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Optimizing the Local Potential of Coffee Aromatherapy Candles as a Flagship Product of Sekolah Alam Nusantara in Suci Villages

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ABSTRACT

Suci Village, located in the Panti District of Jember Regency, boasts an abundance of coffee potential that has largely been underutilized for commercial purposes. To increase its added value and empower the local community, the Community Partnership Program (PKM) introduced a training program for producing coffee-based aromatherapy candles at Sekolah Alam Nusantara. The program employed a participatory approach, involving 20 participants, primarily homemakers, and consisted of three stages: material delivery, hands-on practice, and evaluation. Pre- and post-tests were used to evaluate knowledge improvement. The results demonstrated a substantial increase in community knowledge and skills. Before the training, only 25% of the participants were familiar with aromatherapy candles. After the program, however, all of the participants understood their benefits and basic production techniques. The candles produced exhibited a distinctive coffee aroma, functional value, and potential to become environmentally friendly, flagship products of Suci Village. This initiative strengthened the community's capacity to utilize natural resources, encouraged creative entrepreneurship, and supported circular economy practices. This study contributes to the literature on community empowerment by demonstrating how local commodities, such as coffee, can be transformed into valuable products. Furthermore, the study provides a replicable model for sustainable rural development through skill-based training and product innovation.

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INTRODUCTION

Located 14 kilometers east of Jember City, Suci Village spans 60 km^2 in Panti District, Jember Regency, and is situated along the fertile slopes of Mount Argopuro. It has a population of 12,213 with a density of 202 people/km^2. Suci Village is characterized by fertile soil and a cool climate. These conditions support agricultural and plantation activities, especially coffee cultivation. The soil has a pH of 6.0-8.0, sandy loam texture, high organic matter, and is supported by annual rainfall of 1,800-2,500 mm with an average temperature of 18-24 ^{o}C. Such conditions make Suci Village an ideal environment for coffee growth and a potential coffee production center in Jember Regency. Coffee thus becomes a strategic commodity and a local identity, reflected in Panti subdistrict's flagship smallholder coffee, harvested once a year, with a total production of 78,882 tons from 2,173 hectares (Jessica et al., 2024; Sari et al., 2022; Yushardi et al., 2024).

Coffee is one of the plantation commodities with high economic value compared to other plantation crops, and plays an important role as a contributor to the country's foreign exchange. In Indonesia, coffee commodities comprise various types, including Arabica, Robusta, and others. As a plantation commodity, coffee supports foreign exchange earnings and absorbs a large workforce,

creating community jobs. Jember Regency is one of the largest coffee production centers in East Java. According to data from the East Java Provincial Statistics Agency, coffee production in Jember Regency in 2022 reached approximately 11,000 tons.

Regarding land area, Jember ranks third with a total coffee area of 18,321 hectares, after Bondowoso Regency with 20,116 hectares and Malang Regency with 19,207 hectares. Coffee production in Jember Regency is primarily managed as smallholder plantations, with Robusta coffee being the dominant variety (Nandita et al., 2023). Sidiq et al. (2024) state that of the 15 coffee-producing subdistricts, Panti is among those that contribute significantly, with production ranging from 0,018 to 78,858 tons per subdistrict in 2020. Based on marketing network analysis, the coffee plantation area in Panti Subdistrict covers approximately 389.09 hectares, with a production of 1,535.94 quintals (equivalent to 153.6 tons), ranking it reasonably high compared to other subdistricts, such as Silo and Jelbuk.

The utilization of coffee in Suci Village is still not optimal because most of the harvest is sold in its raw form, and some is sold as ground coffee. These products are a good first step in increasing the value of coffee sales. The wealth of coffee as a local resource has not been fully explored, so the potential for product diversity obtained from coffee is not yet widely seen. This situation indicates that coffee processing in Suci Village is still in its early stages and requires further improvement to unlock its full potential, rather than being limited to simple products. Additionally, the people of Suci Village generally lack the technical skills to process coffee into innovative products that are appealing to the market. This situation means that coffee, as a local commodity, has not contributed as much as it could to improving the village's economy (Wibowo & Palupi, 2022; Setyaningsih et al., 2025).

