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Research Paper

Analysis Priority of Handling the Road Damage To South Beach Using Simple Additive Weighting (SAW) Method

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ABSTRACT: *The South Coast Road (Pansela) is one of the programs to accelerate economic development in the Southern Cross Area in the form of a network of roads that cross the southern coast of Java Island. With an increase in the number of vehicle volumes that is not matched by the addition of existing road capacity, road maintenance is currently needed. The method used is Simple Additive Weighting (SAW) with a questionnaire which was distributed to 16 respondents as policy / decision makers who also know and are involved in activities in Malang Regency. After analyzing the data, the priority order for handling damage to the road leading to the selection committee is Kepanjen – Pagak (C4), Pagak – Sumbermanjing Kulon (C5), Sumbermajing Kulon – Pantai Kondang Iwak (C6), Karangkates – Kalipare (C1), Kalipare – Donomulyo (C2), Donomulyo – Pantai Jonggring (C3), Druju – Wonokerto (C7), Segaran – Gedangan (C8), dan Gedangan – Bajulmati Beach (C9) with weights 0.190, 0.170, 0.140, 0.120, 0.100, 0.080, 0.080, 0.070, dan 0.050. While the ranking order of criteria weights is A9, A12, A1, A7, A10, A3, A16, A13, A6, A15, A14, A2, A11, A4, A8, and A5 with weights 0.191, 0.188, 0.187, 0.169, 0.168, 0.141, 0.140, 0.122, 0.114, 0.100, 0.096, 0.081, 0.078, 0.075, 0.069, and 0.050.*

KEYWORDS: *Budget, Malang Regency, Pansela, Handling The Road Damage, Volume*

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I. INTRODUCTION

The South Coast Road (Pansela) [1] is one of the programs to accelerate economic development in the Southern Cross Area in the form of a network of roads that cross the southern coast of Java Island, passing through the provinces of Banten, West Java, Central Java, the Special Region of Yogyakarta and East Java .

With increase the number of vehicle volumes from year to year which is not balanced by the addition of existing road capacity, there are problems that must be resolved immediately. A problem that often occurs in the district is the limited budget / cost in handling the road damage where the number of road damage that must be handled immediately is not balanced with the budgeted funds for these activities. Therefore, it is necessary to select / determine the road damage to be handled based on the priority scale.

From the description above, it is necessary to research to find a way of making decisions in handling road damage and effectively adjusted to the existing budget. For this reason, find of the criteria used in this study can support the selection of alternatives that will be determined by priorities.

One of the appropriate methods in determining the selection of priorities and the order of alternatives is the Simple Additive Weighting (SAW) method. Until now, no research has been carried out on the application of the SAW method to determine alternatives for selecting road handling activities to the south coast, so research using the SAW method is very necessary.

II. RESEARCH LOCATION

The location was carried out on several sections of the road to Pansela which functioned as a strategic route connecting between sub-districts, agricultural centers, markets and tourist attractions including as shown in Figure 1 and for road conditions can be seen in Table 1 as follows:

Figure 1

NO.	ROAD NAME	LENGTH (Km)	WIDTH (m)	DISTRICT
1.	Karangkates – Kalipare (C1)	8,55	4,00 – 8,30	Sumberpucung
2.	Kalipare – Donomulyo (C2)	15,65	4,00 – 6,00	Kalipare
3.	Donomulyo – Jonggring Beach (C3)	11,29	2,50 – 5,50	Donomulyo
4.	Kepanjen – Pagak (C4)	16,1	4,50 – 9,00	Kepanjen
5.	Pagak – Sumbermanjing Kulon (C5)	11,1	4,00 – 6,00	Pagak
6.	Sumbermajing Kulon – Kondang Iwak Beach (C6)	11,7	3,00 – 4,50	Pagak
7.	Druju – Wonokerto (C7)	10,35	3,50	Sumbermanjing Wetan
8.	Segaran – Gedangan (C8)	10,99	3,00 – 6,00	Gedangan
9.	Gedangan – Bajulmati Beach (C9)	15,93	3,00 – 5,00	Gedangan

Table 1

III. IDENTIFICATION OF RESEARCH VARIABLE

The identification of research variable aims to identify variables / criteria that are considered in determining the allocation of activities for alternative handling of road sections to Pansela. The identification of variables / aspects of research [2] in this study can be seen in Table 2 as follows:

