenario E, the development is implemented in its entirety up to Banyuwangi, with Stage 1 (Probolinggo-Besuki) commencing construction in 2023 and Stage 2 (Besuki-Banyuwangi) starting in 2025. Additionally, government support in the form of Availability Payment (AP) of Rp. 7.4 Trillion per year over a period of 20 years is required.

C. Sensitivity Analysis

The estimates or calculations for project or investment plans are derived from the assumptions and limitations established during the initial stages of project planning. However, in reality, these assumptions are subject to change, both externally and internally. Modifying these assumptions can lead to different conclusions when assessing the investment feasibility of the project. Risk analysis of a project entails employing pessimistic, most likely, and optimistic scenarios for each variable that significantly influences the cash flows of the project or investment. This analysis helps estimate the Net Present Value (NPV) or Internal Rate of Return (IRR) of the project or investment. Consequently, conducting a sensitivity analysis is crucial in financial projections to examine the potential variations in NPV and IRR values resulting from changes in key variables, such as inflation, interest rates, and discount rates.

In this study, deterministic sensitivity analysis was utilized, focusing on changing one variable while keeping the other variables constant. The variables that were altered in this analysis include both external and internal factors.

1. Changes in Inflation Rates

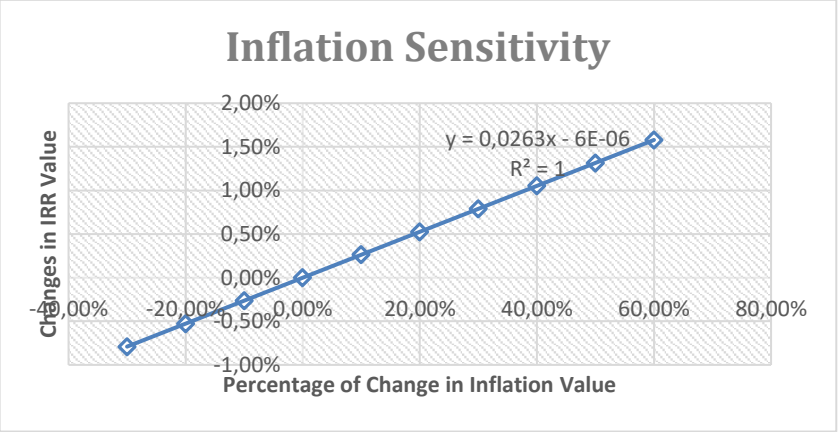


Figure 1
Sensitivity of IRR Values to Changes in Inflation

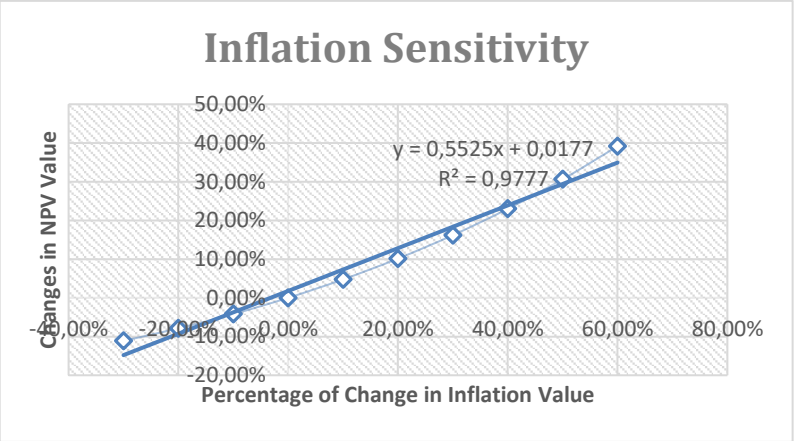


Figure 2
Sensitivity of NPV Values to Changes in Inflation

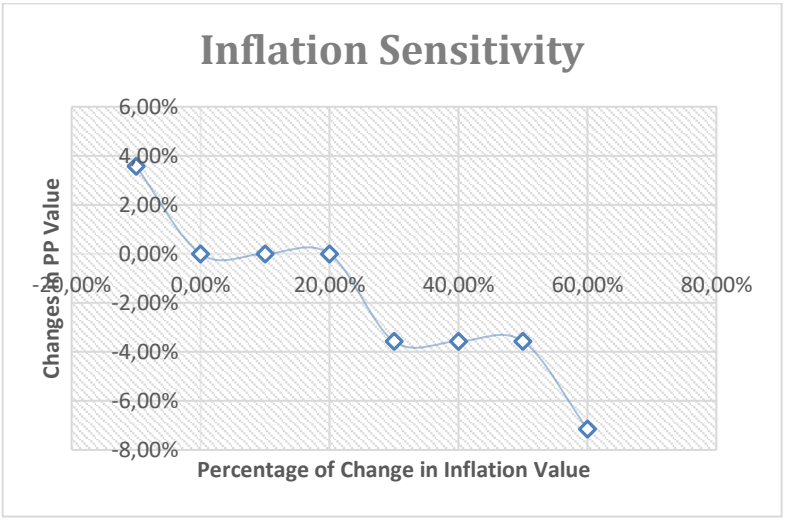


Figure 3
Sensitivity of Payback Period (PP) Values to Changes in Inflation

Based on the analysis results depicted in the Figure above, it is observed that a 10% increase in the inflation rate leads to a corresponding 0.26% increase in the IRR of the project. Conversely, a 10% decrease in the inflation rate from its initial value will result in a 0.26% decrease in the IRR of the project.

Regarding the NPV parameter, it is evident that changes in the inflation value have a linear relationship with changes in the NPV value. Every 10% change in the inflation value from its initial value corresponds to a 3% - 8% change in the NPV value from its initial NPV value.

Furthermore, concerning the Payback Period (PP) parameter, the analysis indicates that a 10% increase in the inflation rate will result in an increase in the Payback Period.

