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Empowerment of Bricklayers through Lightweight Brick Production Training in Makassar City

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ABSTRACT

The urgency of this Community Service activity is to overcome the limitations of the economic capacity of bricklayers due to productivity challenges. The main problem in the initial survey results illustrates the high risk of job loss for bricklayers as seasonal workers. Most bricklayers are unemployed for three to four months a year. This activity aims to improve the knowledge and skills of bricklayers in making lightweight bricks. These skills will be useful in economic opportunities for bricklayers when they are unemployed. The implementation of the training, which is divided into two parts, namely education about lightweight bricks and training in making lightweight bricks, took place effectively with the involvement of 25 bricklayers. The activity evaluation results showed that most participants were skilled in preparing materials and tools, mixing mortar, and molding lightweight bricks.

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INTRODUCTION

The workforce in the construction industry faces significant challenges related to professionalism. Professionalism is becoming increasingly vital in response to the evolving landscape of the construction sector, affecting both productivity and trust among stakeholders (Ofori & Ceric, 2018). The need for adaptability among construction workers to maintain their employment and navigate the industry's evolving landscape is critical (Hovnanian et al., 2022). Advances in construction equipment and mobility across regions for workers have increased the risk of job loss for those who lack professionalism (Wibawa et al., 2022). Generally, stonemasons face a high risk of income loss and job instability. Many stonemasons are seasonal workers without company assurances of job continuity, which heightens the risk of job loss and economic difficulties. This risk is further exacerbated by unpredictable weather conditions, which can impact the continuity of construction work. Additionally, socio-economic issues such as currency fluctuations, domestic socio-political conflicts, and the availability of technology and equipment can sometimes affect the sustainability of construction industry activities.

Stonemasons, who typically work as temporary laborers in the construction industry, need sufficient skills to maintain their family's economic stability (Nugraha, 2020). Based on the analysis of the situation in the construction industry, such as multi-story building construction, residential development, road repair work, and other construction activities, it is observed that masons are often employed temporarily. Companies typically engage masons for construction activities that match their expertise. The duration of these activities generally lasts for about six months. As a result, masons often experience periods of unemployment or joblessness for three to four months each year. This situation affects their family's economic conditions.

Lightweight bricks are widely used as wall materials for constructing simple houses and multi-story buildings (Salomovich et al., 2023) (Satar & Ismail, 2023). This material is produced by large industries with production volumes that do not match field demands. The advantages of this material include its lighter weight compared to traditional bricks and its larger size, which results in easier and faster wall installation (Ningrum et al., 2022). The global lightweight brick market analysis indicates a noticeable gap between production and demand, particularly in regions with fast-paced construction growth (Islam et al., 2023). Additionally, research on sustainable brick production methods points out that handmade or smaller-scale production models offer flexibility to adapt to market demands, providing opportunities for individuals or small businesses to contribute to supply and alleviate shortages (Cultrone et al., 2020).

The high demand for lightweight bricks has led to material shortages. This issue presents an opportunity for masons to start producing lightweight bricks as a side business. The opportunity for masons to develop skills in producing lightweight bricks is significant due to the available raw materials on the market (Tanjung & Munte, 2020). Adopting new, eco-friendly building materials innovations indicates that masons could adapt and benefit from producing alternative materials to meet local demands while supporting sustainable practices in the industry (ul Haq et al., 2023).

Portland cement and sand can be purchased in small quantities at building supply stores. Additionally, conventional molds, typically made from wood and plywood, do not require complex skills. The chemical additives necessary to achieve the desired properties of lightweight bricks are readily available in the construction materials market. Based on this problem and the opportunities identified, the basis for the team's outreach effort is to conduct training for masons in lightweight brick production. This initiative aims to develop masons' skills in manufacturing lightweight bricks, contributing to business opportunities and supporting their economic stability.

