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The Priority Scale of Handling the Province Road in South Kalimantan

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ABSTRACT
The assessment attributes reviewed by the priority scale on the increase are the level of road damage, Average Daily Traffic, road class, land use, and road network, while for the construction is the road network, specifications for the provision of road infrastructure and road classes. The weighting results of the AHP technical factors were (83.33%) and non-technical (16.67%), the non-technical factors had attribute assessments of the Development Planning Deliberation (10, 44%), community proposals (4.66%) and specific policies (1.56%). For weighting technical factors for improvement (69.44%), reviewed based on the largest attribute assessment is the level of road damage (38.21%), road class (12.11%), and LHR (8.46%). Where as weighting for road construction is reviewed based on the assessment of the largest attributes are road class (7.64%) and road network (3.34%) The results of this comparative research between the AHP method and the implementation conditions in the field showed very few differences. This showed that the design of the assessment form using AHP can be applied in determining the priority of work implementation.
Keywords - priority scale, provincial road, improvement, development, AHP

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I. INTRODUCTION

Based on the Decree of the Governor of South Kalimantan Number: 188.44 / 0320 / KUM / 2017 concerning the General Plan of the Provincial Road Network in South Kalimantan Province, South Kalimantan province has 47 sections with sections of 762.61 km, 44 strategic roads with long sections 715.84 km [1]. Due to limited funds for the construction of road infrastructure from the central government, the entire road infrastructure needs of both construction and road improvement have not been fulfilled. By considering this matter, it is necessary to apply priority scales that can be used as a reference in the preparation of provincial road handling programs for the next fiscal year.

The purpose of this research is to obtain the priority scale on road improvement and construction, comparethe priority scale between road improvement and construction and compare the road handling between the use of analysis and existing results.

II. THEORITICAL REVIEW

According to the Government Regulation of the Republic of Indonesia Number 34 of 2006 concerning Roads, roads are land transportation infrastructure covering all parts of the road, including complementary buildings and equipment intended for traffic, which are at ground level, above ground level, below ground level and / or water, as well as above the water level, except railroads, lorry roads, and cable roads [2]. According to its function, roads are classified as arterial roads, collector roads, local roads, and environmental roads. Based on its status, roads are grouped into national roads, provincial roads, district roads, city roads and village roads [3]. Roads are classified into several classes based on function and traffic intensity in order to regulate road use and smooth traffic and road transport, and carrying capacity to receive the heaviest source of load and dimensions of motorized vehicles, which consist of road class I, road class II, road class III, special class roads [4]. The program for handling road networks includes road maintenance programs, road improvement programs, and new road construction programs [2]. Spatial pattern is the distribution of allotment space in an area which includes the allotment of space for the function of protection and spatial allocation for the function of cultivation [5].

Analytical Hierarchy Process (AHP) is a method of decision making by conducting pairwise comparisons between choice criteria and choices. The problem of decision making with AHP is generally composed into criteria, and alternative choices. AHP works by guiding developing priorities for alternatives and used to evaluate or judge alternatives

[6]. AHP is known by two types of measurements to reduce the scale of the measurement ratio, the scale of measurement is absolute and relative. In absolute comparisons, alternatives are compared to standards in one's memory that have been developed through experience, in relative comparisons of alternatives compared to pairs according to common attributes. This produces a ratio scale score for alternatives. Scores obtained from alternatives can be normalized using absolute measurements, no matter how many new alternatives are introduced, or long ones removed, alternative lines cannot reverse [7]. Previous studies have applied the AHP method by combining various factors to obtain the level of importance by weighting each of the criteria used to determine the priority scale of handling the road [8], [9], [10]. The median value of the survey is an answer that represents all then a comparison test is made of pairs of answers to the survey median value with the Wilcoxon signed - rank test. Fulfillment of significance is in the P-value> 0.05 for comparison of the pairs of respondents answers to the median value of the survey that do not meet, the survey median value is shifted with the provisions +/- 1 from the initial value or the observed value to obtain significant P-value> 0.05 [11].

