Journal of Safety Education
Volume 1 Issue 2 Year 2023 Pages 37-42

P-ISSN 2986-6391 | E-ISSN 2988-3504
https://journal.unnes.ac.id/sju/index.php/jse

Do Safety Education Show in Implementation of Health and Safety Standard?

Syavirra Fadhilah*, Orin Rindiantika, Rizqika Aprilia Nugrahani, Putri Oktaviana Wahyu Ningrum, Indri Mayningsih, Hermi Nur Laela

Department Public Health Science, Faculty of Medicine, Universitas Negeri Semarang, Indonesia

*Correspondence to: *syavirraf17@students.unnes.ac.id*

Abstract: Emergency is an unplanned event that can cause death or serious injury to people affected, shutdown/disrupt work processes, and cause physical and environmental damage. Disasters can be caused by natural disasters and human error, and are usually emergencies in nature. This study aims to obtain an objective description and evaluate the safety situation at building of research centre as an emergency response effort to minimize the risk of loss during an emergency. This research was conducted at the building of research centre building using a comparative descriptive research design and using a case study research design. Data collection process was carried out primarily by field observations and interviews with visitors and workers. Based on the observations that have been carried out in the building of research centre, the results are that the implementation of the disaster protection and prevention system consisted of 29 points, i.e., 4 active protection components and 8 components of rescue facilities. Hence, the conclusion is that the disaster management in building of research centre still needs a lot of improvements, due to some shortages in the disaster management facilities.

Keywords: : disaster management; building; fire management; emergency; knowledge

INTRODUCTION

According to FEMA (Federal Emergency Management Agency) an emergency is an unplanned and unwanted event that can result in injury or even death to all employees, customers, or the public, disrupt work processes, cause environmental or physical damage, or damage the public image. Several conditions can be classified as emergencies, such as fires, material accidents, floods, storms, earthquakes, explosions, and others. Disasters can be unexpected events that interfere with various activities that humans normally do (Tomasini & Van Wassenhove, 2004).

Buildings experience several hazards, namely natural (earthquakes, tsunamis, hurricanes) and human-made (explosions, fires), which can disrupt building operations and even collapse buildings. The impact of disasters can be minimized even though disasters and those that cause them cannot be prevented (Lin Moe et al, 2006). Emergency preparations need to be made in all building locations, considering that no building location is safe from a disaster that causes an emergency. In this case, disaster management is very important. This is important because it can reduce several effects, such as reducing potential losses due to disasters, ensuring aid arrives quickly and on target to disaster victims, and achieving fast recovery (Al Mujaidel, 2022).

Fire is one of the extreme hazards that occur in buildings. The danger of fire is the potential for intentional or unintentional fires to threaten property and life. In developed and developing countries around the world, about 3.8 million fires occurred and fire deaths totalled around 44,300 (Brushlinsky et al., 2017). Therefore, to reduce losses from fire hazards, it is necessary for buildings to provide fire safety, namely a set of practices to prevent both intentional and accidental fires (Kodur et al., 2020).

The university not only has classrooms for studying but also has other buildings, this institution plays an active role in developing science and technology and is closely related to research activities and community service. The building of research centre has various potential hazards, namely fire, hazardous material accidents, floods, storms, earthquakes, explosions, and others. The fire hazard is a disaster that deserves attention for the building of research centre because there are flammable materials (such as plastic, paper and cloth) and electrical installations that have the potential for short circuits. Disaster management is important for the building of research centre because the impact of disasters not only causes loss and damage to property but also endangers institutions, staff, students, learning materials for academic purposes and data from research (Murphy et al., 2019).

This research aims to obtain an objective description and evaluate the safeness of situation at building of research centre as an emergency response effort to minimize the risk of loss during an emergency, especially fire hazard.

METHODS

This research was conducted at the building of research centre, Universitas Negeri Semarang as an emergency response initiative. This study combined a case study research design with a comparative descriptive research approach. This approach was used because it aligned with the study's goals, which included getting an objective description of the state of safety and comparing real-life circumstances with different disaster management system regulations to get a sense of what would happen in an emergency. The main methods for gathering data were observations and interviews with visitors and workers.

RESULT AND DISCUSSION

The standards and rules used in the study include: Kepmen PU No.02 / KPTS / 1985; Permenaker No.Per 04/Men/1980; Kepmen PU 02/KPTS/1980; Kepmenaker 04/1986; Kepmenaker 186/Men/1999; Kepmen PU 10/KPTS/2000; SNI-03-1746-2000; Permen PU 26/Prt/M/2008; NFPA 10, 13, 14, 72; and OSH. Based on these rules, in the implementation of the disaster protection and prevention system in the building of research centre, there were 29 points consisting of 4 active protection components and 8 components of rescue facilities.

Active Protections

(1) Fire alarm
In the building of research centre, there are two fire alarm points together with a fire extinguisher and hydrant placed near the stairs, which are also evacuation routes. Fire alarm equipment has sirens, sensing devices, and indicator panels. The installation of the alarm is according to standards and is within the standard distance range between detectors, which is below the maximum standard set at 9.1 meters.

