DEVELOPMENT QUALIFICATION STUDY LAWE PERLAK ROAD – TERUTUNG PAYUNG WITH CONSUMER SURPLUS ANALYSIS

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Abstract
Highway is an accessibility of vehicle users from one region to another to carry out economic, social or cultural movements, increasing the movement of people from one place to another due to population growth and growth in vehicle traffic or other interests, so it requires a highway construction in meeting the demand for human movement in the field of transportation. The purpose of this study is to determine BOK (Vehicle Operating Cost) based on Consumer Surplus Analysis and calculate the economic feasibility of road development (Lawe Perlak – Terutung Payung), when viewed based on Benefit Cost Ratio (BCR), Net Present Value (NPV), and Economic Internal Rate of Return (EIRR). The results of this study get project benefits or vehicle operational cost benefits (BOK) with the consumer surplus method in passenger car types of vehicles amounting to Rp. 3,969, -/vehicle, buses amounting to Rp. 14,977, -/vehicle and for trucks amounting to Rp. 8,566, -/vehicle. And the economic feasibility of the construction of the Lawe Perlak – Terutung Payung (With Project) road in Southeast Aceh district in 2056 or the 37th year after the road is opened, has not met the economic feasibility standards for all discount rates, namely with BCR at a 10% discount rate is 0.75 12% discount rate is 0.62 and at a discount rate 15% is 0.47 then for Net Present Value at a discount rate of 10% obtained NPV Rp.-490,256,465,- discount rate 12% obtained NPV Rp.- 742,010,473,- and at discount rate 15% obtained NPV Rp.- 968,905,014, -.so that the EIRR value is obtained obtained at a discount rate of 91.41%, this shows that the construction of the Lawe Perlak – Terutung Payung (With Project) road is not yet feasible to build, because the interest rate on loans to banks is too large, which is with a value of 91.41%.

Keywords : Study Qualifications, Economic Eligibility, Consumer Surplus.

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Introduction

As a developing economic region, the increase in vehicles is increasing both in motorcycle (MC), light vehicles (LV), medium weight vehicles (MHV), large buses (LB), and large trucks (LT); thus the construction of road sections (Lawe *Perlak – Terutung Payung*) located in Lawe Sumur sub-district and Bambel sub-district with a feasibility study of development including Consumer Surplus analysis including BOK, BKBOK, as well as the feasibility analysis of transportation economics which includes *the Benefit Cost Ratio* (BCR), *Net Present Value* (NPV), and *Economic Internal Rate of Return* (EIRR), so that later feasibility will be found in the construction of the road section from the point of view of Consumer Surplus and transportation economic feasibility analysis.

The increasing number of population growth and traffic flow growth in the road area (Lawe *Perlak - Terutung Payung*) located in Lawe Sumur sub-district and Bambel sub-district, resulted in the need for the community to improve road access services to carry out a movement from and to other movement centers, such as market centers, administrative centers, education centers or others related to a movement so that Make it easier for people to reach the intended location.

This study is conducted to obtain the level of economic feasibility and consumer surplus as a result of project development including analysis: economic feasibility and *consumer surplus* The benefit of this *study is* to provide an economic feasibility evaluation that can be used to formulate planning policies for the government. This study has a lot to do with basic theories such as: Traffic volume, traffic composition, speed and travel time, project costs, project benefits, BOK (vehicle operating costs) and BKBOK (large vehicle operating cost benefits).

Consumer surplus *analysis* is a parameter of project feasibility evaluation. In this case there is a reduction in costs that must be incurred by users to obtain or use certain facilities/services/products, the difference in initial costs with new costs that must be incurred is savings (*saving*) for users, while in accordance with the function (curve) of the deman, there will be an increase in volume, so that the total benefit is the multiplication of the amount of new volume by the price difference that occurs. Previously, similar research in different locations with different objects had also been carried out by previous researchers, including (Jetno Harja, Taufik, and Michel Kasaf 2023), and (Jetno Harja, M. Isya. Sugiarto. S 2020).

