



# Extension on Efforts to Increase the Quality of Gumantar Coffee Through Improved Harvest and Post-Harvest Techniques

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**Abstract:** The quality of coffee, including taste and aroma, is determined mainly by the timeliness of harvesting and post-harvest processes. The quality of Robusta coffee produced in Tenggorong Hamlet, Gumantar Village, North Lombok Regency is still relatively low because the harvesting of coffee beans is carried out using the strip picking method and not the selective picking method. The post-harvest method is still inappropriate, especially in the section for producing green beans. This extension aimed to improve the quality of Gumantar Village coffee through activities to increase farmers' knowledge and capacity in conducting harvest and post-harvest processes. Marketing facilitation activities were also carried out using various applicable process standards. The results and evaluation of the activities showed an increase in coffee farmers' knowledge and capacity in selective picking and post-harvest coffee processing. Coffee processing methods that determine the taste, such as green bean preparation and roasting, have also been well understood. The facilitation has resulted in a business identification number (NIB), label and packaging logo with 'Sangakopi' product brand rights, halal certificate, and distribution permit. It is expected that 'Sangakopi' products will enter the NTB Mall shortly.

**Keywords:** Facilitation; Partnership; Marketing; Capacity building; Processing, Sangakopi

## Introduction

Most adults consume coffee because it is believed to improve fitness and work concentration. This belief is supported by the fact that coffee contains caffeine, which can enhance endurance, speed of movement, and muscle strength (Guest et al., 2021; Pickering & Grgic, 2019). However, there are also reports suggesting that

excessive coffee consumption can lead to anxiety and heart palpitations (Tambalis, 2022). Additionally, coffee consumption has become a social trend among adults, with coffee shops serving as places for social interaction and coffee adding a unique touch to religious and cultural activities. This has contributed to the rapid growth of the coffee industry in Indonesia.

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Despite a decrease in the area of coffee plantations and production in Indonesia in 2022 compared to the previous year, the country is still able to export. Data from the Central Statistics Agency (BPS) shows that Indonesia's coffee production in 2022 was 774.96 thousand tons, about 1.43% lower than the previous year. More than 99% of this production came from smallholder plantations, with the remainder from state and private plantations (BPS, 2023). BPS data also reveals that the volume of Indonesia's coffee exports fluctuates, ranging from around 279.96 thousand tons to 534.02 thousand tons with a value of US\$ 815.93 million to US\$ 1,197.74 million. South Sumatra is the largest producer, followed by Lampung, North Sumatra, Aceh, and Bengkulu. These provinces contribute 26.85%, 14.68%, 11.16%, 9.08%, and 7.72% to the total Indonesian coffee production. Meanwhile, coffee from West Nusa Tenggara (NTB) accounts for about 0.82% of national production.

The coffee contribution from West Nusa Tenggara (NTB) to national production may be relatively small, but the existing coffee plantations hold significant strategic importance. Besides providing livelihoods for those involved in the industry, coffee plantations can also serve as a strategy for climate change mitigation and adaptation. This is due to the plants' ability to absorb CO<sub>2</sub>, potential for agroforestry systems, improvement of soil health, and reduction of deforestation (Fahad et al., 2022; Koutouleas et al., 2022; Rahn et al., 2014).

On the island of Lombok, which is categorized as a small island in terms of size, the presence of coffee plantations, particularly smallholder coffee plantations with agroforestry systems, plays a crucial role. Small islands rely heavily on rainwater as a source of fresh water, and agroforestry systems can help conserve water, making smallholder coffee plantations important for providing fresh water on islands like Lombok (Udawatta & Gantzer, 2022).

In addition to its environmental importance, coffee also has a strategic role in developing the green economy. It can positively impact the community's economy, particularly for small farmers (Siles et al., 2022). As consumers become more discerning about coffee quality, enhancing the quality of community coffee production is important, especially from micro, small, and medium enterprises (MSMEs). Quality improvement through training or certification can increase the selling value and consequently boost farmers' income (Astuti et al., 2015). Government agencies conduct quality certification, while government and private institutions train farmers and MSMEs. The timing of harvest and post-harvest processes and harvesting and drying techniques significantly affect coffee quality (Haile & Kang, 2019; Firdaus et al., 2022).

Coffee production is a significant part of the local economy in the village of Gumantar, located in the Kayangan District of North Lombok Regency, West Nusa Tenggara. Most coffee plantations in Gumantar Village are situated in Tenggorong Hamlet, covering around 180 hectares of land, with individual ownership areas averaging between 2 to 10 hectares. The primary type of coffee grown in this area is robusta (*Coffea canephora*), with only a small portion being arabica (*Coffea arabica*) due to the suboptimal altitude for arabica coffee production, which is less than 500 meters above sea level.

