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Determining Priorities for Handling Environmental Road Sections in Palu City (Case Study in West Palu District)

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ABSTRACT: Palu City has numerous roads, including environmental road networks, where the function of many environmental roads has decreased due to heavy traffic and damaged road structures. The improvement of environmental road infrastructure is a complex issue that requires objective policymakers. Sometimes, the work carried out to address environmental issues on roads is not prioritized effectively. To tackle this problem, a research study was conducted to determine the priority order for handling environmental roads in the West Palu sub-district of Palu City. The study used a multi-criteria analysis approach to determine priorities, where the criteria were weighted based on input from respondents from government agencies related to road infrastructure. The criteria used to determine priorities in this research were road conditions, traffic volume, land use, and development planning deliberation proposals. The criteria for road conditions and traffic volume were given the highest priority weighting with weight values of 39.10% and 28.10%, respectively. This was followed by the development planning deliberation proposal criteria at 21.50% and land use criteria at 11.30%. By weighting criteria and scoring criteria based on operational criteria variables, the analysis obtained the top 5 priority orders for handling environmental road sections on Jl. Srikaya. Lr. Sirsak II Kel. Kamonji, Jl. Mas Mansyur Lr. Kel. Baru, Jl. Samudra II Lr. II Kel. Lere, Jl. Lasoso Lr I Kel. Lere and Jl. Durian Lr. Kel. Kamonji.

KEYWORDS: Environmental Roads, AHP Method, Road Management Priorities

1. INTRODUCTION

Roads are a crucial part of land transportation infrastructure that plays a vital role in achieving national goals.[1] They are essential for supporting transportation and have economic, socio-cultural, environmental, political, defense, and security benefits. Neighborhood Roads, which are public roads located in residential and residential areas, serve transportation within the environment with the characteristics of short-distance travel and low speeds.

Palu City has many road networks, including a network of environmental roads. The function of many environmental roads has decreased due to excessive vehicle volumes and the poor condition of road structures. Therefore, the handling of environmental roads must be carried out comprehensively and involve community participation to ensure sustainable understanding of the road for both the implementers and the community.

However, there are problems in handling environmental road improvements. Policymakers are sometimes not objective in determining environmental road work, and the work carried out is not always on target because the determination of the road sections to be handled is not based on a priority scale, and there is a limited budget. Thus, it is impossible to meet the needs for funds to handle all environmental roads at once. Therefore, priority is needed in allocating funds for handling environmental roads.

To address this issue, a research study titled "Determining Priorities for Handling Neighborhood Roads in Palu City (Case Study in West Palu District)" was conducted. The study aimed to determine the priority order for handling environmental roads in the West Palu sub-district of Palu City based on the level of importance of the neighborhood roads. The researchers considered specific criteria in determining policy and weighed each environmental road to determine the priority of which environmental roads receive treatment first. [2]

The aim of this research is to determine the priority order for handling environmental roads in West Palu sub-district, Palu City.

2. LITERATURE REVIEW

Several concepts and literature studies that are related to and support the research object are as follows:

2.1 Definition and Classification of Roads

Roads are an integrated road network system and can be interpreted as land transportation infrastructure. This includes all parts of the road, including auxiliary buildings and means of transportation, located on, above and below the ground. And in the water. Above water level, excluding railways, causeways and cable cars.

Roads are grouped according to their purpose. Namely, roads are divided into particular roads and public roads.[3]

For their benefit, certain roads are built by authorities, companies, individuals and community groups.[4] They are not intended for public traffic to distribute the necessary goods and services. These particular roads include, among others, roads in port areas, forestry roads, plantation roads, water inspection roads, industrial areas, and roads in residential areas that have yet to be handed over to the government. On the other hand, public roads are meant for public traffic and can be categorized based on system, function, status, and class.

2.2 Road Technical Requirements

Roads have different functions and classifications, each with its unique characteristics.[5] Technical requirements for roads are determined based on their role in distributing goods and services within specific regions.

