

Effect of Land Transport Infrastructure Against Problems in Jayapura City

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Abstract – The transportation sector is one of the sectors that has a large enough impact on the environment, especially the occurrence of air pollution in urban areas. In addition, congestion and damage to several roads are affected by traffic volume, proportion of heavy vehicles, speed, and the amount of delay. The transportation system is very important in supporting daily activities such as economic activities, activities in the world of education and activities in the world of work. The purpose of this study is to determine the effect of land transportation infrastructure on congestion in the city of Jayapura. This research is a quantitative research. The data collection technique used in this study is to use a questionnaire. Data analysis in this study was carried out using simple regression analysis. Based on the research results of the t test (partial), it can be seen that the SPSS calculation obtained t count of -8,957 with a probability value (sig value) of 0.000. The probability value is smaller than alpha (5%). Thus it can be concluded that partially land transportation infrastructure has a significant effect on congestion.

Keywords – Transportation, Infrastructure, Congestion.

I. INTRODUCTION

Transportation infrastructure, both land, sea and air, is a means that plays a very important role in supporting economic growth and regional growth, so it is often referred to as the lifeblood of the economy besides its function as a means of unifying the nation [12]. In relation to the sectors - economy, transport infrastructure acts as a stimulant growth of new economic sectors and the development of the economic sectors that already exist [6].

With the existence of transportation infrastructure, other economic sector activities will grow and develop. The development of transportation infrastructure with this objective is carried out in the context of regional development or remote areas, where economic and trade activities have not been going well. In the context of road infrastructure development, policies are directed at constructing new roads or constructing interconnection roads.

Transportation infrastructure in its function as a public facility provides public services for the community, namely: (1) Encouraging equitable development; (2) Serving the needs of community movements at affordable prices; (3) Streamlining mobility of distribution of goods and services; (4) Encouraging the growth of other economic sectors. In relation to the intermediate sector, transportation infrastructure connects various kinds of economic activities, is a connecting infrastructure between regions and facilitates mobility of the population and facilitates the traffic of goods between regions and the delivery of goods abroad.

The development of transportation infrastructure must be directed to improve transportation services that are effective, efficient, quality, safe, comfortable and at prices affordable to the public. To achieve these objectives, it is necessary to develop a national transportation system and a regional transportation system with the principle of inter and intermodal integration and inter-regional integration. The intermodal transportation system is the planning and

development of an integrated mode of transportation so that it can connect one area to another, both from villages to cities, between sub-districts, between districts, between provinces and nationally. The intermodal transportation system is an integrated system between different and mutually supporting modes of transportation, so as to create a smooth distribution system, both regionally, nationally and internationally.

Jayapura City is the capital of the developing Papua Province, therefore the mobility of the people in their daily activities continues to increase. The topography of the city of Jayapura has many mountains, making this city consisting of five sub-districts (Distric), namely North Jayapura, South Jayapura, Abepura, Muara Tami and Heram [3]. Length The number of queues that occur at several intersection points in the city of Jayapura triggers road congestion followed by the large number of heavy vehicles that are not traveling on their lanes, as well as the large number of public vehicles that pick up and drop off passengers out of place, the location of waiting for public transportation on the roadside becomes the main peak of congestion, this is considering the service from the road infrastructure itself is still not balanced when viewed from the development of the number of vehicles in the city of Batam. With these symptoms, you should think about it so that it doesn't get worse in terms of preventive action. It can be added again that most people lack discipline, are careless and irregular in parking their vehicles, often run through traffic lights at red lights and many other things that cause congestion.

II. METHODOLOGY

Types of research

This research is a quantitative research. [5] argues that quantitative research is research based on the philosophy of positivism, used to examine specific populations or samples, sampling techniques are generally carried out randomly, data collection uses research instruments, data analysis is quantitative statistics with the aim of testing hypotheses. which has been set .

This research includes correlation research. Correlation research is research conducted by researchers to determine the level of the relationship between two or more variables, without making changes, additions, or manipulations to existing data [1]. This research was conducted to determine the effect of land transportation infrastructure on congestion in the city of Jayapura.

