Assessment of The Building Reliability From Fire Hazards in Cikurubuk Market Tasikmalaya

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Abstract. Condition that describes an emergency and gives impact of loss or damage if it is not handled properly and quickly is fire. One of the causes of fires is the lack of adequate infrastructure and facilities for building fire protection systems, especially in traditional markets. The research carried out focused on the components of site completeness, namely water sources, road environment, distance between buildings, and outdoor hydrants. Site completeness is one of the prerequisites that must be fulfilled to create building reliability and environmental conditions from fire risk. The purpose of this study is to determine the level of reliability of the building safety system and the environment from fire hazards. The research method used in this research is analytical descriptive method where the examination and recording of existing conditions in the field are the initial stages in the research and become the basis for more depth analysis. The observation location is in Cikurubuk Market, Cikurubuk market is the largest traditional market in Tasikmalaya and this market has experienced fire in 2009 and 2015. The results of the reliability assessment of site completeness aspects obtained in accordance with the calculations based on the existing provisions obtained a value of 14.6 out of 25 or equivalent to 58.40% so it can be concluded that the site feasibility conditions for fire protection systems in the Cikurubuk market are still low.

1. Introduction

Emergency is a condition or situation that occurs suddenly and abnormally, which can turn into a disaster that results in many losses and damage. One condition that describes an emergency condition and gives an impact of loss or damage if it is not handled properly and quickly is fire [1].

Fire occurs as a chain process between combustible materials, oxygen, and heat. The series of oxidation processes will continue, until one of the elements forming the fire ends [2]. The causes of fires include the low understanding and awareness of the community about fire hazards, the lack of community preparedness in dealing with and overcoming fire hazards, fire handling systems that have not been realized and integrated, and the lack of adequate infrastructure and facilities for building fire protection systems [3].

Cikurubuk Market is the largest traditional market in Tasikmalaya, built in 1994 on an area of 43,120 m2, and has 2,772 kios [4]. Cikurubuk Market has experienced a major fire disaster in 2009 and 2015. Assessment of the reliability of building safety systems against fire hazards refers to four parameters, site completeness, rescue facilities, active protection systems, and passive protection systems [5].
Table 1. Weighting Protection Parameters Building Fire

| Number | Subcomponent               | Value |
|--------|----------------------------|-------|
| 1      | Site completeness          | 25    |
| 2      | Rescue facilities          | 25    |
| 3      | Active protection systems  | 26    |
| 4      | Passive protection systems | 24    |

The purpose of this study was to determine the level of reliability of building and environmental safety systems from fire hazards, while the focus of this study was an assessment of how the building safety system and the environment in the Cikurubuk market were seen only from the aspect of the site completeness. Sub-components that are included in the site component are: water source, road environment, distance between buildings, and outdoors hydrants [6].

2. Experimental Method

2.1. Instruments

Observation instrumentation of building safety systems and traditional market environments, including: (a) Observation checklist sheet building safety facilities. (b) Camera for photo documentation. (c) Measurement.

2.2. Variable

Variables examined in fire safety systems, especially those related to site completeness, consist of four aspects, water sources, road environment, distance between buildings, and hydrants. These aspects are identified for assessing the level of availability, completeness, and feasibility.

2.3. Method

The research method used in this research is analytical descriptive method where the examination and recording of existing conditions in the field are the initial stages in the research and become the basis for more in-depth analysis. Criteria for assessing the condition of building fire protection components are divided into three levels, namely: BAIK = "B", SEDANG or CUKUP = "C" and KURANG = "K". The equivalence of the value "B" is 100, the value "C" is 80 and the value of "K" is 60 [5].

Table 2. Fire Audit Assessment Level

| Value  | Suitability                                      | Reliability |
|--------|-------------------------------------------------|-------------|
| > 80-100 | According to requirements                     | B = Good     |
| 60-80  | Installed but there are a small number of installations that don't according to requirements | C = Enough   |
| < 60   | Not suitable at all                            | K = less     |

The research focused on site completeness components, namely water sources, environmental roads, distance between buildings, and hydrants, where each of these aspects will be included in a special weighting value in accordance with the applicable provisions.
Table 3. Subcomponent Weighting Site Completeness

| Number | Subcomponent          | Value |
|--------|-----------------------|-------|
| 1      | Water sources         | 27    |
| 2      | Environmental roads   | 25    |
| 3      | Distance between buildings | 23  |
| 4      | Hydrants              | 25    |

3. Result and Discussion

Overall assessment of the complete site components in the Cikurubuk market environment gives a value of 14.6 with a standard value in accordance with the provisions of 25. With the assessment that is considered the best is the availability of road environment and the distance between buildings. The assessment component for the availability of water sources and hydrant pages is still very lacking.