Coffee can also be transformed into other products, one of which is coffee aromatherapy, a form of treatment that utilizes the aroma of volatile plant compounds (Barnawi et al., 2022). One form of innovation that has been developed is using coffee as a base ingredient for making aromatherapy candles. Aromatherapy candles can be used for various purposes, including reducing stress and anxiety, as well as relieving headaches. Aromatherapy candles are crafted with fragrances that can induce a sense of relaxation, calmness, and soothing (Maryanti et al., 2024). Natural aromatherapy candles are generally considered superior to air fresheners made from synthetic materials, as they can be harmful to human health when inhaled (Pratita et al., 2022). Coffee aromatherapy candles have the potential to become a local flagship product because they offer uniqueness that distinguishes them from similar products. The existence of coffee aromatherapy candles can bring a new dimension to coffee processing in Suci Village, which previously focused solely on consumption, making it more diverse.

Using coffee as a base ingredient for aromatherapy candles has advantages because many people love its aroma and benefits. Coffee is rich in food phenols, such as chlorogenic acid and caffeic acid, which are antioxidants. In addition, coffee has anti-inflammatory properties through unidentified compounds that are thought to reduce the risk of heart disease and certain types of cancer (Vani et al., 2024; Hawiset, 2019). Aromatherapy candles made from coffee have great potential health benefits. Coffee contains caffeine, which can affect the central nervous system, increase alertness, and improve concentration. Other studies have shown that the smell of coffee can improve mood, reduce stress, and enhance sleep quality (Auliza, 2024; Pachimsawat et al., 2024). These findings indicate that incorporating coffee into aromatherapy candles not only provides a pleasant fragrance but also offers functional health benefits that can support psychological well-being and stress management.

Although Suci Village has excellent potential as a coffee producer in Jember, its utilization is still limited to primary products such as raw beans and ground coffee. Previous studies have highlighted the role of coffee in the local economy (Jessica et al., 2024; Sari et al., 2022) and its potential as an ingredient in aromatherapy (Barnawi et al., 2022; Maryanti et al., 2024). However, there has been no

study that develops coffee derivative products, such as aromatherapy candles, through a community empowerment approach. Limited technical skills are also an obstacle to the diversification of value-added products. Therefore, this study aims to develop coffee-based aromatherapy candles through community empowerment-based training as an effort to increase the economic value of local coffee and the skill capacity of Suci Village residents.

METHOD

Community empowerment activities in Suci Village were carried out using a participatory approach that integrated the principles of Participatory Rural Appraisal (PRA) and Community-Based Participatory Research (CBPR) (Narayanasamy, 2009; Collins et al., 2018). This approach involves the community as active partners throughout the planning stage to the evaluation stage, ensuring the program's local relevance and sustainability. The training was designed in three stages: 1) preparation and introduction (identification of needs, socialization, recruitment of 20 participants, implementation of a pre-test to deliver theoretical material on the potential of coffee and aromatherapy candle formulas); 2) hands-on practice with technical assistance from the community service team; and 3) evaluation (post-test of knowledge, product quality assessment—e.g., aroma, burning power, density—and group discussion). The evaluation was conducted using a combination of quantitative and qualitative methods to measure outcomes, in accordance with the participatory evaluation approach (Buetti & Bourgeois, 2024). The stages of the implementation method are illustrated in Figure 1.



Figure 1. Implementation method

The presentation of materials for making coffee aromatherapy candles was conducted early as an introduction to the community regarding the concept and benefits of coffee-based aromatherapy candles. The socialization stage began with a pre-test to assess the community's initial knowledge and the delivery of PowerPoint material explaining the potential of coffee in making aromatherapy candles.



Figure 2. Presentation of material on making coffee aromatherapy candles

Figure 2 shows the socialization stage. This aromatherapy candle-making training employs an empowerment method designed to enhance the skills and independence of the community. One of the methods used is the participatory approach, in which training participants are actively involved in the training process. This method emphasizes the importance of collaboration between facilitators and

participants to achieve maximum results. By using this method, participants obtain information and contribute to the training process and decision-making. The use of coffee in aromatherapy candle making is also a form of utilizing local resources, thereby strengthening participants' connection with their surrounding environment and encouraging the utilization of local potential. Assistance in making coffee aromatherapy candles is provided directly by the community service team, allowing the community to acquire skills through hands-on experience.