Road Technical Requirements are the technical provisions that must be met by a road section to ensure optimal function and to meet the Minimum Road Service Standards in serving road traffic and transportation.[6]

2.3 Road Handling Activities

1) Road management aims to maintain road infrastructure so that its function in the road infrastructure system can run as it should according to the objectives of the road infrastructure itself. In other words, the purpose of road management is to maintain the physical and operational condition of the road network so that it remains in good condition and can be operated or provide services as it should.
2) Road maintenance includes preventing and repairing the road network to maintain optimal conditions and achieve the specified plan life so that it helps the road network to continue serving traffic effectively.[7]

2.4 Multi Criteria Analysis and Analytical Hierarchy Process

Multicriteria analysis (AMK) is a type of quantitative analysis that initially comes from qualitative data, which is converted into quantitative.[8] By definition, AMK is a method developed for making decisions based on several alternative solutions from the field that meet policymakers' criteria. From several alternatives, the best alternative will emerge considering the desired criteria. Analytical Hierarchy Process (AHP) is a unique multicriteria decision making (MCDM) technique introduced by Thomas L Saaty AHP is very useful as a decision analysis tool and is commonly used in various fields.

In essence, the AHP method divides complex and unstructured situations into several parts. These parts or variables are then arranged in a hierarchical order and a numerical value is assigned for subjective assessment of the relative importance of each variable.

AHP helps solve various problems, such as resource allocation, analyzing benefit or cost decisions, ranking several alternatives, carrying out projected future planning, and setting development priorities for a business unit and other complex problems.[9]

Meanwhile, the AHP method's weakness is its dependence on the AHP model as its primary input.[10] The main input is expert perception, so in this case it becomes expert subjectivity. Additionally, if experts provide incorrect assessments, the model becomes meaningless.

2.5 Determining Priorities in the AHP Method

When making decisions, it is essential to collect data that is close to the actual value.[11] The degree of customer interest can be determined by using a paired comparison approach. Pairwise comparisons are often used to determine the relative importance of existing factors and criteria. These pairwise comparisons are repeated for all elements within each level. The element with the highest weight is a decision option worth considering. Pairwise comparisons must be made for each criterion and each alternative. A rating scale is used to quantify qualitative opinions so that opinion values can be obtained in numerical form (qualitative).

2.6 Processes in the Analytical Hierarchy Process (AHP) Method

The processes that occur in the AHP method are as follows:

1. Define the problem and determine the desired solution.
2. Create a hierarchical structure starting with the general goal, followed by criteria and possible alternatives at the lowest level of criteria.
3. Create a pairwise comparison matrix that describes the relative contribution or influence of each element on the criteria at the level above it.
4. Carry out pairwise comparisons to obtain judgments (decisions) of n x ((n-1) /2) bh, where n is the number of elements being c oger ompared.
5. Calculate the eigenvalues and test their consistency. If they are not consistent, then the data collection is repeated.
6. Repeat steps 3,4 and 5 for each hierarchical level.
7. Calculate the eigenvectors of each pairwise comparison matrix.
8. Checking the consistency of the hierarchy. If the value is more than 10 percent then the judgment data assessment must be corrected.

2.7 Pairwise Comparison Matrix

From the arrangement of the pairwise comparison matrix, a number of priorities are produced which are the relative influence of a number of elements on the elements at the level above them.[12] The eigenvector calculation is done by multiplying the elements of each row and multiplying them by the root n, where n is the element. Next, carry out normalization to combine the number of columns obtained. By dividing each value by the total value, decision makers can

not only determine the priority of each calculation step, but also the magnitude of the priority. These criteria are compared and priorities are calculated based on the opinions of each decision maker.

2.8 Calculation of Element Weights

Element weights are calculated using a matrix. If an operating system has 'n' operational elements, namely operational elements A1, A2, A3,An, then the results of the pairwise comparison of these elements form a comparison matrix. Pairwise comparisons start from the top level of the hierarchy, where criteria are used as the basis for comparison.

2.9 Consistency Calculation in the AHP Method

The weight matrix obtained from the pairwise comparison results must have the following cardinal and ordinal relationships. The problem with the Analytical Hierarchy Process (AHP) method of measuring respondents' opinions is that consistency cannot be forced.[13] The collection of opinions between one criterion and another is independent of each other, and this can lead to inconsistent answers given.