III. RESEARCH METHOD

The research background is to consider several matters that need to be applied to determine the priority scale that can be used as a reference in the preparation of project programs for the next fiscal year. The formulation of research methods is needed as an effort to investigate the stages of research work. Phase per stage that must be done, so that no mistakes occur in conducting research until the expected results are achieved. In addition to assisting in analyzing the data that has been collected. The arrangement of hierarchical structures is made as one of the steps that must be done to design the desired hierarchical structure for this study and for the preparation of questions from the questionnaire for respondents later. The data obtained is then processed. Data that has been processed is then analyzed using the Analytical Hierarchy Process (AHP) method which has been selected from various literature taken as research reference material. The results of the analysis are concluded and given recommendations.

3.1 Collecting data

1. Primary Data

The primary data was obtained from the survey using the questionnaire method with respondents among the Office of Public Works and Public Housing of South Kalimantan Province (Bina Marga), Office of Public Works and Public Housing district/city (the areas contained in the provincial road handling list), Development Planning Agency at Sub-National Level and the Planning, Development, Research And Development Agency at district/city.

2. Secondary Data

Secondary data include: road list data, list of respondents.

3.2 Stages of data analysis using the AHP method

1. Hierarchy Formation
2. Assessment Process
3. Making the respondents paired answer matrix

The procedure for answering is as follows:

a. Each respondents answer to each question will be assessed.
b. The results of the assessment in one question for all respondents were then on average.
c. The average value is the answer that represents all respondents for each question.
d. This value is then entered in the paired matrix and placed according to the pair between the factors reviewed.

4. Weighting each factor involved
5. Consistency ratio calculation (CR)

IV. RESEARCH METHOD

4.1 Identity of Respondents

Survey research was conducted by questionnaire with the target plan of respondents in this study were 80 people, while those distributed to respondents were 74 questionnaires, the return questionnaires amounted to 60 questionnaires. Based on the data obtained through the questionnaire, then analysis and discussion were conducted. The questionnaire was distributed and distributed to 3 agencies, namely the Office of Public Works and Public Housing of South Kalimantan Province, Office of Public Works and Public Housing at the district/city, the Development Planning Agency at Sub-National Level and the Planning, Development, Research and Development Agency at district/city. From those 3 agencies there are 60 competent people (stakeholders) in determining the road handling plan. The last educational background of the respondents can be seen in Figure 2.

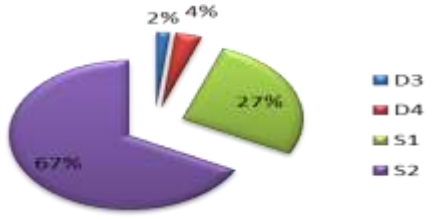

Figure 2. Respondents Recent Educational Background

Respondents work experience can be seen in Figure 3.

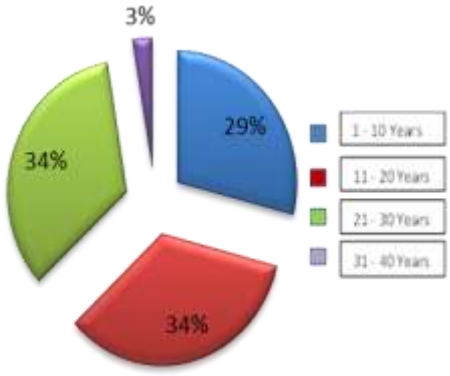

Figure 3. Respondents Work Experience

4.2 Respondents preferences

From the results of the assessment of respondents answers to each question a matrix is formed. Matrix formation is formed in each group of questions with the order according to the number of questions. The Wilcoxon test calculation process is exemplified at the criteria level for pairwise comparison data (question 1) between Community Proposal factors and Special Policies. The value of the respondents choice in sequence from the 60 sample data are 1/8, 1/8, 1/8, 1/8, 1/8, 1/8, 1/8, 1/7, 1/7, 1/7, 1/7, 1/7, 1/7, 1/7, 1/7, 1/6, 1/6, 1/6, 1/6, 1/6, 1/6, 1/6, 1/6, 1/6, 1/6, 1/6, 1/6, 1/6, 1/6, 1/5, 1/5, 1/5, 1/5, 1/5, 1/5, 1/5, 1/5, 1/5, 1/5, ¼, ¼, ¼, 1/3, 1/3, 1/3, 1/3, 1/3, 1/3, 1/3, 1/3, 1/3, 1/3, 1/3, 1/3, ½, ½, ½, 1, 1, 1, 1, 5.

