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Alternative Analysis of Type B Terminal Locations in Bone Bolango Regency, Gorontalo Province: Application of AHP

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***Abstract*—** *In the mode of ground transportation The terminal is a transport node where passengers and goods enter or exit the transportation network system. Terminal is a part of the confining of a road transportation network system that has the role and function that is very important so that in determining a terminal location is required a thorough study of both the environment around and the city side as a whole, so that the existence of a terminal is expected to be a motor drive so that an area around it can be more rapidly changed. This Thesis analyzes the alternative location of type B terminals in Bone Bolango Regency Gorontalo Province so that the location is in accordance with the determining factors of the location that corresponds to the government regulation of PM No. 40/2015, and PM No. 132/2015. Method used for the analysis of alternative terminal location of type B in Bone Bolango Regency Gorontalo province with Analytical Hierarchy Process (AHP) and Tools AHP Calc-year 2017. Based on the results of the analysis, the biggest feasibility parameter factor is the law and licensing which can be interpreted as this is the most influential factor in the eligibility parameters for the determination of type B terminal location in the district Bone Bolango Gorontalo Province with a weight of 20.9%. Scoring results from two alternative locations, namely Buladawa Village and Langge Village at acquired location in Langge village of Tapa Regency Bone Bolango District as the recommendation of the largest scoring 6.48 and for the village of Boludawa Suwawa Sub-district Bone Bolango Regency of scoring is 6.08.*

***Keywords*—** *Alternative, Analysis, Location, Terminal Type B.*

I. Introduction

The transportation means are very crucial in the living system, the need for transportation is a derivative need that is caused by economic behavior, social, and so on. In a macro-economic framework, transportation is a fundamental in the national economy, both in urban and rural areas. It must also be remembered that the transportation mechanism has a network system in which the function and integration of the network is strongly influenced by the performance of the implementation. In determining a terminal location, an in-depth study of the surrounding environment and the city side as a whole are needed, so that the performance of the terminal is influenced by the effectiveness and efficiency of the transportation system on a track. The existence of a terminal is expected to be a driving force, so that an area around it can experience changes more quickly (developing), this makes a policy that many terminals in the city are diverted to the suburbs to reduce congestion within the city.

The existence of aspects that influence is a very important part in determining the location of a terminal. It underlies researchers in conducting studies and analysis so that the objectives of the terminal can be implemented properly and effectively. Studies and research on the analysis of location for terminal development have been done before, but with the location analysis method, each evaluation variable is analyzed independently of one another, so researchers use the research method with the Analytical Hierarchy Process (AHP) so that the interconnections occur between one alternatives and the other. In addition, the difference shown in this study is that there is a combination of primary data from the location and secondary data in the form of literature studies and discussions with steakholders in the assessment and determination of selection variables so that the location that is later recommended will be in accordance with the RTRW and RPJM from the government in the study area.

The purposes of this study are:

1. Analysis of the determination of an alternative location for Type B Terminal in Bone Bolango Regency, Gorontalo Province.
2. Analysis of the determination of criteria and sub-criteria of the Type B Terminal location in Bone Bolango Regency, Gorontalo Province.
3. Recommended location for Terminal Type B in Bone Bolango Regency, Gorontalo Province.

II. Literature Review

A. Terminal

a. The definition of terminal

According to Law Number 22 Year 2009 concerning Traffic and Public Transportation, the terminal is a base for Public Motor Vehicles that are used to regulate arrivals and departures, raise and lower people and / or goods, and transport modes. Meanwhile, according to the Decree of the Minister of Transportation No. 31 of 1995 concerning Road Transportation Terminals, Passenger Terminals are road

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transportation infrastructure for the purposes of reducing and increasing passengers, intra and or intermodal transportation modes and regulating the arrival and departure of public vehicles.

b. The function of terminal

The main function of the terminal can be viewed from three related elements, namely passengers, government and public transport operators. These functions are as follows:a.

a. The function of the terminal for passengers is to facilitate the transfer from one mode to another or in other words to accelerate the flow of passengers towards the destination by paying attention to safety and comfort, the availability of terminal facilities and information and private vehicle parking facilities.
b. The terminal's function for the government is planning and traffic management and controlling the flow of public transport to avoid congestion as a source of regional revenue.
c. The function of the terminal for public transport operators is to regulate bus operations, provide rest facilities and information for bus crews and as a base facility.

B. Analytical Hierarchy Process Metode

a. The definition of AHP (Analitycal Hierarchy Process

AHP is a decision support model developed by Thomas L. Saaty. This decision support model will describe a complex multi-factor or multi-criteria problem into a hierarchy, according to Thomas L. Saaty (Saaty.1993), a hierarchy is defined as a representation of a complex problem in a multi-level structure where the first level is the goal, followed by the level of factors, criteria, sub-criteria, and so on down to the last level of alternatives. With hierarchy, a complex problem can be broken down into groups which are then arranged into a hierarchical form so that the problem will appear more structured and systematic.