Repeating interviews with a number of respondents at the same time is sometimes necessary if the degree of inconsistency or deviation from consistency is considered large. Deviations from consistency are expressed by the consistency index obtained by the formula:

$$CI = \frac{\lambda \text{ maks.} - n}{n - 1}$$

Where:
λ max = Maximum Vector Eigenvalue,
n = Matrix Size.

Random matrix with a rating scale of 1 to 9 and its inverse as the Random Index (RI). With a Random Index (RI) for each matrix order as shown in Table 1.

Table 1. Random Index

Order Matrix	1	2	3	4	5	6	7	8	9	10
RI	0	0	0.58	0.9	1.12	1.24	1.32	1.41	1.45	1.49

In the AHP Calculator application, it uses a linear equation to calculate the CR value:

$$CR = \frac{\lambda max - n}{2.7699n - 4.3513 - n}$$

For the AHP model, the comparison matrix is acceptable if the consistent proportion value is less than or equal to 10% or equal to 0.1. If the CR value is less than or equal to this value, it can be assumed that the evaluation of the matrix is acceptable or the matrix has good consistency.

$$CR = \frac{CI}{RI} \leq 0.1 \text{ (OKE)}$$

3. RESEARCH METHODS

This research uses a survey method. The survey method is a method of collecting primary data obtained directly from sources in the research field.[14] Direct collection of data and information and field facts is generally carried out through questionnaires and oral or written interviews and requires personal contact between researchers and respondents (subjects).

3.1 Research Location

The research location for determining road segment priorities was focused on secondary environmental roads in West Palu sub-district of Palu city, located in the Central Sulawesi Province. The roads were classified based on their function as secondary environmental roads. The research was planned to be conducted in August 2023.

3.2 Techniques of Data Collection

Data collection techniques refer to methods used to gather data. In this study, secondary data was obtained from relevant technical agencies while primary data was collected through direct interviews with respondents.

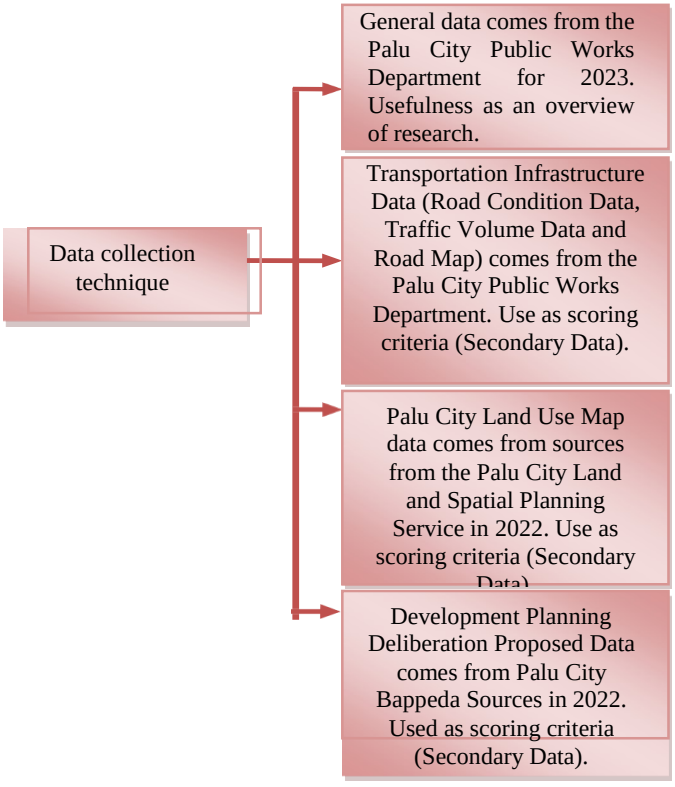


Figure 1. Data Collection Process

3.3 Research Variables

The variables used in this research consist of criteria/considerations which are the background for determining environmental road management priorities in Palu. The criteria used to determine priorities are determined based on literature, literature reviews, and references from similar research conducted previously.

