Priority Analysis Of Administrative Building Maintenance At Pratama Sumber Harapan Hospital, Nasal District, Kaur Regency, Bengkulu Province, Using The Analytical Hierarchy Process (Ahp) Method

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Abstract

The maintenance of hospital buildings plays a critical role in ensuring the sustainability of healthcare services, especially in rural areas with limited access and resources. This study aims to analyze the maintenance priority scale of the Administrative Building of Sumber Harapan Pratama Hospital, located in Nasal District, Kaur Regency, using the Analytical Hierarchy Process (AHP) method. This is a descriptive-evaluative study with a quantitative approach. Primary data were obtained through direct observation of building conditions and questionnaires distributed to six technical informants. The weighting results indicate that the architectural aspect holds the highest priority (0.365), followed by structural (0.196), mechanical (0.151), electrical (0.150), and outdoor spatial planning (0.139). Within the architectural aspect, roof covering is the top sub-criterion (0.382), while the foundation dominates the structural aspect (0.458). Air conditioning (AC) was identified as the highest priority in the electrical aspect (0.538), and wastewater drainage ranked highest in the mechanical aspect (0.552). In the outdoor spatial category, hardscape received the highest weight (0.366). These findings suggest that AHP is an effective tool for objectively determining maintenance priorities in healthcare facilitie.

***Keywords**: Building maintenance, Pratama Hospital, AHP, priority scale, healthcare infrastructur.*

INTRODUCTION

The rapid pace of national development has driven significant growth in the construction sector, marked by the increasing number and complexity of buildings across various regions. Buildings not only serve as spaces for activities but also constitute vital infrastructure that supports various aspects of social, economic, and governmental life. Properly designed, managed, and maintained buildings contribute directly to the effectiveness and efficiency of the functions they serve (Siddiq & Dharmawan, 2023).

According to the Regulation of the Minister of Public Works No. 24/PRT/M/2008, a building is defined as a physical structure resulting from construction works that is integrated with its site, either above or below ground and/or water, and is used as a place for human activities. These activities encompass residential, religious, business, social, cultural, as well as other special functions. In this context, state-owned buildings, including healthcare facilities such as hospitals, are strategic assets funded through the State Budget (APBN), the Regional Budget (APBD), or other legitimate financing sources (Awainah et al., 2024).

One of the main challenges in managing public assets is the decline in building quality due to aging, environmental factors, and usage intensity. This condition poses risks to user safety and may disrupt service delivery, particularly in the health sector where constant readiness is essential.

Pratama Sumber Harapan Hospital in Nasal District is a class D healthcare facility serving rural communities with limited access. The hospital is assumed to have been built using the Special Allocation Fund (DAK) to provide basic healthcare services. Among the hospital's key structures, the Administration Building plays a crucial role as the center of managerial activities, archiving, and inter-unit coordination.

The poor physical condition of the Administration Building can significantly impact the overall operational efficiency of the hospital. One of the main recurring challenges is the deterioration of building quality due to age, environmental influence, and high usage intensity. Damage or disruptions to critical elements, such as staff workspaces, lighting systems, archival security, and supporting facilities, can hinder administrative processes, including patient registration, medical logistics management, and coordination across service units. If left unaddressed, this situation has the potential to lower the quality of healthcare services provided to the community.

Building maintenance includes a series of activities such as periodic inspections, replacement of damaged components, and repairs based on need and urgency analyses. Priority-based maintenance not only extends the building's lifespan but also helps avoid unexpected costs arising from major damages that could have been prevented (Pranowo, 2019).

Most decision-making in building maintenance has so far remained conventional, relying heavily on subjective managerial considerations. This often results in inaccurate prioritization of maintenance actions, ultimately affecting budget allocation effectiveness and the continuity of building functions.