Research Method
Research Location

The location of this study is a road (Lawe *Perlak - Terutung Payung),* which is located in Lawe Sumur sub-district and Bambel sub-district of Southeast Aceh regency, this road is located on a district road that connects several regions to the national highway (*Kutacane - Medan*).

Data Types and Sources

The data used is in the form of primary and secondary data. Primary data is traffic volume and speed. Traffic volume survey is carried out by direct observation by filling out the traffic volume survey form with recording carried out in intervals per 15 minutes for 3 days on the road *(Lawe Perlak – Terutung Payung)*. The travel time to obtain speed is carried out by direct observation through recording vehicle license plates at the start and end points of observation with a control device using a speed gun.

Secondary data collected from various agencies and publishers are: Number of population, Gross Regional Domestic Product (GRDP), vehicle growth, Regional Spatial Plan (RTRW) of Southeast Aceh district, Long Term Development Plan (RPJP) of Southeast Aceh district, Furthermore, the road network map of Southeast Aceh district, Planning Costs, Physical Work and Supervision is obtained from (Southeast Aceh Highways Agency 2020).

Data Processing

Data from traffic volume and speed surveys, as well as secondary data are carried out data processing. To obtain BOK used method (PCI 2000), to obtain BKBOK used method (PCI 2000) and to obtain time value, method is used (Directorate General of Highways 1997). Secondary data from relevant agencies, especially population, gross regional domestic product, GRDP from (Central Bureau of Statistics 2023), vehicle growth (Transportation Agency 2023), RTRW regional spatial plan and long-term development plan RPJP Southeast Aceh district (BAPPEDA 2020) and road network map, planning costs, physical work and supervision (Southeast Aceh Highways Agency 2020).

In this economic feasibility analysis, cash flow *analysis of each economic feasibility criterion* is carried out by calculating the *Benefit Cost Ratio* (BCR), *Net Present Value* (NPV), *Economic Internal Rate of return* (EIRR). This evaluation will compare the amount of costs incurred in the construction of this road, with the amount of economic benefits obtained within the period to be determined in the *cash flow analysis*.

According to (Bukhari R. A. and Saleh 2002) that traffic volume is the number of vehicles that pass through one point or cross-section of the road in one unit of time. The unit is expressed in vehicles/hours/lanes or junior high schools/hours/lanes. Traffic volume can also be expressed in terms of annual average daily traffic volume (LHRT) in kend/day. LHRT is obtained by dividing the peak hour traffic volume during observation (kend/hour) divided by the k factor (Directorate General of Highways 1997). It is further stated that speed or also called travel speed is defined as the average speed of space of a vehicle along a segment of the road. Then (Tamin 2008) states that there are two methods of approach in predicting the benefits of a transportation project, namely the *consumer surplus* approach method and *producer surplus*. The *consumer surplus* approach is generally carried out in areas with high activity, usually with high traffic volumes, so that benefits will

be obtained from savings in Vehicle Operating Costs (BOK) and time cost savings. While for *surplus producers*, benefits are calculated generally from the yield of superior commodities in an undeveloped region.

According to (D. PU 2005), project costs include land acquisition, administration and certification, design, construction and supervision. The estimated cost of land acquisition is also included in the project cost whose value is adjusted in accordance with Presidential Decree No. 55/1993, Head of BPN Regulation No. 1/1994 and Land Acquisition Guidelines for road construction issued by the Ministry of Public Works.

Suryaningsih (2010) states that the value of time is the value of the time that when operating a vehicle to a destination and is used as part of the economic analysis of transportation, this value increases as the travel time increases. The time value varies according to the type of trip taken.

According to (D. PU 2005), BOK is the total cost required to operate a vehicle in a traffic and road condition for one type of vehicle per kilometer of mileage, the unit is rupiah per kilometer. Vehicle operating costs consist of two main components, namely *variable costs or running costs*, and *standing costs or fixed costs Pacific Consultant International* (PCI 2000).