In this research, the hierarchical level arrangement used in the Analytic Hierarchy Process (AHP) technique consists of three levels,[15] namely:

1. Level 1 (goal) is to determine the priority of environmental roads, which receive priority for routine and periodic environmental road management, road rehabilitation, road improvement, and widening of environmental roads.
2. Level II (Criteria) consists of several criteria for determining environmental road priorities. These criteria are Road Condition Factor (A), Traffic Volume Factor (B), Land Use Factor (C), and Musrenbang Proposed Factor (D).
3. Level III (Development of Level II, referred to as sub-criteria), sub-criteria for road conditions, traffic volume, land use, and Development Planning Deliberation proposals, obtained from secondary data from the relevant agencies.

3.4 Determination of Respondents

The respondents who participated in this research were knowledgeable policymakers with experience in road work.[16] They were selected based on their expertise in both theory and practice. The respondents included the following departments:

1) Department of Housing and Residential Areas of Palu City (8 respondents)
2) Palu City Public Works Department (6 respondents)
3) Central Sulawesi Province Land and Settlement Housing Department (2 respondents)
4) Department of Human Settlements and Water Resources of Central Sulawesi Province (2 respondents)

3.5 Level of Importance

Data relating to the sequence of criteria that serve as alternatives for selecting. Neighborhood roads with a pairwise comparison scale from 1 to 9. Number 1 is the respondent's answer code which indicates that the two items are equally important. Meanwhile, number 9 is a response code which indicates that one element is more important than other elements.

4. RESULTS AND DISCUSSION

Specifically, the research location for handling environmental roads is West Palu District. Based on its geographical position, West Palu District has the following regional boundaries:

Northside : Boundaries with Ulujadi District
East Side : Boundaries with East Palu District
South Side : Boundaries with Tatanga District
West Side : Boundaries with Donggala Regency and District. Sigi

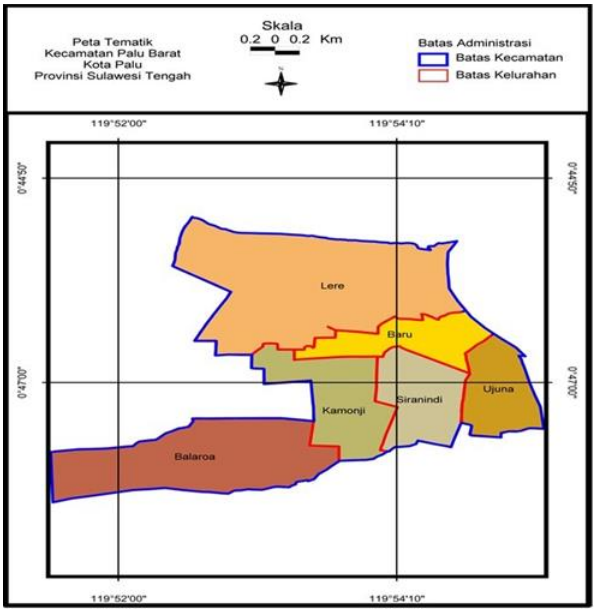


Figure 2. Map of research locations

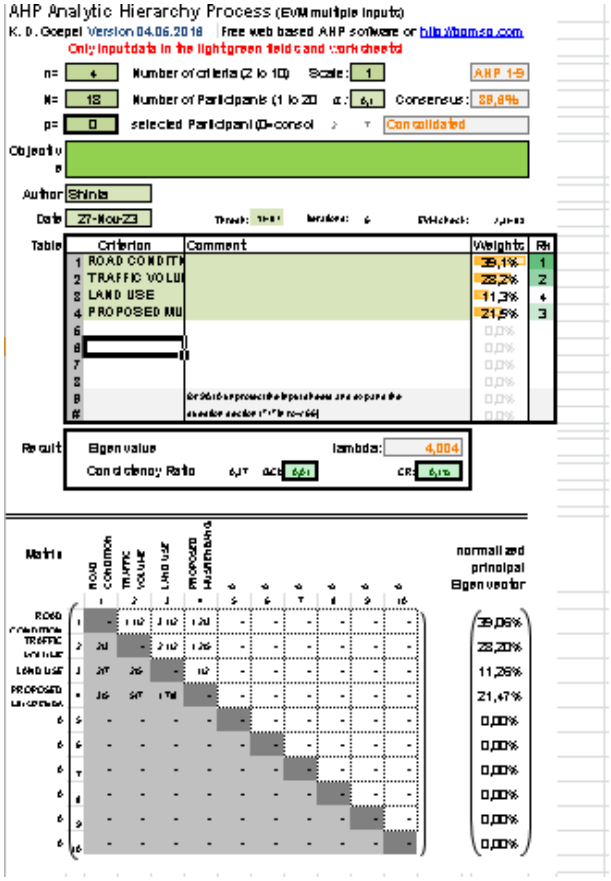
4.1 Hierarchy of Determining Road Handling Priorities