Previous studies have discussed building maintenance in general and the importance of public asset management (Soemitro & Suprayitno, 2018; Herlinda & Fitriani, 2023; Permana, 2024). Research by Faulinda and Sunanungsih (2020) also examined building maintenance procedures but did not specifically emphasize priority-scale analysis, particularly using structured quantitative approaches. Meanwhile, studies that specifically address maintenance strategies for class D hospitals in remote areas remain very limited. Moreover, few studies have integrated quantitative decision-making methods such as the Analytical Hierarchy Process (AHP) in prioritization, leaving a research gap that needs to be filled to support the optimal and sustainable management of healthcare facilities.

This study responds to the lack of research specifically addressing hospital building maintenance systems in rural areas using measurable quantitative approaches. So far, decision-making in prioritizing building maintenance has been dominated by subjective judgment, without systematic analytical methods. In this context, AHP is introduced as an alternative approach capable of objectively determining maintenance priorities through weighting relevant criteria.

The AHP method allows for more structured and transparent decision-making, thereby improving efficiency in asset management, particularly in healthcare facilities (Magdalena et al., 2025). By integrating various assessment dimensions such as technical, operational, environmental, and safety aspects, AHP has the potential to become a strategic instrument in supporting the sustainability of hospital building functions.

Aligned with the efforts to achieve the Sustainable Development Goals (SDGs), this study supports:

1. Goal 3: Good Health and Well-being, by ensuring the provision of safe and quality healthcare services through adequate building conditions;
2. Goal 9: Industry, Innovation, and Infrastructure, particularly the target of building reliable and sustainable public infrastructure; and
3. Goal 11: Sustainable Cities and Communities, by strengthening the management of public infrastructure in rural areas (United Nations, 2023).

The urgency of this research lies in the importance of maintaining the physical and operational feasibility of Pratama Sumber Harapan Hospital in Nasal District as part of basic healthcare service provision in remote areas. Considering budget limitations and the high demand for reliable buildings, an approach is needed that can produce targeted maintenance decisions. The application of AHP in this context is expected to optimize resource allocation and strengthen managerial capabilities in healthcare infrastructure maintenance planning.

Based on the background outlined above, this study is entitled:

Priority Scale Analysis of the Maintenance of the Administration Building of Pratama Sumber Harapan Hospital, Nasal District, Using the Analytical Hierarchy Process (AHP) Method.

LITERATURE REVIEW

The performance of supervisory consultants is a critical element in the success of construction projects, as it is directly related to quality, cost, and implementation time. According to Lock (2007), effective supervision is strongly influenced by an understanding of the scope of work and the work contract. Errors in contract interpretation can lead to conflicts during project execution (Rustiadi et al., 2020).

In addition to contracts, understanding technical specifications also serves as an indicator of consultant professionalism. Pontan (2024) states that supervisory consultants must be able to ensure the consistent application of technical specifications. Findings by Widodo et al. (2019) further emphasize that technical deviations can cause project delays.

Material supervision plays a strategic role in ensuring the quality of work. Sin (2023) asserts that material quality control is a core component of project quality management. The labor factor also presents its own challenges. Hamali et al. (2023) mention that labor supervision is complex, as it involves skills, motivation, and social dynamics that influence productivity.

The effectiveness of equipment utilization also determines project success. Kerzner (2017) highlights that good equipment management can enhance time efficiency in project implementation. Meanwhile, uncontrolled work execution methods can reduce quality and lead to delays (Widodo et al., 2019).

Beyond technical aspects, compliance with local regulations and the implementation of Occupational Safety and Health (OSH) are equally important. According to Cantika & Sofyan (2024), OSH implementation is not merely regulatory compliance but also contributes to increased productivity and worker morale.

Therefore, this study emphasizes seven key factors of supervisory consultant performanc, namely: contract comprehension, technical specifications, material supervision, labor supervision, equipment utilization, work execution methods, and compliance with regulations and OSH.

RESEARCH METHODS

This study employs a quantitative approach with a descriptive-evaluative method. The analysis was conducted using the Analytical Hierarchy Process (AHP) to determine the maintenance priorities of the administration building at Pratama Sumber Harapan Hospital, Nasal District. The data used consisted of both primary and secondary sources. Primary data were obtained through direct observation of the building's physical condition, interviews with stakeholders involved in building maintenance, and questionnaires distributed to selected respondents. Secondary data were collected from relevant literature and regulations, including the Regulation of the Minister of Public Works No. 24/PRT/M/2008 on Building Maintenance, Regulation of the Minister of Public Works No. 45/PRT/M/2007, Regulation of the Minister of National Education No. 24/2007, textbooks on the Analytical Hierarchy Process, as well as previous studies supporting the analysis.

