www.bircu-journal.com/index.php/birci
Budapest International Research and Critics Institute-Journal (BIRCI-Journal)
Humanities and Social Sciences
ISSN 2615-3076 Online)
ISSN 2615-1715 (Print)
Budapest Institute

Adaptive Housing Planning Strategy for Post-Disaster

Syaifuddin Zuhri[1], Imam Ghozali[2]
[1,2]*Universitas Pembangunan Nasional "Veteran" Jawa Timur, Indonesia*
syaifuddin.zuhri@upnjatim.ac.id

Abstract

Disasters are a bad condition, especially when these conditions occur in densely populated areas or residential areas, of course this will result in damage to infrastructure, like buildings, houses and other facilities or communities. Of course, this can be of particular concern in the context of the loss or damage to buildings inhabited by the local community. Attention to post-disaster conditions, seen in the context of the availability of houses intended for disaster victims, is of course a major concern. Because the loss or damage to their buildings or homes will have an impact on losing their shelter in this condition. This research tries to develop this problem so that the availability of houses for them can be provided quickly with simple building and construction. The developed building model is very adaptive to the basic needs of the space needed for them to be able to live in the house with the characteristics of a building that is comfortable and safe for them to live in. The development of building field panels that have been developed is very effective and efficient in adapting to the use of lightweight structural systems and materials.

Keywords
home; affordable; function; comfort; safe

I. Introduction

Flashbacks from the eruption of Mount Semeru have reminded us of the importance of comprehensive disaster management that guarantees emergency measures for handling refugees, managing disaster funds, and consistently implementing disaster mitigation. From BMKG data that after 5 (five) days after the eruption of Mount Semeru in Lumajang, East Java, 43 people were declared dead and also resulted in thousands of people being displaced. Because the recovery period in the post-disaster phase will take quite a long time to restore life and the availability of all infrastructure to normal. Post-disaster is a condition that is felt very sad for the sufferers because the consequences of the disaster were so terrible that it damaged, eliminated and destroyed all aspects of people's lives, even the lives of relatives who were affected by the disaster. The destruction of infrastructure, buildings and homes experienced by the community caused them (disaster victims) to have no shelter and shelter for themselves and their relatives (Yan Hong, 2017).

How will it affect the victims of the disaster? Of course, they will lose shelter and shelter. The absence of a house as a place to live for them after the disaster will cause a very worrying problem, and will have a further impact on their next life. The house as a place to live for them is a very urgent and very important need to be provided quickly to meet the needs of their next life (Koenigsberger, 1973). The house as a place for them to gather and reunite their families who were separated by the disaster must also have a function as a place for them to live as a family (Turner, 1972).

A house that functions as a place to live for the families of disaster victims is urgently needed, so it requires careful planning to be able to provide housing that is appropriate and in accordance with their needs (Clare, 1977). Provision of space for them must be effective and meet the standard basic needs in living in a house (Downs, 2004;

DOI: https://doi.org/10.33258/birci.v5i4.7349

Rapoport, 1977). Besides that, in the process of providing the building, you must be able to provide the building quickly (Ghozali, 2018), and you don't need to follow standard development patterns that are known so far, which take a long time to build.

Adaptive building planning as one of the strategies to provide decent housing for them and fast procurement can be developed for victims affected by disasters (Zuhri, 2017). Besides that, the house building must have health requirements, space comfort, good utility (Turner, 1982), and have ease in assembling, building and installing it when used in a disaster area (Ria, at. all. 2018).

By understanding the meaning of the house as a place to live which must be equipped with environmental infrastructure (Law No. 4 of 1992). According to Badudu (1994) the notion of a house or residence is a building with floors, walls and roofs, doors and windows, human habitation, various shapes and sizes as well as the materials it is made of. 2010).

II. Review of Literature

According to Housing Regulation No. 8 of 2007 that a decent house is a building that at least meets the safety requirements for the occupants, the adequacy of the minimum space requirements and is able to maintain the health of the occupants. Building security can be viewed in terms of the strength and robustness of the building which is able to support and protect the occupants inside from natural influences (Budiarso, 2007). Meanwhile, the adequacy of the minimum area of space required must be related to meeting the minimum standard of space for human movement activities in space (Zuhri, 2017).

Comprehensively it is explained that a healthy and proper house needs to consider aspects of comfort, health, safety and security for its inhabitants. Aspects of the solution include natural ventilation or ventilation systems, lighting systems and humidity considerations in the room (Frick, 2006). While the safety aspect is clearly intended so that the resilience and strength of building construction must adapt in overcoming disasters, such as earthquakes or winds, to a certain extent so that buildings can survive from collapsing or being damaged (Zuhar, 2022).