This study uses a multi-criteria analysis/AHP approach to establish a hierarchy for managing environmental road sections. The approach involved determining the weights of different criteria through pair-wise comparisons and calculating the criteria scores for each environmental road section based on the variables of each criterion.

4.2 Criteria Weighting

Based on the five existing criteria, the weighting is obtained based on the input results from respondent assessment data distributed through questionnaires/interviews (primary data), and the comparison matrix is acceptable if the consistent ratio value is no more than 10%. Analysis was carried out using the AHP Calculator v2013-12-24 application tool. The selected respondents are technically considered to know the problems regarding the research conducted by the author. The following are the analysis results obtained using the AHSP Calculator application as follows:

Table 2. Results of criteria weighting analysis



The results of the criteria weighting analysis conducted on all respondents from relevant government agencies in Palu City can be viewed in Figure 3. The analysis shows that the criteria that have the most significant influence on decision-making for prioritizing environmental road management in Palu City are road Condition, with a value of 39.10%; Traffic Volume, with a value of 28.10%; Development Planning Deliberation Proposal criteria, with a value of 21.50%, and system criteria a value of 11.30%. The consistency ratio (CR) of the analysis is 0.1% (<10%), which indicates that the criteria are reliable and dominant. Please refer to the diagram below for a visual representation of the final results of the criteria weighting analysis.

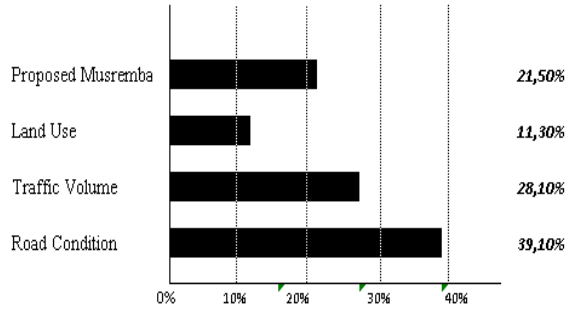


Figure 3. Relative Importance Weights Between Criteria

4.3 Scoring Criteria

Once the criteria weights are obtained, the next step is calculating the assessment (scoring) of alternatives (road sections) based on operational variables.

4.4 Scoring Criteria for Road Conditions

The scoring of road conditions is based on the condition variables of each road section.[17] The road condition data used is secondary data from the Palu City Road Infrastructure Basic Data database, which was collected during a survey by the Palu City Public Works Department in mid-2023. For instance, to calculate the scoring criteria for alternative environmental road sections, Jl. Asam I lr kel. Lere, the following calculations are performed:

The variable x value is obtained from the sum of the percentages of AHP results against road condition criteria = 3.91 + 2.45 + 0.00 + 0.00 = 6.36

Highest variable value in road condition criteria = 66.60
K1 Criteria Score = (X variable value)/(Highest variable value) × 10
= (6.36 /66.60) ×10
= 0.95

Then, calculate the Performance against the Road Condition Criteria as a Weighted Score, obtained by multiplying the Road Condition Criteria Scoring with the Road Condition Criteria Weight. For example, when calculating the scoring criteria for alternative environmental road sections, Jl. Asam I lr kel. Lere, the following calculations are used:

Road condition criteria weight = 39.10%
Criterion Performance K1 = Criterion Score × Criterion Weight
= 0.95 × 39.10%
= 0.37

Based on the calculation results, the priority preference for treatment based on road condition criteria, using primary road data in Palu city, is the environmental road section Jln.Srikaya Lr Sirsak II Kel. Kamonji.