The respondents in this study consisted of six individuals, comprising decision-makers and professionals with knowledge and experience in building maintenance. Respondent selection was carried out using a purposive-random sampling technique, which involves selecting participants based on their competence and direct involvement in building maintenance while still retaining a limited random element.

The collected data were then analyzed using the Analytical Hierarchy Process (AHP). The stages of analysis included: constructing a hierarchical structure of the problem, developing pairwise comparison matrices based on respondents' assessments, calculating eigenvector values to determine priority weights, normalizing the comparison matrices, and testing consistency using the Consistency Ratio (CR). The results of this analysis were subsequently used to determine the priority alternatives for maintaining the administration building of Pratama Sumber Harapan Hospital in Nasal District.

Fundamentally, there are three steps in decision-making with AHP: hierarchy construction, assessment, and priority synthesis.

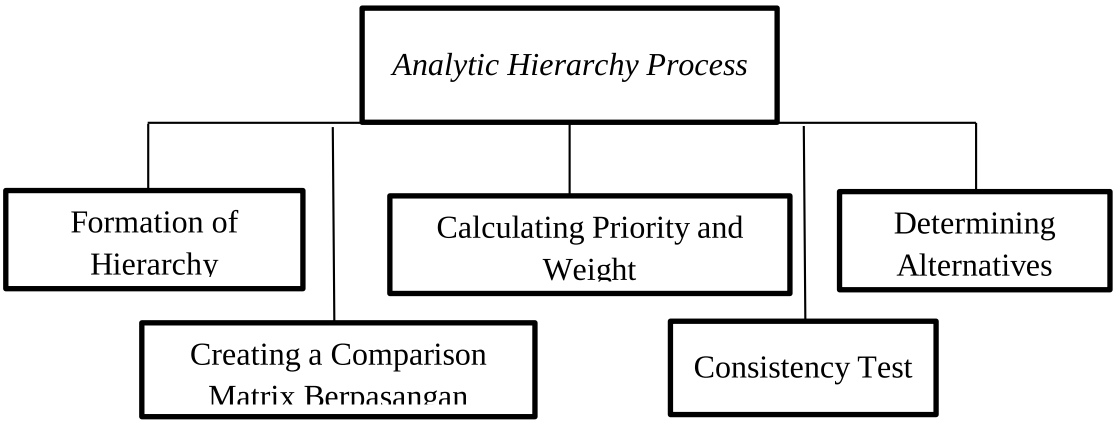

Figure 1 AHP Method Coverage

RESEARCH RESULT

The data collected in this study is based on 5 criteria consisting of several sub-criteria as follows:

Table 1. Initial Criteria Used to Determine Priority Scale

No	Kriteria	Sub Kriteria
1	Architectural	Roof Covering Ceiling Walls and Partitions Doors and Windows Floors
2	Structural	Substructure Superstructure Roof Structure
3	Electrical	Air Conditioning Electricity

		Fire Prevention and Suppression Systems Telecommunications
4	Mechanical	Sewerage Clean Water Channels Rainwater Flow
5	Outdoor Layout	Landscapes Hardscape Sewer Kitchen

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The above criteria were selected based on general damage found during field observations and refer to the technical standards of PUPR Ministerial Regulation No. 24 of 2008 concerning Guidelines for Building Maintenance and Care. Each aspect contributes to the overall functioning of the hospital service system.

Determining the Weighting of the Administration Building Maintenance Criteria Assessment

After identifying the criteria used in assessing the priority scale for maintenance of the Pratama Sumber Harapan Hospital Administration Building, the next step was to determine the weighting or importance of each criterion. The weighting was based on respondents' perceptions of the urgency of each criterion in supporting the functioning and sustainability of the hospital building. Each respondent's perceptions regarding the "Criteria" are tabulated as shown in Table 4.3.

