

OCCUPATIONAL HEALTH AND SAFETY AMONG POTTERS IN KASONGAN VILLAGE, BANTUL, YOGYAKARTA

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ABSTRACT

Kasongan is a pottery center and a tourist destination in Bantul, Yogyakarta. Most of Kasongan people make pottery for a living. The production stages, however, potentially pose dangers to potters. Occupational health and safety (OHS) is crucial in this type of work. This community service aims to: 1) identify the potential hazards faced by the potters, 2) formulate technical guidelines for standardization of OHS, and 3) conduct technical guidance for the potters. Methods employed were: 1) identification of potential hazards to the potters, 2) discussion with the potters about OHS, 3) formulation of technical guidelines of OHS for the potters, and 4) counseling service of technical guidelines on the implementation of OHS. The results of the study are: 1) a growing awareness of the importance of OHS and the process of production among the potters, 2) the availability of technical guidelines of OHS, and 3) OHS ensured for the potters in Kasongan, Bantul, Yogyakarta.

Keywords: Occupational Health and Safety, Community Service, Potters, Technical Guidelines.

INTRODUCTION

Kasongan, located in Bantul, Yogyakarta, is a pottery center that was developed in 1675–1765 and has strived to exist until the present time. Since 1987 the industry has exported its products to 12 countries (<https://larembantul.wordpress.com/2015/03/19/profil-sentra-gerabah/>). Pottery refers to handmade objects made out of clay. The pottery industry is a home industry that has aimed to preserve the culture, in addition to increase the revenue of the people in Kasongan. Pottery making requires several stages (<https://ruangkumemajangkarya.wordpress.com/2012/01/20/proses-pembuatan-gerabah/>).

The results of the discussion with one of the potters suggest that the manufacturing process consists of the preparation stage, the material processing stage, the shaping stage, the drying stage, the firing stage, and the finishing stage.

The preparation stage requires the potters to pick the clay, dry it, as well as prepare the mixture and the processing tools. Then, the processing stage can be done in two ways: wet processing and dry processing. Dry processing, however, is more popular among traditional potters in Indonesia. The dry processing is performed by kneading the clay until smooth, sifting it, and mixing it with additional materials. The mixture is added by water and then re-mixed until even and homogeneous. As a result, the clay is ready to be used to make clay bodies. The clay mixing aims to strengthen the clay bodies when being shaped and fired.

The next stage is called the shaping stage. At this stage, different shaping techniques can be applied, such as *wheel throwing, casting, slab, pinching, coil*, and the combination of

techniques. The shaping stage consists of two steps, namely the initial shaping (clay bodies) and the addition of ornament/decoration. Most potters use the wheel throwing technique despite modest tools. The pinching technique was the basic technique in making pottery before other techniques were introduced. This technique is still popular among Japanese ceramic artists to make bowls since it allows them to add a special touch to the bowls.

After the shaping stage, potters perform the next stage called the drying stage. The drying process can be done with or without the sun's heat. The final stage of the pottery making includes the firing and finishing steps. The firing process is accomplished using a kiln, while the finishing process involves the use of chemical substances, such as paints.

Workplace can potentially pose hazards to the workers (International Labour Organization, 2013). The hazards can be nature of the site, environmental conditions, site specific conditions, process, transport, equipment, violence, individual(s)/other person(s) at risk, and work pattern (Fieldwork ESSL, 2010). Potters are individuals at risk (Sudirman Central Business District, 2017) when performing the stages from the stage of mixing raw materials, the firing process, until the finishing step. Thus, the aspects of OHS should become serious concern in the process of pottery making.

Based on the pottery making stages and the discussion with the potters, potential hazards could be identified. The results of identification of potential hazards are presented in Table 1 as partner problems. These results help determine the technical guidelines in regard to potential hazards and the technical guidance to the potters in Kasongan, Bantul, Yogyakarta.

Table 1. Partner Problems

No	Activities	Potential Hazards	Information
1.	Collecting raw materials	No potential hazards	
2.	Mixing raw materials	Low back pain (LBP), joint pain, muscle pain	Injuries can occur in the process of mixing materials when potters stretch their muscle and transfer the materials after being soaked. If potters do not follow biomechanical principles when transferring the soaked clay, potters can suffer from LBP, joint pain, and muscle pain.
3.	Shaping the clay	Joint pain caused by static position when shaping the clay	Static position in a long period of time can cause joint pain.
4.	Firing potter	Burns on parts of the body and respiratory tract (inhalational trauma)	Fire exposure can prompt sunburn that results in pain, sore, and irritation on the exposed skin.
5.	Finishing	The use of solvents (tinner)	Toluene/tinner can cause problems to the respiratory tract and irritation or allergy to the skin.