4.5 Scoring Traffic Volume Criteria

The priority of a road in accommodating or serving a specific volume of traffic flow is determined by its role. The volume of traffic flow passing through a road section is the variable that serves as the basis for assessing the flow function. In this case, the Average Daily Traffic (LHR) value will be used. The LHR data used is secondary data from the results of the LHR survey in Palu City in 2020. For example, to calculate the scoring criteria for traffic volume on alternative environmental road sections, the calculation is done for Jl. Asam I lr kel. Lere using the following formula:
The value of the variable X is obtained from the average LHR Volume. The highest variable value is obtained from the average LHR volume for the traffic volume criteria = 4.579

Criterion score = (X variable value)/(Highest variable value) ×10
= (4,208 / 4,579) × 10
= 9.19

Then, calculate the Performance against the Traffic Volume Criteria as a Weighted Score, multiplying the Traffic Volume Criteria Scoring by the Traffic Volume Criteria Weight. For example, Calculating the scoring criteria for alternative environmental road sections on Jl. Asam I lr kel. Lere involves the following calculations:
Traffic volume criteria weight = 28.10%
K2 Criterion Performance = Criterion Score × K2 Criterion Weight
= 9.19 × 28.10%
= 2.58

The calculation results show that the priority preference for treatment based on the traffic volume criteria is the environmental road section Jl. H.O.S. Cokroaminoto Lr. Kel. Lere.

4.6 Scoring of Land Use Criteria

Alternative scoring on Land Use criteria is carried out by spatial superimposed analysis based on land use on the research road section, as shown in Table 3 below.

Table 3. Scoring assessment of land use

No.	Area	Value
1	Housing/Settlement	2
2	Trade and Services	2
3	Agriculture	2
4	Industry	2
5	Offices	2

As an example of the scoring criteria for land use on alternative environmental road sections, Jl. Asam I lr kel.Lere is a residential/settlement and trade/service area, so this is done using the following calculations:
The highest variable value is obtained from the highest value in the AHP matrix = 10
Criterion score = (X variable value)/(Highest variable value)×10
= (4 /10) ×10
= 4

Then, calculate the weighted score for land use criteria performance by multiplying the land use criteria scoring with the land use criteria weight. For Jl. Asam I lr kel. Lere, the calculations are as follows:

Land Use Criteria Weight = 11.30%
K2 Criteria Performance = Criterion Score x K2 Criteria Weight
= 4 × 11.30%
= 0.452

Based on the calculation results, the environmental road sections with the highest priority for treatment according to land use criteria are Jl. Durian lr Kel. Kamonji and Jl. Datu Pamusu Lr Depas Kel. Kamonji/Baru.

4.6 Scoring Criteria for Development Planning Deliberation Proposals

To calculate the scoring criteria for proposed Development Planning Deliberation on alternative environmental road sections, a score of 10 is given to the proposed road sections, and a score of 1 is given to those not. As an example, the proposed Development Planning Deliberation for Jl. Asam I lr kel. Lere is carried out using the following calculations:

Criterion score = (X variable value)/(Highest variable value)×10
= (1 /10) ×10
= 1

Then, calculate the Performance against the proposed Musrembang Criteria as a Weighted Score obtained by multiplying the Criteria Scoring proposed by Development Planning Deliberation with the Weight of the Criteria proposed by Development Planning Deliberation. For example, when calculating the scoring criteria for alternative environmental road sections, Jl. Asam I lr kel. Lere is carried out using the following calculations:

Weight of criteria for Proposed Musrembang = 21.50%
K2 Criterion Performance = Criterion Score × K2 Criterion Weight
= 1 × 21.50%
= 0.215

The calculation results show that the priority preference for treatment based on the proposed Development Planning Deliberation criteria is the environmental road section Jln. Srikaya Lr Sirsak II Kel. Kamonji, Jl. Mas Masyur Lr Kel. Baru, and Jl. Durian Lr Kel. Kamonji.