Population and Sample

The population is the entire research subject [1]. Population is a generalization area consisting of objects / subjects that have certain qualities and characteristics that are determined by the researcher to study and then draw conclusions [5]. The population in this study were 200 people

The sample is part of the number and characteristics of the population [5]. The sample is a part or representative of the population under study. Named sample if the researcher intends to generalize the results of the sample study. Generalizing is raising research conclusions as something that applies to the population [1]. The sampling technique used purposive sample. This technique is a way of taking the subject not based on strata, random, or area but based on the existence of certain goals [1]. The number of samples in this study were 100 people

Variable

1. Land Transportation Infrastructure Variable (X_1)

In this study, land transportation infrastructure is measured based on the attributes of land transportation, namely, 1) road infrastructure, 2) bridge infrastructure, 3) transportation facilities.

2. The variable Y in this study is congestion .

In this study, congestion is measured by indicators according to the department of housing and regional infrastructure (2004), namely side obstacle factors, road capacity factors, traffic conflict factors, temporary disturbance factors, women clothing factors and community activity factors.

Data collection technique

The data collection technique used in this study is to use a questionnaire. The questionnaire is a data collection technique that is carried out by providing a set of questions or written statements to the respondent to answer. The questionnaire is a data collection technique suitable for use if the number of respondents is large enough and spread over a large area [5].

Analisis Data

Data analysis in this study was carried out using simple regression analysis. This analysis is to determine the direction of the relationship between the independent variable and the dependent variable whether positive or negative and to predict the value of the dependent variable if the value of the independent variable has increased or decreased. The data used are interval or ratio scale [4].

Hypothesis test

Validity test

The validity test is used to measure whether a questionnaire is valid or not. A questionnaire is said to be valid if the questions on the questionnaire are able to reveal something that will be measured by the questionnaire. The significance test is done by comparing the calculated r value with the r table for *degree of freedom* (df) = $n-2$, in this case n is the number of samples. If r count is greater than r table

and the value is positive, then the question is declared valid [2].

Reliability Test

Reliability is a tool for measuring a questionnaire which is an indicator of a variable or construct. A questionnaire is said to be reliable or reliable if someone's answer to a question is consistent or stable over time. Reliability measurement can be done in two ways, namely [2]:

1. Repeat *measure* (*repeated measure*). This is done by asking the same question at different times, and then seeing whether it is consistent with the answer.
2. Measurement only once (*one shot*). Measurement in this way is only done once and then the results are compared with other questions or measure the correlation between answers to questions. This method can be done with the SPSS program with the *Cronbach alpha* (α) statistical test . A construct is said to be reliable if the *cronbach alpha* value is > 0.70 .

t Test

The t statistical test basically shows how far the influence of one explanatory / independent variable individually in explaining the variation of the dependent variable [2].

F test

The F test basically shows whether all the independent variables included in the model have a joint influence on the dependent variable [2].

III. RESEARCH RESULT

Respondent Characteristics

Most of the respondents were male, there were 66 respondents with a percentage of 66 % and women there were 34 respondents with a percentage of 34 %. Thus, the largest percentage is found in the male gender category, namely 66 %.

Respondents aged 20-30 years were 29 respondents with a percentage of 29 %, ages 31-40 years were 40 respondents with a percentage of 40 %, ages 41-50 years were 24 respondents with a percentage of 24 %, ages over 50 years were 7 respondents with a percentage of 7 %. Thus, the highest percentage was found in the age category 31 - 40, namely 40 respondents by 40 %, while the smallest percentage was in the age category > 50 years as many as 7 respondents by 7 %.

A total of 31 respondents with a percentage of 31 % had a marital status is not married, and as many as 69 respondents with a percentage of 69 % have married status. Thus, the highest percentage is in the married category with a percentage of 69 %. Respondents with the SLTA education

category consisted of 33 respondents with a percentage of 33 %. The DIII education category consisted of 8 respondents with a percentage of 8 %, the S1 education category consisted of 52 respondents with a percentage of 52% and the S2 education category consisted of 7 respondents with a percentage of 7 %. Thus, based on the highest educated group terdapat on the category of educated S1 consisting of 52 respondents with a percentage of 52 %.

Respondents to the category transportasi that use that the car consists of 28 respondents with a percentage of 28 %. Category transportation that digunakan motors consist of 56 respondents with a percentage of 56 %, category transportation that use bike consisted of 12 respondents with the percentage of 12% and for category transportation that use transportation consists of 4 respondents with a percentage of 4 %. Thus, based on the group transportation that use highest one is on transportasi that use motors consist of 56 respondents with a percentage of 56 % .