METHODS

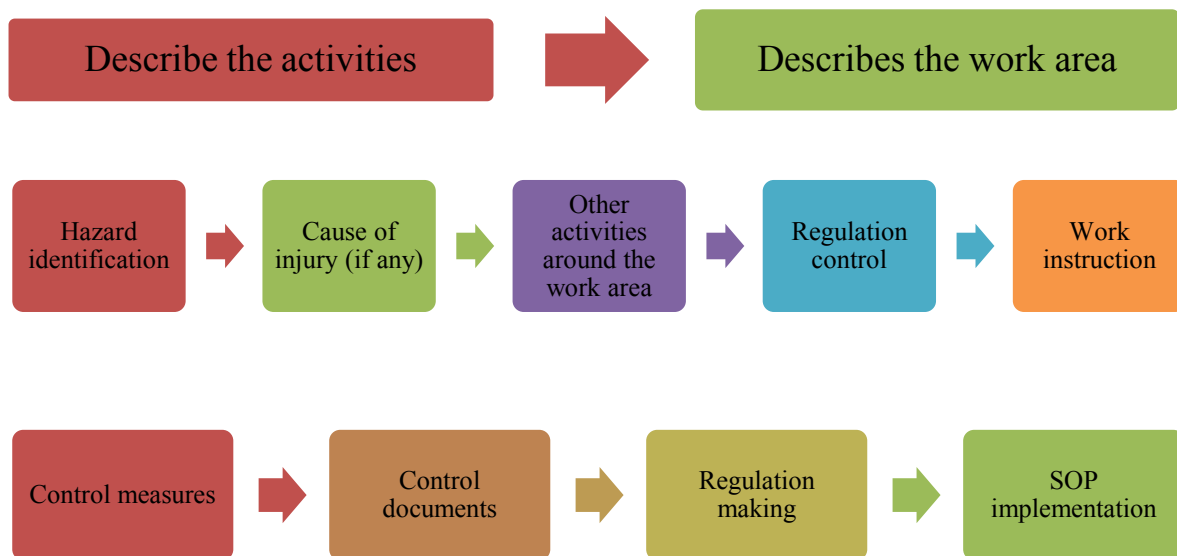


Figure 1. The Implementation of Methods

To resolve the problems about OHS in Kasongan, certain methods were necessary to be employed. The methods were activity description, hazard identification, and control measures. Creating a safe and comfortable workplace requires serious plans and commitment. One of the steps that can be taken is holding a discussion with the potters about potential hazards at the workplace. The discussion with the potters in Kasongan was held on February 15, 2019. In addition, the authors conducted hazard identification independently by observing the potters when working. After potential hazards were successfully identified, the authors subsequently designed the technical guidance on OHS for the potters and validated it.

RESULTS AND DISCUSSION

Based on Figure 1, the implementation of the community service was conducted in several stages explained as follows.

Activity Description

To describe the activities, observation and discussion were conducted at the place where the community service took place which was one of the pottery stores called Subur Keramik. The results of observation suggest the finding about the activities of the potters as follows: 1) the preparation stage (choosing/buying raw materials), b) the mixing stage, c) the shaping stage, d) the drying stage, e) the firing stage, and f) the finishing stage.

The potters prepare or search for raw materials before making clay and buy raw materials – red soil and fine sand – in Pocung Imogiri and Kuloprogo. There are no risks at this stage since the raw materials are usually delivered by the producers. After the raw materials are obtained, the next stage is mixing them.

The mixing stage refers to the process of mixing the red soil, bought in Pocung Imogiri and Kulonprogo, with the fine sand (taken from the river). The two raw materials are mixed with a hoe. The composition of the mixture is a half part of the red soil from Pocung Imogiri, a half part of the red soil from Kulonprogo, and the fine sand. The potters who perform the mixing process are all male. Hoes are used by the potters to do the mixing. Some potters said that the mixing stage required a lot of energy. After all the raw materials are mixed, the

mixture is let to soak for a night. Then, it is transferred to the mixer. This process needs a large amount of energy because the mixture contains wet soil. The soaked mixture is later re-mixed in a mixer tool for 6 spins. After the mixing stage is complete, the shaping stage should be conducted next.

The shaping stage refers to the process of shaping raw materials into pottery. Pottery can be shaped by a range of techniques, such as *wheel throwing, casting, slab, pinching, coil*, and the combination of different techniques. The shaping process can be divided into two steps: initial shaping (clay bodies) and the addition of decoration/ornament. The wheel throwing technique is the most popular among the potters even though the tools they have are quite modest. The pinching technique, however, was the basic technique before other techniques were invented. This technique is still commonly used by Japanese ceramic artists in order to give a special touch to the bowls they make.

The next process is the drying stage which can be performed with or without the use of the sun heat. It means that the pottery can be dried in the sun; otherwise, the pottery can be left in an open room for 3 days until it is fully dry. After being dried, the pottery is then fired. This stage aims to remove the moisture content and to unite molecules of the pottery in order to make it hard and durable. This stage is followed by the finishing stage. The finishing stage is the final stage of pottery making. This stage involves painting which aims to decorate the pottery in order to make it more attractive to customers and to increase sales. Thus, many kinds of paints are used together with a solvent called tinner.