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METHODS

The training activities are conducted in Makassar City, specifically in the Manggala District. The community service program unfolds in four stages. The first stage involves a Focus Group Discussion (FGD) with masons, developers, and experts actively engaged in lightweight brick studies. This discussion aims to formulate the training approach and strategies for involving partners effectively. The second stage focuses on education about lightweight bricks, including explaining their properties, raw materials, and production methods. The goal here is to introduce material standards, tools, and dimensions of lightweight bricks. The third stage is dedicated to hands-on training, which involves explaining the production process, demonstrating techniques, and providing practical experience in making lightweight bricks. Finally, the fourth stage is the evaluation, where the masons' skills are assessed based on performance measurements taken during the training. Each stage employs different methods, which are detailed in Table 1.

TABLE 1. Stages of Training Activities

Stages	Method	Number of Partner Members
Focus Group Discussion	Discussion	3 people
Education about lightweight bricks	Lectures and Q&A sessions	25 people
Lightweight brick production training	Demonstration	25 people
Evaluation of results	Performance	17 people

RESULTS AND DISCUSSION

Focus Group Discussion

This activity represents the initial step for the outreach team in designing the training program. The activity aims to gather input on the issues and potential challenges that may emerge during the training program. The event was attended by various stakeholders with expertise in producing and marketing lightweight bricks. A description of the parties involved in the Focus Group Discussion is presented in Table 2.

TABLE 2. Stakeholders Involved in the Focus Group Discussion

Participants Involved	Description	Column Header Goes Here
Stonemason community	An element representing the members of the Makassar stonemasons' organization	Elaborating on their opinion regarding the fundamental potential possessed by stonemasons to produce lightweight bricks independently
Home developer	Residential development companies (two companies using lightweight bricks)	Elaborating on the potential uses of lightweight bricks produced by stonemasons
Lightweight brick and marketing technology expert	Lecturers and the lightweight brick research team	Elaborating on the educational methods, types of training, and necessary tools

The Focus Group Discussion was held at Hotel Remcy Makassar on July 9, 2024. This event resulted in the formulation of stages of activities, socialization with the stonemasons who will be involved, and the design of training materials.

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(a) (b)

FIGURE 1. Focus Group Discussion

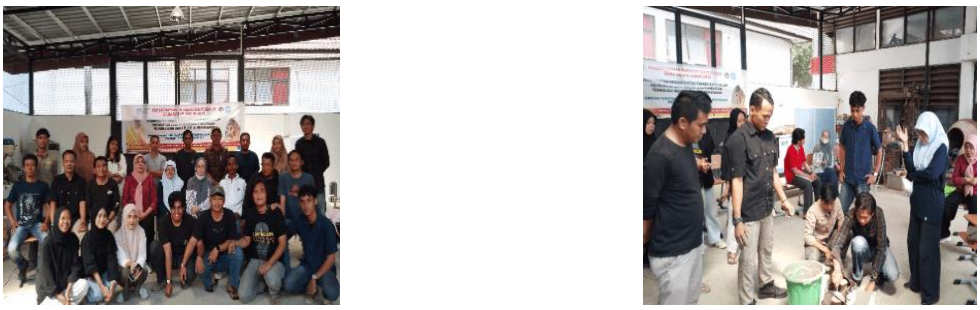
The focus group discussion results serve as a guide for the service team in implementing the training program. The training design considers the characteristics of the stonemasons, which is crucial for achieving participant engagement. A well-designed training program is aimed at encouraging active participation from the attendees. This condition is fostered through interaction, discussion, and practical activities. As a result, instructors can stimulate participants' motivation to pay attention to the material and strive to absorb the presented knowledge and skills (Nugroho et al., 2020).

Lightweight Brick Education

This activity aims to enhance stonemasons' knowledge about the types and properties of lightweight bricks and their production methods. The event will take place for one day, on July 21, 2024, at the FT UNM Material Testing Laboratory. An expert with experience in lightweight brick production will guide the educational session.

The explanation covers the properties of supporting materials that meet the requirements, such as Portland cement with good fineness and sand as a fine aggregate that must be free from oil, moss, and organic contaminants. The expert also elaborates on the criteria for materials used in making lightweight brick molds. A good mold can be used repeatedly without undergoing any shape changes.