Economic feasibility analysis can be seen from several economic parameters, one of which is the *Benefit Cost Ratio* (BCR). (Tamin 2008), states that *the Benefit Cost Ratio* is the ratio between the *Present Value Benefit* divided by *the present value cost.* The BCR result of a project is declared financially viable if the BCR value is greater than 1 (>1). This value is done based on the present value. The equation for this method is as follows:

$$\text{BCR} = \frac{\text{Present value benefit}}{\text{present value cost}} \quad \text{...(1)}$$

According to Tamin (2008), that *net present value (NPV) is the* difference between the *present value benefit minus the* present value cost. The NPV result of a project is said to be financially viable is what produces a positive NPV value. The general equation of this method is as follows:

$$\text{NPV} = \sum_{t=0}^{n} \frac{B_t - C_t}{(1+r)^t} \quad \text{...(2)}$$

Where:

NPV   = Net present value;
Bt   = total amount of project benefit component in year t;
Ct   = the total amount of cost components in year t;
n   = economic life of the project under review;
r   = interest rate (% / year); and
t   = Economic life of the project, starting from the planning stage to the end of the life of the road plan.

According to Tamin (2008) that *the Economic Internal Rate of Return* (EIRR) is used to determine the interest rate when the NPV value = 0. The EIRR value of a project must be

greater than the prevailing interest rate or the rate of return (EIRR) method based on the determination of the prevailing interest rate value, where all future profits equivalent to present value equal the cost of capital. *The Economic Internal Rate of Return* (EIRR) is a rate of return based on the determination of the discount *rate*, where all future benefits assessed now at a given *discount rate* are equal to the cost of capital or *present value* of the total cost. In calculating the EIRR value is to try several interest rates. The calculation of the EIRR value is calculated based on the interest rate value that produces the smallest positive NPV and the interest rate that produces the smallest negative NPV, then interpolated using the equation;

$$\text{EIRR} = i_1 + (i_2 - i_1)\ \frac{NPV_1}{NPV_2 - NPV_1} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\ (3)$$

Where:

EIRR   = *Economic internal rate of return;*
i_1= Discount rate resulting in the smallest negative NPV;
i_2 = Discount rate that produces the smallest positive NPV;
NPV_1 = Current value and using i_1; and
NPV_2 = Current value and using i_2.

Consumer Surplus Analysis

Consumer surplus analysis is an analysis that analyzes changes in parameters in vehicle operating costs (BOK) and time value (NW), namely the reduction in costs that must be incurred by users to obtain or use certain facilities / services / products, the difference in initial costs with new costs that must be incurred is savings (*saving*) for users, Approach *Consumer* surplus is generally carried out in areas where traffic has a dense movement of vehicles, namely having high traffic volume, large vehicle growth, so that benefits will be obtained from the difference in vehicle operational cost savings and the difference in cost savings on time value, thus consumer surplus analysis is used in developed and developing regions.

Vehicle Operating Cost (BOK)

Department of Public Works (2005), vehicle operating cost is the total cost required to operate a vehicle in a traffic and road condition for one type of vehicle per kilometer of mileage, the unit is rupiah per kilometer. Vehicle operating costs consist of two main components, namely standing costs or *fixed* costs, and *variable costs* or running *costs.*

The fixed costs of its components include fuel oil costs, lubricating oil usage costs, tire usage costs, maintenance costs and mechanical costs, while the non-fixed costs of its component components include depreciation, interest rates, vehicle crew travel costs and overhead costs. For the BOK calculation equation using the *Pacific Consultant International* (PCI) method where the BOK component consists of:

1)   Fuel oil

The consumption of fuel oil is usually calculated based on the number of kilometers per liter. This value is the opposite of the cost calculation measure, where the increase in per kilo meter of a vehicle reflects a decrease in fuel costs. Factors that affect fuel usage are vehicle size, weather, altitude, driving style, vehicle condition, charging level, road surface condition and vehicle speed.

