



# Model of the Need for Road Service Improvement, Maruni Manokwari, Indonesia

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## Abstract

Roads are vital infrastructure for land transportation and one of the most critical aspects of development in the national and regional economy. According to the Central Statistics Agency for West Papua, the roads successfully built in West Papua Province were only 11,951,592 km until 2017. It comprises 1003.26 km, 2309,648 km, and 8,638,687 km of national, provincial, and regency roads, including Jalan Maruni - Manokwari City Limits. According to the Minister of PU-PR RI, this road type 2/2 UD length is 17.17 km and administratively connects two districts (West and South Manokwari). One of the areas in West Papua Province where the development of infrastructure, investment, and urbanization is very rapid is Manokwari Regency. In line with the change in government status, its development then changed the physical image of the region to become urban. It is because Sorong City has a strategic economic location concerning natural resources, high accessibility, and is the center of the provincial government, thus attracting other financial functions for investment. This movement burdens road infrastructure, and we need several alternative treatments to improve the service of the street segment above. The method is done through surveys of stakeholders on alternative handling, and then the results are analyzed using multiple linear regression. This research is expected to find alternative handling solutions to improve road services in this segment.

**Keywords:** Road, Service Level, Regression, Manokwari, Alternative.

## 1. Introduction

Before becoming the capital of West Papua Province, traffic conditions in Jalan Maruni-Manokwari City Limits were not so crowded [1]. After the offices of the Provincial Government, Regional Police, Regional Military Command, and other infrastructure are concentrated in Arfai, which must pass through this section, the traffic flow is increasingly denser than usual, especially during working hours. The peak traffic jams occur in the morning and evening, which results in economic and immaterial losses such as stress due to the frustration of not being on time [2] [5]. Congestion is caused by various related things, such as lack of discipline, weak law enforcement, and the growth of vehicles higher than road infrastructure [6] [9]. Therefore, efforts are needed to increase road capacity. The solution must be formulated in a comprehensive plan, one of which is a traffic management approach, which changes traffic movement patterns by maintaining the existing roads as much as possible. So, the traffic movement system can be as efficient as possible [10] [13].

## 2. Literature Review

It is a statistical method for studying the relationship between the nature of the problem, which can model the connection between two or more variables [14] [15]. Here, a dependent variable (y) has a functional relationship with one or more independent ones (x<sub>i</sub>). It is used extensively in transportation modeling, where regression techniques are used in rating choice [16] [17]. Researchers perform data processing to obtain a quantitative relationship between a set of variables and individual responses [18], which is stated as follows:

$$Y = a_0 + a_1x_1 + a_2x_2 + \dots + a_kx_k \tag{1}$$

- Y = individual response
- X<sub>1</sub>, X<sub>2</sub>, ..... X<sub>k</sub> = service attribute
- a<sub>0</sub> = constant
- a<sub>1</sub>, a<sub>2</sub>, ..... a<sub>k</sub> = model parameter coefficient



Variable X is several alternative treatments to increase the level of service in the section (variable Y), which are:

- a. Trans Papua Operations
- b. Operation of feeder transport
- c. Opening new paths
- d. Making underpasses/flyovers
- e. Enforcement of heavy vehicle operating hours
- f. Restrictions on private vehicle ownership
- g. Relocation of street vendors
- h. Installation of prohibition signs according to the conditions needed
- i. Installation of separators
- j. Use of roadside land following the designation
- k. Separation of traffic lanes with pedestrian paths
- l. Construction of public transport shelters
- m. Parking arrangement on the shoulder of the road
- n. Widening towards standard and changing geometry according to regulations (NSPM)
- o. Enforcement of one-way roads

### 3. Methods

Researchers conducted [19] [20] multiple linear regression to get an equation model of road service needs based on the information obtained from secondary data and the questionnaire survey results. The primary and secondary data were obtained from the agency, Road Geometrics, and questionnaires.

### 4. Results and Discussions

The survey results show that 39% operate Trans Papua, 31% are roadside parking arrangements, 28% install separators, and the rest are other handling alternatives. More details can be seen in the following image.

Researchers conducted a multiple linear regression test with the help of SPSS to determine the effect of X on Y and obtained as follows:

$$Y=3,743-1,358(x_1)-0.214(x_2)-0.109(x_3)-0.645(x_4)+0.199(x_6)+0.127(x_7)+0.268(x_8)+0.355(x_9)-0.105(x_{10})+0.185(x_{11})-0.151(x_{12})+0.270(x_{13})+0.105(x_{14})+0.232(x_{15})$$

The equation above explains that the X5 variable is constant, or it can be interpreted that all (100%) respondents choose the same choice. For more details, the coefficient value of each alternative treatment can be seen below.

**Table 1.** Coefficients

Model	Coefficients <sup>a</sup>						
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	3.743	.827		4.525	.000	2.039	5.446
x1	-1.359	.775	-.194	-1.752	.092	-2.956	.238
x2	-.214	.253	-.097	-.847	.405	-.734	.306
x3	-.109	.155	-.093	-.705	.487	-.429	.210
x4	-.645	.097	-.777	-6.620	.000	-.846	-.444
x6	.199	.124	.178	1.600	.122	-.057	.455
x7	.127	.108	.141	1.175	.251	-.096	.350
x8	.268	.129	.234	2.082	.048	.003	.533
x9	.355	.221	.220	1.604	.121	-.101	.811
x10	-.105	.080	-.146	-1.320	.199	-.270	.059
x11	.185	.110	.199	1.676	.106	-.042	.412
x12	-.151	.083	-.225	-1.830	.079	-.322	.019
x13	-.270	.200	-.195	-1.351	.189	-.682	.142
x14	.105	.171	.083	.613	.545	-.247	.457
x15	.232	.190	.155	1.223	.233	-.159	.623

a. Dependent Variable: Y

The analysis shows a correlation coefficient (R) of 0.880, which means that the relationship between the 15 independent variables (X) and the variable of road service improvement (Y) is solid. At the same time, the coefficient of determination (R<sup>2</sup>) shows a value of 0.775, which

means that the independent variable explains the road improvement variable by 77%, whereas 33% is explained by other variables not examined in the study. The model's accuracy is better as the value of  $R^2$  gets closer to 1.

**Table 2.** Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.880a	.775	.649	.65553	.775	6.155	14	25	.000	2.164

a. Predictors: (Constant), x15, x9, x1, x6, x7, x10, x8, x2, x3, x4, x11, x12, x14, x13

b. Dependent Variable: y

## 5. Conclusions

The results show that 39% of respondents proposed operating Trans Papua, 31% structuring roadside parking, 28% installing separators, and the rest were other alternatives to improve the service of Jalan Maruni Section-Manokwari City Limits.

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