Fire Safety System Building

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Abstract. The purpose of this study is to provide information related to the importance of the use of the safety system of the building, so that the building owners know the system and can apply it to a building that they own, and also can minimize the extent of damage and loss in the receive in disaster or a fire in the building. This study used literature study about tools and equipment related to fire hazards that must be present in a building and descriptive method with data collection related data from the journal of the problems taken to support this theory as a method. There are three factors of fire handling, namely supervision, prevention and evacuation systems. This research discusses the tools of these three factors. The result of this research shows that fire safety system is one of the measures to minimize the loss in the building. With the right equipment, factors that can cause fires can be detected early with a surveillance system, and can be dealt quickly and precisely, so that losses can be minimized.

1. Introduction
The fire handling system is an integrated system of supervision, prevention, and mitigation. The availability of monitoring and prevention equipment is an obligation of the building manager, besides that if a fire has occurred, the building manager must be able to minimize material losses and human casualties through an integrated evacuation system in the building. Building smart safety systems is of paramount importance and become a major standard in the design of a building, a building that is healthy and safe for the occupants would apply if the fire safety system applied in the building. many ways to make the building a healthy and safe from fire as described in the book To Err Is Human: Building a Safer Health System, Volume 6 [1]. According to the journal Wall Fire protection is important as it relates to injury and loss of life. Buildings in New Zealand are designed against the three major dynamic forces of earthquake, wind and fire. Considering only deaths in New Zealand, however, there is a 20-fold danger from fire Compared with the earthquake risk, and the danger from wind causing house collapses in relation to the lateral bracing has yet to register as a significant risk [2].

However, the number of the building designer who understands this, but many designers atu architect who felt the buildings they already feel safe and override the standard they should use in its design, as well as in the journal Umara saying Many professionals are Involved in the design and installation of fire safety provisions in factory buildings. However, each perceived professional fire safety background from his professional point of view, the which is definitely his Affects decision of ranking the fire safety criteria and attributes. The differences in the perception of the professionals could not be avoided rather it can be managed to rank the criteria and attributes of fire safety. The use of AHP is very essential as it can synthesize all the perceptions and arrived ata reasonable weighting of the criteria and attributes. The criteria and weightings attributes can be used to prioritize the Necessary fire safety improvement and Also determined the level of risk associated with the factory buildings [3].

whereas the importance of the implementation of fire safety systems in buildings is very high, although the designer can calculate and felt the building was secure, the building needs to adopt the standards that have been set and determined by each state, as the highest cause of death in the
causes of the building is a fire in the building, such as which is described in the journal Runyan and carol, Residential fires are the most important cause of fire-related mortality in the United States[4]. Previous research has concentrated on fatal fires in urban areas; considerably less is known about fatal fires in rural areas [5],[6].

The biggest effect of buildings that are not readily going to the fire disaster is the loss in material terms, need to be noticed in effect, building a secure system is not ready to be a higher fire disasters will lead to high losses. the building owner must have losses that caused the fire. the risk of these risks can be calculated using the risk management science [7],[8].

The purpose of this paper, so that the building designers and contractor can know the standards of a smart building, and by considering the use of surveillance, prevention and evacuation systems in the building, in order to minimize all forms of losses in the construction and the conclusion of this study is that fire safety devices are one of the important indicators needed by a building, so that all forms of fire and the like can be minimized.

2. Method

The research used descriptive methods using data collection related data from the journal of the problems taken to support this theory other method is to use the data processing system of book utility systems in buildings. By using the descriptive method, it will explain more clearly how a safety device is used as a management system in a building.

3. Result and Discussion

The most basic thing in fire management system in the building is part of the smallest part that is often forgotten by the design of the building, where it is actually things you need to know to designer designer building or district can apply to buildings they design later.

Not all parts of the fire safety system designer needs to know in detail, the designer need only provide places / spaces that will be used in the implementation of all of these systems. There are several tools according to the consideration of the use of surveillance, prevention and evacuation systems in the building :

A. Surveillance and Prevention

1. Smoke detector and sprinkler

Which works based on the collision of particles as soon as possible with radioactivity in the detector chamber (smoke chamber) (see Figure 1).

![Figure 1. Smoke detector and Sprinkler](image-url)
existence of the fire. The designer need only provide point to point on the image of their work, so that the team could ME know sprinkler and smoke detector needs to be mounted on any part, so that the ME does not spoil the aesthetics of the building. There are still many buildings that use both of these tools, but not activated, so that when there is a fire both of these tools are not working properly [9].

2. Hydrant box
   Its the same thing sprinkler and smoke detector, the designer just illustrates the point hydrant box placement on buildings or areas designed (Figure 2).