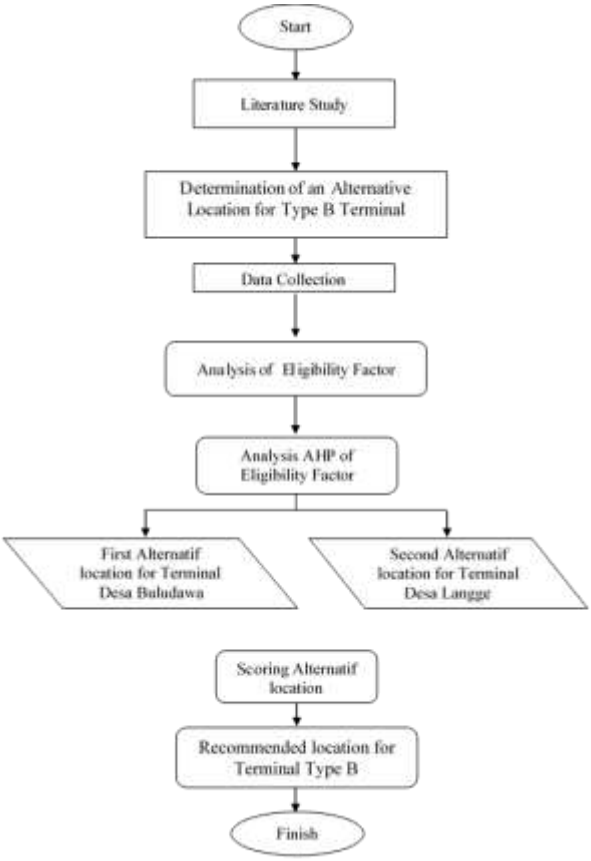
III. Research Method

The stages of the research are shown in the flowchart below.

IV. Analysis and Discussion

A. Result of AHP Analysis

The selection of the Type B Terminal location is based on the Eligibility Parameter Criteria which were built based on PM No. 40/2015, PM No.132/2015, and several other relevant literatures. The results of weighting the criteria for the location feasibility parameters are analyzed based on the Multi Criteria Analysis Method or Analitycal Hierarchy Process (Saaty, 1993). After obtaining primary data, in this case the filling of 8 (eight) eligibility parameter criteria derived from several regulatory studies, regulations and the results of discussions with government agency stakeholders in the Gorontalo Province region, then data consistency test and weighting analysis were conducted.



Picture 1. Research Flow Chart

B. Weighing Criteria for Eligibility Parameters

The results of weighting criteria for the Feasibility Parameters analyzed based on the Multi Criteria Analysis Method (Saaty, 1993) using the 2017 version of the AHP calculator are as follows:

Average Weight Criteria Table of 8 (eight) Eligibility Parameters

No	Indikator Kelayakan	Total Bobot	Prosentase
1	Legal & Licensing	1.67	**20,9%**
2	Regional Development	1.66	**20,8%**
3	Technical Development	1.6	**20,0%**
4	Operational Eligibility	1.6	**20,0%**
5	Eligibility in Provincial Transport	0.72	**9,0%**
6	Environmental Feasibility	0.38	**4,7%**
7	Socio-Cultural Feasibility	0.18	**2,3%**
8	Eligibility for Development Fund Availability	0.19	**2,3%**
Jumlah		**8,00**	**100**

Source: Analysis Results, 2019

Based on the calculation of the average criteria weights of all feasibility parameters, it can found out the criteria weights for the Type B terminal location in Bone Bolango Regency, Gorontalo Province. Based on the table above, the legal and licensing criteria are the biggest criteria. However, it is not the dominant from the regulator's preferences. The operational eligibility criteria and the feasibility of using public transport services are still sufficient to influence the choice of

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regulators, operators and users in determining the criteria for public transport locations.

C. Alternative Scoring Results for Type B Terminal Location in Bone Bolango Regency

Table of Scoring Results for Alternative Type B Terminal Locations Based on Criteria Weight in Bone Bolango Regency

