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Development of Coffee SMEs in Pulosari District through the Application of Appropriate Technology as an Effort to Improve the Quality of Local Superior Products in Pemalang Regency

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Abstrak (Times New Roman 10, Spacing 1)

Kabupaten Pemalang memiliki dua jenis kopi yang dibudidayakan, yaitu kopi Arabika dan kopi Robusta. Penerapan teknologi pascapanen kopi yang tepat merupakan salah satu cara untuk meningkatkan nilai tambah komoditas perkebunan kopi. Kelompok tani GURILANG, yang beranggotakan para petani kopi dari Desa Gunungsari, menjadi mitra dalam kegiatan IDBU ini. Setiap tahun, luas lahan di Desa Gunungsari terus bertambah; namun, hal ini tidak dibarengi dengan peningkatan produksi. Produksi kopi Arabika dan Robusta justru mengalami penurunan masing-masing sebesar 820,00 ton (-81,12%) dan 2.514,22 ton (-91,23%)—dibandingkan dengan tahun 2010. Tujuan dari kegiatan IDBU ini adalah untuk memperkenalkan dan menerapkan teknologi pascapanen kopi yang tepat guna—meliputi mesin pengupas kulit kopi, mesin pencuci biji kopi, dan mesin pengupas kulit ari (huller)—kepada para petani kopi di Desa Gunungsari, Kecamatan Pulosari, Kabupaten Pemalang. Upaya ini dilakukan untuk meningkatkan pendapatan dan produktivitas kelompok tani GURILANG selaku mitra. Sebagai hasil dari kegiatan tersebut, telah dihasilkan sejumlah mesin teknologi pascapanen kopi, yang terdiri dari dua unit mesin pengupas kulit kopi portabel (*pulper mobile*), satu unit mesin pencuci biji kopi tipe *batch*, dan satu unit mesin pengupas kulit ari kopi (*huller*) portabel. Para petani kopi di Desa Gunungsari, Kabupaten Pemalang, kini telah mengenal teknologi pascapanen kopi yang tepat guna tersebut. Hasil evaluasi menunjukkan bahwa produktivitas petani kopi mulai meningkat, yang terlihat dari proses pascapanen kopi yang menjadi lebih efektif dan efisien.

Kata Kunci : Kopi, Penerapan Teknologi Tepat Guna, mesin pengupas kulit kopi, mesin pencuci biji kopi

Abstract

Pemalang Regency has two types of coffee that are cultivated, namely Arabica coffee and Robusta coffee. The application of appropriate post-harvest technology for coffee is one way to enhance the added value of coffee plantation commodities. The GURILANG farmers' group is a group of coffee farmers from Gunungsari Village that will serve as the partner community in this IDBU activity. Every year, there has been an increase in the area of land in Gunungsari Village; however, this has not been matched by an increase in production. The production of Arabica and Robusta coffee has decreased from 2010 to 820.00 tons (-81.12%) and 2,514.22 tons (-91.23%), respectively. The purpose of the IDBU activities for the community is to introduce and implement appropriate post-harvest coffee technology machines (coffee skin peeling machine, coffee bean washing machine, and huller machine) to the coffee farmers in Gunungsari Village, Pulosari District, Pemalang Regency. This effort is made to increase the income and productivity of the partner community, the GURILANG farmers' group. As a result of these activities, post-harvest coffee technology machines have been produced, which consist of two units of mobile coffee peeling machines (pulper mobile), one unit of batch type coffee bean washing

machine, and one unit of mobile coffee huller machine. Coffee farmers in Gunungsari Village, Pemalang Regency, have become familiar with appropriate post-harvest coffee technology machines. The evaluation results indicate that the productivity of coffee farmers has begun to increase. This can be seen from a more effective and efficient post-harvest coffee processing.
Keywords : *Coffee, Application of Appropriate Technology, coffee huller, bean washing machine*

I. INTRODUCTION

Coffee is a significant source of foreign exchange for Indonesia and plays a crucial role in the development of the country's plantation industry. As the third-largest coffee producer in the world after Brazil and Vietnam, Indonesia was able to produce 685 thousand tons of coffee in 2014, contributing approximately 8.9% of the total global coffee production. The majority of this national production is dominated by robusta coffee, which accounts for 76.7%, while the remainder consists of arabica coffee. Farmers and the government plan to expand coffee plantations, rejuvenate existing crops, and increase national coffee production over the next decade with a target of reaching between 900 thousand tons to 1.2 million tons per year.

