

Research Article

Assessment of The Condition of Emergency Buildings and Intensive Care of Meuraxa Hospital Based on Maintenance Cost Analysis

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ABSTRACT

Rumah Sakit Umum Daerah (RSUD) Meuraxa in Mibo is a Badan Layanan Umum Daerah (BLUD). Meuraxa Hospital is obliged to provide comfort and safety for patients. As a BLUD, almost all of its operational costs are sourced from the hospital's own revenue. The hospital building has a variety of ages, and the oldest has been operating for more than 17 years. Therefore, the reliability of the building began to decrease, and there were even building components in a damaged state. Even so, the standardization of hospital performance indicators in 2019 requires that hospital facilities and infrastructure are always in 100% condition. This can be realized by building buildings according to standards and carrying out building maintenance periodically/routinely. Determining the extent of building damage in compliance with norms and regulations is the aim of the investigation (Peraturan Menteri Pekerjaan Umum Nomor: 24/PRT/M/2008). The method used is to conduct a field observation of building damage. The results of observation of the existing condition of emergency and intensive service building infrastructure obtained a building damage intensity of 1.32%. This condition is included in the category of light maintenance, which is $\leq 35\%$ of the cost of building a new one. Damage is predominant to non-structural components.

Keywords: Building Infrastructure, Maintenance Management, Maintenance Costs, Damage Intention, Condition Assessment

1. INTRODUCTION

Rumah Sakit Umum Daerah (RSUD) was initially a hospital owned by the Meuraxa Foundation, established by community leaders from the Meuraxa District of Banda Aceh City. On April 26, 1997, the hospital was officially handed over to the Provincial Government of the Aceh Special Region through the Governor of the Aceh Special Region. Then, on September 20, 1997, the provincial government handed it over to the Banda Aceh city government to be used as a regional general hospital (RSUD Meuraxa, n.d).

RSUD Meuraxa first operated in Ulee Lheue, Meuraxa District, Banda Aceh City. Following the destruction of all facilities and infrastructure at Meuraxa Regional General Hospital due to the Aceh earthquake and tsunami, the hospital was temporarily relocated to the Banda Aceh City Health Office complex. Meanwhile, preparations for the construction of a permanent Meuraxa Regional General Hospital building began in 2005 on Jalan Soekarno-Hatta Km. 2 in Mibo Village, Banda Raya District, Banda Aceh City. Construction was made possible through sponsorship and cooperation from several donors: BRR Aceh-Nias, the Austrian government, and Hungary. RSUD Meuraxa in Banda Aceh City currently has a building area of 5,300 m² and a land area of 15,268 m². Since December 2009, Meuraxa Hospital has officially had the status of a Badan Layanan Umum Daerah (BLUD). In early 2017, Meuraxa Hospital was upgraded to class B Plenary, so this hospital is obliged to provide equality and security to the community in providing health services.

The hospital buildings have varying ages, and the longest have been operating for more than 17 years. Therefore, the reliability of the building has begun to decrease, and there are even building components in a damaged state. However, the quality indicators of hospital performance in 2019 require that facilities and infrastructure must always be in 100% condition. This can be realized by building buildings according to standards and maintaining building infrastructure on a regular basis. Many obstacles faced in hospital maintenance activities can come from the hospital itself, such as the lack of a balanced budget for routine/periodic maintenance of building facilities and their environment, and the lack of proper building maintenance. It is also often found that buildings tend to be maintained when they are in a damaged condition.

This can incur greater costs and can have an effect on the overall hospital budget. Today, the reality is often the opposite. Many obstacles arise from within the hospital organization itself. These include a lack of balanced budgets for the routine and periodic maintenance of buildings and their surroundings, as well as poorly scheduled maintenance. These issues result in many buildings falling into disrepair before the end of their service life. Buildings are often maintained only after they are damaged. This can incur greater costs and impact the hospital's overall budget.

The evaluation of the Meuraxa Hospital building's condition in compliance with Peraturan Menteri Pekerjaan Umum Nomor: 24/PRT/M/2008 is the issue under investigation in this study. Determining the building's degree of damage intensity is the goal. This research provides concrete input and an overview of the current condition of the building, making it easier to make decisions related to building infrastructure management. The final result of the study is in the form of the percentage of damage intensity of the current hospital building, which is 2.93% and includes minor damage (Amna, 2020). Meanwhile, the percentage of damage intensity for emergency buildings and intensive services is 1.32%, also included in the category of minor damage.