Figure 3. Assistance in the practice of making coffee aromatherapy candles

Figure 3 illustrates the process of making coffee aromatherapy candles with assistance. The steps include melting paraffin wax using a heating technique. The paraffin is cut into small pieces and then melted using a double-boiler method until liquid. Next, coffee powder and essential oil are mixed and poured into a prepared mold with a wick. After that, the candle is left to harden and is ready for use. Finally, the wick is trimmed to leave about 1 cm above the candle surface, and the candle is ready for use. Figure 4 shows a diagram of the process of making aromatherapy candles made from coffee. Through this hands-on practice, individuals can gain a deeper understanding of the process of transforming coffee into aromatherapy candles, from start to finish.

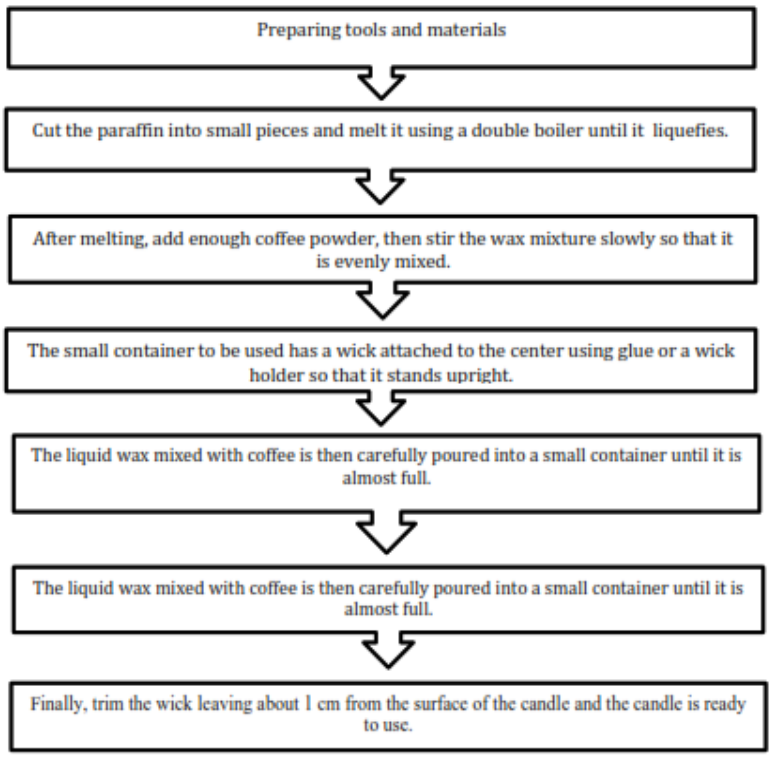

Figure 4. Steps for making aromatherapy candles

The evaluation aims to assess the training process's success, gauge the community's enthusiasm, and identify potential for product development. It is hoped that these skills will increase the community's knowledge, fill their free time, and open up new opportunities for innovation. For example, aromatherapy candles can be developed in various shapes, sizes, and aroma combinations, allowing the resulting products to have commercial value. Thus, the results of this training have the potential to positively impact the local economy of Suci Village, Panti District. After the evaluation stage, the team conducted a post-test to compare the community's knowledge before and after the activity.

RESULTS AND DISCUSSION

The training on coffee-based aromatherapy candle production was conducted at Sekolah Alam Nusantara, a non-formal, nature-based educational institution located in Suci Village, Panti District, Jember Regency. The uniqueness of this institution lies in its inclusivity, as it engages not only children and adolescents but also homemakers (PKK members) as active participants. This distinguishes Sekolah Alam Nusantara from most previous empowerment initiatives and research programs, which commonly focus only on formal school students or specific community groups. The novelty of this study lies in the community empowerment model, which integrates community-based learning with the utilization of local resources to produce value-added products, specifically aromatherapy candles. This model provides not only practical skills but also embeds the principles of circular economy and zero waste practices at the household level, which remain underexplored in rural community empowerment contexts in Indonesia.