In another broader understanding regarding the functions in which, according to Wisnu Budiarso (2007), that the house must meet certain requirements that allow the house to function as a place to sleeping, eating, cooking, take a bath and toilet that meet health and comfort in it (Gunawan, 1981).

This is confirmed in the Regulation of the Minister of Social Affairs of the Republic of Indonesia Number 20 of 2017 concerning Social Rehabilitation of Uninhabitable Houses and Environmental Infrastructure which states that the criteria for uninhabitable houses are as follows (Zuhar, 2022):

a. Walls and/or roofs are in a damaged condition which can endanger the safety of occupants;
b. Walls and/or roof made of materials that are easily damaged/rotted;
c. Floors made of earth, planks, bamboo/cement, or ceramics in a damaged condition;
d. Do not have a place to bathe, wash and latrines; and/or
e. Floor area less than 7.2 m2/person (seven point two square meters per person).

III. Research Method

The research method used in this discussion is descriptive qualitative by means of direct observation and interviews. This is done to describe and describe the basic needs of residents of residential houses after the disaster, after which a method of mapping potential needs is carried out based on a priority scale using a Likert scale (Thomas, 2010). This method is carried out to obtain the needs and characteristics of the space needed by space users, this is done so that the space requirements that are made can be according to their needs.

After the space requirements are arranged, then an analysis is carried out using the problem-solving method needed to develop a spatial layout design. When carrying out this process, it is necessary to pay attention comprehensively to several aspects, such as structure, materials, building methods and building disassembly methods that will be applied to the building. Decision making on each aspect of consideration is of course based on several literature studies, case studies from various sources such as journals, scientific articles or the results of previous research.

IV. Result and Discussion

Planning needs and spatial programs carried out through analysis of the activities of disaster victims while in evacuation sites to obtain basic needs for their functions and characteristics. The needs of the basic functions that they perform can be carried out to determine the minimum basic area for each basic activity that is usually carried out in activities in the house (Zuhri, 2022).

Table 1. Characteristik Spatial Requirements

Nu	Design Criteria	Performance Requirement
1	Sleeping area	indoor area with the optimum size for sleeping, health ventilation with natural lighting
2	Washing and cleaning	good drainage and availability of plumbing and adequate water supply
3	Pantry and cullinary activities	covered space preferably with clean and dry condition
4	Family and public room	can be used for family activities and receiving guests and public function
5	Service and kitchen area	natural ventilation with cross ventilation strategy, comfort natural lighting with good utility

Next is the development of these basic requirements into space which is then compiled in a space programming analysis until it becomes a plan that can be developed with structural or material considerations.

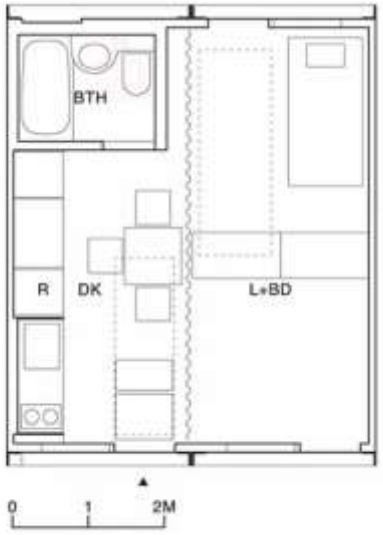

Figure 1. *Spatial Organization Pattern*

The development of the plan above is carried out with basic geometric shapes arranged in a grid pattern according to the basic shape of the box. This is done to obtain space with sufficient efficiency so that empty spaces are not obtained. Finally, several rooms were arranged consisting of a bathroom, bedroom, kitchen, living room and living room. These spaces are arranged compactly in one mass of box-shaped space with connected spaces that support one another.

In developing the shape of the building, it is carried out with a simple building appearance arrangement but still using openings in the form of doors, windows or bovenlich so that the building looks clean. Showing a building expression that looks simple is very distinctive as an adaptation of local building typology using today's building materials.