Table 2 Summary of Respondents' Answers to "Criteria"

Respondent	RESPONDENT PERCEPTION																			
	A:B		A: C		A:D		A: E		B:C		B:D		B: E		C:D		C: E		D: E	
R1	1	9	6	1	1	3	1	5	1	7	1	7	1	9	1	6	3	1	1	6
R2	1	4	1	6	5	1	4	1	1	5	4	1	1	4	1	6	1	5	1	6
R3	9	1	8	1	4	1	5	1	4	1	5	1	4	1	5	1	4	1	3	1
R4	1	9	1	6	3	1	1	5	1	7	1	5	1	9	1	6	1	7	1	6
R5	1	9	6	1	5	1	1	6	5	1	1	6	1	9	1	7	5	1	6	1
R6	1	5	2	1	1	4	1	6	1	4	1	6	1	5	1	8	1	4	1	8

Source: Data Processing Results by the Author, 2025

Description:

A:B= Comparison of architectural and structural aspects.

A:C= Comparison of architectural and electrical aspects.

A:D= Comparison of architectural and mechanical aspects.

A:E= Comparison of architectural and exterior design aspects.

B:C through D:E follow the same pattern. serupa.

Example of data interpretation:

A:B rating given a scale of 9 means the Structural Aspect is much more important than the Architectural Aspect.

A:C rating given a scale of 6 means the Architectural Aspect is more important than the Electrical Aspect.

The weighting of each criterion (Architectural, Structural, Electrical, Mechanical, and Exterior Layout) was analyzed using the Analytical Hierarchy Process (AHP) method with the following steps:

Preparing a Pairwise Comparison Matrix

The pairwise comparison matrix was prepared based on the summary of respondents' assessments of the importance of each criterion, as shown in Table 4.3. The values provided by respondents were then processed into a matrix for further analysis. In this matrix construction process, each comparison value was examined based on the order of its position between criteria. For example, if a respondent gave a score of 5 for C as more important than A, then in the matrix, the value of A versus C would be changed to 1/5 or 0.20. On the other hand, if the order of the criteria in the assessment matches the order in the matrix, then the values do not need to be reversed.

Table 3 Comparison Scale of "Criteria" Assessment

Respondent	Respondent Perception									
	AB	AC	AD	AE	BC	BD	BE	CD	CE	DE
R1	0.11	6.00	0.33	0.20	0.14	0.14	0.11	0.17	3.00	0.17
R2	0.25	0.17	5.00	4.00	0.20	4.00	0.25	0.17	0.20	0.17
R3	0.11	6.00	5.00	0.17	5.00	0.17	0.11	0.14	5.00	6.00
R4	0.20	2.00	0.25	0.17	0.25	0.17	0.20	0.13	0.25	0.13
R5	9.00	8.00	4.00	5.00	4.00	5.00	4.00	5.00	4.00	3.00
R6	0.11	0.17	3.00	0.20	0.14	0.20	0.11	0.17	0.14	0.17
∑R	9.78	22.33	17.58	9.73	9.74	9.68	4.78	5.77	12.59	9.63
∑R/6	1.63	3.72	2.93	1.62	1.62	1.61	0.80	0.96	2.10	1.60

Source: Data Processing Results by the Author, 2025

Explanation:

∑ R = The cumulative total of the comparison scale assessments.

R/6 = The average assessment obtained by dividing R by the 6 respondents.