No		Eligibility Indicators and Varibel	Conditions	Score	Weight (%)	Alternative 1	Alternative 2
						Rating (SxB)	
1		**Legal Eligibility & Licensing**			21%		
	a	Status of Land (Land Tenure)	State-owned	3			
			Resident's	1		0.21	0.21
2		**Regional development Feasibility**			21%		
	a	Conformity RTRW National, Provincial, Kab/City	Appropriate	3		0.62	0.62
			Will suit	2			
			Inappropriate	1			
	b	Suitability Sistranas, Tatrawil, Tatralok	Appropriate	3		0.62	0.62
			Will suit	2			
			Inappropriate	1			
3		**Technical feasibility development**		3	20%		
	a	Location and Accessibility	Available Street Access	3		0.60	0.60
			There will be access road	2			
			Tdkavailable Street Access	1			
	b	Energy, Water and Telecommunications Resources	Adequate	3		0.60	0.60
			Adequate	2			
			Inadequate	1			
	c	Physical Location (DDT and Drainage)	Good and decent	3			
			Quite and decent	2		0.40	0.40
			Not good	1			
	d	Space Rrequirement (Land Area)	Meet broad standards	3			0.60
			Quite fulfilling	2		0.40	
			Does not meet	1			
	e	Prone to Disaster	Not prone	3		0.60	0.60
			Moderately vulnerable	2			
			Prone	1			
4		**Operational feasibility**			20%		
	a	Operating Area Boundary	There is obviously	3		0.60	0.60
			It is unclear	1			
	b	Number of Route Network	Suitable for demand	3			0.60
			Good fit	2		0.40	
			Inappropriate	1			
	c	Network Route Performance	Compliant performance standards	3			
			Quite as per standard	2			
			Unsuitable standards	1		0.20	0.20
5		**Feasibility of Transportation in province (AKDP)**			9%		
	a	Approximate Demand for Road Transport Services	Increased	3			
			Stagnant	2		0.18	0.18
			Decreased	1			
	b	Plan Route Routes	Appropriate area	3			
			Good fit	2		0.18	0.18
			Not appropriate	1			
	c	Type AKDP and Load factor	Compliant performance standards	3			
			Quite as per standard	2			
			Unsuitable standards	1		0.09	0.09
6		**Environmental Feasibility**			5%		
	a	Natural Environment	Low change rate	3			
			Moderate change Rate	2			
			High rate of change	1		0.05	0.05
	b	Provision of Land	Low function changes	3		0.14	0.14
			Moderate function changes	2			
			High function changes	1			
7		**Feasibility of Social Culture**		3	2%		
	a	Population Relocation	No potential	3			
			Potentially relocation	1		0.02	0.02
	b	Matches with Local Cultures	No effect	3			
			Influential	1		0.02	0.02
8		**Feasibility of Development Fund Availability**			2%		
	a	Liberation of Land and Buildings	Can be freed	3		0.07	0.07
			It cannot be	1			
	b	Construction Costs	Available	3		0.07	0.07
			Not available yet	2			
			Not available	1			
Total					100%	6.08	6.48

Source: Analysis Results, 2019

D. Evaluation Results of Type B Terminal Location Selection

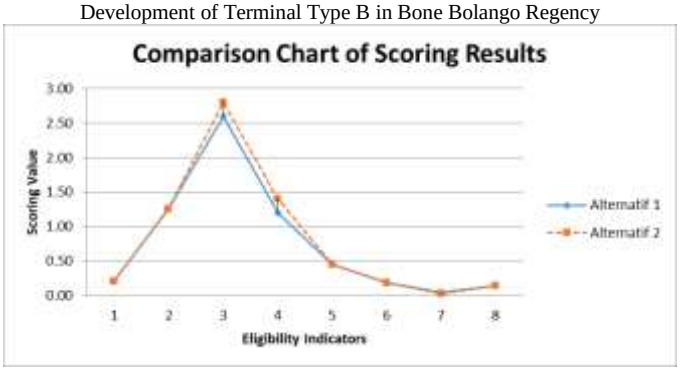
Evaluation Results Table for Location Type B Terminal Selection Bone Bolango Regency

No	Eligibility Indicators and Alternative Varibells	Alternative 1	Alternative2	Description
1	Legal & Licensing	0.21	0.21	A1 & A2 Worth
2	Regional Development	1.25	1.25	A1 & A2 Worth
3	Technical Development	2.6	2.8	A2 > Worth
4	Operational Eligibility	1.2	1.4	A2 >Worth
5	Eligibility in Provincial Transport	0.45	0.45	A1 & A2 Worth
6	Environmental Feasibility	0.19	0.19	A1 & A2 Worth
7	Socio-Cultural Feasibility	0.05	0.02	A1 > Worth
8	Eligibility for Development Fund Availability	0.14	0.14	A1 & A2 Worth
TOTAL		6.08	6.48	A2 > Worth
AVERAGE		0.76	0.81	A2 >Worth
ALTERNATIVE SELECTED		**ALTERNATIVE 2**		

Source: Analysis Results, 2019

Based on the results of the terminal location selection above, the location in Alternative 2 is the most dominant alternative (value 6.48 vs 6.08), meaning that the construction of the Type B public transport terminal location should be at alternative location 2, located in Langge Village, Tapa District, Bone Bolango Regency.

Graphic of Evaluation Results for the Selection of Location Plans for the Development of Terminal Type B in Bone Bolango Regency



Source: Analysis Results, 2019

V. Conclusions

Based on the results of the analysis, it can be concluded that the recommended location of the type B terminal in Bone Bolango Regency is in Langge Village, Tapa District, Bone Bolango Regency, Gorontalo Province. This is based on the results of scoring for each alternative location where alternative region 2 is the most dominant alternative (6.48 vs 6.08).

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