AHP scale conversion in the form of an ordinal scale and determining the median value of the initial hypothesis (θ). The ordinal scale of the answer are-7, -7,-7,-7, -7,-7,-7, -6, -6, -6, -6, -6, -6, -6, -6, -5, -5, -5, -5, -5, -5, -5, -5, -5, -5, -5, -5, -5, -4, -4, -4, -4, -4, -4, -4, -4, -4, -3, -3, -3, -2, -2, -2, -2, -2, -2, -2, -2, -2, -2, -2, -1, -1, -1, 0, 0, 0, 0, 4. The median of the sequence of values is 4. This median value is used as the median value of the initial hypothesis. The standardized test statistic (z) value is a function of the T value, the average value (μT), and the standard deviation value (σT). Significance assessment θ. Based on the value of z = -0,289 for the two-way test obtained P-value = 0.14. Because P-value> α (0,05) then Ho is accepted (M = -4) or it can be concluded that the median value of the comparison between the factors proposed by the community and the specific policy is 4 (four). This median value is returned in the AHP scale format, which is 5 (five). A value of 5 (five) as a combined preference value explains the importance of special policy factors slightly more important than the community's proposed factor.

4.3 Factor Weighting Process

The factor weighting process is carried out in each group of criteria, subcriteria and alternatives. Non-technical sub-criteria are found in questions number 2 to 4 which is a comparison between Development Planning Deliberation, community proposals, and specific policies. From the calculation of the CR ratio 7.39% <10% of questions 2 to 4 can be accepted. Furthermore, the weighting values that have been normalized for subcriteria elements can be seen in Table 1 and Table 2.

Table 1. Normalization of Levels 2, 3 and 4

Level 2		Level 3		Level 4	
Attribute	Weight	Attribute	Normalization	Attribute	Normalization
Technical	83,33%	Improvement	69,44%	Road Damage	38,21%
				LHR	8,46%
				Road Class	12,11%
				Land use	6,18%
				Road Network	4,48%
		Development	13,89%	Road Class	7,64%
				Road Network	3,34%
				Specifications for Provision of Road Infrastructure	2,91%
Non-technical	16,67%	Development Planning Deliberation	10,44%		
		Special Policy	4,66%		
		Community Proposal	1,56%		

Table2. Normalization of Development Factor of Level 5

Level 3 Attribute	Level 4 Attribute	Normalization	Level 5 Attribute	Normalization
Development	Road Network	3,34%	Primary	2,43%
			Secondary	0,49%
	Specifications for Provision of Road Infrastructure	2,91%	Highway	0,85%
			Freeway	1,98%
			Moderate	0,29%
			Small	0,22%
	Road class	7,64%	Class 1	4,71%
			Class 2	1,14%
			Class 3	1,30%
			Special Class	0.49%

From the results of weighting, AHP is made an evaluation form. The weight used is the weight of the last level of all criteria. The form of valuation form as shown in Table 1, technical factors have a weight of 83.33% and non-technical as much as 16.67%, in non-technical factors have an attribute evaluation of development planning deliberation of 10, 44%, community proposals of 4.66 % and special policies of 1.56%. For weighting technical factors for an increase of 69.44% reviewed based on the largest attribute assessment is the level of road damage of 38.21%, road class of 12.11%, and LHR of 8.46%. While the weighting for road construction based on the largest attribute rating is the road class of 7.64% and the road network of 3.34%.

4.4 Comparison of Analysis Results with Work Package Lists

The factors that influence the weighting in the AHP method on the results of the priority sequence of road handling in Banjarmasin City in this study are technical factors (maintenance and improvement) and non-technical (development planning deliberation, community proposals, and policies). Where technical factors weigh 3 (three) times (75%) compared to non-technical (25%). However, as a whole it is reviewed with the fulfillment of non-technical indicators, it turns out that non-technical has a very large level of weight, the most important factor is indicated by the development planning deliberation weighing 14.48%. As for technical, both maintenance and improvement are indicated by indicators of severe damage with an interest rate of 8.63% for maintenance, and 8.53% for improvement [12]. In study aims to determine the priority scale of handling using the AHP method in Murung Raya Regency. The weight of technical factors is 85.71%, higher than non-technical factors which weigh 14.29%. Road damage has a weight of 40.05% which is very influential compared to development planning deliberations which have a weight of 7.96% [13].

