

## The Training in Early Fire Fighting Using Portable Fire Extinguishers at Penjaringan Sari, Surabaya

Indri Santiasih<sup>1,a)</sup>, Dika Rahayu Widiana<sup>1)</sup>, Ryan Yudha Aditya<sup>2)</sup>, Adhi  
Setiawan<sup>3)</sup>, Vivin Setiani<sup>3)</sup>, Suci Indaryani<sup>4)</sup>, Yoga Dwikurniawan<sup>5)</sup>, Vanny  
Nastiti<sup>5)</sup>

<sup>1</sup>Safety and Risk Engineering Study Program, Shipbuilding Institute of Polytechnic Surabaya, Indonesia

<sup>2</sup>Automation Engineering Study Program, Shipbuilding Institute of Polytechnic Surabaya, Indonesia

<sup>3</sup>Waste Management Engineering Study Program, Shipbuilding Institute of Polytechnic Surabaya,  
Indonesia

<sup>4</sup>Instrumentation Laboratory, Shipbuilding Institute of Polytechnic Surabaya, Indonesia

<sup>5</sup>Occupational Safety and Health Engineering Study Program, Shipbuilding Institute of Polytechnic  
Surabaya, Indonesia

<sup>a)</sup>Corresponding author: indri.santiasih@ppns.ac.id

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### ABSTRACT

Surabaya is currently in an urban development phase. This is indicated by the increasing population growth every year. According to data Badan Pusat Statistik (BPS) in 2021, the population of Surabaya was approximately 2880284 people. The population density in Surabaya was around 8612 people per square kilometer. This number increased by 0.28 % from 2020 to 2021. The land conversion from open land to residential land in Surabaya thus increased population density. The high density of residential areas had a greater likelihood of fire hazards that were more difficult to control. It happened because they facilitated the rapid propagation of fire. In addition, the high temperature in Surabaya ranging from 22°C – 34°C was a factor that triggered fire as well. Furthermore, various activities also produced potential hazards including the leakage of LPG gas, electrical short circuits, and the residents' habit of throwing cigarette butts, coupled with the low fire safety system in buildings and the community's lack of ability to prevent and overcome light fire. So, this was a factor that exacerbated the incidents of fires in residential areas. Therefore, the training and simulation activities of early firefighting using portable fire extinguishers aimed to provide the understanding and skill of Penjaringan Sari residents in the ignition phase of the fire. This was the way to prevent large fires. A portable fire extinguisher (PFE) was easy to use by residents for early fire fighting. The results of the training and simulation showed that there was an increase in the knowledge of the people of Penjaringan Sari Urban Village about the material of the fire and its management. This was demonstrated by an increase in the number of correct answers in 95.5% of respondents based on pre-test and post-test results

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## INTRODUCTION

The city is a center of all human activities that continuously grow, influenced by several factors including the increasing population and the rising land need, the availability of public facilities and infrastructure to carry out the activities of residents as well as the city as a place to a decent life. Surabaya City is undergoing a significant development phase, characterized by population growth that continues to increase from year to year and the availability of adequate public facilities to support community activities. The city's progress is evident through the increasing number of facilities and infrastructure developments that aim to facilitate community activities (Aziz H, 2017). Badan Pusat Statistik (2021) studied that the population of Surabaya City is 2.880.284 people, whereas the population density is about 8.612 people per kilometer square. This figure will increase by 0.28% by 2020-2021 (Kusnandar, 2021). This is due to the increased conversion of land from open land to residential. The densely populated area is highly likely to cause potential hazards that could lead to fires. The occurrence of a fire is due to the combination of three elements known as the fire triangle, namely the elements oxygen (O<sub>2</sub>), combustible materials, and heat (Ridley, 2006). Based on their location, fires can be classified into four main types, namely residential fires, industrial fires, transportation fires and forest fires. Residential fires generally occur in densely populated residential areas, as is often the case in Surabaya City (Rogo Sukmo, Suroto, 2016). The fire hazards derived from gas leakage, electrical short circuits, cigarette nipples, and the low fire fighting system in the buildings, etc. Surabaya Government published that there are 144 fire cases in 2022. The high-risk area of the fire is characterized by the densely populated with poor construction materials, consequently, the fire engine finds it difficult to reach these areas (Suhardi, 2021).

The surveys and interviews conducted with partners illustrated that the Penjaringan Sari Community does not yet have capabilities related to early firefighting. Preventive measures that can be taken are actually very easy and relatively affordable, namely by developing an attitude of community preparedness in dealing with fires. In particular, maintaining personal safety is very important. Every individual should have self-evacuation skills as a preventive measure (Eni Supartini et al., 2017). The portable fire extinguisher (PFE) is compatible with controlling early fire due to its light and ease of use (Firdani *et al.*, 2014).