Coffee farmers in Tenggorong face various challenges, including the lack of recognition for their coffee products in the wider community and issues with the quality of the coffee harvesting and post-harvest processes. Problems such as harvesting coffee cherries at different stages of ripeness and non-standardized coffee powder production have resulted in Gumantar coffee not meeting market quality standards, leading to lower demand.

To address these issues, a community service activity has been initiated to enhance farmers' understanding of coffee harvesting and post-harvest handling processes and improve Gumantar coffee's marketing.

## Method

The KKN PMD team of Gumantar Village is working to develop the village's potential, focusing on agriculture and the community's economy through extension activities. The method is participatory and practical, involving all community components, especially coffee farmers. This approach has proven effective in identifying and developing local potential and solving the local community's problems (Zunaidi, 2024).

The activities began with a survey of the village's conditions and potential in June 2024. The survey involved visiting the village head's house and conducting interviews to obtain complete information about the village's conditions, common problems, and existing potentials. After obtaining information from the initial survey activities, the KKN PMD team of Gumantar Village held discussions to address the problems occurring in the village and how they could utilize the village's potential to help solve them. The team examined the potential in Gumantar Village, particularly in the agricultural sector, and formulated various problems, especially in the agricultural and economic sectors. The village head expressed the main concerns about the lack of post-harvest processing actors for agricultural commodities and the absence of added

value from the existing commodity potential. At the end of the discussion, the team decided to develop the coffee commodity potential in Gumantar Village to help with economic problems, post-harvest activities, and the lack of agricultural product processing actors.

Based on the discussions and problem formulation, the KKN PMD team of Gumantar Village developed a work program and activity plan to improve coffee quality through extension activities on improving harvesting and post-harvest techniques. The plan included the following activities:

1. *Socialization and Extension of Coffee Potential and Organic Farming.*

The activity began with interviews and field observations with coffee farmers and local stakeholders in Gumantar Village, specifically in Tenggorong Hamlet. The purpose was to identify the problems faced in coffee cultivation, harvesting, and processing and recognize the potential that can be further developed. The data obtained from these interviews were then used to design a targeted extension program. After obtaining information about the coffee-related issues in the village, the KKN PMD team of Gumantar Village began looking for suitable speakers to provide material on coffee potential and organic farming. The team then contacted Liana Suryaningsih Badrun, SP., M.Sc., a lecturer, coffee enthusiast, and owner of a Non-Governmental Organization (NGO) in agriculture named AgriTC. The KKN PMD team of Gumantar Village discussed the planned extension activities and subsequently agreed to conduct the extension activities. The extension activity was held on the agreed date, July 29, 2024, at the Gumantar Village Hall. This extension activity targeted coffee farmers from the Farmers Group Association (Gapoktan) in Gumantar Village, totaling approximately 50 people. This activity also aimed to establish cooperation between AgriTC and the coffee farmers in Gumantar Village. The effectiveness of the activity was measured using pre-test and post-test methods and distributed to participants before and after the extension activity.

2. *Education and Coffee Processing Practice*

The next step involved conducting a focus group discussion with the AgriTC team, farmers, and farmer groups. This discussion aimed to delve deeper into the cultivation practices already carried out, the obstacles faced, and the opportunities to improve the quality and quantity of coffee production. Farmers were also given training and education on better farming techniques at this stage, including introducing organic farming and proper post-harvest practices.

The activity continued with an Education and Coffee Processing Practice event. Before the event, the

KKN PMD team of Gumantar Village held discussions with the Head of Tenggorong Hamlet to be appointed as the Local Champion or Leader of the coffee quality improvement activities carried out by the KKN PMD team of Gumantar Village. After the discussion, the team prepared the necessary equipment for the processing practice, such as clay pans or kettles, roastery machines, and V60 coffee brewing tools. The KKN PMD team of Gumantar Village also discussed with the speaker for the event, Mr. Wisnu Supangga, a coffee practitioner residing in Sesait Village, about 15 minutes from Gumantar Village.

The discussion aimed to design an interactive and communicative event concept among participants and ensure that the practices conducted could be accepted and applied by the participants. The event was held in Tenggorong Hamlet, specifically at the berugak (traditional gazebo) of the Hamlet Head's residence, on August 5, 2024, with Mr. Wisnu Supangga as the speaker. He is a competent and certified barista who processes coffee beans into coffee powder and its presentation methods.