The value used in the analysis is the cumulative average (R/6). In the diagonal matrix, AA = BB = CC = DD = EE = 1, since each factor is compared to itself. The resulting matrix size for each criterion is presented in the following table. This table shows the comparison results from six respondents for each pair of criteria. After summation, the values were divided to obtain the average, which then served as the basis for constructing the matrix:

Table 4. Average Values of the Comparison Assessments of "Criteria"

Criteria Pair	Average value	Criteria Pair	Average value
A:B	1.63	B:A	0.61
A:C	3.72	C:A	0.27
A:D	2.93	D:A	0.34
A:E	1.62	E:A	0.62
B:C	1.62	C:B	0.62
B:D	1.61	D:B	0.62
B:E	0.80	E:B	1.25
C:D	0.96	D:C	1.04
C:E	2.10	E:C	0.48
D:E	1.60	E:D	0.62

From these average values, we construct an initial comparison matrix between criteria. In the matrix, the comparison value for one direction is entered directly, while the comparison value for the opposite direction is calculated by inverting the value (1 divided by the existing value). For each criterion compared to itself, the value is 1 because they have the same weight. The following is the initial comparison matrix between criteria:

Table 5 Initial Research Matrix

	A	B	C	D	E
A	1.00	1.63	3.72	2.93	1.62
B	0.61	1.00	1.62	1.61	0.80
C	0.27	0.62	1.00	0.96	2.10
D	0.34	0.62	1.04	1.00	1.60
E	0.62	1.25	0.48	0.62	1.00

Source: Data Processing Results by the Author, 2025

Eigenvector Calculation

The next step after constructing the pairwise comparison matrix is to calculate the eigenvector, or the weights of each criterion. The eigenvector represents the relative importance of each compared criterion.

Step 1: Multiply all the values in each row, as shown below:

Row A = 1.00 × 1.63 × 3.72 × 2.93 × 1.62 = 28.80

Row B = 0.61 × 1.00 × 1.62 × 1.61 × 0.80 = 1.27

Row C = 0.27 × 0.62 × 1.00 × 0.96 × 2.10 = 0.34

Row D = 0.34 × 0.62 × 1.04 × 1.00 × 1.60 = 0.35

Row E = 0.62 × 1.25 × 0.48 × 0.62 × 1.00 = 0.23

Step 2: Calculate the fifth root of each product:

$w_i = \sqrt[n]{\text{Row Product}}$, where n = matrix size (5 × 5).

$w_A = \sqrt[5]{28.80} = 2.03$

$w_B = \sqrt[5]{1.27} = 1.07$

$w_C = \sqrt[5]{0.34} = 0.70$

$w_D = \sqrt[5]{0.35} = 0.71$

$w_E = \sqrt[5]{0.23} = 0.66$

Step 3: Normalization, by summing all the root values and dividing each value by the total:

Total = 2.03 + 1.07 + 0.70 + 0.71 + 0.66 = 5.17

Table 6. Normalized Eigenvectors of Each Criterion

Criteria	5th Root	Priority Weight (Eigenvector)
Architectural (A)	2.03	2.03 / 5.17 = 0.393
Structural (B)	1.07	1.07 / 5.17 = 0.207
Electrical (C)	0.70	0.70 / 5.17 = 0.135
Mechanical (D)	0.71	0.71 / 5.17 = 0.137
Exterior Layout (E)	0.66	0.66 / 5.17 = 0.128

Table 7 Eigenvalues of Vectors

	A	B	C	D	E	Jumlah Baris	wi	Eigen Vektor
A	1.00	1.63	3.72	2.93	1.62	28.85	1.96	0.365
B	0.61	1.00	1.62	1.61	0.80	1.28	1.05	0.196
C	0.27	0.62	1.00	0.96	2.10	0.33	0.80	0.150
D	0.34	0.62	1.04	1.00	1.60	0.35	0.81	0.151
E	0.62	1.25	0.48	0.62	1.00	0.23	0.75	0.139
∑						31.05	5.37	1.00

Source: Data Processing Results by the Author, 2025

Calculating the Maximum Eigenvalue.