A study conducted by (Ferianto & Hidayati, 2019) showed that training in disaster management had a positive effect on increasing community knowledge and attitudes related to flood preparedness. In addition, research conducted by (Winoto & Zahroh, 2020) also found that socialization through disaster preparedness simulations has a positive impact on improving community skills in dealing with disasters. Based on the conditions described, communities need to have the competence to prevent and control early fires using PFE. The activity was conducted to develop the people skills to control early fire through training and simulation. The type of PFE is selected regarding the causes of fire including the types of A, B, and C. This activity aims to improve the competencies of the Penjaringan Sari people to control early fire and also to provide PFE. The PFEs are employed in the early firefighting simulation and will be delivered as firefighting equipment in Penjaringan Sari.

## METHOD

This activity was executed to improve the knowledge and skill of the Penjaringan Sari people to prevent and control early fire through training and simulation. To increase people's knowledge was carried out by giving people fire fighting theory. The rising of people's skill could be developed by simulation in means that people did themselves to control early-artificial fire. The results were examined by the instrument of pre-test and post-test to investigate the people's knowledge and skills before and after training.

The training was conducted in RT.02/RW.04 Pandugo Baru Wisma Penjaringan Sari, Penjaringan Sari Village, Rungkut, Surabaya City because the area is a densely populated area, so there is a high risk of causing a large fire. The flow of community service implementation is like the flowchart below:

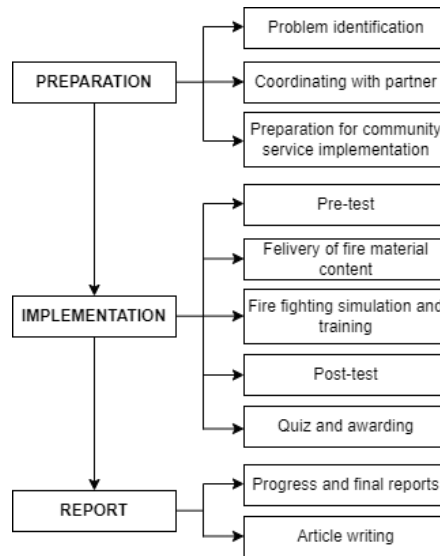


FIGURE 1. Activity Implementation Flowchart

### The Location of Penjaringan Sari

Penjaringan Sari Village located in Rungkut District of East Surabaya (Figure 1) has an area of 33.593 km<sup>2</sup> and was inhabited by 19.417 people, 9.502 of them were men, and 9.915 people were women.

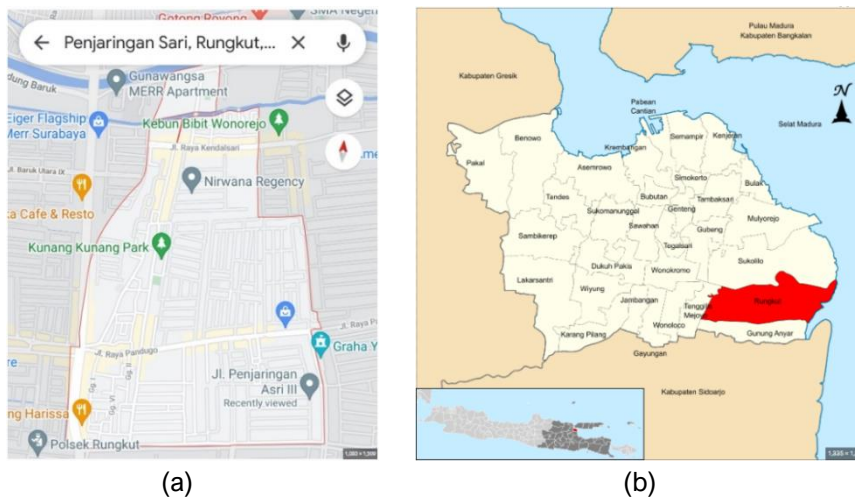


FIGURE 2. The Location of Penjaringan Sari (a) Rungkut District, (b) Penjaringan Sari Village  
Source: <https://www.google.com/search>