The event was designed with an outdoor concept and had around 20 participants, including coffee enthusiasts, activists, and women from the Women's Farmer Group (KWT) in Tenggorong Hamlet. The event was focused on maximizing interaction between participants and the speaker. It included hands-on coffee roasting, brewing practices, and organoleptic tests based on the coffee's ripeness level.

The event began with discussions on various coffee processing methods, including natural, semi-washed, full-washed, and honey drying processes. It also covered coffee roast levels like light, medium, and dark and various flavor profiles such as fruity, caramel, earthy, and chocolatey. Practical activities involved processing coffee beans with different roast levels and brewing them for the participants to taste. The goal was to find a flavor that suits the character of Gumantar Village coffee and the local community, creating a signature coffee powder product of Gumantar Village called "Sangakopi."

In addition to training, the KKN PMD team of Gumantar Village facilitated the creation of product legality and the development of packaging and product labels. This included obtaining a Business Identification Number (NIB), Halal Certification, SPP-IRT, and Trademark through a partnership with the Ministry of Cooperatives and SMEs and the Integrated Business Service Center (PLUT) for SMEs in NTB. The partnership involved discussions with an SME advisor at PLUT UMKM NTB, leading to a cooperation agreement to facilitate the legality of the coffee product. After obtaining the necessary certifications, the team designed the packaging concept and label according to Indonesian

National Standards (SNI) and the Food and Drug Supervisory Agency. The packaging concept and label design went through revisions and were then procured for the first 100 units of Gumantar Village's signature coffee powder product, "Sangakopi."

### 3. Marketing of Coffee Products

The coffee powder product made from coffee beans sourced from the land in Gumantar Village has officially been created under the brand name "Sangakopi." Efforts to improve the quality of coffee in Gumantar Village continue, from cultivation practices to processing, aimed at igniting the enthusiasm of the villagers involved and interested in the coffee commodity, both upstream and downstream.

The marketing of coffee products is carried out online and offline, utilizing marketing instruments to the fullest. Online marketing involves creating social media accounts for the "Sangakopi" product, creating a business email, and registering the business on Google Maps for Business to ensure branding and recognition from potential customers. Additionally, offline marketing is often done by offering the product to cafes, retail stores, and target markets door-to-door through word-of-mouth.

### 4. Evaluation and Monitoring

The extension results were evaluated periodically using pre-test and post-test methods to measure changes in farmers' knowledge and skills. Monitoring is carried out to observe the application of the knowledge provided and assess its impact on coffee production and quality. Field surveys and follow-up interviews are conducted to obtain feedback from farmers regarding the success and challenges in applying the techniques taught.

## Results and Discussion

The extension activities conducted as part of the Community Service Program (KKN) by the KKN PMD team of Gumantar Village focus on improving the quality of the village's coffee commodity. Coffee quality is determined by the plant variety, cultivation conditions, and harvesting and post-harvest techniques used. Given the significant coffee potential in the area, efforts to improve coffee quality through better harvesting and post-harvest techniques are crucial in Gumantar Village.

The extension activities focus on improving harvesting and post-harvest techniques to help local coffee farmers understand how to harvest and process coffee beans for high-value products. The emphasis is on practice-based extension and training, which has been

found to be effective for farmers' adoption of new techniques (Feder et al., 1985).



**Figure 1.** Discuccion with one of coffee farmer in Tenggorong Hamlet.

The KKN PMD team of Gumantar Village conducted five activities focusing on the coffee commodity, including:

#### 1. Socialization and Extension of Coffee Potential and Organic Farming

Initial survey activities revealed that the coffee industry in Gumantar Village is still very conventional. The planting, cultivation, and harvesting techniques used are simple, with most of the community relying on local seeds. Some community members have started using grafting techniques, but the scions' origin is unclear. Coffee cultivation in the gardens is carried out using conventional methods, with the use of chemical fertilizers and pesticides common among farmers. The excessive use of chemical pesticides can have various negative impacts, including disrupting pollination and causing health problems in humans (Purnomo et al., 2019).

The interviews conducted by the KKN PMD team in Gumantar Village revealed several issues. One of the problems is the lack of education for farmers on proper harvesting methods and post-harvest processing techniques. This is evident from poor practices such as piling up wet coffee cherries in sacks after harvesting and leaving them unattended. The harvested cherries are not immediately washed, sorted, and dried, significantly impacting the coffee's quality and flavor. Additionally, the coffee drying process is carried out in unhygienic and dusty places, affecting the quality of the coffee due to contaminants such as dust and dirt flying around.

