Utilization of used cooking oil into aromatherapy candles as a community empowerment program in Padukuhan Plembon Kidul

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Abstrak

The problem of used cooking oil waste remains a serious issue due to its harmful impacts on both the environment and human health when disposed of improperly or reused repeatedly. This community service program aimed to empower members of the PKK women's group in Plembon Kidul, Gunungkidul, by training them to process used cooking oil into eco-friendly and economically valuable aromatherapy candles. The applied experimental method was implemented through education sessions, hands-on training, and entrepreneurship mentoring. Data were collected using participatory observation, brief interviews, and documentation, and then analyzed qualitatively with simple quantitative support. The results showed an increase in community knowledge and skills, as evidenced by the successful production of high-quality aromatherapy candles in terms of form, fragrance, and burn performance. Active community participation further indicated the potential for developing environmentally based creative enterprises. This program contributes not only to reducing environmental pollution but also to opening opportunities for improving community welfare through a circular economy approach.

Keywords: used cooking oil, aromatherapy candles, community empowerment, circular economy, waste management

1. Introduction

Waste management remains a critical issue in modern society, particularly household waste such as used cooking oil. Household waste is a major contributor to environmental pollution in Indonesia, and one of the most neglected forms is used cooking oil. This material is a residue from repeatedly used frying oil, which is often discarded into the environment without further treatment. Such practices significantly contribute to water pollution, as discharged used oil can form a layer on the water surface and hinder oxygen diffusion (Ery Susiany Retnoningtyas, 2024). In fact, used cooking oil has the potential to be recycled into useful and economically valuable products such as biodiesel, soap, liquid fertilizer, and aromatherapy candles. Aromatherapy candles are selected because, apart from being eco-friendly, they also provide health benefits, including relaxation effects, stress reduction, and a comfortable atmosphere (Amalia Yuli Astuti, 2021). However, low environmental literacy and limited community skills remain major obstacles to optimizing the utilization of this waste.

Plembon Kidul Hamlet, Logandeng Village, Playen Subdistrict, has the potential to develop community skills, particularly among members of the PKK women's group, to process used cooking oil into creative products. The lack of environmental awareness and technical skills creates challenges,

thus requiring practice-based education and training to shift the community's mindset from waste disposal to waste utilization as a business opportunity within a circular economy framework (Testa Pradia Nirwana, 2024).

This community engagement program aims to enhance the community's capacity to process used cooking oil into eco-friendly, marketable aromatherapy candles; provide education on the environmental impact of waste; train candle-making skills; and encourage the growth of environmentally based creative enterprises. Problem-solving strategies include educational workshops, hands-on training, entrepreneurship mentoring, as well as product and marketing monitoring and evaluation. Indicators of success are assessed through improvements in participants' knowledge and skills (Dela Kumalaningsih, 2023). With a participatory approach based on local potential, this activity is expected not only to generate functional products but also to foster collective awareness among the people of Plembon Kidul regarding the importance of simple and sustainable innovations in environmental conservation.

Previous studies indicate that used cooking oil can serve as a raw material for various eco-friendly products (Poetriku Pradhana, 2025). highlighted that aromatherapy candles derived from used cooking oil offer both health benefits and strong market value, aligning with the growing trend of eco-friendly products. Training in candle-making has also been shown to enhance community skills and ecological awareness (Dipa Mazidan Latief, 2024). Similarly, emphasized that empowerment through used cooking oil processing can stimulate household entrepreneurship and support the concept of a sustainable circular economy.

Accordingly, recycling training in Plembon Kidul is highly relevant to addressing household waste problems while simultaneously opening up opportunities for environmentally based creative economic ventures. The hypothesis of this program is that education and training on processing used cooking oil into aromatherapy candles will increase ecological awareness and create creative business opportunities that reduce pollution while contributing to family income.