One of the unique features of this school is the active participation of homemakers in the learning process. This demonstrates that Sekolah Alam Nusantara not only focuses on early childhood and adolescent education, but also serves as a community learning center that provides opportunities for anyone who wants to develop themselves. With this approach, the school plays a crucial role in reducing the gap in access to education, particularly for community groups that the formal education system has traditionally underserved. The programs include practical skills training such as organic farming, household waste management, creative recycling, making household products, and entrepreneurship based on local potential. In addition, children are also encouraged to learn directly from their surroundings, such as identifying plant species, understanding ecosystems, and developing a sense of responsibility towards nature and the community. With this method, students understand concepts in theory and gain hands-on experience that can be applied in real life.

The aromatherapy candle-making training activity was part of the activities carried out at Sekolah Alam Nusantara. The novelty of this training lies in its use of coffee powder and coffee grounds. This approach connects local agricultural potential with a zero-waste framework. The training conducted in the Suci Village community involved aromatherapy candle making. The materials and methods for making aromatherapy candles are straightforward, and the tools used are common household items, including a stove, a small pan, a wick, and a candle mold. The materials used can be modified according to the materials available in the surrounding environment, such as paraffin, essential oils, and coffee powder. The results of aromatherapy candle production are shown in Figure 5.



Figure 5. Results of the aromatherapy candle

The implementation of the Community Empowerment Partnership carried out by Sekolah Alam Nusantara in Suci Village has successfully achieved its target, which is to improve the skills of the community, especially homemakers, in processing local coffee potential into value-added products. The solution, which involved training in making coffee aromatherapy candles, proved effective, as participants could follow all stages of the process, from learning about the ingredients and mixing coffee grounds to candle-making techniques. Twenty Suci Village PKK members participated in this training activity. The community's method of making aromatherapy candles is shown in Figure 6.



Figure 6. The process of making aromatherapy candles

The community service team prepared pre-test and post-tests, which were completed by 20 people who participated in this activity. The pre-test results, presented in Table 1, indicate that the community's knowledge and skills regarding the creation of coffee aromatherapy candles were still limited before the activity was conducted. Less than 50% of the community was aware of the benefits of aromatherapy candles and how to create them. However, after the dissemination and demonstration of aromatherapy candle making, the evaluation of the community's knowledge and skills regarding aromatherapy candles increased. Table 2 shows the results of the post-test.

Table 1. Result of Pre-test

Question	Answer	
	Yes	No
Do you know about aromatherapy candles?	5 people	10 people
Are you familiar with the benefits of aromatherapy candles?	3 people	17 people
Do you know how to make aromatherapy candles?	2 people	18 people
Do you know about using coffee grounds to make aromatherapy candles?	1 people	19 people

Table 2. Result of Post-test

Question	Answer	
	Yes	No
Do you know about aromatherapy candles?	20 people	0 people
Are you familiar with the benefits of aromatherapy candles?	20 people	0 people
Do you know how to make aromatherapy candles?	20 people	0 people
Do you know about using coffee grounds to make aromatherapy candles?	20 people	0 people

The community service team from Sekolah Alam Nusantara has developed an innovation to utilize the local potential of coffee, which is widely available in Suci Village. Until now, processed coffee products have been limited to beverages or food. However, in this activity, the community service team has developed an innovative approach by utilizing coffee powder to create aromatherapy candles. These candles have a distinctive coffee aroma that can provide a refreshing and calming effect, helping to reduce stress. In addition to the benefits of aromatherapy, the use of coffee grounds in candle making also contributes to waste reduction and economic added value (Melviani et al., 2021; Rahman et al., 2025).

The results of the pre-test indicate that most people in Suci Village are unfamiliar with aromatherapy candles. Of the 20 people who participated in this training activity, only five had heard of aromatherapy candles, and even fewer knew about their benefits, how to make them, or that local coffee could be used to make them. The pre-test results served as the basis for the need to hold training on making aromatherapy candles, enabling the community to innovate in processing coffee products from Suci Village. This training also aimed to provide an understanding of how to process coffee powder into aromatherapy candles and their utilization. Providing materials before demonstrations or hands-on practice in making aromatherapy candles is essential to give the community participating in the training activities a basic understanding.