Hazard Identification

Hazard identification was conducted in this community service based on the stages of activities of the potters. At the preparation stage, no potential hazards are found because the potters order the raw materials and then wait for them to be delivered. The following stage is the stage of mixing raw materials.

The mixing stage is performed by male potters. This stage requires a large amount of energy since kilograms of red soil are mixed with fine sand. Potential hazards are found at this stage, such as fatigue, LBP, joint pain, and muscle pain. Fatigue is caused by a long period of time and a large amount of energy required in the process of mixing raw materials. Joint pain, however, often happens when the potters carry heavy loads and ignore principles of ergonomics. Ergonomics is the study of designing workplaces, work equipment, machinery, tools, products, and working environment to accommodate the humans' physiological capabilities, effectiveness, and productivity at work with an aim to maintain the workers' health and safety (Marley & Fernandez, 2007).

Fatigue, joint and muscle pain occur due to the activity of the musculoskeletal system that consists of skeletal muscle, heart muscle, and smooth muscle (Bhattacharya et al., 2012). The skeletal muscle is used by arms, legs, and back as part of conscious movement (Bhattacharya et al., 2001). Skeletal muscles work when potters mix raw materials. The mixing stage requires physical activities that cause metabolism to occur (Bhattacharya et al., 2001). Heavy physical activities, however, can cause anaerobic metabolism that produces lactate acid (Tortora & Derrickson, 2009). In addition, strenuous physical activities that mainly use skeletal muscles can lead to strain and sprain. They can cause a cell injury called inflammation. A cell injury on the skeletal muscles is the result of micro trauma on the muscle cells due to the continuing use of muscles (Bhattacharya et al., 2001). The cell injury causes inflammation characterized by symptoms, such as the warm feeling on the muscles, pain, and redness.

Furthermore, at the firing stage, there is a risk of burns on parts of the body and on the respiratory tract. Burns on parts of the body are the results of the heat produced by the fire during the firing process. Burns on the respiratory tract, however, are caused by the fire or toxic gas inhaled by the workers (Gupta et al., 2018). The components of toxic gas that can damage the airways are carbon monoxide (CO), hydrogen cyanide (HCN), ammonia, sulfur dioxide, hydrogen sulfide (H₂S), and formaldehyde. If inhaling the toxic gas, potters can suffer from edema, thus have breathing problems (Gupta et al., 2018).

The finishing stage can also pose dangers since it involves the use of paints and solvents that contain hazardous substances, such as formaldehyde, toluene, and xylene (Argo et al., 2010). According to Argo et al. (2010), xylene is easily absorbed and metabolized in the human body. Hazard identification and guidelines on toluene have been developed by National Research Council (Toxicological Review of Toluene, 2005). Toluene, according to Toxicological Review of Toluene (2005), can be absorbed into the body through ingestion, skin, as well as inhalation, and then then distributed throughout the body. Toluene exposure can affect the brain and the nervous system (Toxicological Review of Toluene, 2005) even though toluene is carcinogenic.

Control Measures

Control measures on OHS are presented in the table below.

Table 2. Control Measures on OHS of the Potters in Kasongan, Bantul

No	Activities	Potential Hazards	Control Measures
1.	Mixing raw materials	LBP, joint pain, and muscle pain	Prevent LBP and pain by muscle stretching, biomechanics training, and proper lifting technique
2.	Shaping clay	Joint pain due to static position during the shaping process	Follow ergonomic principles and do light stretching every 30 minutes
3.	Firing pottery	Burns on parts of the body and respiratory tract (inhalational trauma)	<ol style="list-style-type: none"> 1. Pay attention to airways, breathing, and circulation 2. Save/remove the patient from the fire area 3. Determine the degree of the burn: <ol style="list-style-type: none"> a. Degree 1 Pour cold water for 20 minutes. No need for treatment of wounds or antibiotic ointments, only a moisturizing cream or lotion special for burns such as bioplacenton. b. Degree 2 The epidermis layer is damaged; thus, the wound feels more painful, so the patient needs to be referred to the nearest health center. c. Degree 3 and 4 All layers of the dermis are injured characterized by hard, blackened, painless skin. The patient needs to be referred to the nearest health center.

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| 3. Finishing | The use of solvents (tinner) | 1. Exposure to eyes
Immediately wash eyes with running water or NaCl. |
| | | 2. Exposure to skin
Immediately wash hands if the skin is exposed to toluene. |
| | | 3. Exposure to respiratory tract
Inflammation can occur on respiratory tract, so the patient needs to be referred to the nearest health center. |
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In general, the results of this communication service cover several aspects, namely: the sufficient number of the target trainees, the accomplishment of the training objectives, the target accomplishment of the planned materials, and the ability of the participants to absorb the planned materials. In this regard, there were 11 employees of Subur Keramik who attended the technical guidance on OHS.

CONCLUSION AND RECOMMENDATION

Based on the evaluation of the activities of the potters in Kasongan, the conclusion that can be drawn is that it is necessary for the potters to do self-protection based on the guidelines that have been made. The guidelines are expected to be able to protect the potters from the hazards at the workplace.

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