

## The Importance of Plant Layout to Support the Smooth Process of Building Shelters After the Semeru Eruption

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### ABSTRACT

The purpose of this study was to determine the importance of the right plant layout to support smooth development and to find out the obstacles in the process of building Huntara after the Semeru Eruption. This type of research is descriptive research with a qualitative approach where a Huntara in Sumbermujur-Candipuro Village in the form of interviews and this analysis uses the information system from Huntara in Sumbermujur-Candipuro Village. In this study using data, which data is processed from documentation data. The results of this study are the role of plant layout in the development process is very important because it can support the smoothness of the development process. All of this if applied according to the initial plan quickly the process of work in the construction of shelters will soon be completed and will soon be occupied by its residents. Because in this development process there are not only a few shelters but several thousand affected by Semeru. While the obstacles that occur in this development process are the first from the community itself and from the Non-Governmental Organization (NGO). If the community itself is constrained if they switch to a place that has been made by the government (huntara) this can interfere with the work they do everyday.

Keywords: Plant Layout, Shelter, Semeru Eruption, Sumbermujur-Candipuro Village



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### INTRODUCTION

Java, home to more than 60% of Indonesia's population, has at least 25 volcanoes. One of the most active volcanoes in East Java is Mount Semeru, which is located in two places, Lumajang and Malang. Mount Semeru erupted on Monday, December 20, 2021. This eruption was recorded by seismograph with a maximum amplitude of 11 mm and a duration of 433 seconds. The problem is the damage caused to the population by the disaster and the loss of the land on which they live. The Lumajang district government has allocated land for the resettlement of the Semeru Eruption APG in Sumbermujuru village, Candipuro sub-district, Lumajang district. Volcanic eruptions are usually accompanied by eruptions of ash, sand, gravel, rock, gas, and sometimes lahar, which have great destructive power. (Nugroho, 2018). One of the most active volcanoes in East Java is Mount Semeru,

which is located in two places, namely Lumajang and Malang. Mount Semeru is the mountain with the most eruptions in Indonesia and even in the world. This real condition requires comprehensive measures from various parties. This is because the impact of mountain activity, especially Semeru when it experiences an increase from eruption to eruption, will affect various sectors. Not only individually or personally but also socially. (Hidayat & Ermawati, 2022).

After the eruption of Mount Semeru, because many people took sand and stones, the results of these activities had an impact on the economic and social side, and the standard of living of the community increased. For example, the ownership of household goods, area and infrastructure, and the availability of sufficient daily needs. Traditional mining is very beneficial for people's lives and becomes the livelihood of the surrounding community. The abundance of natural resources can attract investors to Lumajang Regency's sand sector. Based on data in the field, it can be seen that since the sand mining, there has been great economic development, as evidenced by the importance of family businesses. It can be said that the financial turnover of the community is very stable, this is supported by the fact that community members have taken up several jobs, indicating that they earn more than their previous jobs (before the sand development company). Development accompanied by the management of mining potential to improve the economy and human welfare has an impact on the environment of the mining area.

After the eruption in December 2021, it affected the livelihoods of residents around Mount Semeru alone but also affected the place where they lived from childhood. Many houses were lost and not a few of the gardens and rice fields that they had when there was still no eruption were lost buried by sand. However, the place where they live is where they gather and live with their families, so the government provides assistance by replacing the houses of affected residents with decent houses and even making one location in an area that is safe from eruptions.

Temporary shelter is a temporary residence for disaster victims in their home area, either as a mass shelter or as a family or individual. The purpose of establishing shelters is to keep evacuees safe by keeping them away from the disaster area. Temporary housing which includes facilities and infrastructure is almost entirely non-permanent to emphasize its role as transitional housing. The most important thing that should not be forgotten when building shelters is the availability of infrastructure and infrastructure, availability and availability of various services. All of these things must be adapted to the local culture.

The progress of temporary housing construction has reached 562 housing units. At the same time, 1651 of the 1656 apartments set as targets were completed. So far 1656 apartments out of 1951 apartments have been built in Huntap buildings, and currently 178 apartments are being built in Huntara and 155 apartments in Huntap. As for residents, as many as 478 families who are currently still living in refugee camps, get new flats in the relocation location of Sumbermujur Village. The budget for the construction of the shelters is not only sourced from the APBD and APBN, but also from donations from non-governmental organizations (NGOs, ed) such as NU, Muhammadiyah, Banser and many more who are involved in the construction of the shelters. However, the construction of Katkat cannot be compared to the construction of state-owned enterprises such as Brantas and Utama Karya due to limited budget and experience in housing construction..

