



Improving Coffee Processing Towards Community-Based Agritourism

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ABSTRACT

The quality and flavor of coffee products are influenced by the processing used. Suitable processing methods can increase coffee products' quality, flavor, and bioactive content. Better coffee quality can support the agritourism development program in the Harapan Maju group. This community service aims to improve the knowledge and skills of Harapan Maju group on processing coffee and to increase communication skills in English to sell and promote their products. The methods used in this program are surveys, observation, transfer of knowledge and skill, mentoring, documentation, as well as practicing. There are 28 participants from the group who joined in this activity. The result showed that the knowledge and skill of the group members are increasing therefore, the Harapan Maju group can produce coffee products with good quality and flavor to support agritourism programs. Otherwise, the ability of English communication skills also increases and can support agritourism development in the future. However, the group continuously needs mentoring and guidance from the University and government.

1. INTRODUCTION

1.1. Research Background

Based on BPS Bali Province data for 2019, the total production of Arabica coffee in 2018 was 4,217 tons, and the highest Arabica coffee production was produced by Bangli Regency, amounting to 2,252 tons [1]. Most of the people of Bangli Regency make a living as coffee farmers. The level of the economy and welfare of farmers in Bangli Regency is determined mainly by the quantity and quality of coffee produced.

Batur Tengah Village is one of the villages in Kintamani District, Bangli where most people live from coffee plantations. This condition has encouraged the Bali Province and Bangli Regency regional governments to always try to help and facilitate farmers in increasing the productivity and quality of their coffee. According to Ref. [2], to be liked by consumers, coffee products must be high quality and unique.

The Harapan Maju group is located in Banjar Petung, Batur Tengah Village. This group has a board of 10 people and is engaged in cultivating coffee plants and processing and marketing coffee products. Apart from that, the Harapan Maju

group has also carried out agro-tourism, supported by the potential of coffee and citrus plantations and well-known tourist attractions in the Batur and Kintamani areas.

The observations and interviews with group administrators in the field show that the group has carried out integrated activities between agriculture (coffee) and tourism. Some of the potential it has include coffee plantations that are integrated with citrus plants, coffee processing units, attractive landscapes, and coffee marketing (Figure 1). These potentials can be used as supporting facilities in developing coffee-based agro-tourism planned by the Harapan Maju Farmers Group. In preparing an agro-tourism location, it needs to be supported by several related components, including coffee products that must have good quality and provide taste, aroma, and safety for visitors; there are attractive activity attractions that can be used as educational tours such as picking coffee, processing coffee and tasting coffee. According to Ref. [3], tourism must be a "community-based activity"; utilizing the resources and uniqueness of the local community in the form of physical and non-physical elements attached to the community must be the main driving element. Quality coffee products and delicious flavors can be served directly to tourists and used as souvenirs for visitors. Realizing this plan, adequate preparedness of human resources is needed who has the ability both in the field of processing and



English skills as a communication tool in handling visitors (tourists), especially visitors from abroad. Skills in English communication are needed to realize coffee-based agro-tourism. The research results by Ref. [4] said that the level of education and skills can affect the entrepreneurial ability of a community.

The results of surveys and interviews conducted with group administrators found several problems in the future development of community-based businesses and agro-tourism. These problems include the knowledge and skills of the group regarding coffee processing technology are still lacking and the understanding and ability of group administrators in English is still weak.

To develop coffee-based agro-tourism in Batur Tengah Village, Kintamani, Bangli, especially in the Harapan Maju group, it is necessary to help solve the abovementioned problems. The group will not be able to overcome these problems without assistance from related parties, especially from universities. Therefore, the group needs help and cooperation from various parties.

1.2. Objective

The purpose of this service activity is to 1) increase the knowledge and skills of the management and members of the Harapan Maju group in the field of coffee processing following GMP, 2) improve the quality and taste of the coffee products produced so that the selling price will be higher which can ultimately increase the group's income, and 3) to help improve the English language skills of group administrators in preparing community-based agro-tourism development programs.

2. MATERIALS AND METHODS

This community service was conducted at the Harapan Maju Group in Batur Tengah Village, Kintamani District, Bangli Regency, Bali Province, at 1250 m above sea level. The method of implementing community partnership service activities is by providing training consisting of 1) surveys and observations, 2) knowledge transfer and discussion, 3) practice, and 4) documentation [5]. Transfer of knowledge to PKM activity participants in coffee processing technology following GMP, including fermentation, drying, roasting, quality evaluation, and communication techniques in English actively to support agro-tourism activities. The method used for this process is counselling or lectures and practice. In addition, written material was also given in the form of brochures.