The fuel consumption equation on old roads based on PCI is:

Light vehicles $\quad: Y=0.05693.S^2 - 6.42593.S+269.18576$.....................(4)

Bus $\qquad\qquad: Y=0.21692.S^2 - 24.15490.S+954.78824$...................(5)

Truck $\qquad\quad: Y=0.21557.S^2 -24.17699.S+947.80882$...................(6)

The fuel consumption equation on new roads based on PCI is:

Light vehicles $\quad: Y= 0,04376. S^2 - 4,94078.S + 207,0484$...............…...(7)

Bus $\qquad\qquad: Y =0,14461. S^2 - 16,10285.S + 636,503431$..............(8)

Truck $\qquad\quad: Y= 0,13485. S^2 - 15,12463.S + 592,60931$..............…...(9)

Where:

$\qquad\qquad$ Y $\quad=\quad$ Fuel oil consumption (litres/1000km); and

$\qquad\qquad$ S $\quad=\quad$ Vehicle speed (km/h).

2) Use of lubricating oil

The use of lubricating oil is measured based on the use of each liter with 1000 km of mileage. For the use of lubricating oil each type of vehicle can be calculated by the following equation:

The equation for lubricating oil consumption on the old road based on PCI is:

Light vehicles $\quad: Y=0,00037.S^2 - 0,04070.S+2,20403$.......(10)

Bus $\qquad\qquad: Y = 0.00209.S^2 - 0.24413.S+13.29445$....(11)

Truck $\qquad\quad: Y=0,00188.S^2 - 0,22035.S+12,06488$......(12)

The equation for lubricating oil consumption on new roads based on PCI is:

Light vehicles $\quad: Y=0,00029.S^2 - 0,03134.5 + 1,69613$......(13)

Bus $\qquad\qquad: Y=0,00131.S^2 - 0,15257.S + 8,30869$......(14)

Truck $\qquad\quad: Y=0,00188.S^2 - 0,13770.S + 7,54073$......(15)

Where:

$\qquad\qquad$ Y $\quad=\quad$ Lubricating oil consumption (litres/1000km); and

$\qquad\qquad$ S $\quad=\quad$ Vehicle speed (km/h).

3) Tyre usage

The use of tires for the replacement period is based on the vehicle's mileage in kilometers, but there are also those who replace tires in a calculation based on how many months of use. Treatment of tires on roads with poor conditions will be faster replacement period than the use of tires on good road conditions. For tire usage of each type of vehicle can be calculated using the following equation:

The similarity of tire usage on both roads based on PCI is:

Light vehicles $\quad: Y=0,0008848.S - 0,0045333$ ....(16)

Bus $\qquad\qquad: Y=0,0012356.S - 0,00064667$....(17)

Truck   : $Y=0{,}0015553.S - 0{,}0059333$ …… (18)

Where:

Y = The use of one tyre (per 1000km); and

S = Vehicle speed (km/h).

4) Maintenance costs

Vehicle maintenance costs consist of costs incurred for maintenance, repair and replacement of parts. This cost includes the cost of replacing parts both regularly and for periodic maintenance and work costs. The basis for the calculation is the mileage and time period. For the cost of maintaining each type of vehicle can be calculated by the following equation:

The maintenance cost equation on both roads based on PCI is:

Light vehicles   : $Y=0{,}0000064.S + 0{,}0005567$ ….. (19)

Bus   : $Y=0{,}0000332.S + 0{,}00020891$ … (20)

Truck   : $Y=0{,}0000191.S + 0{,}00015400$ … (21)

Where:

Y = Cost of spare parts (per 1000km); and

S = Vehicle speed (km/h).

5) Mechanical cost

For the mechanical cost of each type of vehicle can be calculated by the following equation:

The mechanical cost equation on both roads based on PCI is:

Light vehicles   : $Y=0{,}00362.S + 0{,}36267$ ……….. (22)

Bus   : $Y=0{,}02311.S + 1{,}97733$ ……….. (23)

Truck   : $Y=0{,}01511.S + 1{,}21200$ ……….. (24)

Where:

Y = Mechanical working hours (per 1000km); And

S = Vehicle speed (km/h).