Design is a physical description of the social, economic and human aspects of life and reflects the culture of the time. Design is a special form of culture and a product of the values prevailing at a particular time. With a good factory design can provide benefits in the production system, namely: increasing production capacity, reducing waiting time (delay), reducing material handling processes, reducing in-process inventory, shortening the production process, etc. A business needs good layout and facility planning to run an efficient and effective business. Factory layout or facility layout can be defined as the act of organizing the factory floor to support the smooth production process. (Wignjosobroto, 2009). Facility layout of a facility planning also refers to the analysis,

conceptualization, planning and implementation of systems for the production of goods or services. Spatial planning activities refer to the planning of the arrangement of the physical elements of the living environment (Apple & Jungck, 1990). While operational management is operations management is a sequence of activities that create value in the form of goods and services by converting inputs into outputs. In addition, it is also necessary to see the definition of operations management as a type of management science regarding the operational management of companies according to the views of operations management experts. Various activities related to the design, restructuring (operation), and improvement of systems that create and produce business outputs, both goods and services. (Ermawati, Atoillah, Anggraeni, & Istichomah, 2022).

A site plan is a two-dimensional drawing that contains a conceptual description or map of a building or lot division plan. In developing housing, usually housing developers will prepare a site plan before physical construction begins. Housing developers and architects need a site plan before the construction process is carried out because it contains detailed information related to the building plan that will be realized. For this reason, the site plan will be the basic reference in a plan. Standardization of housing site plans also needs to be done to uniform the provisions, procedures and planning standards in the site plan document. In addition, the standardization of site plans is currently increasingly urgent because site plans have also become one of the prerequisites in various licenses, such as:

1. Business licensing for the implementation of settlements and housing through the OSS-RBA system, and
2. Issuance of Building Implementation (PBG-SLF) initiated by the Directorate General of Human Settlements.

Although there are currently many regulations and technical standards related to it, housing site plans still need to be reviewed for their relevance for the present and future. This is because of the various technical standards that exist, there is no regulation on the assessment of the suitability of housing site plan standards, so there is no measuring tool for enforcing the implementation of balanced occupancy and development discrepancies from planning.

The site plan planning process is divided into several parts. Before entering the planning stage, the choice of location or site must be in accordance with existing criteria. The land area can be adequate for the construction of houses, facilities, infrastructure, public utilities, and allows incorporation into an already organized residential neighborhood. In addition, the land is free from water, air and noise pollution. It is free from landslides, floods, airplane tracks, and volcanoes, and is not a productive agricultural area. Provisions for the location of housing development must be in accordance with the local Regional Spatial Plan (RTRW), or other planning documents stipulated by local regulations.

In the planning preparation stage, the process of collecting location data and information is carried out. Starting from geographical conditions, designation plans, topography, land value, and other necessary data. In addition to location information data, technical data and local regulations also need to be collected. The technical data includes land slope, earthquake potential, noise level, and others. Meanwhile, the local regulation data that needs to be collected is data related to building boundary lines, maximum building height, and basic and floor coefficients.

The smoothness of the production process and company operations is determined by one factor, the agreement. Various factors must be considered in the design, including workflow, optimization of process movement time, possible damage due to process movement, minimizing the movement or use of materials in the process. A well-thought-out arrangement usually determines efficiency and supports the success of the industry. Folding design is one of the decisions that affect production costs in an increasingly competitive environment. Transportation costs associated with facility planning account for 20% to 50% of operating costs, 2% to 10% of those transportation costs can be

reduced by good plant layout planning. (Hosseini-Nasab, Fereidouni, Fatemi Ghomi, & Fakhrzad, 2018). From the background stated above, the researcher wants to research related to "The Importance of the Right Plant Layout to Support the Smooth Process of Building Huntara after the Semeru Eruption in Sumbermujur-Candipuro Village".

## **METHODS**

The type of research used in this research is descriptive research using qualitative methods in the form of literature research in the form of descriptive analysis and social observation, namely, the process of creating new knowledge about the "social world" (social life). scientific approach. The purpose of this research is to explain the smooth process of building shelters in Sumbermujur-Candipuro Village after the Semeru eruption. (Ermawati, Atoillah, & Anggraeni, 2022). According to Moleong,, (Yulastina & Andriyanto, 2019) revealed that qualitative research is research that aims to understand the phenomenon of the object of research, such as behavior, observation, motivation, action and others, holistically through verbal and language descriptions in a natural and natural context. with different scientific methods. Qualitative research methods directly represent the nature of the relationship between researchers and informants. This type of research is descriptive and can describe informative information based on facts or facts obtained at that time. This is due to the use of qualitative methods (Lexy J Moleong & Edisi, 2004). (Yuliani, 2018), explains the definition of a research object as "a scientific goal to obtain information about something objective, valid and reliable (certain variables) for specific purposes and uses". The research object is the subject of research, the research subject is the subject of research to obtain answers or solutions to problems that arise. The object of this research is the construction of shelters after the Semeru eruption in Sumbermujur Village, Candipuro District, Lumajang Regency. This research was conducted to find out how important the right plant layout is to support the smooth process of building shelters after the Semeru eruption in Sumbermujur-Candipuro Village which provides benefits and added value for researchers and eruption victims.