Discussions were held after the theory/material was presented to clarify understanding further and increase the participants' knowledge of PKM activities. Practice is carried out after the delivery of theory and discussion. The practice is carried out jointly between the resource person and the training participants. The practical materials provided are 1) GMP-compliant coffee processing technology, 2) fermentation and drying processes, 3) roasting processes, and 4) direct practice of communicating in English. Practical activities are given to improve the skills or skills of participants related to the theory and material that has been given. During practical activities, discussions were also held related to material that was not clear and understood.

3. RESULT AND DISCUSSION

3.1. *Transfer knowledge and technology of Coffee Processing Standard.*

The group's coffee processing is to produce green beans, but only a small portion is processed into ground coffee. The processing method used is generally processing without fermentation and wet fermentation. The disadvantages of these two methods are that processing without fermentation takes longer, and the quality of the coffee produced is lower, although it is easier. While processing with wet fermentation, the quality of the coffee produced is better, the time is shorter, but it uses a lot of water, and the resulting liquid waste is more.

Based on the weaknesses of the two processes, in this PKM activity, the group will be introduced to the coffee processing method by dry fermentation. The results of several studies that have been carried out show that this method is better because it can produce a better quality and taste of coffee takes less time, is not wasteful of water, and can reduce the resulting liquid waste. The most important conditions of fermentation are temperature and duration of fermentation. The research results by [5] found that processing coffee by dry fermentation can produce rice coffee beans with better quality than processing without fermentation. The most important factors of fermentation are temperature and duration of fermentation [6]. The study [5] showed that Arabica coffee fermented at $28 \pm 1^\circ\text{C}$ for 48 hours and was dried in an oven at $60 \pm 2^\circ\text{C}$ for 8 days.

Improvements to the coffee processing process at the farmer group level in Batur Tengah Village are needed to improve the processing process to improve the quality and taste of the coffee produced. Besides that, developing arabica coffee processing can help community-based agro-tourism development programs. Coffee processing activities can be used as attractions or educational facilities for tourists, including providing processed coffee products that are unique to visiting tourists. To produce good quality and taste coffee products that are safe for health, the stages of coffee processing that will be carried out must follow the standard operating procedure (SOP) that has been tested and determined. The stages of implementing science and technology in coffee processing by dry fermentation include:

3.1.1. *Coffee picking*

The coffee cherries used are ripe Arabica coffee cherries (at least 95% red skin color) harvested from the Harapan Maju group's plantations. Harvesting coffee cherries must be done properly and correctly. Errors in harvesting coffee cherries, especially the level of maturity, can affect the quality of the coffee produced.

3.1.2. *Sortation*

Sorting is selecting coffee cherries to get good (superior) raw materials. This sorting process will result in red, yellow, and green coffee cherries, damaged coffee cherries, dirt, or other foreign materials. The coffee cherries used are red and are not defective/damaged.

3.1.3. *Washing*

Washing of sorted red coffee cherries is done using clean running water. The washing process aims to clean the coffee beans from dirt attached to the surface of the coffee beans and foreign objects such as small stones, soil, twigs, leaves, etc.

3.1.4. *Material Weighing*

The coffee fruit to be used weighs as much as 20 kg. Weighing is done to determine the initial weight of whole coffee beans (initial) before the fruit peeling process is carried out.

3.1.5. *Pulping*

Peeling the outer skin of the coffee cherries is done using a Pulper machine. The process of stripping the outer skin of the coffee cherries is done by inserting the coffee cherries into the Pulper machine, which is assisted by a stream of water so that the skin-peeling process is easier and faster. The purpose of this skin peeling is so that the fermentation and drying of coffee beans can run better and faster. The coffee fruit that has been peeled is then weighed again to get the weight of the material used and to find out the skin waste produced.

3.1.6. *Fermentation*

The fermentation process is carried out in a dry way. Coffee beans peeled off the outer skin still contain mucilage that washing cannot remove. The primary purpose of this fermentation process is to make it easier to remove the mucus attached to the surface of the coffee bean [7]; [8]; [9]. In addition, fermentation aims to form flavor precursors and can increase the content of bioactive compounds that are beneficial to health [10]; [11]; [12]. Fermentation is done by placing the coffee beans in a dry container (sack) and then fermenting them at $30^{\circ}\text{C} \pm 2$ for 36-48 hours. The fermentation temperature must be maintained to remain stable during the fermentation process. The fermentation process is one of the most important keys in coffee processing [11] and [13].

3.1.7. *Washing*

After being fermented, the coffee beans are rewashed to remove the mucus attached to the surface of the coffee beans. Washing is done with running water until the coffee beans are clean.