2. Changes in Interest Rate Value

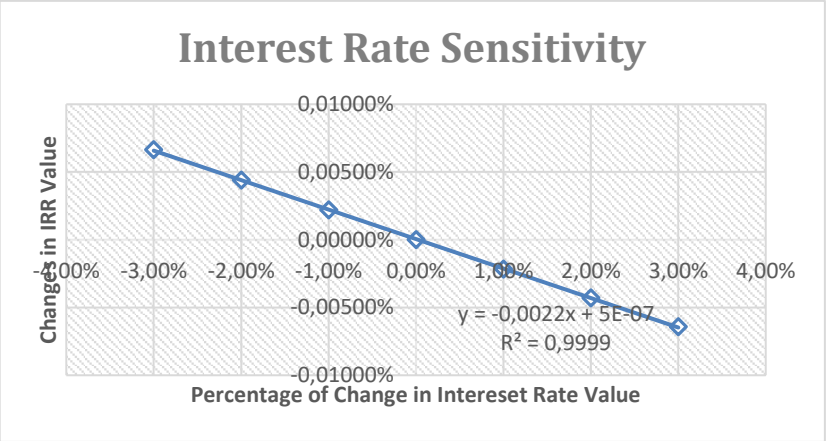


Figure 4
Sensitivity of IRR Values to Changes in Interest Rates

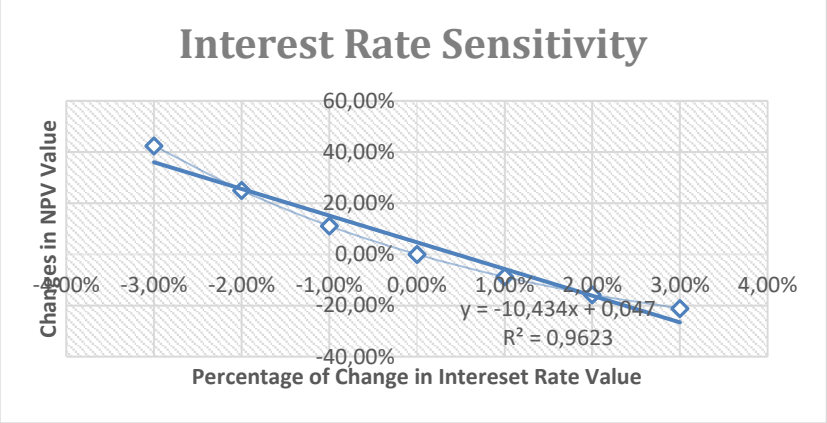


Figure 5
Sensitivity of NPV Values to Changes in Interest Rates

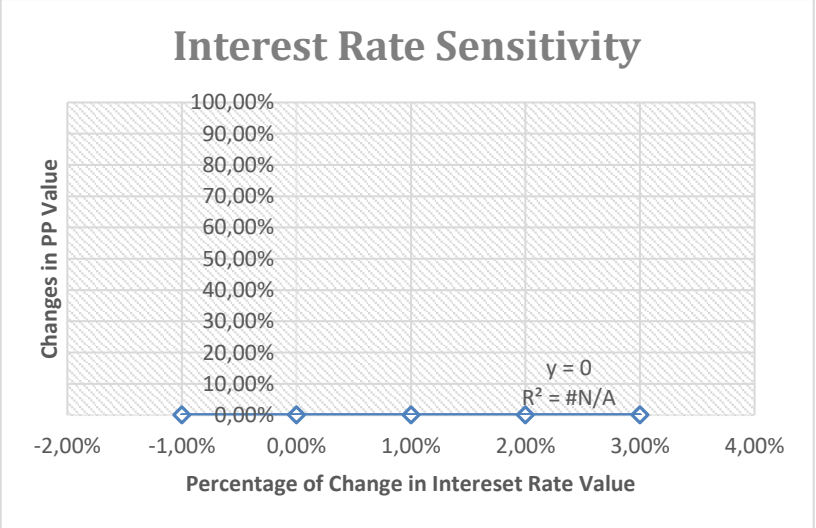


Figure 6
Sensitivity of Payback Period (PP) Values to Changes in Interest Rates

Based on the analysis results depicted in the Figure above, it can be observed that changes in interest rates have a relatively minimal effect on the IRR value of the project. Specifically, for every 10% increase in the interest rate, the IRR value of the project decreases by 0.002%. Conversely, for every decrease in the interest rate, the IRR value increases by 0.002%.

Regarding the NPV parameter, it is evident that changes in interest rate values are inversely proportional to changes in NPV values. For each 1% increase in the interest rate value from its initial value, the NPV value decreases by 5% - 9% from the initial NPV value. Conversely, for every 1% reduction in the interest rate value from its initial value, the NPV value increases by 11% - 23% from the initial NPV value.

Furthermore, concerning the Payback Period (PP) parameter, the analysis indicates that changes in interest rate values have no significant effect on the payback period value.

