Analysis of The Reliability Level of The Fire System in M. Syafei Building

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ABSTRACT

Himawan Hadi Sutrisno, Aditya Fadhlurrahman, Ricko Jonathan, Catur Setyawan Kusumohadi, Jafar Amiruddin, Pratomo Setyadi. 2025. Analysis of The Reliability Level of The Fire System in M. Syafei Building.

Data was collected by means of observation and interviews as well as documentation. Based on the results of field analysis using the Building Safety System Reliability Value, it can be determined that The M Syafei Building UNJ is in good condition. However, the manager of the M Syafei Building UNJ must pay attention to routine maintenance so that the fire protection systems can be used, running as well function properly. The purpose of this study is to assess the reliability of the fire prevention system at Universitas Negeri Jakarta (UNJ)'s M. Syafe'i Building. The construction of structures in DKI Jakarta is increasing. Rapid development requires a high-level protection system to respond to fire dangers. The protection system cannot be separated from the building's construction; thus, the fire protection system must be planned from the start, alongside the building's development. Data were acquired by observation, interviews, and documentation. According to the results of field analysis utilizing the Building Safety System Reliability Value, the M Syafei Building UNJ is in good condition. However, the manager of the M Syafei Building UNJ must pay attention to routine maintenance in order for the fire prevention systems to be used, run, and work efficiently.

Key Words: Development, Protection System, M Syafei Building

INTRODUCTION

Fire is an issue that cannot be isolated from mankind. Building Law No. 28 of 2002 indicates that buildings must fulfill the needs and safety of structures that have requirements, the ability of buildings to support weights, and the ability of buildings to prevent and overcome fire and lightning dangers. A fire hazard is defined as the possible threat and level of exposure to fire emissions from the initiation of the fire to the spread of fire, smoke, and gas [1-4]. Fire causes not only property devastation, but also moral and spiritual losses. Some of the causes of fires include a lack of knowledge and public awareness of the dangers of fire, a lack of community preparation to face and overcome the dangers of fire, an unformed and integrated handling system, a lack of infrastructure, and an adequate building fire protection system [2, 5-9]. The rise in development must be accompanied with a high level of protection system capable of responding to threat of disaster or fire. The protection system cannot be isolated from the building construction, so the fire protection system must be planned from the beginning, along with the planning of the building construction [3, 10-14]. This is consistent with DKI Jakarta Provincial Regulation Number 8 of 2008 on the Prevention and Management of Fire Hazards, which states that every owner, user, and/ or building management agency, as well as the building environment, that has the potential for fires, must play an active role in fire prevention and must provide one [15].

You can use the NKSKB to assess a building's reliability, as others have. One of them, Safriandi, who researched case studies utilizing the NKSKB to test the trustworthiness of the Surya Dumai Group Building and the Pekanbaru City State Savings Bank [16]. Thus, the author proposes a plan to analyze the level of reliability of the fire protection system in one of the tall buildings at Universitas Negeri Jakarta, namely the Muhammad Syafe'i building. It is also possible to obtain that the lack of fire protection systems in the Muhammad Syafe'I building will produce recommendations for improving the prevention system for the following year. The objectives of this research are to determine the level of completeness of the active fire prevention system located at the Muhammad Syafe'I building, Universitas Negeri Jakarta. To learn about the level of active fire prevention system held by Muhammad Syafe'I building at Universitas Negeri Jakarta. It is need to find out about the amount of fire rescue facilities owned by the Muhammad Syafe'i building at Universitas Negeri Jakarta.

MATERIALS AND METHODS

The analysis of this study uses a qualitative descriptive approach that tries to collect genuine settings or conditions by collecting primary data sources and collecting additional data to produce results regarding the level of reliability of the fire prevention system in the M. Syafe'I building. Table 1 shows weighting safety parameters. Table 2 describes weighting of sub components site equipment. In addition, Table 3 presents weighting of sub components rescue means. Table 4 shows parameter weighting safety. Table 5 describes weighting of sub components passive protection system.

Table 1. Parameter Weighting Safety

No.	System Component Building	
	KSKB Parameters	Weight KSKB
1	Site Equipment	25
2	Means of Rescue	25
3	Active Protection System	24
4	Passive Protection System	26

Table 1 presents the results of weighing the parameters of the building safety system components as specified by the Pd-T-11-2005-C Building Fire Safety Inspection guidelines utilized in this study. This weighting in Table 1 uses the the Analytical Hierarchical Process (AHP) method to eliminate subjectivity in the components.