3.1.8. *Drying*

The coffee beans that have been washed clean are drained and then dried using the solar dryer method or sunlight. Drying aims to reduce the water content of coffee beans to $<12.5\%$ according to SNI 01-2907-2008 standards, namely a maximum of 12.5% [14]. The drying process is carried out for 7-10 days, depending on the weather. Coffee beans, after drying, are called HS (hard skin) coffee beans. This coffee bean still contains hard skin; after the HS coffee beans have a moisture content of around 12.5% , the horn skin will be easily separated with a Huller machine.

3.1.9. *Hulling*

The coffee beans (hard skin) are then peeled from the horn skin using a huller machine. Stripping the skin of the horns will produce rice coffee beans without the skin but still contain the epidermis. Rice coffee beans are widely sold in the market and have a long shelf life of several months if the storage process is done in a non-humid place.

3.1.10. *Roasting*

This process is one of the most important stages besides fermentation because it can affect the quality, taste, and safety level of the ground coffee produced. The aroma and taste of new coffee are formed in this roasting process. The quality and taste of the coffee depend on the degree of roasting done. To produce coffee products with aroma, taste, and good quality and safe for health, the roasting process should be carried out using the LTLT (low-temperature long-time) method [10].

3.1.11. *Grinding*

The grinding process is carried out to produce ground coffee. Grinding is done by inserting cold roasted coffee beans into a disk mill grinder. A sieve with a size of 60-80 mesh can be produced of fine ground coffee.

3.1.12. *Packaging*

The ground coffee is packaged using plastic, aluminum foil, and paper. The packaging size is adjusted to the weight of the ground coffee to be packaged.



Figure 1. The transfer of coffee processing technology to the participants of Harapan Maju

3.2. *Strengthening human resource capacity in the field of English*

The potential possessed by the group is not only in coffee plants but in the Batur Village area; several interesting tourist objects are very well known to domestic and foreign tourists. This tourism object can help support the Harapan Maju group's program in accelerating the development of community-based agro-tourism. This group can potentially become a community-based tourism object. Human resources are needed to support the realization of the agro-tourism development plan, especially managers and administrators who can communicate in English actively so that service activities and providing information to tourists, especially from foreign countries, can run smoothly. The stages of implementing learning in English include an introduction to English to service activity participants, communication techniques in English quickly and easily, self-introduction, conveying group profiles and group potential in English, communication practices using English, discussions or questions and answers from the board groups with resource persons, provision of conversation material (daily speaking) in the form of brochure and provide of community-based agro-tourism development material (Figure 2).



Figure 2. The transfer of knowledge and English skills to the participants

3.3. Benefit and impact to the community

Based on the implementation of PKM activities in the Harapan Maju Group, was obtained an illustration that in general, the management and group members were very enthusiastic and supportive of community service activities carried out on the topic "PKM Improvement of Coffee Processing Methods Towards Community-Based Agriculture" Batur Tengah Village, Kintamani Bangli District.

In addition, there are several benefits that the participants get from carrying out this PKM activity, namely: 1) the level of group knowledge about processing Arabica coffee with the Good Manufacturing Practices (GMP) system is sufficient and increasing, 2) the level of communication skills of group participants in English is already sufficient and has increased after being given training and 3) opportunities in increasing access to the marketing of coffee products and agro-tourism packages are more incredible because the English language skills they have are sufficient and the group's location is close to tourist areas (Figure3).



Figure 3. The English skills the participants with the students

Leaders and group members get productive activities by providing materials, consumption, and snacks to provide additional income. Managers and members of the Harapan Maju group get extra knowledge and skills in coffee processing techniques with the GMP system and communicate using English properly and correctly.

3.3.1. Further action plans

It is necessary to strengthen knowledge and skills in processing with a consistent and sustainable GMP system. We are carrying out mentoring, training, and coaching activities on an ongoing basis, significantly improving English language skills in supporting the development of community-based agro-tourism.

The Harapan Maju Group will try to increase market access and sales volume by exploring cooperation with buyers and travel agents. The condition of the group where the problems meet is more in the marketing of coffee products and the development of agro-tourism; it is necessary to carry out further activities that are more focused on overcoming these problems. Continuous facilitation activities are needed from universities, the private sector, and the government so that solutions that have not been resolved can be found together. Increasing market access and collaboration or networking with various parties needs to be continuously carried out by groups, significantly to improve market access and sales of coffee products and introduce or promote groups in developing community-based coffee agritourism.

4. CONCLUSION

In general, the level of participation of managers and group members in PKM activities from the preparatory stage to implementation is outstanding and enthusiastic. According to GMP, the leaders and group members already have good and correct knowledge and skills in Arabica coffee processing. The ability of the manager and members of the Harapan Maju group to communicate with guests, especially from abroad, using English is sufficient but needs further improvement. The group still needs mentoring activities, especially in increasing market access for coffee products and tour packages, expanding collaborative relationships or networking with various parties, and conducting promotions.

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