Based on the type of data obtained in the importance of the right plant layout to support the smooth process of building shelters after the Semeru eruption in Sumbermujur-Candipuro Village, the data analysis technique used in this case is a qualitative descriptive method, namely the data collected before data analysis must be in accordance with the validity of the data according to the research. The data engineering used in this research begins with reviewing all available data from various sources, for example interviews, field observations, official documents, etc. This research method is about the importance of proper facility layout to support the smooth process of shelter construction after Semeru eruption in Sumbermujur-Candipuro town.

Data Collection Techniques To obtain the data needed in this study, researchers used the method:

1. Interview

(Ratna Sari & Slamet, 2017), An interview is a conversation between two parties, the interviewer and the interviewee, for a specific purpose. Interviews are used as a data collection technique, where the problem to be researched and researched is explained in more detail. In this study, a questionnaire data collection technique was used by asking informants. These questions are prepared in advance and arranged systematically in a questionnaire. The questions were then sent to the informants and developed according to the clarity of the answers needed, even though the questions were not in the questionnaire.

2. Documentation

(Lexy J Moleong, 2018), Documentation is a qualitative method of collecting information by reviewing or analyzing documents prepared by the subjects themselves or others involved in the research. In this study, documentation was carried out by recording, namely. Functional information in the form of photographs that visually illustrate the process of working on frame products. The use of notes and records in the reporter's report is not enough. To prove that the information provided is in line with the development of the industry, the researcher copies files or archives related to the research, such as the importance of proper factory layout to support the

smooth process of building temporary shelters post-Semeru eruption in Sumbermujur-Candipuro village.

3. Observation

(Noeraini & Sugiyono, 2016), defines observation as a complex process. It consists of various biological and psychological processes through vision and perception. Observation can be defined as an object-oriented process or activity, the purpose of which is to understand information based on prior knowledge and then understand the phenomenon so that research can proceed.

At this stage, data collection is carried out regarding information on the process of building shelters after the Semeru eruption in Sumbermujur-Candipuro Village which will be used as the object of research to find out the plant layout of the construction of shelters which is then continued by looking for qualitative data in the form of the importance of the right plant layout to support the smooth construction process of shelters after the Semeru eruption in Sumbermujur-Candipuro Village.

## RESULTS AND DISCUSSION

Sumbermujur Village, Candipuro Subdistrict, Lumajang Regency is an area with a large number of residents. The village more or less earns a living as farmers and traders to fulfill their needs. In the case of Sumbermujur village, it is the home of residents affected by the eruption of Semeru. With that decision, there are residents here who have access rights to Perhutani land. The Perhutani land used as HUNTARA in Sumber Mujur village is 79.6 ha, which means they have the right to use Perhutani land. It can also be seen that Lumajang district has a large amount of Perhutani-owned land. From Sumber Mujur village, a decent shelter can still be built for the victims of the Semeru eruption.

### 1. The Importance of Proper Plant Layout to Support the Smooth Construction of Shelters

One of the ways the MBKM Humanitarian Project works is to help IAI monitor and collect data on Huntara/Huntapi from communities affected by the Semeru eruption. One form of centralization is the implementation of the shelter plan in Sumbermujur Village. Temporary shelters are temporary housing for disaster victims in their area of origin. This animal shelter uses the concept of "HEALING HOME" with the aim of creating a temporary residential space with a rural style like a former residential village, which can be used as a means of trauma rehabilitation after the eruption of Mount Merapi. There is a plan to build a break and expand it into a structural RISHA shelter the layout of the shelter adapts to the shelter built in the previous position.

In accordance with the layout of the factory, the workers completed the construction of the quiet living house (and temporary shelters for people affected by the eruption of Mount Semeru in Sumbermujur Village, Candipuro District, Lumajang Regency, East Java. In Sumbermujur Village, the construction of temporary shelters and transitional housing reached 234 dwellings while the number of temporary shelters reached 635 dwellings since the beginning of construction on January 4, 2022 until February 15, 2022, approximately the same number. The construction of temporary and transitional shelters certainly takes into account the comfort factor and provides space for economic activities.