6) Depreciation (depreciation)

For depreciation costs of each type of vehicle can be calculated by the following equation:

The depreciation cost equation on both roads based on PCI is:

Light vehicles   : $Y=\dfrac{1}{2{,}5.S+100}$ (25)

Bus   : $Y=\dfrac{150}{9.S+315}$ (26)

Truck   : $Y=\dfrac{1}{6.S+210}$ ………………………………………………(27)

Where:

Y = Depreciation (per 1000km); And

S = Vehicle speed (km/h).

7) Interest

For the interest rate of each type of vehicle can be calculated by the following equation:
The interest rate equation on both roads based on PCI is:

Light vehicles   : Y= $.\dfrac{150}{500.S}$ (28)

Bus   : Y= $\dfrac{150}{2571,42857.S}$ (29)

Truck   : Y= $\dfrac{150}{1714,28571.S}$ ....(30)

Where:

     Y = Interest rate (per 1000km); and

     S   = Vehicle speed (km/h).

8) Travel time of the vehicle crew

For the travel time of the crew of each type of vehicle can be calculated by the following equation:

The equation of travel time of the vehicle crew on both roads is:

Bus   : Y= $\dfrac{1000}{S}$ (31)

Truck   : Y= $\dfrac{1000}{S}$ ....(32)

Where:

     Y   = Travel time of vehicle crew (per 1000km); and

     S   = Vehicle speed (km/h).

9) Incidental expenses (*overhead*)

For unexpected costs, each type of vehicle can be calculated by the following equation:

The unexpected cost equation on both roads is:

Bus   :   10% of sub total......... (33)

Truck   :   10% of sub total......... (34)

According to *Tamin (2008),* the amount of Vehicle Operating Costs (BOK) per year can be calculated using the equation:

    BOK (Rp/year) = BOK (Rp/kend.km) x road length (km) x LHR (kend/day) x 365....... (35)

$$\text{BKBOK} = (\text{BOK}_{alt} \text{ x } D_{alt} - \text{BOK}_{baru} \text{ x } D_{baru}) + \left\{\left(\frac{D_{alt}}{V_{alt}} - \frac{D_{baru}}{V_{baru}}\right) \text{ x } T_v\right\}.............. (36)$$

Where:

     BKBOK   = The amount of profit on vehicle operating costs (Rp.);

     BOKalt   = Vehicle operating costs on existing roads (Rp.);

     BOK_{new} = Vehicle operating costs on new roads (Rp.);

     Dalt   = Length of existing road (Rp.);

     New   = New road length (Rp.);

     Valt   = Speed on existing roads (km/h);

     Vbaru   = Speed on new roads (km/h); and

     Television   = Vehicle time value (Rp/hour);

Time Value (NW)

Time value is the time when moving by vehicle from one place to another. The time value is used as part of the transportation economic feasibility analysis, the time value will increase as the length of travel increases and varies according to the type of trip made. Meanwhile, according to the function (curve) of the deman, there will be an increase in volume, so that the total benefit is the multiplication of the amount of new volume by the price difference that occurs. These advantages can be seen in figure 2.1 below.

Figure 2.1 Changes in Consumer Surplus
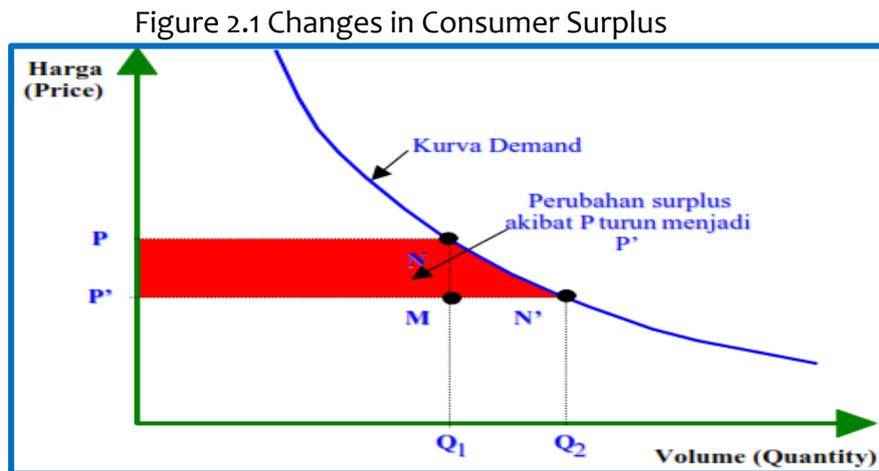
Source: Planning, Modeling and Transportation Engineering (Tamin, O.Z., 2008)