Validity test

The validity test is carried out to determine whether the primary data collection tool (through a questionnaire) used is in accordance with the objectives to be addressed in the study. The table below shows in detail the comparisons of the calculated r value for all question items used in this study:

Validity Test of Land Transportation Infrastructure Variables

The following are the results of the validity test for the Land Transportation Infrastructure variable which is presented in the following table:

Table 1. Results of Test Validity Variable land transport infrastructure

No.	Land Transportation Infrastructure (X)		
	r count	p	ket
item1	0.698	0.000	valid
item2	0.453	0.012	valid
item3	0.599	0.000	valid
item4	0.399	0.029	valid
item5	0.755	0.000	valid
item6	0.613	0.000	valid
item7	0.618	0.000	valid
item8	0.405	0.026	valid
item9	0.563	0.001	valid
item10	0.721	0.000	valid

item11	0.621	0.000	valid
item12	0.656	0.000	valid

Based on the test results, all statement items are declared valid in accordance with the rules If $r_{\text{count}} > r_{\text{table}}$ or $p < 0.05$ means valid. Thus it can be concluded that all question items used to measure the Land Transportation Infrastructure variable are considered valid and can be used to obtain research data.

The Validity Test of Congestion Variables

The following results from the congestion variable validity test are presented in the following table:

Table 2. Validity Test Result of Congestion Variable

No.	Jam (Y)		
	r count	p	ket
item1	0.553	0.002	valid
item2	0.419	0.021	valid
item3	0.519	0.003	valid
item4	0.760	0.000	valid
item5	0.381	0.038	valid
item6	0.740	0.000	valid
item7	0.850	0.000	valid
item8	0.575	0.001	valid
item9	0.422	0.020	valid
item10	0.675	0.000	valid
item11	0.489	0.006	valid
item12	0.519	0.003	valid

Based on the test results, all statement items are declared valid in accordance with the rules If $r_{\text{count}} > r_{\text{table}}$ or $p < 0.05$ means valid. Thus it can be concluded that all question items used to measure the congestion variable are considered valid and can be used to obtain research data.

Reliability Test

Reliability is a measure of the stability of the final result. So that when the same measuring instrument is used to test the same instrument it will produce data that can be trusted (reliable). Where to measure the reliability of the instrument in this study used Alpha coefficient formulation. Based on the instrument reliability test using the SPSS program, the following data were generated:

Table 3. Reliability Test Results

Variable	Alpha Cronbach	Critical Value	Information
Land Transportation Infrastructure	0.830	0.70	Reliable

Congestion	0.806	0.70	Reliable
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A variable is said to be reliable if the resulting alpha value gives an alpha value > 0.70 . Thus, from the results of the reliability test as described in the table above all of them are reliable and can be used to conduct research, because the Alpha value of the land transportation infrastructure variable and congestion is greater than alpha > 0.70 [2].

Classic assumption test

Heteroscedasticity Test

Heteroscedasticity test is used to see whether in a regression model there is an inequality of variants. A good regression model is that heteroscedasticity does not occur. To detect heteroscedasticity can be done by using the Scatter Plot. If there is no regular pattern, then the regression model is free from heteroscedasticity problems. The results of the heteroscedasticity test can be seen in the following graph:

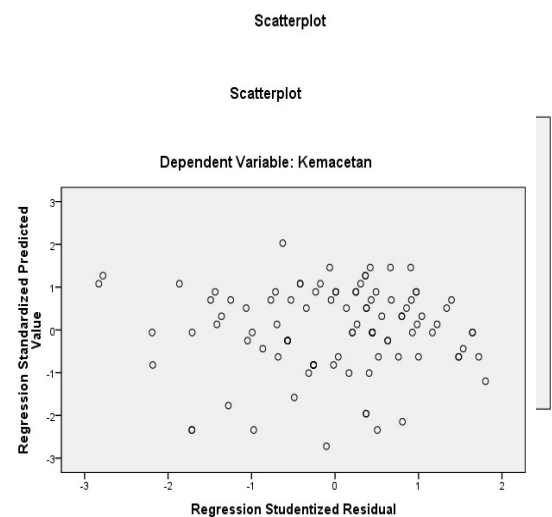


Figure 1. Hetero-plasticity Test Results

Based on the scatter plot graph above, it can be seen that the dots spread randomly both above and below the zero on the axis, so that heteroscedasticity does not occur.