2. RESEARCH METHOD

2.1 Hospital Building

Based on the Peraturan Menteri Kesehatan Republik Indonesia nomor 24 tahun 2016 concerning the technical requirements of hospital buildings and infrastructure, a hospital is a health service institution that provides individual health services in a complete manner, providing inpatient, outpatient, and emergency services. In contrast, a hospital building is a tangible construction project that is integrated with its location, either fully or partially on land or in water, or underground or in water where the hospital operates.

2.2 Building Maintenance

Based on Mulyandari and Saputra (2011), maintenance is the right way or technique to maintain the condition or components of a building so that it is always in excellent condition according to its function. On the other hand, maintenance is the process of fixing and/or replacing building components, parts, materials, and/or facilities in order to keep the building functional and healing after minor, moderate, or major issues. Figure 1 depicts the entire building maintenance procedure.

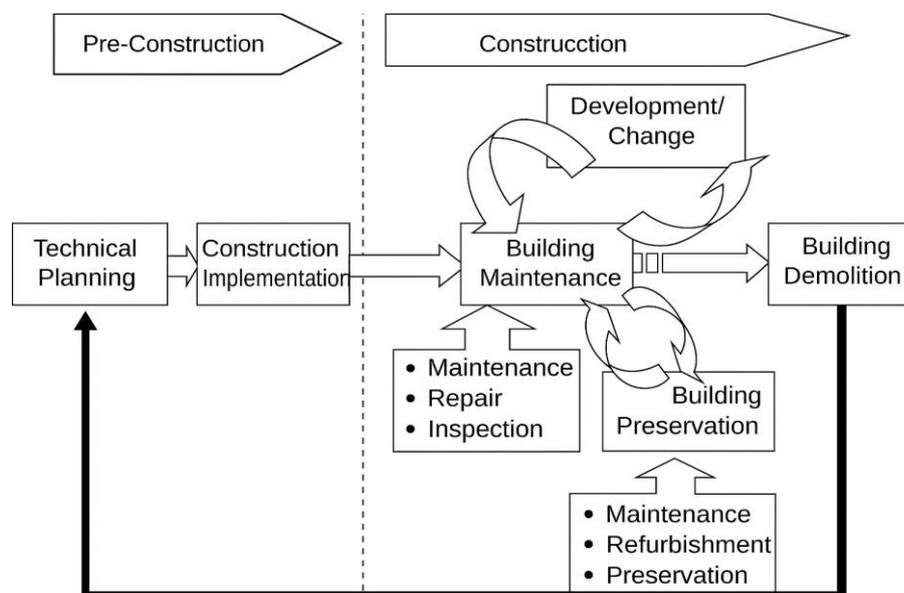


Figure 1. Building Maintenance Process

Building maintenance is the process of keeping buildings, their infrastructure, and their facilities reliable so that they are always fit for purpose, as stated in Peraturan Menteri Pekerjaan Umum Nomor: 24/PRT/M/2008 concerning Guidelines for Building Maintenance and Maintenance.

2.3 Types Of Bulding Maintenance

The types of maintenance activities based on the British Standard Institute (1984) BS 3811 : 1984 Glossary of Maintenance Management Terms in Terotechnology, quoted from Mulyandari and Saputra (2011), consist of:

- a) Planned maintenance, consisting of:

- Preventive Maintenance
- Predictive Maintenance
- Corrective Maintenance
- b). Unplanned maintenance
- Breakdown Maintenance

2.4 Factors Cousing Building Damage

Buildings from the beginning of planning, implementation, to their service life are likely to suffer damage caused by several factors, namely:

- Building age factors
- Factors of soil and groundwater conditions
- Wind factor
- Earthquake Factors
- Material quality factor
- Planning quality factors
- Implementation error factors
- Factors influencing the building's altered design and function

2.5 Scope of Building Maintenance and Manintenance

Peraturan Menteri Pekerjaan Umum Nomor: 24/PRT/M/2008, according to the requirements for building operation and maintenance, maintenance work comprises various forms of cleaning, organizing, testing, inspecting, repairing, and/or replacing building materials or equipment, among other comparable tasks. The building's maintenance scope is as follows, specifically:

- Architectural
- Structural
- Mechanical
- Electrical
- Outdoor layout
- Housekeeping

2.6 Maintenance Implementation Schedule

Based on Mulyandari and Saputra (2011), the schedule of maintenance implementation procedures for each component consists of:

- Routine (daily/weekly and monthly)
- Periodic (annual and five-yearly)
- Incidental (emergencies and special options)

2.7 Intensity of Building Damage

The intensity of building damage can be classified into three levels of damage, namely:

- a) Light damage
 - Minor damage is damage mainly to non-structural components.
 - Maintenance for minor damage, the maximum cost is 35% of the highest unit price of the applicable new building construction, for the same type/class and location.
- b) Moderate damage
 - Moderate damage is damage to a portion of non-structural components, and or structural components.
 - Maintenance for moderate damage, the maximum cost is 45% of the highest unit price of the applicable new building construction, for the same type/class and location.
- c) Heavy damage
 - The majority of a building's structural and non-structural components are considered to be severely damaged.
 - For the same type, class, and location, the maximum cost is 65% of the highest unit price of the relevant new building construction.

2.8 Hospital Building and Infrastructure Maintenance

Hospital buildings and infrastructure must be maintained periodically at a certain interval. Hospital building and infrastructure maintenance activities include several maintenance activities, including:

- Promotive maintenance.
- Maintenance of function monitoring/inspection (testing).
- Preventive maintenance.
- Corrective maintenance.

Peraturan Menteri Kesehatan Republik Indonesia Nomor: 24 of 2016 concerning the Technical Requirements of Building and Hospital Infrastructure requires the maintenance program, maintenance guidelines and guidelines, as well as worksheets for building and infrastructure maintenance. The Hospital must also provide a minimum maintenance cost of 15% (fifteen percent) of the value of the Hospital's building and infrastructure.

2.9 Work Cost Analysis

Harga Perkiraan Sendiri (HPS) is the cost determined in an analysis of the unit price of a work, which includes direct costs (labor, materials, and tools) and indirect costs (general or overhead costs, and profits) as the currency of a particular type of work, excluding Value Added Tax (VAT), according to Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat nomor: 28/PRT/M/2016 concerning Unit Price Analysis of Work in the Public Works Sector.

2.10 Building Aset Value

The value of building assets is obtained from the existing area of the building multiplied by the Highest Unit Price of Building State Buildings (HSBGN). Based on the Regulation of the Minister of Public Works Number: 45/PRT/M/2007 concerning technical guidelines for the construction of state buildings, the requirements for State Buildings consist of:

1. Classification of State Buildings;
2. Type of State House Building;
3. Wide Standard;
4. Technical Requirements; and
5. Administrative Requirements.

Table 1. Coefficients/Multiplier Factors for the Number of Floors of Multi-Storey Buildings

No	Number of Building Floors	Highest Unit Price Per M2
1	Two-story structure	1,090 price standards for multi-story buildings
2	Three-story structure	1,120 is the typical cost of multi-story buildings.
3	Four-story structure	Price criteria for 1,135 multi-story buildings
4	Five-story structure	1,162 is the typical cost of multi-story buildings.
5	A six-story structure	1,197 is the typical cost of multi-story buildings.
6	A seven-story structure	1,236 multi-story building standard prices
7	Eight-story structure	1,265 multi-story building standard prices

Table 2. Coefficients/Multiplier Factors for Building/Space Functions

No	Building/Space Function	Highest Unit Price Per M2
1	ICU/ICCU/UGD/CMU	1.50 standard building price
2	Operating Room	2.00 standard building price
3	Radiology Room	1.25 standard building price
4	Hospitalization	1.10 standard building price
5	Laboratory	1.10 standard building price
6	Obstetrics and Gynecology	1.20 standard building price
7	Emergency Room	1.10 standard building price
8	Powerhouse	1.25 standard building price
9	Outpatient Room	1.10 standard building price
10	Kitchen and Laundry	1.10 standard building price
11	Workshop	1.00 standard building price
12	Lab. SLTP/SMA/SMK	1.15 standard building price
13	Roofed outer hallway/Terrace	0.50 standard building price

2.11 Intensity of Building Damage

According to the Peraturan Menteri Pekerjaan Umum Nomor: 24/PRT/M/2008 concerning Guidelines for Maintenance and Maintenance of Buildings. The intensity of building damage is obtained based on the amount of building maintenance costs compared to the highest unit price of the applicable new building construction, for the same type/class and location. And it can be mathematically used with the following equation:

$$\text{Intensity of Building Damage} = \frac{\text{Maintenance Cost}}{\text{Building Asset Value}} \times 100$$

2.12 Research Methods

As stated by Arikunto (2006), research methods refer to the approaches researchers employ to gather data, whereas research instruments are the tools or devices researchers utilize for data collection, enhancing their work and yielding improved, more precise, comprehensive, and organized results that are simpler to analyze. The research was carried out by direct observation in the field to obtain the volume of building damage. The full research steps are shown in **Figure 2**.