The savings in travel time value are obtained from the difference in travel time calculations for conditions *with the project (with project)* and without the project (without project). The value of *travel time* in the base year for various types of vehicles is obtained through field surveys. The value of time used can be determined from the results of time value studies using productivity methods, *stated preference* or *revealed preference*.

1) The productivity method is a method of determining the value of time that uses the average value of income or *gross regional dosmetic product* (GDP) per capita per year which is converted into a smaller unit of monetary value of time union, rupiah per hour.
2) The *stated preference* method is a time value obtained through individual interviews for hypothetical conditions about various travel time and expense scenarios.
3) The *revealed preference* method is a time value obtained from the reality of travel choices that occur and is associated with existing travel costs.

The time value based on the revenue approach can be calculated using the formula:

NW (orang) = PDRB / (40% x 2100 x JP)... (3.7)

Where:

NW = Value of people's time
GRDP = GRDP (without oil and gas)
JP = Number of inhabitants
40% = Proportion of working population
2100 = Assumption as the number of hours worked in a year

Results and Discussion
Traffic Volume and Travel Time

The traffic volume survey was carried out for 3 (three) days on the Lawe Perlak – Terutung umbrella *road,* Observations were carried out on July 11, 13, and 15 in 2023 sequentially on Tuesday, Thursday and Saturday,. The results of traffic volume data processing can be seen in Table.1.

Table.1. Traffic volume (vehicles/day)

Origin and Purpose	Tuesday	Thursday	Saturday
Lawe Perlak - Covered Umbrella	228	218	226
Payung - Lawe Perlak	254	391	364
Sum	482	609	590

After obtaining the volume of vehicle traffic, on the Lawe Perlak - Terutung Payung road, the results of travel time on each type of vehicle obtained can be seen in Table.2.

Table.2. Lawe Perlak - Terutung Payung road travel time

No	Road Sections	Travel Time (hours)		
		LV	BUS	TRUCK
1	Lawe Perlak - Covered Payung *(Without Project)*	0,386	0,515	0,441
2	Lawe Perlak - Payung *(With Project)*	0,295	0,330	0,337
	Travel Time Difference	0,092	0,185	0,105

Project Cost Analysis

The estimated cost on the Lawe Perlak – Terutung umbrella *road* is set as a cost component, in the form of a planning fee of Rp. 63.295.358,-, construction cost of Rp. 2.109.845.282,-, supervision fee of Rp. 42.196.906,-, routine maintenance fee of Rp. 10.549.226,-, and periodic maintenance costs of Rp. 15,823,840,-.

Development Economic Eligibility

The results of *cash flow* analysis on the economic feasibility of development from each economic feasibility criterion by calculating *the Benefit Cost Ratio* (BCR), *Net Present Value* (NPV), *Economic Internal Rate of return* (EIRR) on the construction of the *Lawe Perlak – Terutung Payung* road (*with project*), with *a discount rate* The calculated ones are 10%, 12% and 15%, not yet eligible, because at each discount rate on BCR the result is < 1, on NPV the result is negative (-) and on EIRR the bank loan interest rate is too large.