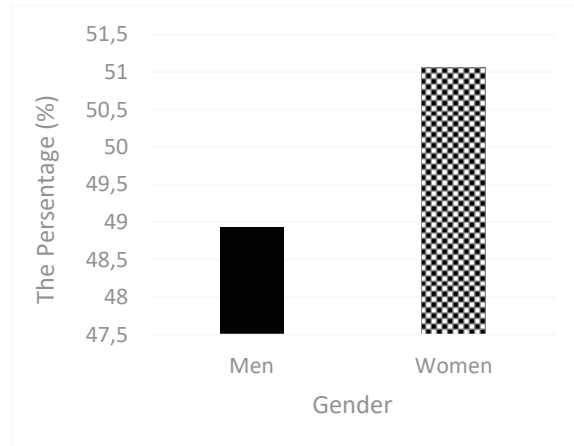
### The Material Submission

The material content was delivered by the Community Service Team of Surabaya State Shipping Polytechnic about what is the portable fire extinguisher, how to use it, and what kind the characteristics of fire. After the trainee obtained the material content, the training continued trying to control artificial fire using the portable fire extinguisher.

## RESULT AND DISCUSSION

### The Characteristics of Penjaringan Sari People

The percentage of Penjaringan Sari people according to gender is illustrated in Figure 3 shows that 51% of Penjaringan Sari people were dominated by women, and 49% were men.



**FIGURE 3.** The percentage of Penjaringan Sari People according to Gender  
Source: BPS (2022)

(Shuster MP, 2000) conducted a study that delved into the unique challenges faced by women working in the field of firefighting. This research identified a range of pressures, encompassing both psychological and physical stressors, which were specific to women in this profession. Among the psychological stressors, self-doubt and the doubts of others about their skills played a significant role in affecting women's well-being in the workplace. Furthermore, performance pressure, sexual harassment, and social rejection were also notable examples of the psychological challenges that women firefighters had to confront. On the physical front, Shuster's study shed light on various stressors that could hamper the effectiveness of women in firefighting roles. These included inadequate physical preparation, which could impact their ability to perform in physically demanding situations. Additionally, insufficient power tool instruction and improperly fitted personal safety equipment further compounded the physical challenges faced by women in this field. (Hulett, et al., 2008) conducted a research project that examined the issue of gender inequality and exclusion within the firefighting industry. Their study provided an in-depth analysis, comparing the problems affecting women, including both women of color and white women, with those affecting men in the same profession. The findings of their research pointed towards a stark contrast in the experiences of women and men in firefighting, where women, in particular, were more constrained by various barriers. The challenges and disadvantages faced by women in firefighting were considerably greater when compared to their male counterparts. This underscores the importance of addressing and rectifying the gender-based disparities and discrimination prevalent in the field of firefighting to promote inclusivity and equality for all individuals working in this demanding profession.

### The Mechanism of Training

The training was conducted through 3 steps including the preparatory stage, implementation stage, and evaluation stage.

#### *The Stage of Preparation*

The preparatory stage was the process of preparing all the material content needed including tools, and equipment, and also preparing administrative processes like correspondence process and

coordination meetings with the chairman of RT. The coordinating meetings were investigated to determine the time for activity execution and prepare all the material content needed. The tools and equipment needed included the portable fire extinguisher for simulation, dry wood, and the drum for a place of firewood to initiate fire. By carrying out thorough preparation stages, an activity can run smoothly and efficiently. All materials and equipment that have been prepared will ensure that the activity runs without unnecessary obstacles. Apart from that, good administrative processes will also help in better coordination and implementation of activities.

#### *The Stage of Implementation*

The training and simulation were executed on July, 23<sup>rd</sup> 2023 at the Village Hall of Kelurahan Penjaringan Sari. The trainee who participated in this training was 48 people from the Penjaringan Sari community (Figure 4). By involving 48 participants from this community, it is hoped that the training and simulation will provide significant benefits to the residents of the Penjaringan Sari Village.



**FIGURE 4.** The Trainees of Early Fire Fighting Using Portable Fire Extinguishers At Penjaringan Sari, Surabaya

The type of fire extinguisher used was powder because the powder fire extinguisher was found to be the most effective in controlling the types of fires A, B, and C. This choice was based on extensive research and testing, ensuring that the safety of the environment and individuals was a top priority. Before the delivery process of fire material content was executed by Mrs. Dika Rahayu (Figure 5), the trainee accomplished the pre-test, aimed at assessing their existing knowledge and skills before undergoing the training program. This pre-test served as a valuable baseline to gauge the trainee's current understanding of fire-related topics. The material content covered various essential aspects, including the characteristics of fire, the fire triangle, the types of portable fire extinguishers, and the principles of fire control. These topics were chosen to provide trainees with a comprehensive understanding of fire safety, enabling them to respond effectively in case of a fire emergency.