To achieve this target, improving the quality and productivity of coffee is essential. This must be supported by appropriate technology and post-harvest facilities that suit the conditions of the farmers. For coffee beans to meet the expected quality standards, it is crucial for the harvest to be processed efficiently and timely. The availability of quality coffee beans, along with sustainability in supply, will contribute to more favorable prices for farmers. Post-harvest handling must be carried out correctly, similar to other agricultural products, so that the coffee produced by the farmers can be competitive in the market.

In Pemalang Regency, there are two types of coffee cultivated: arabica and robusta. With its elevation being suitable for growing both types of coffee, Pemalang is a strategic location for coffee agriculture. Although the area of arabica coffee saw an increase between 2010 and 2014, the production of both arabica and robusta coffee experienced a decline due to various factors such as tree renewal and the conversion of agricultural land. To improve product quality and farmer income, the farming community in Gunungsari Village, particularly the GURILANG Farmer Group, participates in IDBU activities aimed at introducing more efficient post-harvest coffee technology, thereby enhancing their productivity and the competitiveness of their coffee products.

The technological outputs to be applied include various specially designed machines. In the first year, activities will focus on program socialization and the implementation of coffee roasting equipment and coffee displays through collaboration with the Office of Cooperatives and SMEs, the Trade Office, and relevant faculties. During this year, technical training and workshops on ergonomics, workplace safety, and understanding the coffee industry will be conducted to create high-quality processed coffee products that can compete in the market. The planned coffee roasting machine will require selected coffee beans and a controlled roasting process, designed to produce high-quality roasted coffee with a capacity of approximately 10 kg per batch. Additionally, coffee displays will be prepared to protect the products from weather damage and attract customers' attention [1].

In the second year, the focus will shift to program socialization and the implementation of inventory information systems and sales information systems, also supported by the Office of Cooperatives and SMEs and the Trade Office. This is designed to enhance production and group income through appropriate technology. In this year, the Rok Presso machine will be introduced to make espresso coffee manually without electricity, providing a practical way to produce quality espresso. Moreover, blowers will be applied in the coffee roasting process to

prevent over-roasting and ensure even cooling. The third year will involve program socialization and the implementation of hulling equipment, in line with assistance activities in branding, digital marketing, and improvements in production efficiency. The huller machine is used to remove the hard shell from coffee beans, facilitating subsequent processing, and is designed to assist coffee farmers from small to large scales [2], [3], [4], [5].

II. METHODS

Place and Time. The service activities that have been carried out are at Pulosari District, Pemalang Regency. The location that has been chosen is because There is still a need for empowerment regarding the use of appropriate technology.

Target Audience. In this case the target audience is: Tugu Juang Mas UKM group and Karya Slamet Farmers Group.

Research Methodology, Materials. The raw materials are arabica and robusta coffe.

Devotion method. This community empowerment is implemented through various methods, including functional approaches, training, and mentoring. The functional approach begins with problem identification, involving collaboration with SME groups and village officials, followed by the design and fabrication of machines using Appropriate Technology. The stages to be carried out in the implementation of Appropriate Technology at Tugu Juang Mas SMEs and Karya Slamet Farmer Group in Pulosari District, Pemalang Regency are as follows:

1. Conduct problem identification and needs assessment of the community partners, which are the initial stages in grouping and defining social and economic issues present in the community.

2. Coordinate with relevant parties to identify activities related to community empowerment and training for SMEs. This process involves socializing the activities to stakeholders and relevant parties.

3. Design and model appropriate technology machines that are deemed solutions to the issues faced by SMEs in Pulosari Village.

4. Implement or apply the appropriate technology machines that have been fabricated through training in usage and maintenance.

5. Provide ongoing support for activities and operations conducted regularly to address issues that arise during implementation.

6. Conduct a final evaluation to improve the quality and sustainability of the community engagement activities.Can

Success Indicators. Can provide assistance with branding, digital marketing, and production efficiency and sales, improvement of facilities and infrastructure and independence. Making the product happen superior group of processed coffee with maximum quality and able to compete.