The participants in the activity were very enthusiastic about the explanations for lightweight bricks. Some participants shared their impressions of the business opportunities in lightweight bricks, noting the increase in the number of simple houses built in Makassar. This indicates that the educational program has contributed to shaping the stonemasons' attitudes toward developing their potential. Cognitive development among the stonemasons was achieved through the delivery of materials and discussions. This aligns with (Tabun et al., 2022) that an individual's knowledge develops through interactions with others and the environment. Such knowledge is formed through internalization and reconstruction of reality or facts. The educational program provided to the stonemasons has proven effective in developing knowledge about producing lightweight bricks. The subsequent process involves reconstructing thoughts regarding the potential for micro-level development of the lightweight brick industry.



(a) (b)

FIGURE 2. Educational Activity on Lightweight Brick Production

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Lightweight Brick Production Training

Several related work steps are carried out with training materials and practices (Rohana & Zulaeha, 2023), exemplified by the lightweight brick production training that involved 25 stonemasons and lasted four days. The training was conducted on Sundays over four weeks, with each session from 08:00 to 16:00. The equipment and material preparation training guided participants in arranging tools according to their usage sequence. Generally, the tools are divided into two categories: main tools and supporting tools. Primary tools include molds, electric drills, mixing paddles, and buckets. Supporting tools consist of trowels, scales, and compaction tools.

Materials, including Portland cement, sand, water, and foaming agents, are provided using a weighing method. The proportioning of materials by weight is an effort to ensure the quality of the lightweight bricks produced.

FIGURE 3. Lightweight Brick Mixer

FIGURE 4. Lightweight Brick Molds

FIGURE 5. Materials for Lightweight Brick Production

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The participants closely observed the demonstration of material preparation, interspersed with a question-and-answer session about the risks associated with errors in the process. Most participants were enthusiastic about trying out the mixing and molding of the mixture.

FIGURE 6. Materials for Lightweight Brick Production

Evaluation of Activity Results

Measuring the training program's success involves describing the progress and quality of the results achieved. The activity evaluation reflects the weaknesses and successes attained following the training. (Carter et al., 2020) This activity was evaluated by measuring the stonemasons' ability to perform various tasks in producing lightweight bricks. The details of the evaluation results are as follows:

1. The ability to prepare tools and materials is marked by the accuracy in placing tools according to the sequence of tasks. Additionally, stonemasons are considered skilled if they can prepare materials according to the needs of lightweight brick production. The evaluation results show that 23 participants, or 92%, prepared the tools and materials correctly.
2. Observations of the stonemasons' mixing skills reveal that 21 participants, or 84%, could correctly mix the foam. Similarly, their ability to mix Portland cement, sand, and water—key materials for forming lightweight bricks—was also evaluated.
3. The third evaluation focuses on the stonemasons' ability to mold the mixture. This assessment shows that 22 participants, or 88%, could pour the mixture into molds and compact it correctly. However, this also indicates that some participants are still less skilled in the molding process.

The evaluation results indicate that the program objectives have been achieved, specifically in enhancing the stonemasons' capacity to produce lightweight bricks. This outcome represents a starting point for fostering entrepreneurship within the Stonemason community.

A weakness of this activity is the lack of development in the stonemasons' knowledge regarding labor management and marketing. In practice, lightweight brick production should be conducted collectively and requires knowledge of labor management. Similarly, there is a need for stonemasons to learn sales techniques for lightweight bricks. Therefore, the service team proposes extending this program to a broader phase, including capacity building in labor management and marketing within the stonemason community.

CONCLUSION

The community service activity proceeded well, thanks to careful planning based on the results of the Focus Group Discussion (FGD). The outcomes of this activity have demonstrated a significant enhancement in the stonemasons' knowledge and skills in lightweight brick production. The program, which began with the development of knowledge about materials and tools for making lightweight bricks, laid the foundation for shaping participants' attitudes and motivation to continue their involvement in the training program.

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Recommendations

Hopefully, a follow-up program will be established for stonemasons who have become proficient in producing lightweight bricks. This program should focus on business management and marketing training to further develop their skills and support their entrepreneurial endeavors.

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