4.7 Priority Order for Road Handling

The priority order for handling environmental road sections produced in this research used five criteria: road condition, traffic volume, land use, and Development Planning Deliberation proposals; the result was that the environmental road section Jl/. Srikaya Lr Sirsak II Kel. Kamonji is the priority for treatment. The complete sequence of calculation results can be seen in Table 4 below:

Table 4. Priority order for road handling

Sequence No	No Segment	Neighborhood road section	criteria 1	criteria 2	criteria 3	criteria 4	Total
39	969	Jl. Srikaya Lr. Sirsak II Kel. Kamonji	3,91	1,56	0,45	2,15	8,08
26	476	Jl. Mas Mansyur Lr. Kel. Baru	3,91	1,15	0,45	2,15	7,66
33	966	Jl. Samudra II Lr. II Kel. Lere	3,91	1,41	0,23	0,22	5,78
19	453	Jl. Lasoso Lr. I Kel. Lere	2,64	2,65	0,23	0,22	5,74
13	766	Jl. Durian Lr. Kel. Kamonji	0,34	1,98	0,69	2,15	5,16
8	761	Jl. Durian Lr. Kel. Lere	1,93	2,44	0,45	0,22	5,04
46	919	Jl. Tolambo Lr. Bulava Jl. Kel. Kamonji	0,34	2,09	0,45	2,15	5,03
15	793	Jl. Lasadungkara Lr. Kel. Baru	0,44	1,75	0,45	2,15	4,79
29	443	Jl. Pababu Lr. Kel. Balaroa	0,34	1,99	0,23	2,15	4,71
24	466	Jl. Lombok Lr. II Kel. Kamonji	0,34	1,69	0,45	2,15	4,63
22	454	Jl. Lombok Lr. I Kel. Kamonji	0,34	1,82	0,23	2,15	4,54
47	946	Jl. Tolambo Lr. I Kel. Kamonji	0,34	1,78	0,23	2,15	4,50
36	444	Jl. Pababu Lr. I Kel. Balaroa	0,34	1,68	0,23	2,15	4,40
21	459	Jl. Lombok Lr. II Kel. Kamonji	0,44	1,25	0,45	2,15	4,29
7	759	Jl. Kasuari Lr. Kel. Lere	0,34	2,69	0,45	0,22	3,70
25	464	Jl. Tinggi Lr. Kel. Kamonji	0,44	0,63	0,45	2,15	3,67
1	751	Jl. Kasuari I Lr. Kel. Lere	0,37	2,59	0,45	0,22	3,63
10	791	Jl. [illegible] Lr. Kel. Siranindi	0,34	2,81	0,23	0,22	3,59
4	755	Jl. Kasuari II Lr. II Kel. Lere	0,34	2,56	0,45	0,22	3,57
12	743	Jl. Dg. Pawindu Lr. Dapur Kel. Kamonji Baru	0,34	2,47	0,69	0,22	3,70
28	454	Jl. Lasoso Lr. II Kel. Lere	0,34	2,67	0,23	0,22	3,45
2	753	Jl. Kasuari II Lr. I Kel. Lere	0,34	2,45	0,45	0,22	3,45
38	968	Jl. Siranindi Lr. Kel. Siranindi	0,34	0,63	0,23	2,15	3,34
9	762	Jl. Durian Lr. II Kel. Lere	0,34	2,13	0,45	0,22	3,14
5	756	Jl. Kasuari II Lr. IV Kel. Lere	0,34	1,91	0,45	0,22	2,91
3	754	Jl. Kasuari II Lr. III Kel. Lere	0,34	1,86	0,45	0,22	2,86
49	943	Jl. WR. Supratman Lr. Kel. Kamonji	0,34	1,85	0,45	0,22	2,86
42	926	Jl. Sungai Sumpu Lr. I Kel. Ujuna	0,44	1,90	0,23	0,22	2,80
31	456	Jl. Lasoso Lr. V Kel. Lere	0,34	1,97	0,23	0,22	2,75
46	918	Jl. Sungai Manonda Lr. Manonda Kel. Balaroa	0,40	1,83	0,23	0,22	2,67
45	917	Jl. Tembang Lr. II Kel. Lere	0,54	1,69	0,23	0,22	2,67
41	925	Jl. Sungai Sausu Lr. Kel. Ujuna	0,44	1,54	0,45	0,22	2,65
16	741	Jl. Dg. Pawindu Lr. Dg. Pawindu I Kel. Kamonji Baru	0,34	1,56	0,23	0,22	2,34
44	916	Jl. Tembang Lr. I Kel. Lere	0,34	1,51	0,23	0,22	2,30
16	794	Jl. Lajamba Lr. Lajamba Mareh Kel. Siranindi	0,34	1,49	0,23	0,22	2,27
48	941	Jl. Wahid Hasyim Lr. Kel. Baru	0,34	1,23	0,45	0,22	2,24
17	435	Jl. Kemiri Lr. Kel. Kamonji	0,34	1,17	0,45	0,22	2,18
43	915	Jl. Tembang Lr. Kel. Lere	0,38	1,34	0,23	0,22	2,17
34	961	Jl. Samudra II Lr. II Kel. Lere	0,44	1,26	0,23	0,22	2,14
27	478	Jl. [illegible] II Lr. Kel. Siranindi	0,44	1,24	0,23	0,22	2,13
35	962	Jl. Samudra II Lr. Hanafi Kel. Lere	0,34	1,34	0,23	0,22	2,13
36	963	Jl. Samudra Lr. Bagia Kel. Lere	0,44	1,22	0,23	0,22	2,10
11	742	Jl. Dg. Pawindu Lr. Kel. Kamonji Baru	0,34	1,27	0,23	0,22	2,05
28	479	Jl. [illegible] Lr. I Kel. Siranindi	0,34	1,26	0,23	0,22	2,04
32	499	Jl. Samudra II Lr. I Kel. Lere	0,34	1,07	0,23	0,22	1,85
31	458	Jl. Samudra II Lr. [illegible] Kel. Lere	0,34	1,01	0,23	0,22	1,79
18	452	Jl. Lasoso Lr. Kel. Lere	0,34	0,74	0,23	0,22	1,52
37	964	Jl. Samudra Lr. V Kel. Lere	0,34	0,63	0,23	0,22	1,41