III. RESULTS AND DISCUSSION

Assistance in Packaging Making

The function of packaging is as a place to sell products. To determine packaging size, it is important to know the weight and type of product to be included. Therefore, choosing the right type of packaging is very important so that the packaging can function optimally. Good

packaging makes it easier to use, especially when carrying or storing, and can also function as a promotional tool that can influence sales. Here are the steps to create attractive packaging:

Packaging that Protects the Product, the key to creating good packaging is ensuring the packaging protects the product. Create Impressive Packaging, packaging is a long-term investment. In addition to protecting your product, good packaging can add value to your product. If you want to look different, luxurious, and leave an impression on customers, use quality packaging.Make sure your product packaging design is simple, elegant and striking to attract customers' attention. Packaging should reflect the value you want to convey to buyers, paying attention to colors, fonts and slogans. Creating limited edition packaging can motivate buyers to buy again.



(a) (b)

Figure 1. (a), (b) *Packaging*

Operational Support

Support is conducted regularly to address issues that arise during the implementation of technology with partners. Some common complaints from partners regarding coffee machines include issues related to electricity, water, brewing processes, and the final quality of the coffee. All of these problems can affect the taste of the produced coffee. Generally, coffee machine spare parts have certain operational limits. Occasionally, coffee machines need to be taken to repair shops for maintenance to ensure they can function optimally again.

Product Quality Testing

To enhance product quality, inspections are conducted on the results to ensure compliance with market coffee quality standards. The Indonesian National Standard for Coffee Beans has implemented export criteria based on a defect value system since 1990, replacing the Triase system (Weight per Weight). Currently, the applicable quality standard is Indonesian National Standard No. 01-2907-2008 for Coffee Beans, which is the result of several revisions, taking into account global market developments and international requirements, as well as reflecting parts of ICO Resolution No. 407 regarding the "Coffee Quality Improvement Program." In terms of general quality requirements, the moisture content of coffee beans is no longer differentiated based on processing methods (wet or dry) and is set at a maximum of 12.5%.



Figure 2. *Product coffee beans*

Application of Appropriate Technology

The technology applied is a coffee roasting machine, which has a large capacity capable of roasting coffee in substantial quantities. The coffee roasting process itself involves the roasting of raw coffee beans to achieve a distinctive taste, and the beans must undergo several stages, one of which is roasting. The roasting process is not simple, as there are several aspects that need to be considered, including roasting temperature, roasting duration, roasting technique, humidity, the quantity of coffee beans being processed, and cooling time. This explains why there are variations in flavor among each batch of roasted coffee beans.

The method of roasting coffee using a coffee roaster begins with preparing the coffee beans to be roasted. After turning on the roaster, the raw coffee beans are added. It's important to monitor the roasting process and ensure that the beans are stirred evenly so that they are cooked to the desired level. Observing the color changes in the beans is crucial, and one should wait until popping sounds are heard, indicating that the coffee beans have cracked, much like popcorn. The first crack signifies that the beans have reached the light roast stage, while the second crack indicates the medium roast stage. Once the roast level meets your preference, the roaster should be turned off. The roasted coffee beans should then be poured into a special container to cool and stop the roasting process. Finally, the beans should rest for a few hours to allow the carbon dioxide to dissipate.



(a) (b)

Figure 3. (a), (b) *Aplication Technology*

CONCLUSION

The community service activities directed at UKM Tugu Juang Mas and the Karya Slamet Farmers Group include the implementation of coffee roasting equipment and coffee displays, as well as training sessions and workshops on workplace safety and understanding the coffee industry to create superior processed coffee products with maximum quality that can compete in the market. This initiative also provides benefits in the application of inventory information systems and sales information systems, while improving production and group income. With the support of Appropriate Technology, these activities aim to enhance the quality and efficiency of coffee bean processing, including assistance in branding, digital marketing, and infrastructure improvements for independence. The outcomes achieved include the creation of packaging for partners to expand sales and protect product quality, operational support for coffee roasting equipment to develop technology in production, and product checking to ensure compliance with market quality standards to enhance product quality.

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