Benefit Cost Ratio (BCR)

BCR is a comparison of benefit value with cost. The *BCR value obtained in 2056 is an analysis since the road was opened to traffic or the 37th year* at a 10% discount rate is 0.75 the 12% discount rate *is 0.62 and at a 15%* discount rate is 0.47, has not received a value of >1, Based on *the BCR value is in accordance with the feasibility requirements (BCR > 1* requirements), shows road construction *Lawe Perlak – Terutung Payung* (*with project*) has not provided benefits in the 37th year for the three *discount rates.*

Net Present Value (NPV)

Net Present Value is the value of net profit or value of benefits from project implementation after deducting project costs. The *NPV value obtained in 2056, since the road was opened or in the 37th year* at a 10% discount rate obtained NPV Rp. -490,256,465, a 12% discount rate obtained NPV Rp. *-742,010,473, and at a* 15% *discount* rate *obtained* NPV Rp. -968,905,014,-. Based on the three discount rates, the *NPV value in the 37th year of analysis for the three* discount rates *above, all of them are negative (-).*

Economic Internal Rate of Return (EIRR)

Economic Internal Rate of Return is a quantity that shows the rate of return on investment based on the interest rate that produces *BCR* equal to 1 (one), the result is at *NPV value = 0,* obtained at a *discount rate of* 91.41%. So the construction of *the Lawe Perlak – Terutung Payung road is not* feasible to be built with bank loan interest rates at 91.41%, the results of cash flow analysis at discount rates of 10%, 12% and 15%, can be seen in Table.3.

Table.3. Cash flow analysis with discount rates of 10%, 12% and 15%, Lawe Perlak - Terutung Payung road

ECONOMIC ELIGIBILITY CRITERIA		DISCOUNT RATE			
		10,00%	12,00%	15,00%	91,41%
Benefit Cost Ratio	BCR	0,75	0,62	0,47	0,0
Net Present Value (Rp.)	NPV	- 490.256.465	- 742.010.473	- 968.905.014	- 832.444.920
Economic Internal Rate Of Return	EIRR	**91,41%**			

Consumer Surplus Analysis

Consumer surplus analysis is an analysis that analyzes changes in parameters in vehicle operating costs (BOK) and time value (NW), namely the reduction in costs that must be incurred by users to obtain or use certain facilities / services / products, the difference in initial costs with new costs that must be incurred is savings (*saving*) for users,

Approach *Consumer* surplus is generally carried out in areas where traffic has a dense movement of vehicles, namely having high traffic volume, large vehicle growth, so that benefits will be obtained from the difference in vehicle operational cost savings and the difference in cost savings on time value, thus consumer surplus analysis is used in developed and developing regions.

Vehicle Operating Costs

The results of the calculation of the basic BOK value, multiplied by the unit price of BOK components on the *Lawe Perlak – Terutung umbrella road (without project)*, and Lawe Perlak – Terutung umbrella road (With Project), *can be seen in Table.4.*

Table.4. Vehicle Operating Costs (BOK) *Lawe Perlak – Terutung umbrella*

No.	Vehicle Type	BOOK jalan Without Project	BOOK jalan With Project	Difference BOOK
		(Rp/kend./km)	(Rp/kend./km)	(Rp/kend./km)
1	Passenger Car (MP)	0,105	0,070	0,035
2	Bus	0,516	0,242	0,274
3	Truck	0,403	0,206	0,197
	TOTAL	1,024	0,517	0,507

After obtaining the BOK, the benefits of vehicle operating costs (BKBOK) on the Lawe Perlak - Terutung Payung (Without Project) road and (With Project), the results of data processing for the large benefits of vehicle operating costs (BKBOK) can be seen in Table.5.

Table.5. Vehicle Operating Costs (BOK) Jalan *Lawe Perlak – Terutung umbrella*

No	Vehicle Type	BOK (Rp)		D(km)		Tv	V (km/jam)		BKBOK
		BOKwithout	BOKwith	Dwithout	Dwith	(Rp/jam)	Growth	Vbaru	(IDR)
1	Passenger Car (MP)	0,105	0,070	15,450	15,450	30.823	40,0	60	3.969
2	Bus	0,516	0,242	15,450	15,450	72.682	30,0	50	14.977
3	Truck	0,403	0,206	15,450	15,450	53.342	35,0	55	8.566

Time Value

The results of the calculation of time value (NW) on the *Lawe Perlak – Terutung umbrella* road, can be seen in Table.6.