3. Changes in the Length of the Concession Period

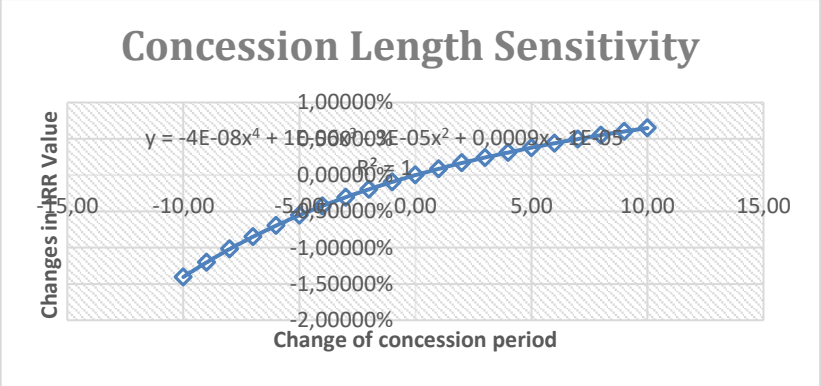


Figure 7
Sensitivity of IRR Values to Changes in Concession Period

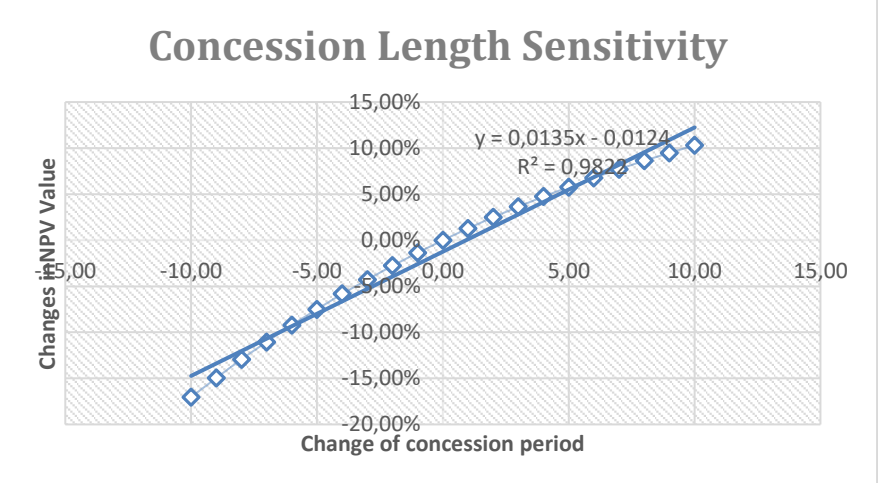


Figure 8
Sensitivity of NPV Values to Changes in Concession Period

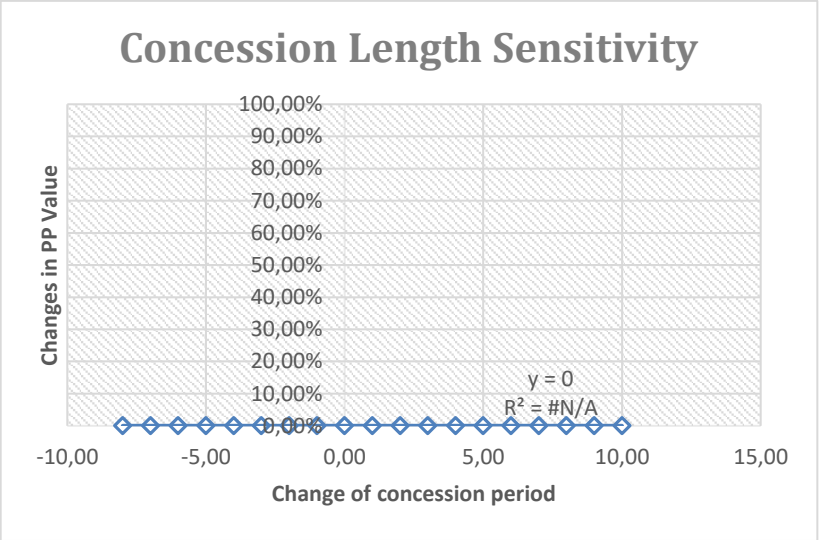


Figure 9
Sensitivity of Payback Period (PP) Values to Changes in Concession Period

Based on the analysis results depicted in the Figure above, it can be observed that for every one-year increase in the concession period, the IRR value of the project increases by 0.05% - 0.09%. Conversely, for every decrease in the concession period, the IRR value decreases by 0.1% - 0.2%.

Regarding the NPV parameter, it is evident that for every one-year increase in the concession period, the NPV value increases by 0.8% - 1.3% of the initial NPV. Conversely, for every decrease in the concession period, the NPV value decreases by 1.4% - 2.1% of the initial NPV.