A demonstration of how to make aromatherapy candles was held, allowing the community to see firsthand how the process works and learn how to do it themselves at home. This approach was intended not only to allow participants to see firsthand how the production process works, but also to build their confidence and ensure that they could independently replicate the activity in their own homes. Following the demonstration, an evaluation activity was conducted to assess the participants' understanding of the training material and their motivation to create their own candles and start a business. The evaluation also assessed quality tests, including density, ability to burn well, and the release of a distinctive fragrance, as criteria for product evaluation (Permana et al., 2023).

The evaluation of the training revealed that the community successfully produced coffee-based aromatherapy candles with distinctive fragrance, stable burning quality, and aesthetic appearance. Furthermore, this evaluation activity was followed by a post-test. From Table 2, it is evident that the participants understood the benefits and the manufacturing process, thereby increasing their knowledge about aromatherapy candles and contributing to innovation in the processing of coffee, a leading commodity from Suci Village. The innovation of making aromatherapy candles can also utilize coffee grounds, thereby helping to reduce environmental waste. This plays a positive role because when people know how to process their waste properly, they are more likely to do so. Additionally, when waste can be processed better, the environment becomes cleaner, healthier, and more comfortable (Lee et al., 2023).

Aromatherapy offers several advantages that make this product a popular natural relaxation method. One of its advantages is that aromatherapy can reduce stress and anxiety through aroma stimulation, which works directly on the limbic system in the brain, the part that regulates emotions (Bachtiar et al., 2022). In addition, aromatherapy also has the advantage of improving sleep quality,

relieving headaches, and improving mood (Nazilla et al., 2025). The use of natural ingredients, such as essential oils or coffee powder, makes aromatherapy candles safer and minimizes potential side effects (Hanphitakphong & Poomsalood, 2024).

Several volatile aromatic compounds, including 2-furanmethanol, furfuryl mercaptan, guaiacol, acetylmethylcarbinol, and caffeol, influence the use of coffee powder in the manufacture of aromatherapy candles. These chemical compounds can be formed through complex reactions during the roasting process of coffee beans. The furfuryl mercaptan compound is the main component that gives coffee its distinctive aroma, which is highly volatile. This compound helps to effectively diffuse the aroma of coffee when the aromatherapy candle is burned. Other compounds, such as guaiacol, have the potential to act as mild sedatives because they affect the central nervous system receptors (Pachimsawat et al., 2024). In addition, physically and chemically, coffee powder mixed into candles serves as a source of aroma and a mild adsorbent that can slow the release of aromatic compounds, resulting in a longer-lasting aroma effect. The cellulose and lignin content in coffee powder also exhibits good thermal stability, preventing it from easily decomposing at candle burning temperatures and maintaining the integrity of the candle structure (Hayati et al., 2024).

Coffee grounds waste can also be used as an additive in the manufacture of aromatherapy candles. Utilizing this waste can provide both environmental and economic benefits. From an environmental perspective, coffee waste is a significant amount of organic waste that is often not utilized optimally. Processing this waste into an additive for aromatherapy candles can reduce the volume of organic waste that ends up in landfills. This, in turn, can help reduce greenhouse gas emissions from the anaerobic decomposition of organic waste, such as methane (CH_4) (Kartini et al., 2024). In the context of economics and sustainability, utilizing coffee waste as an additive in candles can add value to a material that was previously considered waste, thereby supporting the principles of zero waste and the circular economy (Pratiwi et al., 2025).

Processing coffee grounds into aromatherapy candles is a form of environmentally friendly innovation that aligns with the principles of zero waste and the circular economy. Coffee grounds, which are typically considered household waste and often discarded, can now be repurposed as a valuable alternative raw material. This approach demonstrates concrete efforts to reduce waste at the source, while raising public awareness of the importance of responsible waste management. This effort will help encourage the public to shift their mindset from linear consumption to sustainability within the framework of zero waste. The public is invited to explore the potential for reusing or recycling materials around them (Awasthi et al., 2021).