Normality Test

Testing for normality in this study was carried out by using the Normal PP Plot of Regression Standardized Residual graph analysis. If there is a symptom that the location of the points (data) is on or spreads around a straight diagonal line, then it can be said that the data is normally distributed. The results of the normality test in this study can be seen in the following graph:

Normal P-P Plot of Regression Standardized Residual

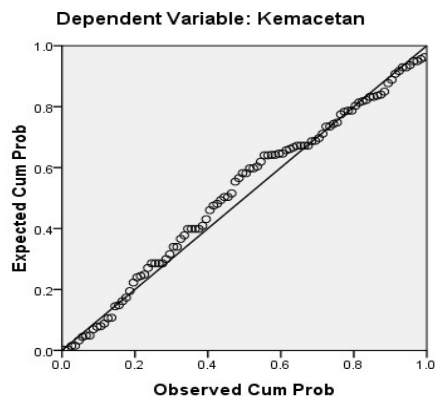


Figure 2 . Normal PP Plot of Regression Standardized Residual Test Results

Based on Figure 2 above, it can be seen that the data plot spreads around a straight line following its diagonal line. Thus it can be interpreted that the residual data is normally distributed. Residual data normality testing can also be done by using the Kolmogrov-Smirnov statistical test to test the normality of the data. This test is performed using the assumption that if the significance value is > 0.05 , it can be said that the residual data is normally distributed. The results of processing using the SPSS program are obtained as follows:

Table 3. Results of the Kolmogrov-Smirnov Statistical Test

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		100
Normal Parameters ^a	Mean	.0000000
	Std. Deviation	4.40504075
Most Extreme Differences	Absolute	.101
	Positive	.049
	Negative	-.101
Kolmogorov-Smirnov Z		1.012
Asymp. Sig. (2-tailed)		.257
a. Test distribution is Normal.		

Based on the results of the normality test, it is known that the significance value is $0.257 > 0.05$, it can be concluded that the residual data is normally distributed.

Simple Regression Analysis

The use of simple linear regression analysis in this study aims to determine whether there is an effect of the independent variable on the dependent variable. The results of data processing in this study used the SPSS for Windows version 20.0 program, the summary of the results can be described in the following table:

Table 4. Results of Simple Regression Analysis

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	65,568	1,943		33,73 9	.000
	Ground transportation infrastructure	-741	.083	-671	- 8,957	.000
a. Dependent Variable: Congestion						

From table 4 above, it can be explained that the coefficient value of land transportation infrastructure is 0.741 which is negative, this indicates that land transportation infrastructure has an opposite relationship with the congestion variable. This means that everyone unit increase in land transportation infrastructure; the congestion variable will decrease by 0.741 assuming that the other independent variables of the regression model are fixed.

t test

The t statistical test was conducted to determine whether the variables of land transportation infrastructure had a partial effect on congestion. The criteria used to see the influence of these variables by looking at the probability value (p-value) in the Coefficient table. The following is a summary of the t test results:

Table 5. t test

Variable	t	Sig value	Information
Land Transportation Infrastructure	-8,957	.000	Significant

Based on the t-test results table (partial), it can be seen that the SPSS calculation obtained t count of -8,957 with a probability value (sig value) of 0.000. The probability value

is smaller than alpha (5%). Thus it can be concluded that partially land transportation infrastructure has a significant effect on congestion. Thus, the hypothesis can be accepted.

Anova test

The following are the results of the ANOVA table test:

Table 6. ANOVA test

ANOVA ^b						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1572,526	1	1572,526	80,221	.000
	Residual	1921,034	98	19,602		
	Total	3493,560	99			
a. Predictors: (Constant), Land transport infrastructure						
b. Dependent Variable: Congestion						

Based on the ANOVA table above, it can be seen that the value ($F = 80,221$ and $p = 0,000$ or $p < 0.05$). That is, this research model is in accordance with existing data.