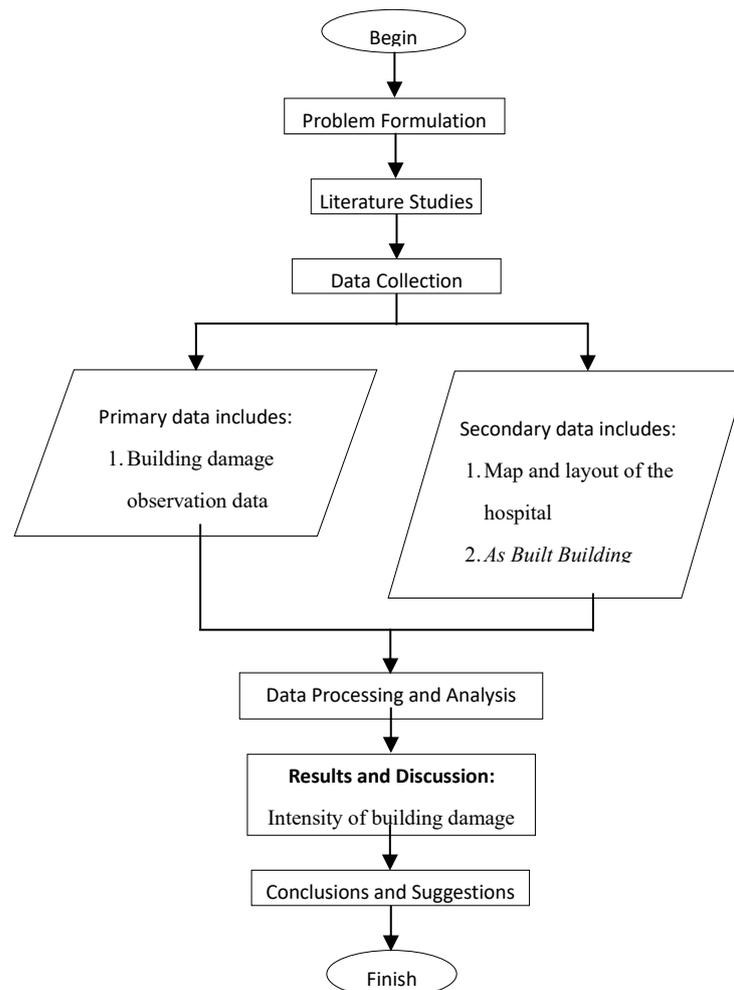


Figure 2. Research Flow Chart

2.13 Maintenance Costs

The unit price of work for the unit of measurement of the volume of work is obtained by adding the result of multiplying the volume of work by the unit price and wages used in each job. The unit price of materials and wages used is a price standard issued by the Banda Aceh City Government in 2019. For the analysis of the Analisa Harga Satuan Pekerjaan (AHSP) used, the AHSP of the Permen PUPR Nomor: 28 of 2016.

3. RESULTS AND DISCUSSION

3.1 Results

The results of the research presented include the results of observations on the damage to building components, namely, in the form of the intensity of building damage.

3.1.1 Estimated Value of Building Assets

The estimated asset value of emergency and intensive service buildings of Meuraxa Hospital was obtained from the results of multiplying the area between the area of the existing building, the coefficient of the number of building floors, the coefficient of building functions, and Harga Satuan Tertinggi Pembangunan Gedung Negara (HSBGN) in the Banda Aceh City area in 2018 issued by the Banda Aceh City Government.

Table 3. Recapitulation Table of Asset Values of Emergency and Intensive Care Buildings

No	Building Name	Broad	Unit	Asset Value
1	Emergency Installation Building (IGD)	3,060.00	M2	28,088,029,800.00
2	Building A (OK and CSSD Building)	1,528.00	M2	13,839,000,000.00
3	Radiology and Laboratory Building	480.00	M2	4,051,268,400.00
4	Pharmacy Building	666.00	M2	4,915,612,800.00
5	VIP Buildings (ICU, ICCU, PICU, NICU)	1,863.00	M2	17,150,617,344.00
6	Surgical Building (Post-operative Care)	597.00	M2	4,717,141,770.00
Total Asset Values				72,761,670,114.00

3.1.2 Building Maintenance Work Cost

Building maintenance costs are calculated by multiplying the volume of damage to building components by the unit price of work. The volume of damage was obtained from field observation data on the components of the Meuraxa Hospital building. For the unit price of work, the 2016 Analisa Harga Satuan Pekerjaan (AHSP) is used with a direct cost following the price standard issued by the Banda Aceh City Government in 2019.

