Feasibilty Analysis Of South Java Road Link in Jogyakarta Province

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Abstract - Distribution of goods and services along the island of Java still mainly depends on the North Java Coastal Road named PANTURA. Trafict demands along this road are increasing every year and road capacity can not match this growth. The government of Indonesia has plans to develop another trans Java route to meet the demands and to develop the southern corridor of Java. The province of Jogyakarta will experience an impact and needs to provide input to the proposed route, as the road can support development of existing regional potencies.

The objective of study is to analyze the economic feasibility of fourth alternative southern Java road route in Jogyakarta province there were evaluated. This analyzewere based on estimated producer surplus of agricultural commodities within influence area.

Keyword : *feasibility study, South Java road link, producer surplus, agricultural potency, Jogyakarta*

1. Introduction

The distribution of goods and services in Java Island from west to east or vice versa, is still dependent on the facilities of the Pantura road lane. Traffic flow on this line each year increases while its capacity is limited. Problems arise when the road on the path of the Pantura occurs disruption resulting in the interruption of this path disturbing the distribution of goods between regions in Java. This causes the central government to immediately open the path crossing the other island of Java. According to the central government's master plan, Java island will have 4 cross roads:

1. North Cross Road (Pantura), this line is already connected and become the main route connecting Java island.
2. Highway cross road, this path is connected but constrained due to the contour of the island of Central Java in the form of mountains.
3. South cross road, this line is partly already connected mainly in the region of central Java and East Java. But not yet connected to heavy transport.
4. Freeway Road otherwise known as Jalan TOL (tax on location), this road is being geared up for completion by the current central government. But the TOL road is not publicly accessible by the public. TOL road was built to connect the big cities on the island   of   Java

2. Sites and Limitations Study

Given the four existing tracks, there is only one focus on the development of the southern part of Java island. This case study where limits by the analysis of cross-route of Java Island in the south and focuses on the province of Jogyakarta.

The area of Jogyakarta province that is being studied is Kulon Progo Regency, Bantul Regency, and Gunung Kidul Regency. These three districts rely on regional income from the agricultural sector.

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The economic feasibility analysis of the road is based on agricultural production potential resulting from the affected area. Agricultural production which is the study of this analysis is grains and crops.

Figure 1. Jogyakarta Province

3. Analysis and Comment

The discussion covering the economic feasibility analysis uses various analyzes, namely the analysis of Vehicle Operating Costs, analysis of agricultural production surplus, and analysis of road financing of road routes with the superior product of the affected locations when there is no new road and when there is a new road. All of these analyzes use Discounted Cast Flow Method with Net Present Value (NPV), Benefit Cost Ratio (BCR), and Economic Internal Rate of Return (EIRR) calculations.

The formula for the above analysis is as follows:

$$NPV = (B0 - C0) + \frac{(B1-C1)}{(1+i)} + \frac{(B2-C2)}{(1+i)^2} + \cdots + \frac{(Bn-Cn)}{(1+i)^n} \qquad (1)$$

$$BCR = \frac{Bn}{Cn} \qquad (2)$$

Where :

$$Bn = \sum_{t=0}^{n} \frac{Bt}{(1-i)^n} \qquad (3)$$

$$Cn = \sum_{t=0}^{n} \frac{Ct}{(1-i)^n} \qquad (4)$$

$$EIRR = \sum_{t=0}^{n} \frac{B_t}{(1-i)^n} = \sum_{t=0}^{n} \frac{Ct}{(1-i)^n} \qquad (5)$$

3.1. Vehicle Operating Costs (VOC)

The components of influence in commonly used VOC analyzes are fuel consumption, lubrication oil consumption, spare parts consumption, vehicle maintenance costs, tire consumption, depreciation of vehicle values, operator costs, and other overheads. (ORN 5 - 2005).

3.2. Surplus Producer Methode

Surplus is a basic concept used to evaluate transportation projects. Simply put, a project will involve costs and benefits, the difference between the two is known as a surplus.

According to the Department for International Development (DfID) in the Overseas Road Note 5 (ORN 5) report in 2005 it stated that where there is no existing road and substantial increase in the accessibility of a vehicle for regional development planning, the approach to production surplus method is Most appropriate. This method is able to estimate the increase in agricultural benefits to a road investment.

In the concept of surplus producer method actually concerns the manufacturer of various goods and services intending to send it or sell it. The approach to production surplus method refers to a situation where low traffic volume results in a reduced consumer surplus justification. Profits due to changes in volume and transportation costs depend on the amount of profits due to changes in the price of agricultural products in the production site.