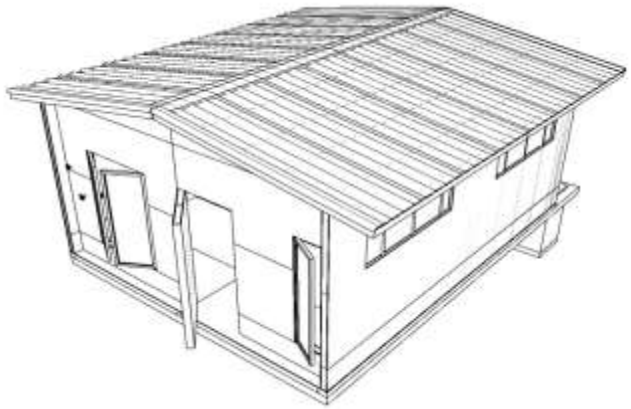

Figure 2*. Building Façade*

The expression of a building that looks simple is very distinctive as an adaptation of local building typology using today's building materials is a strategic adaptation as a residential building today. The harmonization of form, structure and building materials harmonizes with the building environment which must be rearranged. This design idea can become a basic typology of disaster management buildings that represents local building wisdom and adaptation to today's materials.

In the development of the structure and materials that have been determined to use a rigid frame structure made of lightweight materials but still rigid in structure, so it is very effective to assemble quickly.

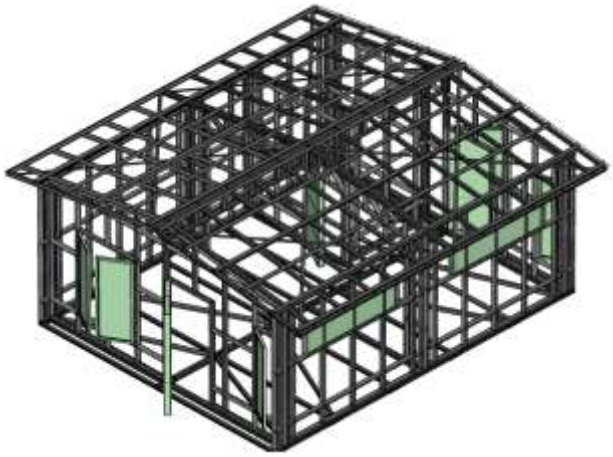

Figure 3. *Building Structure*

Development of structures and materials based on considerations of lightness, ease of application and speed in assembling them, without neglecting the aspect of building strength in carrying the loads of the buildings working within it. Consideration of speed and ease of implementation is urgently needed when the realization of the building procurement in the field will have a very significant impact on the needs of disaster victims who need houses that are ready for occupancy. Installation and characteristics of material relations that are simple and easy in the implementation of process constructions.

The use of this structural and material system allows building fields to be arranged according to the field panels, so it is very effective for fast assembly, even these panels can be stacked and transported easily in areas that are difficult to reach because of their easy and simple packaging.

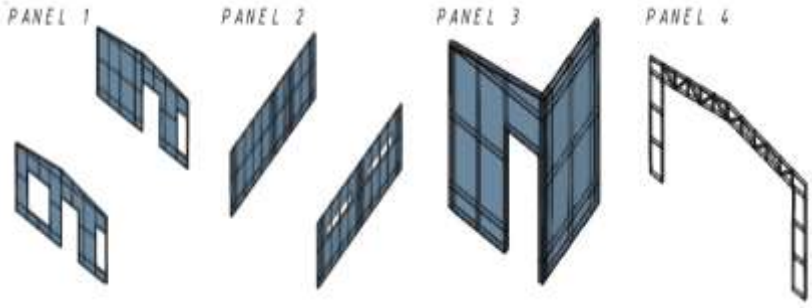

Figure 4*. Elements Building Panels*

These building plane panels are designed according to the needs of each room which has characteristics according to the function of each room, such as the placement of openings in different panel planes. The roof panel is composed of two panel blades with a certain angle of inclination that can be rotated according to the roof slope requirements. The development of wall and roof panels is arranged using a single module to facilitate installation and alignment of building shapes. The form of the building composed of these modules looks simple and does not leave today's technology and materials to facilitate installation.

V. Conclusion

From some of the explanations above, there's some conclusions can be drawn resulting from this study, namely:

1. The basic needs and dimensions of space can be arranged according to the minimum basic requirements of the activities required by occupants with spatial arrangements that are arranged in a grid and interconnected in an integrated manner. The use of the basic form of a box is very effective and efficient for organizing and organizing space so that no space is wasted without leaving the main function of a residential building.
2. The implementation of a prefabricated system with the structure of certain building components with a disassembly system is expected to reduce the cost of implementing the residential building.
3. Using a building system using panels on building components will facilitate the implementation system and building fabrication in the field without reducing the aspects of space comfort and building strength.

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