Table 4. Building Maintenance Cost Recapitulation

No	Building Name	Broad	Unit	Asset Value
1	Emergency Installation Building (IGD)	3,060.00	M2	316,541,576.33
2	Building A (OK and CSSD Building)	1,528.00	M2	315,467,257.78
3	Radiology and Laboratory Building	480.00	M2	99,187,594.39
4	Pharmacy Building	666.00	M2	166,841,661.34
5	VIP Buildings (ICU, ICCU, PICU, NICU)	1,863.00	M2	316,541,576.33
6	Surgical Building (Post-operative Care)	597.00	M2	232,682,946.52
Total Maintenance Cost				963,879,375.02

3.1.3 Intensity of Building Damage

Based on **Table 3**, the asset value of the emergency building and intensive services of Meuraxa Hospital is Rp.72,761,670,114.00, while the amount of cost for the maintenance of the building, as stated in Table 4 is around Rp. 963,879,375.02, so that the intensity of building damage is obtained:

$$\begin{aligned}
 \text{Intensity of Building Damage} &= \frac{\text{Maintenance Cost}}{\text{Building Asset Value}} \times 100 \\
 &= \frac{963,879,375.02}{72,761,670,114.00} \times 100 = 1.32\%
 \end{aligned}$$

From the damage intensity figures, the reliability of emergency rooms and intensive hospital services is currently at 98.68%. This means that this is below the standardization of hospital performance indicators in 2019. Where Hospitals facilities and infrastructure should always be in 100% condition. To achieve the required 100% figure, Meuraxa Hospital needs to make improvements to building components, especially architectural components.

3.2 Discussion

Based on the Peraturan Menteri Pekerjaan Umum Nomor: 24/PRT/M/2008 concerning Guidelines for Building Maintenance and Maintenance, the intensity of damage to emergency and intensive service buildings of 1.32% of the highest unit price of the applicable new building construction is minor damage. And generally damage occurs to non-structural components, such as roof coverings, ceilings, floor coverings, and filler walls. Even though the intensity of building damage is only 1.32%, this can affect the performance of health services at Meuraxa Banda Aceh Hospital. Because, based on hospital performance

indicators in 2019, hospital facilities and infrastructure must always be at 100%. The attention of the management is needed to immediately prioritize the maintenance of the building, so that the damage does not worsen, and to meet the hospital's performance indicators related to building reliability and hospital accreditation standardization.

4. CONCLUSION

Several conclusions can be made based on the data analysis and research discussions on the management of the infrastructure maintenance of the Meuraxa Hospital building in Banda Aceh City. For example, the observation of the current condition of the entire infrastructure of the Meuraxa Hospital building in Banda Aceh City revealed that the intensity of building damage was 2.93%, and for the emergency service building, the intensity of damage was 1.32%. According to Peraturan Menteri Pekerjaan Umum Nomor: 24/PRT/M/2008, the two conditions of damage intensity to the Meuraxa Hospital building in Banda Aceh City fall under the category of light maintenance, which is equivalent to $\leq 35\%$ of the cost of constructing a new building. The cost of maintaining the emergency department building and intensive services is 1.32% of the value of the building assets, or at a cost of Rp. 963,879,375.02, while the asset value of the emergency department building and intensive services of the Meuraxa Hospital in Banda Aceh City is Rp. 72,761,670,114.00. Although the most severe damage occurred to utilities and architecture, overall, the category is still "minor maintenance" according to existing regulations. However, all damage to building components must be repaired immediately, so that it does not worsen and cause structural damage (Mawardi, 2018).

REKOMENDATION

In order to maintain optimal performance, it is advised that damaged building components be repaired right away. Additionally, socialization and training regarding the significance of building maintenance are required for the maintenance installation of the Meuraxa Regional General Hospital in Banda Aceh City. Hospital managers should conduct more focused and quantifiable building maintenance planning each year in order to prioritize and allocate maintenance funding as needed, which will allow the maintenance installation to perform its duties effectively.

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