The final result of weighting AHP, then compared with the priority sequence proposed by the Office of Public Works and Spatial Planning of South Kalimantan Province to determine the procedure for the priority sequence of road improvement and road construction based on the results of the research in accordance with its implementation. Consists of technical criteria (83.33%), and non-technical (16.67%).

Comparison of the order of priority of road handling carried out by the Office of Public Works and Spatial Planning of South Borneo Province using the AHP method based on technical criteria in this study can be seen in Table 4. for improvement and Table 5. for development.

Table 4. Comparison of AHP Result Weight against Priorities for Handling Roads for Improvement

No.	Ranking Based on AHP		Handling of Existing Roads (2018)	
	Section Name	Weight	Section Name	Action
1.	Road Section of Batulicin-Mekarsari-Mentewe	72,43%	Road Section of Batulicin-Mekarsari-Mentewe	
2.	Road Section of Anjir Pasar	65,45%	Road Section of Golf Banjarbaru	
3.	Road Section of Pelaihari–Batakan	65,74%	Road Section of Anjir Pasar	Done
	Road Section of Paringin–Halong			
4.	Road Section of Lumpangi–Loksado	28,51%	Road Section of Pelaihari–Batakan	
5.	Road Section of Golf Banjarbaru		Road Section of Lumpangi–Loksado	
	Road Section of Poros, South Borneo	27,85%	Road Section of Paringin–Halong	
6.	Province Office Environment		Road Section of Poros, South Borneo	
7.		26,67%	Province Office Environment	
		26,56%		
8.	Road Section ofAngsana	32,32%		
9.	Road Section of Rantau–Muara Muning	32,07%	Road Section of Angsana	
			Road Section of Pendahan–Margasari	Not
10.	Road Section of Lingkar Binuang	30,66%	Road Section of LingkarBinuang	Done
11.	Road Section of Gambut-Pulausari	30,66%	Road Section of Gambut-Pulausari	
	Road Section of Pendahan–Margasari		Road Section of Rantau–Muara Muning	
12.		30,66%		

Table 5. Comparison of AHP Results Weight against Priorities for Road Management for Development

No.	Ranking Based on AHP		Handling of Existing Roads (2018)	
	Section Name	Weight	Section Name	Action
1.	Airport Access Road II	21,12%	Road Section of Gatot Subroto-Lingkar Dalam Selatan	
2.	Road Section of Gatot Subroto-Lingkar Dalam Selatan	21,22%	Airport Access Road I	
	Road Section of Gunung Kupang-Kiram			Done
3.	Airport Access Road I	20,00%	Airport Access Road II	
4.	Road Section of Kiram-Simpang 3	20,00%	Road Section of Gunung Kupang–Kiram	
5.	Tahura	20,00%	Road Section of Kiram-Simpang 3 Tahura	

Viewed from the order of priorities between the Public Works and Spatial Planning Service of South Kalimantan Province with the AHP method for improvement and development on average, there was a shift in the sequence, but did not change the position of the segments being worked on and those not done.

V. CONCLUSION

Based on the analysis and discussion of the priority scale of handling the road in the province of South Kalimantan, it can be concluded factors that influence the determination of priority scale in this study are technical and non-technical factors. Technical factors include improvement and development, while non-technical activities include musrenbang, community proposals and special policies. The valuation attributes reviewed in priority scale on road improvement are the level of road damage, LHR, road class, land use, and road network, while the road construction is a road network, specifications for the provision of road infrastructure and road class. Viewed from the priority scale between road upgrade and construction, the assessment attributes are quite similar on the first improvement priority reviewed from the level of damage, road class and LHR, while the first priority for development is road class and road network. The valuation attribute in the lowest improvement priority was the road network while in the development was the specification of the provision of road infrastructure. The results of a comparative decision study between the results of the AHP method and the conditions of implementation in the field showed very few of significant different. It shows that the design of the assessment form using AHP can be applied in determining the priority of work implementation.

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