Coefficient of Determination

The coefficient of determination shows the ability of all independent variables to explain the dependent variable. The coefficient of determination is calculated by squaring the correlation coefficient (R). The calculation results can be seen in the following table:

Table 7. The Result of Determination Coefficient Test

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.671 ^a	.450	.445	4,42746
a. Predictors: (Constant), Land transport infrastructure				
b. Dependent Variable: Congestion				

Based on the value of R² that is presented in the table above shows the value of 0.450 or 45%. This means that as much as 45% of congestion is explained by land transportation infrastructure. While the remaining 55% is explained by other variables outside the variables in the study.

IV. DISCUSSION

Land Transportation Infrastructure affects congestion in Jayapura City

Transportation in economic growth, especially urban areas, has an important role. This is because transportation is related to production, consumption and distribution activities. Various activities related to meeting basic needs require the availability of good infrastructure, now transportation plays an important role in accommodating the social and economic activities of the community. Therefore, the government needs to pay attention to the importance of transportation to accelerate economic activity.

Infrastructure development in the context of public services has a very strategic role. This is because with the availability of good and adequate infrastructure, the diversity of transportation modes will be smooth, so that it will have an impact on improving the economy, people's welfare and regional competitiveness at the global level. In line with this, [7] infrastructure as one of the supporting sectors for public transportation is one of the high needs of the community. Thus the transportation infrastructure can be actively used to drive the regional economy. The development of transportation infrastructure is carried out with the aim of developing remote areas or areas, where economic and trade activities have not been going well [8].

Transportation infrastructure in its function as a public facility provides public services for the community, namely: (1) Encouraging equitable development; (2) Serving the needs of community movements at affordable prices; (3) Streamlining mobility of distribution of goods and services; (4) Encouraging the growth of other economic sectors. In relation to the intermediate sector, transportation infrastructure connects various kinds of economic activities, is a connecting infrastructure between regions and facilitates mobility of the population and facilitates the traffic of goods between regions and the delivery of goods abroad.

[9] states that transportation infrastructure is the backbone of sustainable economic growth and poverty reduction. Road infrastructure is needed to connect all economic growth and achieve a better and wider distribution of economic benefit growth [10]. In particular, building a road network is a prerequisite for the development of economic activities and links in hard-to-reach areas. Roads also connect rural communities to the main stream of the economy, thereby increasing income and thus improving living conditions [11].

Demand for infrastructure will continue to grow significantly in the next few decades, driven by key factors of change such as global economic growth, technological advances, climate change, urbanization and high levels of congestion [9]. In accordance with this, the infrastructure that

has not been upgraded will also increase the level of congestion. According to (the department of housing and regional infrastructure, 2004), congestion is a condition of road performance that does not meet the recommended minimum performance limits. Congestion is a traffic problem that is very common in cities in Indonesia, especially in Jayapura City. So that in supporting the smoothness of regional transportation, a better infrastructure is needed that will be free from various kinds of congestion problems. Thus the transportation infrastructure has an influence on traffic congestion.

Based on the results of the research and discussion that has been described, in this study it can be concluded that based on the t-test results table (partial) it can be seen that the SPSS calculation obtained a t count of -8,957 with a probability value (sig value) of 0.000. The probability value is smaller than alpha (5%). Thus it can be concluded that partially land transportation infrastructure has a significant effect on congestion. If the transportation infrastructure gets worse, the congestion will increase.

The results of research conducted by [3] show that Malang City is a promising orientation for newcomers. Many people move with the aim of working, studying and shopping. So that the city problem arises, namely traffic jams. This is because many people prefer private vehicles as a means of transportation. Even though there is no additional road capacity. The result that appears is longer travel time, waste of engine fuel, and increased air pollution. Therefore, the Malang City Transportation Agency made a transportation policy as a long-term solution. This policy is realized through a traffic management strategy, a road network development strategy, and a public transport strategy. Then, the application of a one-way lane in the surrounding area of UB as a short-term solution to solve traffic jams

V. CONCLUSION

Based on the results of the research and discussion that has been described, in this study it can be concluded that based on the t-test results table (partial) it can be seen that the SPSS calculation obtained a t count of -8,957 with a probability value (sig value) of 0.000. The probability value is smaller than alpha (5%). Thus it can be concluded that partially land transportation infrastructure has a significant effect on congestion.

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