2. Method

This study employed an applied experimental design by providing direct training to the community on processing used cooking oil into aromatherapy candles. In this approach, the community was not only given theoretical knowledge through educational sessions but was also actively involved in hands-on candle-making practices until a final product was achieved. The research focused on evaluating the success of the training based on the quality of the products produced, the skills acquired, and the level of community participation in each stage of the activity (Sukmawati, 2024).

The rationale for selecting this design lies in the fact that an applied experimental approach is able to demonstrate tangible impacts directly through the skills developed and products created (Rahmatullah Akbar, 2023). This method is particularly suitable for community service contexts, where success can be measured by the extent to which participants are able to reproduce the skills taught and produce functional aromatherapy candles. Thus, this design was considered appropriate as it emphasizes empowerment and the sustainability of skills that can be further developed independently by the community.

2.1 Scope and Object of the Research

The scope of this activity includes the targets, location, implementation time, materials and tools, and data sources used. All of this information is presented concisely in Table 1 for ease of understanding.

Table 1. Scope and Research Objects

Aspect	Description
Location & Time	Plembon Kidul Hamlet, Logandeng Village, Playen Subdistrict, Gunungkidul Regency, on August 7, 2025, in conjunction with the Regular Community Service Program (KKN) of Universitas 'Aisyiyah Yogyakarta.
Target Group	Housewives and adolescents, as they are the groups most frequently dealing with used cooking oil as household waste.

Aspect	Description
Materials & Tools	Used cooking oil, charcoal, stearic acid, essential oil, pan/pot, wick, stove, stirring spoon, and candle molds. All were selected for their simplicity, availability, and reusability.
Data Sources	• *Primary:* observations of participants' skills, produced candles, and direct feedback through interviews/FGDs. • *Secondary:* literature, research journals, and village data related to household waste management.
Data Collection Techniques	Participatory observation and documentation in the form of notes, photos, and activity videos.

2.2 Operational Definition of Variables

To ensure that the research variables can be measured concretely and objectively, operational definitions were established to explain both the independent and dependent variables along with their indicators (Rian Vebrianto, 2020). These definitions facilitate the evaluation of program outcomes and ensure that the research objectives are achieved, as presented in Table 2.

Table 2. Operational Definition of Variables

Variable	Operational Definition	Indicators
Independent (Treatment/Intervention)	Training in the production of aromatherapy candles from used cooking oil provided to the community through an applied experimental method. The intervention included educational sessions, hands-on practice, and mentoring throughout the candle-making process.	Number of training sessions; participants' involvement at each stage; availability of materials and tools.
Dependent (Outcomes/Results)	The outcomes of the training activities, including participants' skills, product quality, and community participation.	• *Skills:* ability to independently produce candles. • *Product quality:* shape, fragrance, and burning performance. • *Participation:* participants' activeness and interest in developing the skills further.

2.3 Data Analysis Techniques

A mixed-method approach was applied. Qualitatively, the analysis described participants' involvement, responses, challenges encountered, experiences gained, and attitudes toward the program (Agna Nisa Maghfira, 2024). Quantitatively, it calculated the number of active participants, the percentage of successful products, and the level of participation. This combination provided a simple numerical overview of the program outcomes (Rusydi A.Siroj, 2024). By integrating qualitative and quantitative analyses, the findings were expected to be more comprehensive, capturing not only numerical data but also the meaning behind community engagement.

2.4 Research Implementation Plan

The research plan was systematically structured to ensure that the activities were well-directed and achieved the intended objectives. The stages included preparation, implementation, report writing, publication, and collaboration with village partners. The detailed plan is presented in Table 3.

Table 3. Research Implementation Plan

Stage	Main Activities	Expected Outcomes
Preparation	Identifying problems, coordinating with village officials, determining target participants, preparing materials, tools, and resources.	A structured activity plan; participants and location prepared.
Implementation	Educational sessions on the hazards of used cooking oil; hands-on training in aromatherapy candle production.	Participants understand the material and are able to practice candle-making.