Based on the order of priority road sections from the research results, a type of treatment for each road section is proposed, namely Maintaining the condition of road stability by carrying out maintenance activities (routine maintenance, periodic maintenance, and rehabilitation) because road maintenance is the highest priority of all types—road handling.

The research results show that the highest priority for handling road sections is determined by road condition criteria, followed by traffic volume criteria. These findings are similar to those of previous research.

5. CONCLUSION

Based on the results of research and discussion, the following conclusions can be drawn:

Determining priorities for handling environmental roads in Palu City, particularly in West Palu District, is done using a multi-criteria analysis method based on five criteria, including road conditions, traffic volume, land use, and development planning deliberation proposals. The relative importance weight between the five criteria, which are compared in pairs based on data from respondents' preference results from relevant government agencies with a consistency ratio (CR) value of 0.1% (<10%), road condition and traffic volume criteria are the most dominant criteria with The relative importance weight is Road Condition 39.10%, Traffic Volume 28.10%, Development Planning Deliberation proposal criteria 21.50%, and land use criteria 11.30%. The final results of the analysis by weighting criteria and scoring criteria based on operational criteria variables obtained that the top 5 rankings for treatment priorities on environmental roads are Jl. Srikaya Lr. Sirsak II Kel. Kamonji, Jl. Mas Mansyur Lr Kel. Baru, Jl. Samudra II Lr II Kel. Lere, Jl. Lasoso Lr I Kel. Lere, and Jl. Durian Lr Kel. Kamonji.

The results of the current research compared with previous research show several similarities, namely that the highest priority for handling road sections is obtained from road condition criteria and followed by traffic volume criteria.

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