Table 2. Weighting of Sub Components Site Equipment

No.	Sub Components Site Equipment	
	Components	Weight %
1	Water Sources	27
2	Neighbour Road	25
3	Distance Between Buildings	23
4	Hydrant Page	25

The evaluation criteria for the following components in Table 2 are used as practical reference materials to prevent and minimize fire hazards: building layout and orientation, building distances, yard hydrant location, provision of open areas, and so on.The building management officer assesses the facility's fire protection state.

Table 3. Weighting of Sub Components Rescue Means

No.	Sub Components Rescue Means	
	Components	Weight %
1	Exit	38
2	Exit Construction	35
3	Helicopter Runway	27

This weighting in Table 3 is used to see the value of several sub-components related to the use of facilities for use by residents and firefighters in evacuation efforts in the event of a fire. This tool also aims to separate threatened individuals from harmful products.

Table 4. Parameter Weighting Safety

No.	Sub Component Active Protectiong	
	Component	Weight %
1	Detect and Alarm	9
2	Siamese Connection	8
3	Lightfire Extinguisher	9
4	Building Hydrant	9
5	Sprinkler	9
6	Smoke Control	8
7	Smoke Detection	9
8	Smoke Exhaust	7
9	Fire Elevator	7
10	Emergency Light	9
11	Emergency Power	8
12	Operation Control Room	8

Table 4 describes briefly the active protection system contains 12 subcomponents that facilitate its performance. This technique helps to extinguish fires directly, reducing the effects of spreading fires.

Table 5. Weighting of Sub Components Passive Protection System

No.	Sub Component Passive Protection System	
	Component	Weight %
1	Building Structure Fire Resistance	36
2	Space Compartment	32
3	Aperture Protection	32

In Table 5, the research on passive protection systems is analyzed using three sub-components that are useful for assessing building structural resistance. The structure of this building is expected to reduce the severity of fires.

RESULTS AND DISCUSSION

Observations were made to assist in gathering information by firsthand observations in the field. The observation sheet is designed to meet the research data requirements, which cover all the variables listed in this study. The observation sheet consists of four basic elements, which are:

I. Part I focuses on the site's completeness, which includes water supplies, environmental roadways, building dist ances, and yard hydrants.
II. Part II is concerned with rescue facility components such as exits, exit construction, and helicopter pads.
III. Part III covers active protection components such as detection and alarms, Siamese connections, light fire exti nguishers, building hydrants, sprinklers, overflow suppression systems, smoke control, smoke detection, smok e exhaust, fire lifts, emergency lighting, emergency electricity, and a space operation controller.

IV. PartIV focuses on passive protection components such as fire resistance in building structures, room compartmentalization, and opening protection. Evaluation of the KSKB (Building Safety System Reliability). The state of each KSKB sub-component must be assessed and evaluated. The assessment is broken into three sections, namely:

a. Good: “B” (equivalent value of B is 100)
b. Enough: “C” (equivalent value of C is 80)
c. Less: “K” (equivalent value of K is 60)

The condition value of the sub-KSKB is calculated using the equation: KSKB sub condition value.
Equivalence value x weight of sub KSKB x weight of KSKB
Calculation of the Reliability of the Fire Protection System The reliability value of the fire protection system is calculated using formula:

Reliability value = KT+SP+SPA+SPP KT = value of sitecompleteness condition
SP = value of condition of rescue facility
SPA = active protection system condition value SPP = value of passive protection system condition

CONCLUSION

The objective of this study is to assess the reliability of the fire prevention system at Universitas Negeri Jakarta (UNJ)'s M. Syafe'i Building. There is an increasing trend of construction of structures in DKI Jakarta. Rapid development requires a high-level protection system to respond to fire dangers. The protection system cannot be separated from the building's construction; thus, the fire protection system must be planned from the start, alongside the building's development.

This study compiled data by applying observation and interviews as well as documentation. Based on the results of field analysis using the Building Safety System Reliability Value, it can be determined that the fire prevention system of Muhammad Syafe’I building at Universitas Negeri jakarta has a reliability rating of 95,02%. However, the manager of the M Syafei Building UNJ must pay attention to routine maintenance so that the fire protection systems can be used, running as well function properly. This result indicates that Muhammad Syafe’I building protection system at Universitas Negeri Jakarta is in good category.

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