

## **The Effect of Training and Development Of Industrial Bricks Technology in Lok Buntar Village, Sungai Tabuk District, Banjar Regency, South Kalimantan**

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**Abstract**—Based on data from Banjar Regency shows that the increase in product demand in the construction sector from 2013 amounted to 925,433 to 1,102,927 in 2014. This condition is an opportunity for increasing brick sales and the economy of the Lok Buntar Village community, most of whom work as brick's maker. However, there were problems that had been faced by brick's maker, namely 55% of brick's maker working with high ergonomic risk levels and 52% of brick's maker experiencing musculoskeletal complaints. This is because all stages in brick maker are still done manually with limited physical abilities, hand skills, and non ergonomic work station. The "Bricks Industrial Technology Training and Development" program aims to introduce the automation work system through brick molding machine with extrusion systems to one of the brick's workshops also accompanied by health promotion related to ergonomic work processes to brick printers. Through this program the production process becomes faster where initially 200-300 bricks are obtained in 8 working hours to at least 300 bricks per 5 hours. The brick's maker also know how to process manual material handling that is more ergonomic which is obtained by increasing knowledge by 99.22%.

**Keywords**— brick's molding machine, ergonomic, informal sector, manual material handling, productivity

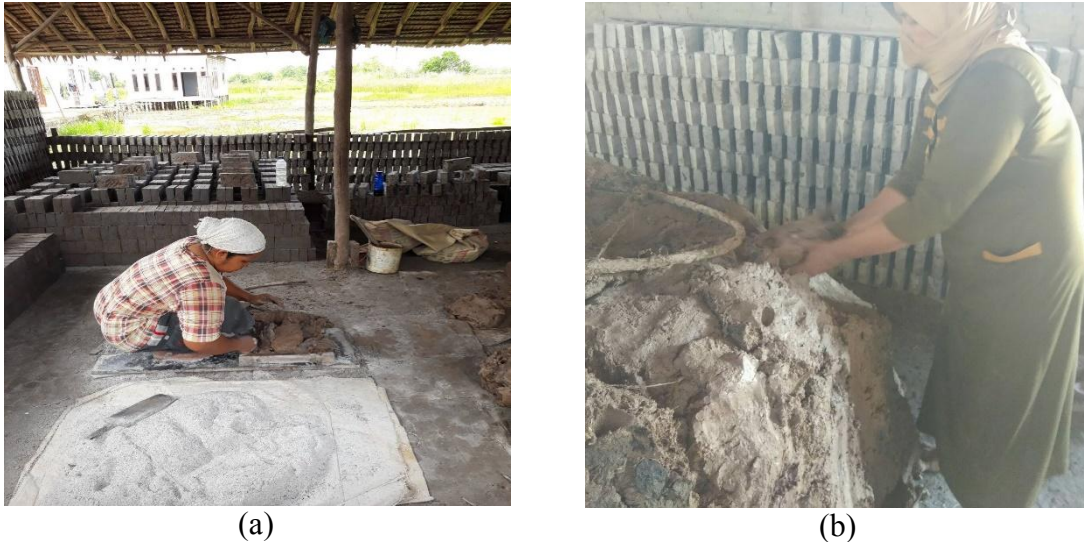
### **I. INTRODUCTION**

Based data from Banjar Regency shows that the increase in product demand in the construction sector from 2013 amounted to 925,433 to 1,102,927 in 2014 [1,2]. This condition is an opportunity for increasing brick sales and the economy of the Lok Buntar Village community. Brick's maker is one of the most common jobs found in Lok Buntar Village, Sungai Tabuk Subdistrict, Banjar Regency [3]. With the growing development of the country, the need for construction materials such as bricks is also increasing. However, the production of bricks produced by the workers in Lok Buntar village does not match with the market demand. During the process of molding and compacting bricks, the brick's maker rely solely on the strength and skill of their hands. This process creates the slow progress of the productivity. In addition, the quality of the bricks are diverse and it is difficult to get the results of bricks with the same flat surface and other characteristics.

To overcome this productivity problem, the most effective solution is to use a brick molding machine. Based on the previous research [4] the use of brick molding machines can significantly rose the production rate. From what initially only ranged from 600 to 700 bricks

per day manually, using the machine can increase the production up to 30,240 bricks per day with an average of 4,320 bricks per hour.

In addition, the results of a previous study found that brick's maker in Lok Buntar village, which consisted of about 120 female workers, experienced fatigue, complaints of pain in their spine and muscles. The results of previous research indicated the slope position of a brick's maker when working could exceeds up to  $20^{\circ}$  [3]. This is situation is worsen by the work of making bricks that are repeated every day with a very high frequency. 52% of brick's worker in Lok Buntar village experienced complaints of musculoskeletal disorders.



Picture 1. (a) Molding process and (b) raw material for making bricks

Each brick's maker can only make an average of 200 bricks per day, whereas the market demand is quite higher. This is very unfortunate as the economic difficulties can be felt around the area. Based on observation, we found the problems faced by brick's worker in Lok Buntar Village, Sungai Tabuk District, Banjar Regency are:

- a. Brick's worker have not obtained the proper tools to create bricks which caused the physical burden exceeds the capabilities of the brick's worker also the quality and quantity of bricks produced were not optimal.
- b. In carrying out its work, 55% of brick's worker in Lok Buntar Village, Sungai Tabuk Subdistrict are at a high risk of ergonomic problems.
- c. As many as 52% of brick's worker in Lok Buntar Village, Sungai Tabuk Subdistrict have complaints about musculoskeletal disorders.
- d. The brick's worker in Lok Buntar Village, Sungai Tabuk Subdistrict, have never taught about using bricklaying tools.
- e. Musculoskeletal disorders were found to slow the productivity as the brick's worker had to rest and take additional medication for it.