This activity also represents the principle of circular economy, where waste is not considered the end of the consumption process, but rather the beginning of a new economic cycle. By turning coffee grounds into products that have market value, the community of Suci Village can create an independent and sustainable recycling-based economic model. Aromatherapy candles made from coffee grounds have the potential to be developed as a creative business opportunity. This shows that simple activities at the local level can contribute to a more inclusive and environmentally friendly economic system (Drewnowski et al., 2025).

High-quality aromatherapy candles possess distinctive characteristics that reflect optimal quality, safety, and therapeutic benefits. Generally, high-quality candles are made from natural and safe ingredients, such as soy wax, beeswax, or coconut wax, which are environmentally friendly and do not produce toxins when burned. Pure essential oils, as a source of aroma, are also key, as they provide a natural fragrance and offer therapeutic benefits such as relaxation, improved focus, and mood enhancement. Good aromatherapy candles also burn cleanly, meaning they do not produce black smoke or soot that can pollute the air in the room. To achieve this, it is essential to use wicks

made from natural materials, such as pure cotton or wood, that do not contain metals or chemicals (Lusiana et al., 2023).

The aroma produced by aromatherapy candles should ideally be soft and not overpowering, yet able to spread evenly throughout the room both when the candle is lit (hot throw) and when it is extinguished (cold throw). The consistency of this aroma indicates the quality of the essential oils used and the proper mixing process. In terms of appearance, a good aromatherapy candle typically has a smooth and neat surface, free from cracks or waves, and is packaged in a sturdy, heat-resistant, and aesthetically pleasing container, such as a glass or metal can. Additionally, a high-quality candle will have a long and stable burn time, with the wax melting evenly across the entire surface, not just in the center, thereby preventing it from burning out quickly and maximizing wax usage (Mehta & MacGillivray, 2022).

User safety is also an important consideration. Aromatherapy candles should be free from harmful chemicals, such as synthetic dyes, and be packaged in environmentally friendly and easily recyclable materials. Clear instructions for use, including safety warnings and proper usage, are also key characteristics of professional candles. Finally, the tangible benefits of aromatherapy are a key aspect: the aroma of essential oils should be able to create the desired atmosphere, such as calming, refreshing, or improving concentration, depending on the type of oil used. All these elements make aromatherapy candles not just a fragrance product, but also a safe, enjoyable, and beneficial therapeutic medium for the well-being of the body and mind (Arumsari et al., 2023; Putra et al., 2023). Considering these characteristics, making aromatherapy candles is not only a creative activity, but also creates a high-quality, safe, and beneficial product. This is especially important if the candles are developed as part of a community empowerment program, because high-quality candles will increase sales value and consumer confidence, while also having a positive impact on health and the environment.

The outcome of this activity is not only the production of coffee aromatherapy candles by the community, but also an increase in the capacity of human resources among partners. Training participants now possess the basic knowledge and technical skills necessary to develop home-based businesses leveraging local potential. Additionally, a training module has been developed that provides comprehensive information on the definition, advantages, benefits, and steps for creating coffee aromatherapy candles. This module is expected to serve as a sustainable guideline, enabling the community to independently produce aromatherapy candles and establish them as a local flagship product of Suci Village. The contribution to science is thus twofold. First, it provides empirical evidence that community empowerment programs can serve as a medium for translating scientific knowledge into accessible, sustainable practices. Another contribution is a replicable model for other rural areas seeking to combine local resource utilization with sustainable entrepreneurship. In line with recent discussions on green economy and sustainable rural development, this study enriches the discourse on how local wisdom and natural resources can be harnessed not only to improve livelihoods but also to support broader scientific and policy frameworks on sustainability.

CONCLUSION

The Community Empowerment Partnership (PKM) program in Suci Village has successfully enhanced the skills of the community, particularly homemakers, in transforming local coffee potential into value-added aromatherapy candle products. Through training stages that include material provision, hands-on practice, and evaluation, participants can understand the process of making high-quality coffee aromatherapy candles from start to finish. This program produced ready-to-use products and strengthened human resource capacity through knowledge and skills that can be developed into independent businesses. The training modules produced serve as a sustainable

guideline, so it is hoped that coffee aromatherapy candles can become one of Suci Village's local specialties while also opening up opportunities for community economic improvement.

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