To address these issues, the KKN PMD team designed a socialization and counseling activity focusing on the potential of coffee, Good Agricultural Practice (GAP), and Organic Farming. They collaborated with AgriTC, an NGO specializing in farmer training

and improving their knowledge and economy. Mrs. Liana Suryaningsih Badrun from AgriTC discussed the event's concept and materials with the KKN PMD team, and it was agreed that AgriTC would provide information on coffee potential and organic farming to the participants, targeting coffee farmers from the Farmers Group Association (Gapoktan) in Gumantar Village.



**Figure 2.** Socialization and Extension of Coffee Potential and Organic Farming at Gumantar Village Hall.

The socialization and counseling activities were held on July 29, 2024, at the Gumantar Village Hall, attended by 50 Gapoktan members, village officials, and the Head of Gumantar Village. The event went smoothly, with all participants attentively listening to presentations on red cherry picking. Proper coffee harvesting techniques are crucial in determining the coffee beans' quality. Harvesting only fully ripe coffee cherries is essential to avoid quality variations and maintain the coffee's flavor.

It is recommended to use the selective picking technique for manual harvesting, as it can improve the quality and selling price of coffee. This technique ensures that only ripe cherries are picked, resulting in a better flavor profile due to balanced sugar and acid content.

The KKN PMD team in Gumantar Village is providing counseling on Good Agricultural Practices (GAP) and organic farming to enhance the knowledge and skills of local farmers, aiming to improve the quality of coffee.

## 2. Coffee Processing Education and Practice

Education and practice in coffee processing are essential for local farmers to add value to their products. Proper education on post-harvest coffee processing techniques such as fermentation, drying, roasting, and grinding can help improve the quality and

competitiveness of the coffee in both local and international markets.

In efforts to improve the quality of coffee in Gumantar Village comprehensively, the KKN PMD team has provided post-harvest processing materials to the farmers. The team also initiated an event on coffee processing in collaboration with the Head of Tenggorong Hamlet, Mr. Putradi, to address the lack of proper coffee processing and the utilization of higher-value coffee products in the market.

The KKN PMD Gumantar Village team collaborated with Mr. Wisnu Supangga, a barista and café owner in the Sesait area, to hold an extension activity in Tenggorong Hamlet, Gumantar Village. This activity focused on processing coffee into coffee powder products and educated the participants on the characteristics and flavors of coffee.



**Figure 3.** Coffee Processing Education and Practice at Tenggorong Hamlet.

Mr. Wisnu provided all the necessary equipment for the coffee processing event, which was attended by 20 participants, including coffee farmers and the Women's Farmer Group (KWT). During the event, Mr. Wisnu discussed the importance of the drying and roasting processes in producing quality coffee.

The drying process is crucial for coffee quality. It aims to reduce the moisture content of coffee beans to around 10-12% for long-term storage without the risk of mold growth or quality degradation. The method of drying, whether sun drying, mechanical drying, or a combination of both, affects drying time, cost, and coffee quality. Slow and even sun drying on racks can produce better quality coffee by preventing bean cracking and maintaining volatile components contributing to the coffee's aroma.

Roasting is the process that transforms green coffee beans into ready-to-grind coffee beans and is essential for developing the final flavor profile. Different roasting

techniques create different flavor profiles, from light to dark roast, each with its characteristics.

During the event, various coffee processing techniques and roasting levels were demonstrated, and a hands-on practice session was conducted with the participants to design a signature coffee product from Gumantar Village. The appropriate roasting level and process for the robusta coffee beans commonly cultivated in Gumantar Village were identified, resulting in a delicious coffee flavor.

In addition to the original robusta coffee, the team formulated "vanilla coffee," a blend of coffee powder with a distinctive vanilla flavor and aroma. After several trials, the team successfully produced two products, Original Robusta Coffee and Vanilla Coffee, which were processed for packaging and legality to be marketed soon.

### 3. Facilitation of Coffee Product Legality and Packaging

Ensuring the legality of coffee products is crucial to meet food safety standards and legal requirements. This assures consumers that the product is safe for consumption and has been processed in compliance with regulations (Trewavas, 2004). Coffee product legality may involve a Business Identification Number (NIB), Halal Certificate, Home Industry Food Production Certificate (SPP-IRT), and permits from the Food and Drug Supervisory Agency (BPOM) for the domestic market.