NO.	CRITERIA	NO.	CRITERIA
A1	Geographical Location	A2	Economic Activities
A3	Destination Tourist	A4	Natural Outcomes
A5	Proposal through Community Aspirations by DPRD	A6	Unorganized community proposals are directly addressed to the relevant technical agencies
A7	Road Conditions	A8	Community proposals that organized through Musrenbang
A9	Traffic Density (LHR)	A10	Available in RPJMD
A11	Road Capacity	A12	Road Functions
A13	Vehicle Operating Cost Savings	A14	Economic Development Potential
A15	Increase Driving Safety	A16	Time Efficiency

Table 2

IV. RESULTS OF RESEARCH AND DISCUSSION

Based on data that obtained from the distribution of questionnaires with respondents who make policies / decisions as well as knowing and being involved in project activities in Malang Regency, which in this case is

handled by the Public Works Office of Bina Marga Malang Regency, then converted into weighted summation of the selection results using the Simple Additive Weighting (SAW) [3] method. The method used in the assessment of road handling priorities to pansela is expected to help find the most needed path for handling appropriately and accurately. The sample to be taken in the priority assessment of handling the road to pansela is 16 people as respondents [4]. The sample to be taken in the priority assessment of handling the road to pansela is 16 people as respondents. Table 3 is a list of alternative priority for handling the road to pansela along with the value of the assessment results of filling out the questionnaire obtained from respondents who have been averaged.

NO.	CRITERIA	SCORE
1.	**Karangkates – Kalipare (C1)**	
	Unorganized community proposals are directly addressed to the relevant technical agencies (A6)	77,5
	Vehicle Operating Cost Savings (A13)	83,1
2.	**Kalipare – Donomulyo (C2)**	
	Economic Development Potential (A14)	75,0
	Increase Driving Safety (A15)	77,2
3.	**Donomulyo – Jonggring Beach (C3)**	
	Economic Activities (A2)	74,4
4.	**Kepanjen – Pagak (C4)**	
	Geographical Location (A1)	89,4
	Traffic Density (LHR) (A9)	91,3
	Road Functions (A12)	90,0
5.	**Pagak – Sumbermanjing Kulon (C5)**	
	Available in RPJMD (A10)	85,6
	Road Conditions (A7)	86,3
6.	**Sumbermajing Kulon – Kondang Iwak Beach (C6)**	
	Destination Tourist (A3)	84,4
	Time Efficiency (A16)	83,8
7.	**Druju – Wonokerto (C7)**	
	Natural Outcomes (A4)	71,3
	Road Capacity (A11)	73,8
8.	**Segaran – Gedangan (C8)**	
	Community proposals that organized through Musrenbang (A8)	73,1
9.	**Gedangan – Bajulmati Beach (C9)**	
	Proposal through Community Aspirations by DPRD (A5)	71,9

Table 3

The weight of preference or the level of importance of each of the criteria that have been averaged that will be used in determining the priority assessment of handling the road to pansela is as follows (Table 4).

NO.	ROAD NAME	PERCENTAGE
1.	Karangkates – Kalipare (C1)	12,19%
2.	Kalipare – Donomulyo (C2)	10,00%
3.	Donomulyo – Jonggring Beach (C3)	8,13%
4.	Kepanjen – Pagak (C4)	19,06%
5.	Pagak – Sumbermanjing Kulon (C5)	16,88%
6.	Sumbermajing Kulon – Kondang Iwak Beach (C6)	14,06%
7.	Druju – Wonokerto (C7)	7,81%
8.	Segaran – Gedangan (C8)	6,88%
9.	Gedangan – Bajulmati Beach (C9)	5,00%

Table 4

The distribution of the results was obtained from the results of the questionnaire that had been distributed to the respondents. Figure 2 is a graphic image of the weight of the road section.