Furthermore, concerning the Payback Period (PP) parameter, the analysis indicates that changes in the length of the concession period have no significant effect on the value of the payback period.

4. Changes in the Toll Tarif

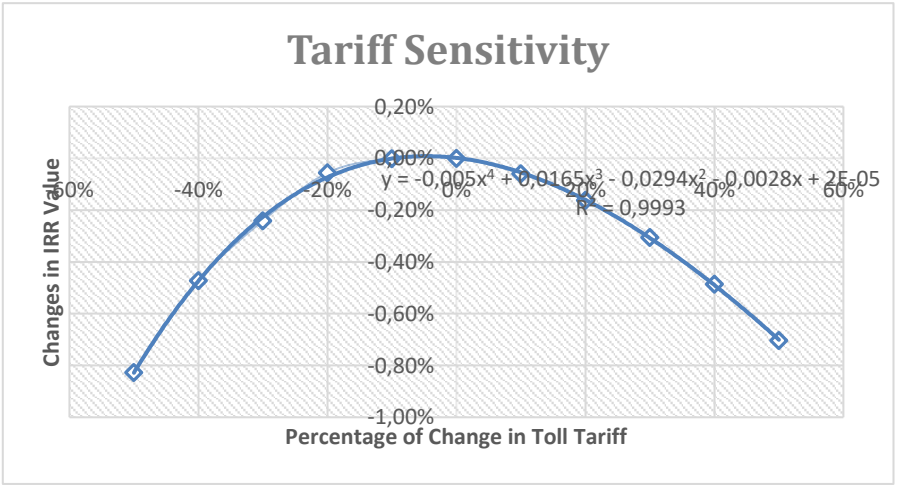


Figure 10
Sensitivity of IRR Values to Changes in Toll Tariff

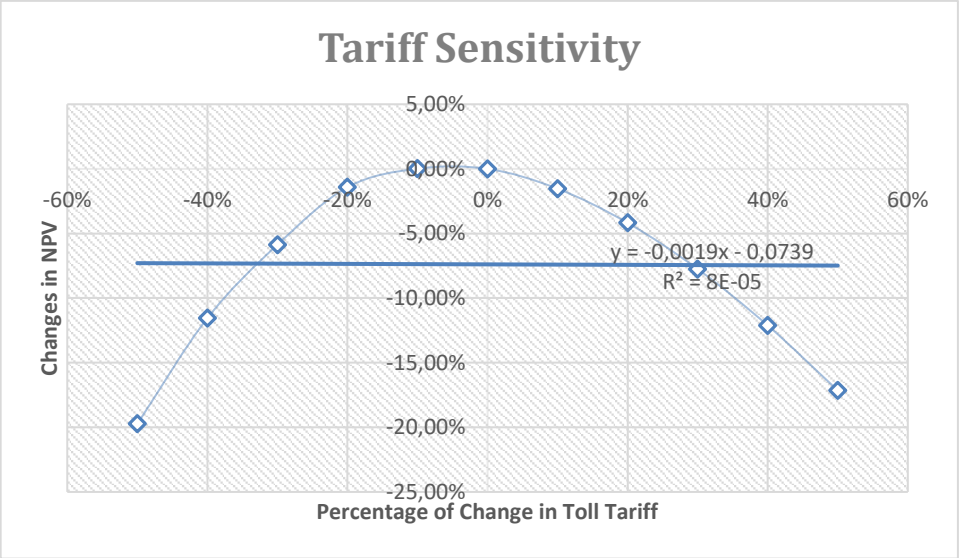


Figure 11
Sensitivity of NPV Values to Changes in Toll Tariff

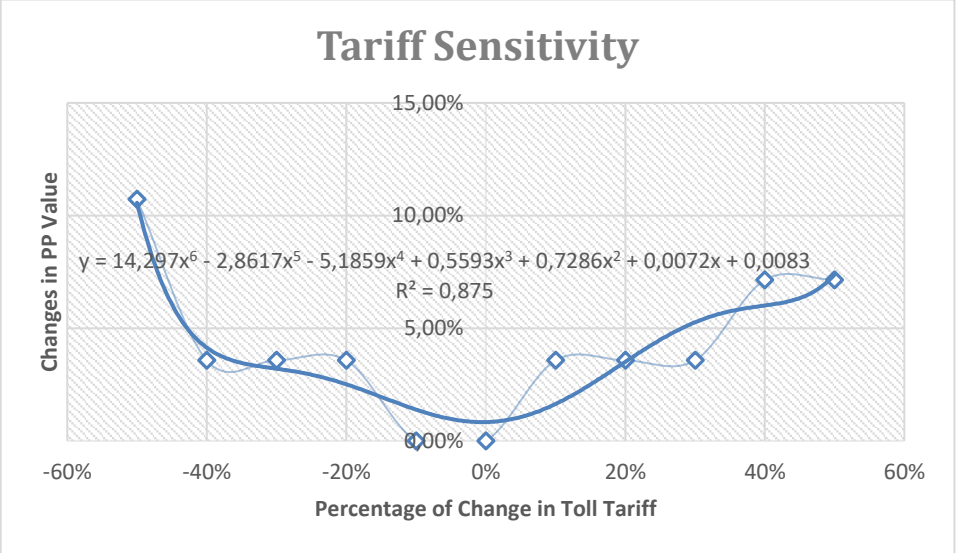


Figure 12
Sensitivity of Payback Period (PP) Values to Changes in Toll Tariff

Based on the analysis results depicted in the Figures above, it can be observed that for every 10% increase in the tariff value, the IRR value of the project decreases by 0.1% to 0.22%. Similarly, for every 10% decrease in the tariff value from its initial value, the IRR value of the project decreases by 0% to 0.35%.

Moving on to the NPV parameter, for every 10% increase in the tariff value from its initial value, the NPV value decreases by 1.5% to 5% from the initial NPV value. Conversely, for every 10% decrease in the tariff value from its initial value, the NPV value decreases by 0.02% to 8% from the initial NPV value.

Furthermore, concerning the Payback Period (PP) parameter, it is found that for every 10% increase in the tariff value, the Payback Period increases by 0% to 3.5% of the initial PP value. Conversely, for every 10% decrease in the tariff value, the Payback Period increases by 0% to 7% of the initial PP value.

Conclusions