After obtaining the priority weights (eigenvectors) for each criterion, the next step is to calculate the maximum eigenvalue. This value is obtained by multiplying each row in the initial matrix (Table 4.5) by the weight (eigenvector) of each column, then summing the results**.**

$$\begin{vmatrix} 1 & 1,63 & 3,72 & 2,93 & 1,62 \\ 0,61 & 1 & 1,62 & 1,61 & 0,80 \\ 0,27 & 0,62 & 1 & 1,96 & 2,10 \\ 0,34 & 0,62 & 1,04 & 1 & 1,60 \\ 0,62 & 1,25 & 0,48 & 0,62 & 1 \end{vmatrix} \times \begin{vmatrix} 0,365 \\ 0,196 \\ 0,150 \\ 0,151 \\ 0,139 \end{vmatrix} = \begin{vmatrix} 1,91 \\ 1,02 \\ 0,80 \\ 0,78 \\ 0,77 \end{vmatrix}$$

Jumlah = 5,28

So that the Max Eigen is obtained $(\lambda_{maks}) = \sum a_{ij}X_j = 5,28$

Consistency Index (CI) Calculation.

The Consistency Index is calculated as follows: where n represents the matrix size,

$$(CI) = \frac{\lambda_{maks} - n}{n-1} = \frac{5,28 - 5}{5 - 1} = 0,070$$

Next, determine the Random Index (RI) value, it is known that there are 5 (five) criteria so that n = 5.

Table 8 RI (Random Index) Values

n	1	2	3	4	5	6	7	8	9	10	11
RI	0	0	0,58	0,9	1,12	1,24	1,32	1,41	1,45	1,49	1,51

Source: Marimin, 2014

Consistency Ratio Calculation

The Consistency Ratio* (CR) is calculated as follows: with $n = 5$, the Random Index (RI) = 1.12.

CR = \frac{CI}{RI} = \frac{0.070}{1.12} = 0.062

Since the Consistency Ratio (CR) value is less than 0.1, it indicates that the pairwise comparison matrix used meets the consistency requirement. In other words, $CR < 0.1$ shows that the respondents provided logical and stable judgments. Therefore, the resulting priority weights can be used as a basis for decision-making in the maintenance of the hospital administration building.

Criteria Weighting

The weight of each element is obtained from the *eigenvector* values, expressed as percentages, as presented in the following table:

Table 4.9 Criteria Weighting and Priority Ranking

Criteria	Weight	Order of Priority
Architectural Aspects	0.365	1
Structural Aspects	0.196	2
Electrical Aspects	0.150	4
Mechanical Aspects	0.151	3
Exterior Layout Aspects	0.139	5
Number	1,00	-

Source: Data Processing Results by the Author, 2025

From the table above, the weight of each criterion using the AHP method can be expressed in the following evaluation formula (Y):

$Y = (0.365 \times \text{Architectural}) + (0.196 \times \text{Structural}) + (0.150 \times \text{Electrical}) + (0.151 \times \text{Mechanical}) + (0.139 \times \text{Exterior Layout})$

Based on the AHP calculation, it can be concluded that the Architectural aspect has the highest weight of 0.365 or 36.5%, making it the top priority in building maintenance activities. Next, the Structural aspect ranks second with a weight of 0.196 or 19.6%, indicating a fairly high level of importance in maintaining building stability and safety.

The Electrical and Mechanical aspects have weights of 0.150 and 0.151, respectively—both approximately 15%. This shows that these two aspects hold nearly equal priority, ranking third. Finally, the Exterior Layout aspect has the smallest weight of 0.139 or 13.9%, thus becoming the last priority in the maintenance scale.

Sub-Criteria Weighting for the Architectural Aspect

The sub-criteria within the architectural aspect consist of five main elements: roof covering, ceiling, walls and partitions, doors and windows, and flooring. The weighting of each sub-criterion in the architectural aspect was determined based on the eigenvector calculation results. These weights are then expressed in percentage form and used to determine the priority order of building element maintenance. The details of the weights and priority ranking are presented in the following table 10:

Table 10 Architectural Weighting and Priority Order

Criteria	Weight	Order of Priority
Roof Covering	0.382	1
Ceiling	0.262	2
Walls and Partitions	0.121	4
Doors and Windows	0.141	3
Floors	0.095	5
Number of	1,00	-

Source: Data Processing Results by the Author, 2025

The table above shows the weighting of each criterion using the AHP method. The following assessment formula (Y) is obtained:

$Y = (0.382 \times \text{Roof Covering}) + (0.262 \times \text{Ceiling}) + (0.141 \times \text{Doors and Windows}) + (0.121 \times \text{Walls and Partitions}) + (0.095 \times \text{Floor})$

Based on the weighting results, it can be concluded that "Roof Covering" is the most prioritized element in the architectural aspect, with the highest weighting of 38.2%, indicating its important role in the building's physical protection from external factors such as weather.