The collaboration between the KKN PMD Gumantar Village team, PLUT UMKM NTB, and the Ministry of Cooperatives and SMEs produced satisfying results in facilitating the legality of Gumantar Village's coffee products. The process went smoothly by providing the necessary data for legality processing. A Cooperation Agreement (SPK) was established to ensure mutual commitment in facilitating the legality of Gumantar Village's coffee products. Furthermore, the KKN PMD Gumantar Village team branded the products as "Sangakopi," derived from the word "Sangapati," meaning Nine Regents.



**Figure 4.** Facilitation of Coffee Product Legality by collaboration between the KKN PMD Gumantar Village team, PLUT UMKM NTB, and the Ministry of Cooperatives and SMEs.

The packaging of Gumantar Village's signature coffee products was designed to be attractive, and packaging labels were created following Indonesian National Standards (SNI) and BPOM. Packaging plays a crucial role in branding and marketing, as well as protecting the product from physical and environmental damage. Additionally, good packaging can extend the shelf life of coffee products by safeguarding them from external factors such as light, humidity, and oxygen, which can affect the quality of the coffee, including its aroma and flavor. Packaging equipped with barrier technology, such as foil or layered packaging, can help maintain coffee freshness for a longer period (Oliveira et al., 2016).

### 4. Coffee Product Marketing

The KKN PMD Gumantar Village team facilitated offline and online marketing of Sangakopi products. Offline marketing involved cooperating with NTB Mall in Mataram City, where the products were curated. Currently, the Sangakopi products have passed the curation process and are awaiting the initiation of a Cooperation Agreement between NTB Mall and the business owner. Online marketing was carried out by creating social media accounts for the Sangakopi product and registering it on Google Maps for Business to gain recognition from various social media users and as a channel for digital marketing.

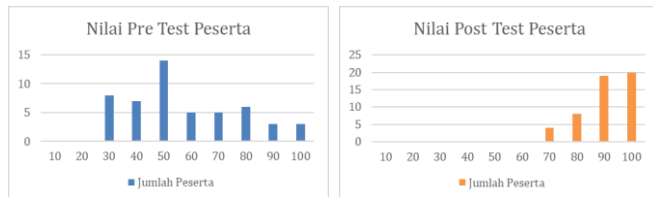


**Figure 5.** Cooperation Agreements between NTB Mall and Sangakopi.

### 5. Evaluation and Monitoring

Evaluation and monitoring are essential components of project management, especially in the context of community empowerment programs such as coffee farming extension in Gumantar Village. Evaluation aims to assess the effectiveness and efficiency of the programs that have been implemented. At the same time, monitoring is an ongoing process that ensures activities are running according to plan and achieving the set targets. This section explains the importance of evaluation and monitoring, effective methods for conducting them, and their impact on the success of community empowerment programs.

Evaluation is a systematic process to assess how well a program or intervention has achieved its predetermined goals. According to Rossi et al. (2018), evaluation allows decision-makers to understand whether the program implemented has been effective, whether the set goals have been achieved, and how the program can be improved. In the context of coffee farming extension in Gumantar Village, evaluation aims to measure changes in farmers' knowledge and skills in coffee cultivation techniques, post-harvest processing, and coffee product marketing.



**Figure 6.** Significant increase in participants' understanding of coffee knowledge before and after the extension activities were conducted

In the evaluation method conducted by the KKN PMD Gumantar Village team, pre-tests and post-tests were carried out during the extension activities to measure the understanding of the participants who attended the activities. From the test results obtained, after tabulation and data processing, it was found that there was a significant increase in participants' understanding of coffee knowledge before and after the extension activities were conducted (Figure 6). Routine monitoring activities were carried out twice a week by the KKN PMD Gumantar Village team and AgriTC because after the socialization and extension activities were conducted, the KKN PMD Gumantar Village team facilitated cooperation between AgriTC and the village government to develop the coffee potential centered in Tenggorong Hamlet.

## Conclusion

The extension program in Gumantar Village successfully increased coffee farmers' knowledge of proper harvesting, post-harvest, and processing techniques to produce good quality coffee. The facilitation activities have also successfully achieved the legality, certification, and marketing of offline and online coffee products. These achievements can enhance the quality and market value of Gumantar coffee under the brand name Sangakopi. The activities can also strengthen local coffee products' position in a broader market with good packaging standards and support for legality and halal certification. Thus, Gumantar Village coffee has become more competitive in national and international markets.

It is recommended that the extension program continue, focusing on developing sustainable farming techniques, diversifying coffee products, and increasing farmers' marketing capacity. Additionally, expanding marketing networks and utilizing digital technology such as e-commerce and social media can increase the visibility and competitiveness of local coffee in a broader market.

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