(2) Fire extinguisher
The fire extinguisher component in the building of research centre consists of 2 pieces. Fire extinguishers are visible, easy to pick up, and equipped with installation markings near the evacuation route (stairs). These fire extinguishers are also installed hanging on the wall with a height of 90 cm. However, the fire extinguishers at building of research centre have not met a number of standard points and have received less attention and maintenance, as evidenced by the expired expiration date, which is September 2021.

(3) Hydrants
Hydrant is a fire extinguisher used in the event of a fire in which there is a hose and nozzle that functions to distribute water under pressure on the fire (Pratiwi et al., 2022) . The hydrant component in building of research centre consists of 2 points with a total (100%) not yet met according to standards. The hydrant is installed near the evacuation route and without any obstructions, making it easy to reach and see. The hydrant box is painted red, says "HYDRANTS" in white, and has complete equipment. This follows the standards specified in NFPA 14. The water supply used comes from reservoirs. The height of the hydrants is 20 cm from the floor surface. It is not suitable according to Pd-T-11-2005-C. The hose box and hydrant must not be blocked and must be placed 0.9-1.5m above floor level. Even so, points not in accordance with the standards include the absence of instructions for using a hydrant and the lack of inspection and maintenance of a hydrant. So, these hydrants are not in accordance with SNI 03-1745-2000 standards, and it is feared that hydrants are not used in a structured manner. Fire hydrants must be inspected once a year as an effort to detect early if there is damage to the hydrant system, so that in an emergency the hydrant is always ready to use (Rosanti et al., 2021).

(4) Sprinklers
The sprinkler component in the building of research centre consists of 13 points, with the whole fulfilled according to standards. Based on SNI 03-3989-2000, sprinklers must have a distance of not less than 2 meters or not more than 4.6 meters. The sprinklers on the 3rd floor of building of research centre are each installed at a distance of approximately 3 meters from each other. Sprinkle has a heat sensor in the room, and both are integrated with detectors and fire alarms. Sprinkles that meet SNI standards can protect lives and property from fire hazards.

Rescue Facilities

(1) Emergency exits
There are no emergency door components in the building of research centre. Based on SNI 03-1746-2000, an emergency exit is a door assembly as a means of exit that is required to serve an exit. Emergency doors should be able to swing from any position, made of fire-resistant steel equipped with a push bar system, separated from ordinary doors, and unlocked so that residents can access them anytime during an

emergency. If there is not door, an emergency that conforms to the standard parameters can complicate the evacuation process.

(2) Fire escape

The emergency ladder component consists of 2 points that overall do not meet standards. Based on the SNI 03-1746-2000 standard, the height of the handrail, if according to the standard, is 86 – 96 cm, while the actual conditions in the building have a height of 110 cm. The height of the steps is also not up to standard, which is 18 cm, while the actual conditions in the hotel are 15 cm. The surface of the emergency stairs is made of slippery material, so it has the potential to cause visitors and workers to slip when passing through the emergency stairs

(3) Emergency lighting

Emergency lights in the building of research centre will turn on instantly when needed and meet national standards. This is in accordance with the SNI 03-6574-2001 standard, where the delay due to a power supply failure does not exceed 15 seconds. The electricity source comes from a large capacity generator and can illuminate the entire building with a bright white colour. Emergency lights available on the third floor of the building have white lighting, whereas it is better to use yellow lighting. Lighting yellow lights can create calm conditions to reduce panic in an emergency (Hernández et al., n.d.).

(4) Evacuation directions

The evacuation directions component in the building of research centre consists of 4 points with two evacuation directions that overall (100%) have met the standards. A direction sign that reads "Evacuation Route" in large white font size with green background color is placed on the stairs so that workers passing through the stairs can see the evacuation route sign. This sign will make it easier for workers to go through the evacuation route in an emergency (N. V. Rahman & Sinaga, 2019).

(5) Corridors

The corridor has a width of 1.78 m, which should be a minimum width of 1.80 m. Each corridor has also been given instructions for an evacuation route that leads to the stairs. The distance between the corridors is vast, namely 3.6 m. The corridor is clear from everything, so as to make it easier and faster for visitors and workers to pass through evacuation routes and go to assembly points when there is a danger of fire and other disasters.

(6) Evacuation route

The evacuation route component consists of 2 points with two evacuation directions. There are two staircases on the 3rd floor of building of research centre. Each stairway has signs or instructions so that in the event of a disaster, visitors or workers on the 3rd floor of building of research centre can follow the directions and get out safely from building of research centre to the assembly point, which is in front of building of research centre. The ladder has a handrail with a height of 110 cm and a step height of 15 cm. The stairs are made with a reasonably smooth floor material with a width of 175 cm without any obstructions that could be dangerous.