The layout analysis serves as supporting information to improve the appearance of the facilities. Information on alternative options and placement transfers were examined from a cost perspective, with a focus on calculating material handling costs. An irregular room layout can result in a halt in the production process, too great a distance between production development departments can result in significant material transportation costs. Therefore, the appearance of the plant needs to be considered can be made or changed more efficiently and effectively (Susetyo, Simanjuntak, & Ramos, 2010). The production process of canopy construction starts from the stage of measuring

residential land, the size of land suitable for each family, the boundary between one apartment and another, building foundation, construction, etc. Each process has a different time. Each office space is depicted as an array of blocks that are sized and placed according to the original size conditions. The planning picture also includes the flow of materials in the shelter construction process. The Huntara Layout uses a U-shaped production flow, where the starting point of development is aligned with the end point of development after construction. (Kartika, 2014).

In using the factory arrangement, it can be done properly and correctly without mixing. It is necessary to pay attention to the calculation of material usage distance in advance, this is done as a reference material in the calculation of material costs. This is important because the cost of moving materials is related to the distance of moving materials. To calculate the working distance of materials, the direct distance measurement method is used because this method is widely used because it is easy to understand, easy to calculate and suitable for solving practical problems. (Hadiguna & Setiawan, 2008).

Based on the results of research that has been done and observed that the existence of plant layout is very helpful for workers. This explains that the role of plant layout in the development process is very important because it can support the smoothness of the development process. All of this if applied according to the initial plan quickly the process of work in the construction of shelters will soon be completed and will soon be occupied by its residents. Because in this development process there are not only a few making shelters but several thousand affected by Semeru.

## **2. Constraints in the Huntara Construction Process after the Semeru Eruption**

Dalam proses pembangunan ini mungkin dapat diamati lagi dari sekian lama yang telah terjadi, mulai dari proses yang tidak berjalan sesuai dengan rencana awal mungkin itulah setiap hal proses pembangunan pastilah terjadi. Tergantung dalam menyikapinya bagaimana. Sedangkan dalam proses pembangunan disini terdapat 2 opsi yang berbeda:

### **a. Option 1**

Penggunaan kembali konsep material, RE-USE bahan bangunan bekas dan alam yang rusak dapat dimanfaatkan untuk mendesain taman, dimaksudkan untuk mendorong warga berinisiatif dalam mendesain tamannya dan melupakan sejenak trauma yang dialaminya.

### **b. Option 2**

Using materials that are easy to implement, Huntara uses plasterboard modules with the following sizes, namely 120 x 240 cm. Because the assembly is fast and you don't have to cut anything except fast assembly, you can also save costs with the size of the plasterboard module because the goods are not thrown away.





**Image: Huntara Semeru Design**

Source: Semeru Huntara 2021 proposal by the IAI Semeru Satker Architect Team.

#### **Description:**

Materials, 100x300 cm spandex roof, 350x750 mm C profile galvanized roof truss, 120x240 cm plaster ceiling are used as materials. Bovenlis uses Bovenlis hollow heads and 2x4 cm galvelum for air circulation, Bovenlis also uses excess hollow pieces to save costs. The galvume construction uses 350750mm gain C galvanized aluminum as the main structure and inner wall frame. Wall, 120x240 cm calcined metal sheet used as outer and inner wall, Roof used as floor filler used for foundation, 1.2m wide vinyl floor concrete, pomdas, UK concrete base 30x30x20 cm. (Marini, 2022).

According to Banser Begana Lumajang, option 1 and option 2 were not used in this plan, as the direction of the shelter is north-south. And the shelter built by Banser Begana does not have a terrace. Using a gable roof The cut of the roof is 27° and the cut is the same on both sides, making it easy to install the roof and does not require cutting, saving time in the process. It has a main door and frame, a bathroom door and frame, a door without a frame and sash, and two double-glazed windows for ventilation and ease of use. The lining material is Sshort, which uses spandex lining material for faster and easier installation. C 350x750 mm hollow profiles are used in the roof frame and wall construction. In addition to strength, the hollow frame also represents excellent quality and quality requirements, so it can be flexibly adapted to construction needs. Installation is relatively simple, fast and convenient.

The floor uses old cement, the wall is generally 0.00-0.65 cm high, and the bathroom is 0.00-1.50 cm high made of wall bricks. Installing 0.60 wall bricks will retain water when rainwater arrives. If the bathroom wall is 1.50m high, because it absorbs the water of the bathroom, so the wall can withstand the burst of shower water. 2.35m wide multipurpose wall Concrete elements were used in the 1.50m wide bathroom to reduce installation time. In addition to shortening the installation time, this also saved costs and meant that the building had no roof. The remaining empty space was converted into curved wall slats.