The next sub-criteria that also require attention are "Ceiling" with a weighting of 26.2%, and "Doors and Windows" with 14.1%. Both contribute to comfort, air circulation, and building access and security.

Meanwhile, "Walls and Partitions" (12.1%) and "Floors" (9.5%) have lower weights, ranking fourth and fifth in maintenance priority. Nevertheless, both remain integral to the overall function and aesthetics of the building.

Structural Aspect Sub-Criteria Assessment Weighting

Element weights are derived from the Eigenvector values expressed as percentages, as shown in the following table:

Table 11: Structural Sub-Criteria Priority Order

Criteria	Weight	Order of Priority
Substructure	0.458	1
Superstructure	0.262	3
Roof Structure	0.280	2

Source: Data Processing Results by the Author, 2025

The weighting of each criterion using the AHP method yields the following assessment formula (Y):

Y = (0.458 × Substructure) + (0.280 × Roof Structure) + (0.262 × Superstructure)

Based on this table, it can be concluded that the substructure has the highest priority within the structural aspect, with a weighting of 45.8%. This demonstrates the importance of the strength of the foundation and basic building elements in ensuring the overall stability of the building structure.

The roof structure sub-criterion ranks second with a weighting of 28.0%, followed by the superstructure with a weighting of 26.2%. Although the difference is not significant, this order provides priority direction for implementing physical maintenance on the structural aspect.

Electrical Aspect Sub-Criteria Assessment Weighting

This aspect consists of four main sub-criteria: Air Conditioning, Electricity, Fire Prevention and Suppression Systems, and Telecommunications. The element weights are obtained from the Eigenvector values expressed as percentages, as shown in the following table:

Table 12 Weighting and Priority Order of Electrical Aspect Sub-Criteria

Criteria	Weight	Order of Priority
Air Conditioning	0.538	1
Electricity	0.143	3
Fire Prevention and Suppression Systems	0.183	2
Telecommunications	0.136	4

Source: Data Processing Results by the Author, 2025

The weighting of each criterion using the AHP method yielded the following assessment formula (Y):

Y = (0.538 × AC) + (0.183 × Fire Prevention) + (0.143 × Electrical) + (0.136 × Telecommunications)

Based on these results, the Air Conditioning (AC) sub-criterion received the highest weighting of 0.538 (53.8%), making it the top priority in electrical system maintenance. This indicates that respondents considered room temperature comfort to be the most crucial factor in supporting hospital service functions.

Furthermore, the Fire Prevention and Suppression System ranked second with a weighting of 0.183 (18.3%), confirming the importance of safety aspects in hospital building operations. The Electrical System and Telecommunications sub-criteria received weightings of 0.143 and 0.136, respectively, ranking third and fourth.

Mechanical Aspect Sub-Criteria Assessment Weighting

In this study, the mechanical aspect consists of three sub-criteria: Wastewater Channels, Clean Water Channels, and Rainwater Channels. Element weights are obtained from the eigenvector values expressed as percentages, as shown in the following table:

Table 13: Weighting and Priority Order of Mechanical Aspect Sub-Criteria

Kriteria	Weight	Order of Priority
Saluran aiar Kotor	0.552	1
Saluran Air Bersih	0.247	2
Aaluran Air Hujan	0.201	3

Source: Data Processing Results by the Author, 2025

The weighting of each criterion using the AHP method yields the following assessment formula (Y):

Y = (0.552 × Wastewater Channels) + (0.247 × Clean Water Channels) + (0.201 × Rainwater Channels)

Based on the table above, the Wastewater Channels sub-criterion has the highest weighting of 0.552 (55.2%), making it the most important consideration in mechanical maintenance activities. Next comes Clean Water Channels with a weighting of 0.247 (24.7%), and finally, Rainwater Channels with a weighting of 0.201 (20.1%).