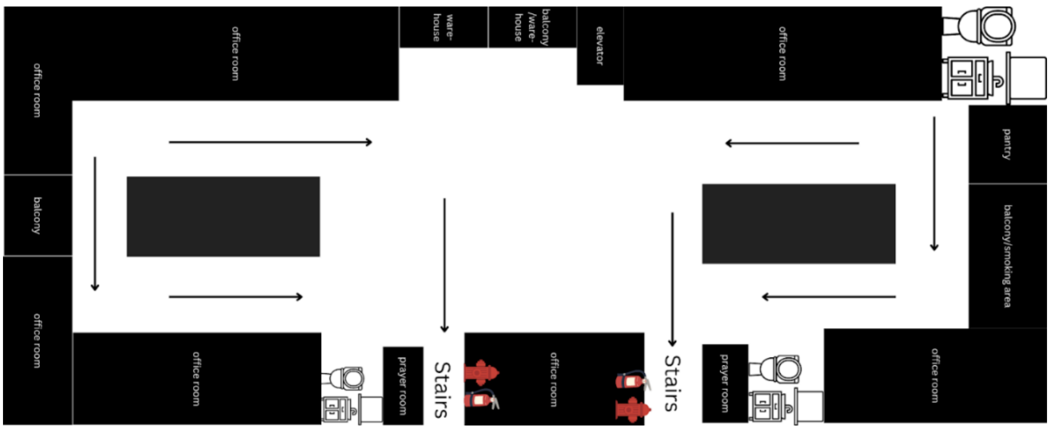

Figure 1. Evacuation route plan in 3rd floor building of research centre

Arrows indicating the direction of evacuation indicated by the evacuation route sign posted on the wall of the 3rd floor of the building of research centre. In the floor plan above, you can also see the position of fire alarms, fire extinguishers, and hydrants.

(7) Evacuation map

The evacuation map component was not met due to the absence of an evacuation map in the building of research centre.

(8) Assembly point

Workers and visitors can gather at the assembly point via the evacuation directions in building of research centre. The assembly point component meets the standards with at least 2 assembly points. The gathering point is outside the building, with an area large enough to accommodate workers and visitors at building of research centre.

Based on the observations and interviews we conducted on building of research centre, it is known that building of research centre has various potential hazards, such as fires, floods, storms, earthquakes, and explosions. However, disaster management tools only focused on fires. There are not many tools prepared for other disaster management.

Knowledge of Visitors and Workers

Based on interviews conducted with interns, visitors and workers, each informant has different knowledge about disaster management in the building of research centre. The results of interviews with interns show that interns know and understand the importance of work security and safety. Interns know what to do in the event of a disaster. Interns also pay attention to the signs inside the building and know the gathering points outside the building. The interns have less knowledge about potential disasters that can occur in the building, and do not know the location of the evacuation route. Interns also do not know about fire extinguishers and how to use.

The results of interviews with visitors showed that informants knew the potential for disasters that could occur in the building and knew what to do when a disaster occurred in the building. The informant also knew the evacuation route inside the building. Furthermore, the informant did not pay attention to the safety signs and signs inside the building and did not know the gathering point’s location outside the building. Visitors have knowledge about fire extinguishers, but do not understand how to use them.

The results of interviews conducted with employees showed that employees working in the building had knowledge about the overall potential disaster, initial response, signs, evacuation routes and gathering points. Informants also have a good understanding of fire extinguishers and understand how to use them also.

CONCLUSION

This paper discusses a potential hazard caused by natural disasters and human errors that can occur in building of research centre and what is the fastest and most appropriate response and handling that can be done if a disaster occurs. Disasters can be caused by natural disasters and human error, and are usually emergencies in nature. Disasters that can be categorized as emergencies are fires, hazardous material accidents, floods, storms, earthquakes, explosions, and others. Disasters caused by nature can’t be prevented but the effects are able to be minimized. And because disasters usually occur very suddenly, carrying out disaster management in advance is very important to do. The purpose of disaster management is to be able to prepare an effective mitigation plan and the most appropriate steps to avoid as many victims as possible.

This research was conducted at the building of research centre using a comparative descriptive research design usng a case study research design. Data collection was carried out primarily by doing field observations and interviews with visitors and workers. Based on the research that has been done, it is found that active protection in the building of research centre has 2 fire alarms, 2 fire extinguishers, 2 hydrants and 13 sprinklers. The rescue facility consists of 2 points of emergency exit but there are no emergency doors, 2 points of fire escape that have not yet met the standards, enough emergency lighting that have met the national standard, 4 points of evacuation direction sign, 2 points of evacuation route, evacuation map that have met the standard, and1 2 point of assembly points that have met the standard.

According to the results of the study that we have done in the building of research centre, we provide the following suggestions for building of research centre disaster management: improve the placement and add instructions for using the hydrants, pay attention to the quality of the existing tools by carrying out routine maintenance and inspections. Furthermore, it is necessary to upgrade rescue facilities in the form of installing emergency exits, ensuring that the floors of emergency stairs are not slippery, installing yellow emergency lighting, and providing evacuation maps.

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