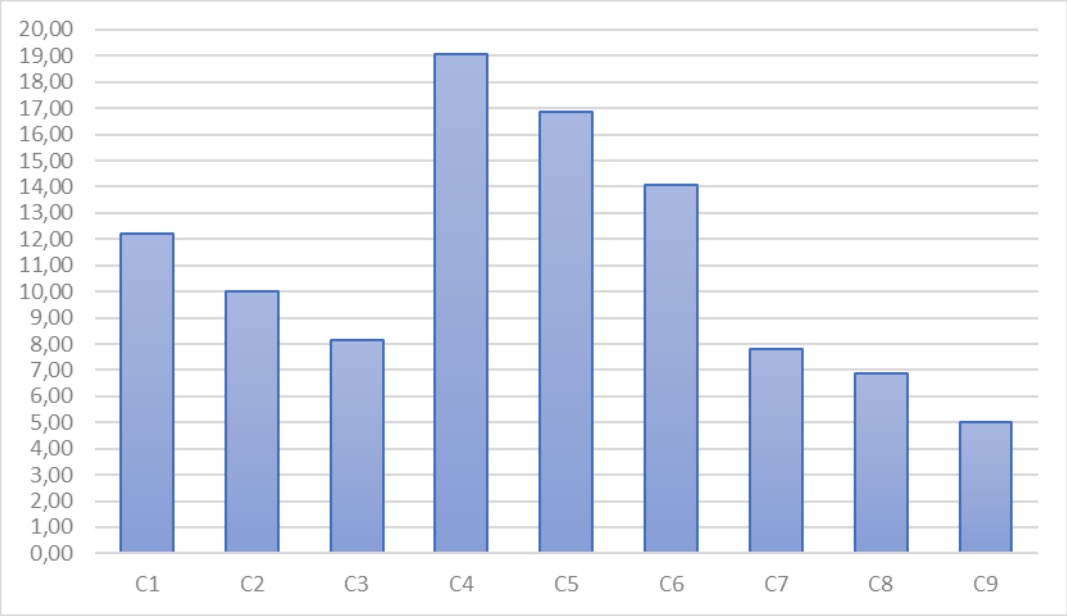

Figure 2

4.1 DECISION MATRIX

A decision matrix (R) generated from a match table values of each alternative on each criterion. The results of the study were obtained from filling in questionnaire data by respondents who had been averaged (Table 3). Next is made a decision matrix (R) of each such alternative (Table 5). The green one is the maximum value in each criterion used for normalization calculations.

R =

C1	C2	C3	C4	C5	C6	C7	C8	C9
0	0	0	89,4	0	0	0	0	0
0	0	74,4	0	0	0	0	0	0
0	0	0	0	0	84,4	0	0	0
0	0	0	0	0	0	71,3	0	0
0	0	0	0	0	0	0	0	71,9
77,5	0	0	0	0	0	0	0	0
0	0	0	0	86,3	0	0	0	0
0	0	0	0	0	0	0	73,1	0
0	0	0	91,3	0	0	0	0	0
0	0	0	0	85,6	0	0	0	0
0	0	0	0	0	0	73,8	0	0
0	0	0	90	0	0	0	0	0
83,1	0	0	0	0	0	0	0	0
0	73,8	0	0	0	0	0	0	0
0	77,2	0	0	0	0	0	0	0
0	0	0	0	0	83,8	0	0	0

Table 5

4.2 NORMALIZATION OF THE MATRIX

Normalization is carried out based on equations that have been adjusted to several paths which then produce decision normalization data (R) using benefit values.

$$r_{ij} = \frac{Xij}{Max\ Xij}$$

An example of Normalizing Calculation is as follows:

$$R1.1 = \frac{0}{Max(0;0;0;0;0;77,5;86,3;0;0;0;0;0;0;0;0;0)} = \frac{0}{83,1} = 0$$

$$R6.1 = \frac{77,5}{Max(0;0;0;0;0;77,5;86,3;0;0;0;0;0;0;0;0;0)} = \frac{77,5}{83,1} = 0,932$$

Table 6 is a result of Normalization of the Matrix of each alternative.

$$R = \begin{bmatrix} C1 & C2 & C3 & C4 & C5 & C6 & C7 & C8 & C9 \\ 0 & 0 & 0 & 0,979 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0,966 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \\ 0,932 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0,993 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0,986 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0,955 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0,993 & 0 & 0 & 0 \end{bmatrix}$$

Table 6

4.3 PREFERENCE VALUE FOR EACH ALTERNATIVE

Preference value for each alternative is to search for the ranking or highest value by entering the given criteria, with the following formula:

$$V_i = \sum_{j=1}^{n} \overline{C_i} x r_{ij}$$

An example of calculating the preference value is as follows:

V1 = ($\overline{C1}$xR1.1)+($\overline{C2}$xR2.1)+($\overline{C3}$xR3.1)+($\overline{C4}$xR4.1)+($\overline{C5}$xR5.1)+ ($\overline{C6}$xR6.1)+($\overline{C7}$xR7.1)+($\overline{C8}$xR8.1)+ ($\overline{C9}$xR9.1)

V1 = 0,189

Next is to calculate the preference for each road section as Table 7

	V1	V2	V3	V4	V5	V6	V7	V8
HASIL	0,187	0,081	0,141	0,075	0,050	0,114	0,169	0,069
	V9	V10	V11	V12	V13	V14	V15	V16
HASIL	0,191	0,168	0,078	0,188	0,122	0,096	0,100	0,140

Table 7

In Figure 3 is the result of a graph of the highest alternative weights based on Table 7.

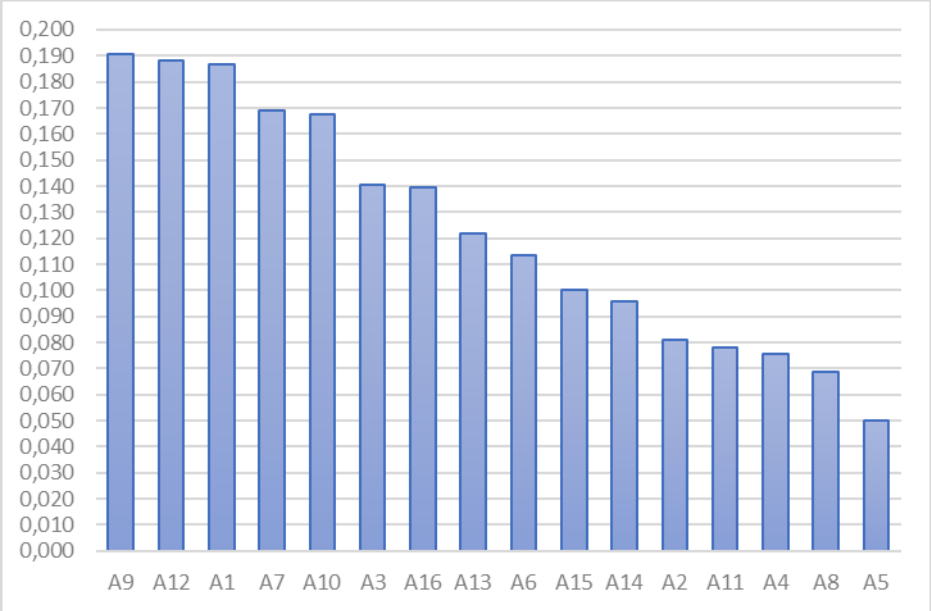

Figure 3

V. CONCLUSION

From the results of the analysis and discussion in the previous chapter, the following conclusions can be drawn:

1. The order of ranking priorities for handling road damage to pansela is the Kepanjen – Pagak Section (C4), Pagak – Sumbermanjing Kulon Section (C5), Sumbermajing Kulon Section – Kondang Iwak Beach (C6), Karangkates – Kalipare Section (C1), Kalipare – Donomulyo Section (C2), Donomulyo – Jonggring Beach Section (C3), Druju – Wonokerto Section (C7), Segaran – Gedangan Section (C8), and Gedangan – Bajulmati Beach Section (C9) by the weight of each 0.190, 0.170, 0.140, 0.120, 0.100, 0.080, 0.080, 0.070, and 0.050.
2. The order of ranking of the criteria is Traffic Density (LHR) (A9), Road Functions (A12), Geographical Location (A1), Road Conditions (A7), Available in RPJMD (A10), Destination Tourist (A3), Time Efficiency (A16), Vehicle Operating Cost Savings (A13), Unorganized community proposals are directly addressed to the relevant technical agencies (A6), Increase Driving Safety (A15), Economic Development Potential (A14), Road Capacity (A11), Natural Outcomes (A4), Community proposals that organized through Musrenbang (A8), and Proposal through Community Aspirations by DPRD (A5) by the weight of each 0.191, 0.188, 0.187, 0.169, 0.168, 0.141, 0.140, 0.122, 0.114, 0.100, 0.096, 0.081, 0.078, 0.075, 0.069, and 0.050.

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