Exterior Layout Sub-Criteria Assessment Weight

The exterior layout aspect is divided into four sub-criteria: Landscape, Hardscape, Drainage Channels, and Fences. The element weights are obtained from the Eigenvector values expressed as percentages as shown in the following table:

Table 14 Weighting and Priority Order of Sub-Criteria for the Outdoor Spatial Aspect

Criteria	Weight	Order of Priority
Landscape	0.326	2
Hardscape	0.366	1
Saluran Pembungan	0.208	3
Pagar	0.101	4

Source: Data Processing Results by the Author, 2025

Based on the table above, it can be concluded that Hardscape has the highest weighting, at 0.366 (36.6%), making it the most prioritized sub-criterion in outdoor maintenance activities. This is followed by Landscape with a weighting of 0.326 (32.6%), Drainage with 0.208 (20.8%), and Fences with the lowest weighting, at 0.101 (10.1%).

The formula for prioritizing exterior layout aspects based on AHP weighting is as follows:

Y = (0.366 × Hardscape) + (0.326 × Landscape) + (0.208 × Drainage) + (0.101 × Fence)

This finding aligns with the building facility maintenance theory proposed by Shohet (2003), which states that physical components (architectural and structural) must receive primary attention in the maintenance system because they serve as the primary framework supporting service activities and building safety.

Conclusion

Based on the data processing and discussion regarding the maintenance priorities of the Pratama Sumber Harapan Hospital Administration Building, the following conclusions can be drawn:

The criteria underlying the maintenance priorities of the Pratama Sumber Harapan Hospital Administration Building are architectural, structural, electrical, mechanical, and spatial aspects.

The assessment results indicate that the architectural aspect holds the highest priority with a weighting of 0.365, as it encompasses the main physical components of the building and directly impacts the comfort and safety of building users. The sub-criteria are prioritized in order of priority: roof covering, ceiling, doors and windows, walls and partitions, and finally, floors.

The next priority is the mechanical aspect, with a weight of 0.151, reflecting the importance of building utility systems such as water sanitation. The sub-criteria with maintenance priority in this aspect are: sewerage, clean water, and rainwater drainage. Sewerage drainage is a top priority because it directly relates to the cleanliness and health of the hospital environment.

The electrical aspect received a weight of 0.150, indicating the importance of electrical systems and room temperature control in supporting the comfort and safety of building operations. The maintenance priority for the sub-criteria in this aspect is: air conditioning (AC), fire prevention and control systems, electricity, and telecommunications.

The electrical aspect received a weight of 0.150, reflecting the importance of utilities in the maintenance priority order: sewerage, clean water, and rainwater drainage.

The exterior layout aspect has the lowest weight of 0.139, but still plays a crucial role in supporting the accessibility, aesthetics, and comfort of the hospital's external physical environment. The priority order for maintenance sub-criteria in this aspect is: hardscape, landscape, drainage, and fences.

Recommendations

Based on the research results and conclusions presented regarding the Maintenance Priority Analysis of the Administration Building of the Sumber Harapan Primary Hospital in Nasal District, Kaur Regency, Bengkulu Province using the Analytical Hierarchy Process (AHP) method, the following recommendations can be put forward:

The management of Sumber Harapan Primary Hospital is advised to prioritize maintenance of architectural aspects, particularly the roof and ceiling elements, considering that research results indicate that damage to these elements directly impacts the comfort and safety of building occupants.

Mechanical aspects, particularly wastewater drainage, require special attention in the routine maintenance program. A non-optimally functioning sanitation system can impact the environment and the health of patients and hospital staff.

Electrical systems, including air conditioning (AC) management and fire protection systems, must be regularly maintained to support operational safety and thermal comfort. Preventive maintenance should be scheduled to prevent malfunctions that disrupt hospital services.

For further research, it is recommended to consider the addition of external variables such as building age, intensity of space use, and maintenance budget allocation, in order to obtain a more comprehensive and applicable priority model for various types of other health care facilities.

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