Table.6. Time Value of Lawe Perlak road - Terutung Payung

No	Road Sections	Time Value			Total Time Value
		MP	BUS	TRUCK	
		(Rp/Kend)	(Rp/Kend)	(Rp/Kend)	(Rp/Kend)

1	Lawe Perlak - Covered Payung (Without Project)	30.823	72.682	53.342	156.847
2	Lawe Perlak - Payung (With Project)	23.501	46.597	40.703	110.801
	Time Value Difference	7.322	26.086	12.639	46.047

Discussion

The economic feasibility criteria in this study are calculated *with discount rates of 10%, 12% and 15%, the value of benefits reduced by* the value of BCR>1 *is not obtained at the three* discount rates, *which shows that the construction of* the Lawe Perlak - Terutung Payung road (*with project*), This is not feasible because the comparison of the value of benefits will be smaller than the cost of the project incurred. The *NPV* value of the three discount rates mentioned above, all of them are negative (-), both *at discount rates of 10%, 12% and 15%, while* the EIRR value in this *study was obtained at* a *discount rate* of 91.41%, this shows that the construction of *the* Lawe Sigala gala – Suka Dame road (*witht project), no* It is worth building with too large a loan interest rate on a bank.

Vehicle Operating Costs (BOK) on the Lawe Perlak – Terutung umbrella road get the benefit of a difference that is too small with the value obtained only *0.507* (Rp/kend./km) on all types of vehicles studied, the Time Value (NW) on the Lawe Perlak – Terutung umbrella road also *gets the benefit of a difference that is too small with the value obtained* only 46,047 (Rp/kend) on all types of vehicles studied, so that all the benefits obtained are not balanced with the amount of value of the development project, this shows that the return on profits in the project takes a long time or not at all, so that the *Lawe Perlak – Terutung Payung road project* is considered unfit to be built from the point of view of economic feasibility criteria for development.

Conclusion

The economic feasibility of the construction of the Lawe Perlak – Terutung umbrella road (With Project) *in Southeast Aceh district in 2056 or the 37th year after the road is opened, has not met the economic feasibility standards for all* discount rates. That is, with BCR *at a 10% discount rate is 0.75, a 12% discount rate is 0.62 and at a 15% discount rate is 0.47, then for* Net Present Value *at a 10% discount rate, an NPV of Rp. -490,256,465, a 12% discount rate is obtained* NPV of Rp. -742,010,473, and a *15%* discount rate is obtained *NPV* Rp. -968,905,014,-. so that the *EIRR* value obtained at a *discount rate* of 91.41%, this shows that the construction of the *Lawe Perlak - Terutung umbrella road (With* Project) is not feasible, Project benefits or benefits obtained by consumer surplus analysis on the calculation of vehicle operating cost benefits (BOK) obtained in road research Lawe Perlak – Terutung umbrella (With Project) is only *0.507* (Rp/kend./km) on all types of vehicles studied, and the benefit of time value (NW) obtained in research on the Lawe Perlak – Terutung umbrella road (With Project) is only *46,047* (Rp/kend) on all types of vehicles studied, so surplus

consumers, The operational cost of the vehicle and the time value obtained by the community in the two sub-districts are very small.

Suggestion

The need for assessment and review in carrying out the construction of the *Lawe Perlak – Terutung umbrella road (With Project),* because the benefits or benefits obtained by the community, especially the Southeast Aceh district government in the point of view of economic feasibility of development have not met the economic feasibility standards for all *discount rates.* The need for more studies in this research by multiplying variables or using other methods as scientific studies that can be useful for the community, especially the Southeast Aceh district government in determining development priorities that are prioritized, so that development costs can be realized in development that is more in need.

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