The "Bricks Industrial Technology Training and Development" program aims to introduce the automation work system through brick molding machine with extrusion systems to one of the brick's workshops also accompanied by health promotion related to ergonomic work processes to brick printers. With this program, we hope the workers are expected to be able to work with a more ergonomic posture and minimize the use of physical energy so that health complaints about musculoskeletal disorders can be prevented and morbidity reduced.

## II. IMPLEMENTATION METHODS

This is descriptive research and to show information about the "Bricks Industrial Technology Training and Development" program. The population on this research is all brick's maker in Sungai Tabuk District and the respondent on this research is one of the brick's workshops on that village. Based on the analysis of the situation and the problems faced, this activity is directed in two ways, the transfer of knowledge and transfer of technology. In the transfer of knowledge, 2 methods of implementation are used, the first method of implementation is in the field of production and The second method is focused on improving the ability of management. In the field of production, the program will begin by providing knowledge about musculoskeletal problems and efforts to prevent them, counseling on occupational Health and effective work method. As with the first counseling, this activity was carried out through interactive dialogue and followed by training. Leaflets, videos and instructions will also be given at the time of counseling.

After the knowledge transfer has been completed, technology transfer will be the next step. Technology transfer is made in the form of through brick molding machine that will be given to the other stakeholder, the community. The bricklaying tool is made an extrusion method. The advantages of this model are: (1)Easier do use, and (2) Only requires 3-4 people to operate.

### **III. RESULT AND DISCUSSION**

In the progress report of the Community Partnership Program (PKM), several activities will be delivered up to August 2018. The activities include the following:

#### **3.1. Preliminary survey**

At the beginning of April and May 2018, the team has made a visit to both partners. In this survey, an initial observation of The manual handling bricklaying process was conducted by the community. In addition, this activity also followed by visual observations of the material used for making bricks. It is important to know the physical and mechanical properties of the brick produced. The properties of materials can also be used as a basic information for creating the bricklaying tool. To explore other information, in this activity discussions were also held with village officials, communities and bricklaying businessman. From the results of the discussion, additional information was obtained regarding the obstacles and challenges they faced. Such as the limited raw materials which is imported from other places, marketing problems and other important information which could support the activities of this community partnership program.

#### **3.2. Training and Health Promotion**

July From May to July 2018, the team visited the program partners several times. This activity consisted of pretest, training and counseling activities which were prepared based on the results of preliminary studies and related references. It is expected that brick's worker can continue working with ergonomic methods to avoid ergonomic risks and musculoskeletal disorders. In addition, the role of entrepreneurs / employers and village officials is also crucial to support the success of this program.



Picture 2. Health Promotion to Brick's Maker

All respondents of the activity are brick's worker, brick burners, raw material transporters and brick warehouse owners in Sungai Tabuk District, Banjar Regency. Most of the participants who participated in the program were male (17 people or 56.67%), aged  $\geq 35$  years (17 people or 56.67%), smokers (16 people or 53.33%) and did not have a habit of exercising (16 people or 53.33%).

Table 1. Result pre and post test score on health promotion about manual material handling and avoiding musculoskeletal disorders

|                      | <i>Pre-test Score</i> | <i>Post-test Score</i> | <b>Difference</b> | <b>Percentage Improvement (%)</b> |
|----------------------|-----------------------|------------------------|-------------------|-----------------------------------|
| <b>Average Score</b> | <b>41</b>             | <b>70,33</b>           | <b>29,33</b>      | <b>92,22</b>                      |

Based on Table 4 it is known that there is a 92.22% increase in knowledge about the correct way of working and musculoskeletal problems. Knowledge can be obtained from the memory process of something the person knows, either through experience, learning, or information from others. Knowledge improvement is the first step in behavior change. Knowledge is the result of knowing and occurs after an individual sensed a particular object. Sensing occurs through the five senses of man, vision, hearing, smell, taste and touch. Though most individual knowledge is obtained through the eyes and ears. Knowledge improvement is effectively proven through training provided to respondents where this training involves the active participation of respondents in learning and practicing the lesson directly [5].

### 3.2. The Brick Molding Machine

The process of manufacturing the brick molding machine is carried out from March to July 2018.



Picture 2. the brick molding machine

The machine has been able to work properly and the production process becomes faster where initially 200-300 bricks are obtained in 8 working hours to at least 300 bricks per 5 hours. To increase productivity, some modifications are still being made. Modifications to facilitate the bricklaying process such as the addition of wheels to the engine, the addition of cutting tools and other minor modifications

#### **IV. CONCLUSION**

Through the "Bricks Industrial Technology Training and Development" the production process becomes faster where initially 200-300 bricks are obtained in 8 working hours to at least 300 bricks per 5 hours. The brick's maker also know how to process manual material handling that is more ergonomic which is obtained by increasing knowledge by 99.22%.

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