Based on the feasibility analysis of the Probolinggo-Banyuwangi Toll Road, several conclusions can be drawn as follows: 1) Regarding the existing condition of the Probolinggo-Banyuwangi Toll Road, it has been observed that the Internal Rate of Return (IRR) is still below the Weighted Average Cost of Capital (WACC), and the Net Present Value (NPV) is negative. These investment parameters do not meet the feasibility requirements and, as a result, are not acceptable to investors. 2) Based on the conducted scenario analysis, to implement the project and achieve an IRR > WACC and NPV > 0, three alternative scenarios can be considered: a) According to Scenario C, the construction will be terminated at Besuki. This scenario does not require government support. b) According to Scenario D, the construction will cover the entire route up to Banyuwangi. Phase 1 (Probolinggo-Besuki) will start construction in 2023, followed by Phase 2 (Besuki-Banyuwangi) in 2025. Additionally, construction support from the government amounting to Rp. 31 trillion is needed, which will cover the construction along a 119 km stretch. c) According to Scenario E, the construction will cover the entire route up to Banyuwangi. Phase 1 (Probolinggo-Besuki) is scheduled to begin construction in 2023, followed by Phase 2 (Besuki-Banyuwangi) in 2025. Furthermore, government support in the form of Availability Payment (AP) amounting to Rp. 7.4 trillion per year for a duration of 20 years is required.

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