NYA cables were used in the electrical installation as per Lumajang District regulations. A total of 3 lights were installed in the party room, bedroom and bathroom. one switch for 1 bathroom, double switch for 1 utility room and bedroom lights. 1 socket is in a public location. Pure water source from PDAM. PVC pipe SNI AW Ø ¾", length 4 m from PDAM to bathroom, used for clean water line. PVC pipe Ø3, 4 m long from the bathroom to the infiltration well is used for waste disposal, while a 4 m long PVC pipe is used for waste disposal from the bathroom to the septic tank.

Meanwhile, according to the NGO Pramuka Peduli, it uses plan option 1 with a shelter design that uses a terrace, with an orientation facing North-South, and an east-west terrace orientation. It has a roof slope of 27° with the same side length to shorten the installation time. There is no gawel because the Huntara / Huntap is combined and rainwater cannot enter through the gap. In addition to shortening the processing time, it also minimizes the cost of expenses because this shelter does not have a back door and palfon. There is one main door and frame, one bathroom door and frame, one door opening without frame and door leaf, there is a single window, double window 1 can make air circulation and lighting better in the house.

Roofing materials using Spendeck have anti-breakage, anti-crack properties and of course shorten installation, Roof Trusses and wall structures using Hollow profit C 350x750 mm can be applied for building purposes flexibly. Installation for buildings is relatively easy, fast and practical., Floor using cement Floor using cement, Multipurpose walls from a height of 0.00- 0.65 cm and bathroom walls from a height of 0.00-1.60 cm using brick walls to prevent water from entering the house and so that the walls can hold water. wall 2.35 cm multipurpose wall 1. 40 bathroom walls using precast cement which has the advantages of good durability, strong, flexible, easy to maintain and easy to install, Electrical Installations use NYA cables because they are easy to install and affordable. has light fittings with a total of 4, with 3 LED lights located in the multipurpose room, room and bathroom. Single switch 1 for bathroom installation double switch 1 for multipurpose room and room installation, 1 socket outlet is located in the multipurpose room. Clean water sanitation comes from PDAM, using SNI AW PVC pipe Ø ¾ "which is 4 m long from the PDAM meter to the bathroom. PVC pipe Ø 3 "with a length of 4 m from the bathroom to the overflow well is used to clean dirty water from bathroom waste, while PVC pipe Ø 4" with a length of 4 m is used from the toilet to the well out The tank is used for waste waste.

This land change has severely disrupted their daily work. Their work is limited and their financial income has also decreased. But that's not all, soil is the story of their lives, meaning that there are residents who do make soil with tripo, ve or ngawit. Soil plants become their children because there are some informants whose land they have utilized for 20 years so that it becomes part of their lives. They are now increasingly feeling the loss of the child they have nurtured for 20 years. In other words, land use change creates a new problem in farming communities, namely marginalization. The marginalization referred to in the case is their limitation in cultivating Perhutani-owned land and also limitations in obtaining financial income. It can be said that their economy is currently forced to fulfill their daily needs.

Based on the research above, we can know that the obstacles that occur in this development process are the first from the community itself and from the Non-Governmental Organization (NGO). The community itself is constrained if they move to a place that has been made by the government (shelter) this can interfere with their daily work. Their work is limited and their financial income is also reduced. While the design of the APG Semeru Relocation Shelter has different plans, some use options 1 and 2. The shelter built by Banser Begana Lumajang does not use options 1 or 2 but uses a new design. The shelter was built by the NGO Pramuka Peduli or using Option 2 designed by the IAI Semeru Satker Team. The materials used by these two NGOs are in accordance with the materials recommended by IAI.

## **CONCLUSION**

Based on the results of the analysis of the importance of the right plant layout to support the smooth process of building shelters after the Semeru eruption in Sumbermujur-Candipuro Village. So it can be concluded that the role of plant layout in the development process is very important because it can support the smoothness of the development process. All of this if implemented according to the initial plan quickly the process of work in the construction of shelters will soon be completed and will soon be occupied by its residents. Because in this development process there are not only a few shelters but several thousand affected by Semeru. While the obstacles that occur in this development



process are the first from the community itself and from the Non-Governmental Organization (NGO). If people themselves are restricted when moving to a state-designated place (Huntara), it can affect their daily work. Their work is limited and their financial income also decreases. Although the design of the APG Semeru Relocation shelter has different plans, some use options 1 and 2. When building the shelter of the Banser Begana Lumajang NGO building, they did not use options 1 or 2, but used a new design.

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