**FIGURE 5.** The Delivery Process of Fire Material Content in The Training

After receiving content delivery, trainees proceed to perform initial artificial fire control efforts, as illustrated in Figure 5. To ensure knowledge and skill improvement, trainees also complete a post-training exam. Even though the training participants were able to use portable fire extinguishers correctly, the Surabaya State Shipping Polytechnic Community Service Team provided a grant in the form of 5 portable

fire extinguishers when a fire occurred. Thus, trainees not only have enhanced knowledge and skills, but also the necessary equipment support to overcome fire emergency situations.

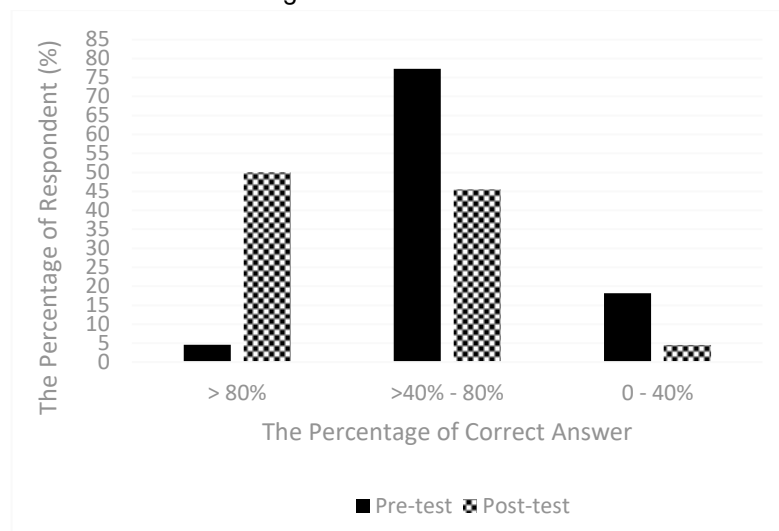


**FIGURE 6.** The Simulation of Early Artificial Fire Fighting Using Portable Fire Extinguisher

### *The Stage of Evaluation*

The success of a training program was determined by training evaluation. Knowing about an organization's, a training program's, and an individual's qualities before, during, and after training was necessary to ensure training efficacy. Training efficacy and evaluation differ from one another. Training assessment exclusively emphasized the micro view of training results, whereas training effectiveness emphasized macro analysis of the training entire system (Wentworth *et al.*, 2009). The trainees' reactions, knowledge enhancement, trainees' behavioral modifications, or the overall efficacy of the entire company. Knowledge was not a necessary prerequisite for behavior change brought about through training, but even so, it was essential. Training itself could directly alter behavior. A training program's employment application could also include a behavior evaluation. After training, consider the trainee's real job performance and the supervisor's feedback for behavioral changes (Arthur *et al.*, 2003).

Figure 7 provides a clear visualization of the pre-test results, indicating that the number of correct answers was relatively low. The data further reveals that the majority of participants fell within the 40% to 80% correct answers range, with an impressive 77.27% achieving this level of accuracy. In contrast, only a small fraction of participants, a mere 4.55%, scored over 80% on the pre-test, representing the lowest percentage of correct answers. These statistics underscore the need for a closer examination of the pre-test performance and the factors influencing it.



**FIGURE 7.** The Comparison between The Number of Correct Answers of Pre-test and Post-test

The post-test results show that the highest percentage of correct answers above 80% is 50%, while the lowest percentage of correct answers falls in the range of 0 to 40%, only 4.55%. It can be concluded



that there has been an improvement in the knowledge and skills of the training participants in early firefighting. (Arthur et al., 2003) investigated that the training effectiveness was examined from the increasing of knowledge or skill obtained from training or simulation.

## CONCLUSION

Penjaringan Sari Village is densely populated with low capabilities in controlling early fire extinguishment. This village continuously faces the threat of fires due to its high population density, and the challenges in addressing fires in such conditions become even more difficult at very high temperatures. With the increasing likelihood of fires occurring in densely populated areas, the community's vulnerability to this situation becomes essential to address. Recognizing the urgent need to enhance fire preparedness and response, the Community Service Team from Surabaya State Shipping Polytechnic has initiated a comprehensive program. This program focuses on training and simulation to teach the residents how to manage risks associated with small-scale fires, using portable fire extinguishing tools. The main goal is to equip the community with the knowledge and skills required to effectively manage fire incidents. By providing these vital skills, this initiative aims to enhance the level of preparedness and safety for the community during emergencies. This not only protects lives but also contributes to peace of mind and a sense of security within the Penjaringan Sari Village community.

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