![Figure 2. Hydrant Box](image)

Hydrant Box is one fire extinguisher in case of fire, this tool at simpat in the interior or exterior of the building, this tool usually used if the fire had started to grow, the water pressure of hydrant box is very high, so the use of these tools need to be used by experts / people who have known functions.

3. Fire Extinguisher
   These objects are placed at points that can be seen clearly, not hidden, and easily accessible (Figure 3).

![Figure 3. Fire Extinguisher](image)
In contrast to Hydrant box, fire extinguishers depiction only point placement, while describing depiction hidrant box in Shaff waterways and waterways that support the function of hidrant box.

4. Hydrant Pillar
   Hydrant pillar is one of the tools of fire safety systems that are in a building, in contrast to the hydrant box, hydrant pillar just being on the outside of the building, this object serves as a tool for firefighters in case of fire in the building or area. (Figure 4).

![Figure 4. Hydrant Pillar](image)

This tool should be placed in the section easily accessed by the fire department. Thus facilitating the process of extinguishing the fire when the fire occurred.

5. Core And Shafts (Figure 5)

![Figure 5. Core](image)

This figure was adopted from www.googleimage.com
B. Evacuation

6. Emergency stairs (Figure 6)

![Emergency Stairs](image_url)

**Figure 6. Emergency Stairs**
This figure was adopted from www.googleimage.com

In contrast to other conventional stairs, emergency stairs is a staircase that would secure the fire, the material used is a material structure, the materials used together with material of columns and beams, so that the fire spreading inside the building will not be able to damage the structure of the ladder. Apart from the structure of the stairs, emergency stairs have a special door where the door in case of fire not burned [10].

Core is the main structural system that greatly affect the major systems in fire safety in highrise buildings, where in addition to functioning as the core of a highrise building, the core serves as a buffer from fires in buildings. Because the core structure strong and sturdy, making cores functioned as the core of the building where the inside of the building and emergency stairs utility efakuasi where the occupants of the building.

As a example a fire alarm system is needed that uses technology that is adequate for buildings as fire control [11]. The building which introduced a system of fire safety will reduce the risk of high losses, many systems are in use in the building, the building has been deploying at least all the above system with a standard that has been set up by legislation the area where the building is established will minimize the loss losses arising as a result of the fire (Figure 7).
The higher the fire safety systems in buildings, the lower losses in get.

4. Conclusion
The conclusion of this research is that fire safety equipment is one of the important indicators needed by a building, so that all forms of fire and the like can be minimized. From the data obtained by the fire safety system is one step to minimize losses on the results received from fires received by the building. Fire handling systems are integrated surveillance, prevention and mitigation systems. The availability of monitoring and prevention equipment is the responsibility of the building manager, in addition if a fire occurs

References
[1] Donaldson, M. S., Corrigan, J. M., & Kohn, L. T. (Eds.). (2000). To err is human: building a safer health system (6). National Academies Press.
[2] Walls, Kelvin L. (2001). "Fire Safety In Buildings." Journal Of Technology, Universiti Teknologi Malaysia 34.
[3] Umar, A., Embi, M. R., Yatim, Y. M., & Alkali, I. A. (2015). Experts influence on fire safety criteria ranking for factory buildings in Nigeria. Jurnal Teknologi, 77(14).
[4] Runyan, C. W., Bangdiwala, S. I., Linzer, M. A., Sacks, J. J., & Butts, J. (1992). Risk factors for fatal residential fires. New England journal of medicine, 327(12), 859-863.
[5] Hanafi, M. (2014). Manajemen risiko.
[6] Cheng, M. Y., Chiu, K. C., Hsieh, Y. M., Yang, I. T., Chou, J. S., & Wu, Y. W. (2017). BIM integrated smart monitoring technique for building fire prevention and disaster relief. Automation in Construction, 84, (14-30).
[7] Walter, R., & Chadwick, B. A. (1993). U.S. Patent No. 5,189,394. Washington, DC: U.S. Patent and Trademark Office.
[8] King, S. (2006). U.S. Patent No. 7,005,994. Washington, DC: U.S. Patent and Trademark Office.
[9] Marks, M. J., & Richey, J. N. (2014). U.S. Patent No. 8,847,772. Washington, DC: U.S. Patent and Trademark Office.
[10] Kinsey, M. J., Galea, E. R., & Lawrence, P. J. (2012). Human factors associated with the selection of lifts/elevators or stairs in emergency and normal usage conditions. Fire Technology, 48(1), 3-26.
[11] Rhodes, N., Han, J., Rule, T., & Faragoi, J. (2006). U.S. Patent No. 7,049,951. Washington, DC: U.S. Patent And Trademark Office.