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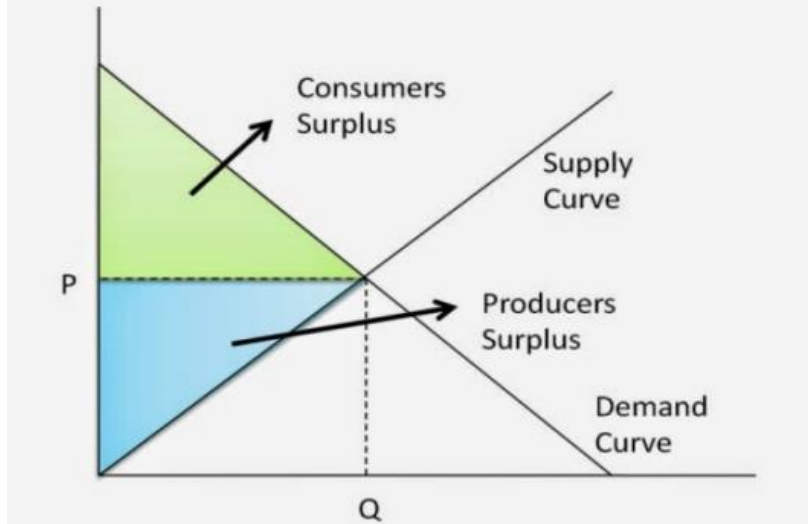Problem, Solution and Development of Coastal and Delta Areas

Figure 2. Approaching Producer Surplus Methode

The approach used is the basic economic formula that is only to calculate surplus producer as follows:

$$Pj_{(wo)} = P(1 + r_1)^{j-1} \tag{6}$$
$$Pj_{(w)} = P(1 + r_2)^{j-1} \tag{7}$$
$$APj_{(wo)} = AP(1 + r_3)^{j-1} \tag{8}$$
$$APj_{(w)} = AP(1 + r_4)^{j-1} \tag{9}$$
$$NTB_{(wo)} = Pj_{(wo)} + \{G \times Pj_{(wo)}\} - \{APj_{(wo)} \times C\} + Pgj_{(wo)} \tag{10}$$
$$NTB_{(w)} = Pj_{(w)} + \{G \times Pj_{(w)}\} - \{APj_{(w)} \times C\} + Pgj_{(w)} \tag{11}$$
$$Tj_{(wo)} = Te(1 + r_5)^{j-1} \tag{12}$$
$$Tj_{(w)} = Te(1 + r_6)^{j-1} \tag{13}$$
$$Bjn_{(wo)} = C_{(wo)} \times Tj_{(wo)} \tag{14}$$
$$Bjn_{(w)} = C_{(w)} \times Tj_{(w)} \tag{15}$$
$$Bjn = Bjn_{(w)} - Bjn_{(wo)} = (C_{wo} - C_w) \times \{Tj_{(w)} - Tj_{(wo)}\} \tag{16}$$

3.3. Analysis of Construction Costs

Components used as the basis of calculation of construction costs to be compared with the value of agricultural production are :
1. Land Acquisition Fee
2. Road Construction Costs
3. Bridge Construction Costs
4. Engineering and Supervision Costs

3.4. Cost Benefit Analysis of Alternative Road Development.

The analysis of the benefits and costs of road construction is done by following Discounted Cash Flow method in determining Net Present Value (NPV), Benefit Cost Ratio (BCR), and Economic Internal Rate of Return (EIRR).

3.5. Economic Feasibility Analysis of Road Construction.

In accordance with the calculation by Discounted Cash Flow method on economic indicators of Indonesia in 2006 with the value referring to the Interest Rate of Bank Indonesia (BI rate) of 10.25% obtained the following results :

EIRR = 15.89%
NPV = Rp.437.145.970.000,00
BCR = 1.57

So economically the project is very feasible to be implemented.

3.6. Sensitivity Analysis

This analysis is conducted to determine the level of sensitivity to change by using the change scenario as follows :
1. Scenarios for changes in costs and benefits.
2. Scenarios to changes in the prevailing interest rate (discounted rate)

4. Conclusion

In accordance with hypothesis and the analisys, the writer has concluded the research as follows:
1. The condition of agricultural production (grains and crops) of Jogyakarta province whose territory is not affected by the southern highway decreases by an average of 2.0% per year. Meanwhile, if the southern passage is built and the firmness of the government to maintain the agricultural land, it is estimated that there will be an average increase of 1.0% per year.
2. Estimated cost of land acquisition, cost of planning, and the cost of building the southern route of Java cross for the corridor of Yogyakarta province amounted to 641.31 billion rupiah. Meanwhile, annual operational and maintenance expenses amounted to 16.21 billion rupiah and a five-year regular basis of 64.82 billion rupiah.
3. The average benefit of surplus production due to the construction of the southern highway was 88.45 billion rupiahs in the first year and an annual increase of 5%.
4. The result of economic feasibility analysis based on the value of Bank Indonesia interest rate in 2006 amounted to 10.25% obtained sufficient result that is as follows:

EIRR = 15.89%
NPV = 437.15 billion rupiah
BCR = 1.57

5. Suggestions

Suggestions from the results of this study are as follows :
1. It is necessary to conduct systematic research on the impact of new road construction on agricultural products in the affected areas.

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2. Since the South Cross Road is another alternative way of the existing Road Pantura, it is necessary to research that is integrated with other road corridors outside the province D.I. Jogyakarta.

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