3.1. Water sources

Water sources in the market environment are from PDAM and wells. The availability of water for the fire extinguishing system is still lacking, where the resulting discharge is not in accordance with the provisions that should be. The availability of water for fires non-residential buildings is required not less than 38 liters / second at 3.5 bar for the first hydrant and 19 liters / second at 3.5 bars for the second hydrant, and for each subsequent hydrant 1200 liters / minute of water supply is added common for hydrants [6]. The availability of water sources in the Cikurubuk market environment is still very lacking with the equivalent value "K" being 20.

3.2. Environmental roads

Environmental roads are used to protect against widespread fires and facilitate blackout operations [7]. All neighborhood roads in the Cikurubuk market have been given asphalt pavement, with a road width of 6-7 meters. Building volume can be used as a reference in determining the minimum access points needed in fire protection systems [8].
Table 4. Building volume for determining access points

| Number | Building Volume       | Explanation                |
|--------|-----------------------|----------------------------|
| 1      | < 7.100 m³            | Min. 1/6 building around   |
| 2      | > 7.100 m³            | Min. 1/6 building around   |
| 3      | > 28.000 m³           | Min. 1/4 building around   |
| 4      | > 56.800 m³           | Min. 1/2 building around   |
| 5      | > 85.200 m³           | Min. 3/4 building around   |
| 6      | > 113.600 m³          | All around buildings       |

All environmental conditions in the Cikurubuk market have been pavemented so that they can be traversed by fire engines, the equivalent value for an environmental road is "B" with 100 points.

3.3. Distance between buildings
The minimum distance between buildings is used to protect against widespread fires and the availability of access points for firefighters [6]. The distance between buildings in the Cikurubuk market is separated by neighborhood roads with an average of 6-7 meters. In accordance with the minimum distance between buildings required for security against fire risk are:

Table 5. Distance between buildings

| Number | Building high (m) | Minimum distance between building (m) |
|--------|------------------|---------------------------------------|
| 1      | 8                | 3                                     |
| 2      | > 8 - 14         | > 3 - 6                               |
| 3      | > 14 - 40        | > 6 - 8                               |
| 4      | > 40             | > 8                                   |

The Cikurubuk market building is mostly a one floor building, with an average height of 5-6 meters and a distance between buildings 6-7 meters, the equivalent value can be entered into a fairly good group "B" with 100 points.

3.4. Outdoors Hydrants
Each part of the access point of a fire engine must be at a distance of 50 meters from the city hydrant, and if there is no city hydrant that meets the requirements, a outdoors hydrant must be provided [8].

Figure 2. Cikurubuk Markets Position Outdoor Hydrant
There are six hydrant courtyards in the Cikurubuk market area, where each hydrant can reach 50 meters of market area and is in accordance with the provisions. However, the existing hydrant condition of the yard is mostly damaged by the condition of water availability and the pressure that is present in the hydrant installation is not feasible and cannot function properly. The equivalent value of the existing hydrant page is less "K" with only 20 points.

Table 6. Subcomponent Weighting Site Completeness Value Cikurubuk Markets Tasikmalaya

| Number | aspects of assessment          | Result | assessment point | Standard quality | Value condition | Number of value |
|--------|-------------------------------|--------|------------------|------------------|----------------|-----------------|
| 1      | Water Resources               | K      | 20               | 25               | 1,35           |                 |
| 2      | Environmental Roads           | B      | 100              | 25               | 6,25           |                 |
| 3      | Distances between buildings   | B      | 100              | 23               | 5,75           |                 |
| 4      | Outdoors hydrants             | K      | 20               | 25               | 1,25           | 14.60           |

Percentage 58.40%

4. Conclusion
Based on observations about the completeness of the site for fire protection systems in the Cikurubuk Market of Tasikmalaya City which includes 1) Availability of water sources obtained equivalent value of 20, which means the value of feasibility is still very low, 2) Roads on the market are good, environmental roads as a whole, it can be used to access fire engines, with an equivalent value of 100, 3) The distance between buildings is also quite adequate, where the value / equivalent obtained is 100, and 4) Hydrant yard that is in the market cikurubuk in terms of the amount already sufficient, but most are in a damaged condition and cannot function so that the equivalent value obtained is very low, namely 20. The average value obtained in accordance with the calculation based on the provisions obtained is a value of 14.6 of 25 or equivalent to 58.40 % so that it can be concluded that the condition of site feasibility for fire protection systems is in pa Cikurubuk is still low.

5. References
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