Report Writing	Processing data from observations, interviews, and documentation into an activity report.	A comprehensive report containing results and evaluations.
Publication	Submitting reports to village authorities, publishing in community service journals, and posting on social media.	Program outcomes disseminated publicly and inspiring to other communities.
Collaboration with Partners	Village officials facilitating participants, PKK women and youth groups as active participants, and the KKN team as facilitators.	A sense of ownership established and program sustainability ensured.

3. Results and Discussion

Used cooking oil is a household waste product derived from residual frying oil of various types such as ghee, vegetable oil, and corn oil (Na'wa Nurmalytasari, 2025). Repeated reuse of used cooking oil can have adverse health effects. One effort to mitigate the harmful impacts of improper use and disposal is to recycle and repurpose used cooking oil into aromatherapy candles. Chemically, used cooking oil contains carcinogenic compounds formed during the frying process (Khairunnisa, 2023).

Reutilizing used cooking oil is necessary to reduce indiscriminate disposal, encourage behavioral change in waste management, and create useful products. Aromatherapy candles made from recycled used cooking oil provide calming and soothing effects, while also helping to reduce stress and fatigue. Thus, utilizing used cooking oil for aromatherapy candle production serves as an effective means of minimizing negative impacts on both health and the environment.

Community empowerment through educational sessions and training on recycling used cooking oil into aromatherapy candles was carried out by Universitas 'Aisyiyah Yogyakarta students as part of their community service program (KKN). The main target group was the PKK women's organization in Plembon Kidul Hamlet, Logandeng, Gunungkidul. The program was implemented at the Plembon Kidul Community Hall on August 7, 2025, at 1:00 PM, with a total of 34 participants. The initiative aimed to enhance community knowledge and skills in waste management, particularly household waste such as used cooking oil, by transforming it into useful and marketable products.

This empowerment initiative was also motivated by the urgency of waste management as a critical issue, as well as the need to mitigate its negative environmental impacts. The approach adopted combined awareness-raising with hands-on training, including live demonstrations of aromatherapy candle-making.

3.1 Awareness Session on Recycling Used Cooking Oil into Aromatherapy Candles

The initial stage of the community empowerment program for utilizing used cooking oil into aromatherapy candles was an awareness session. This session began with the presentation of materials on the utilization of organic waste, particularly household waste such as used cooking oil, followed by a discussion with members of the PKK women's group as participants. The purpose of the session was to increase community knowledge regarding the importance of waste management, especially organic waste. By learning about recycling used cooking oil into aromatherapy candles, participants—particularly the PKK women—gained insights into how to properly process household waste.

During the session, the speaker explained the types of recycled products that can be made from used cooking oil, the benefits of recycling it, and the health benefits of aromatherapy candles. The presentation also included an explanation of the procedure for producing aromatherapy candles from used cooking oil. Throughout the session, the community showed great enthusiasm by actively participating and paying close attention to the materials and training delivered.

The awareness program conducted by the KKN students for the PKK women's group not only educated the community on the importance of managing waste into value-added products but also introduced opportunities to improve the local economy in Plembon Kidul Hamlet. Furthermore, this community empowerment initiative was designed to provide long-term benefits that could be applied and sustained by the community in the future.

3.2 Training on Processing Used Cooking Oil into Aromatherapy Candles

The training program on recycling used cooking oil into aromatherapy candles aimed to equip the residents of Plembon Kidul, particularly PKK women, with practical skills to create innovative recycled products that are both useful and marketable. The training was carried out through direct community involvement and sought to raise awareness of the importance of avoiding indiscriminate disposal of household waste, while encouraging participants to transform waste into beneficial products.

In this training, participants were guided step by step through the process of making aromatherapy candles. The stages involved included preparation of tools and materials, followed by the candle-making process itself. The equipment and materials used in producing aromatherapy candles from used cooking oil included a pot, stove, weighing scale, stainless-steel bowl, measuring cup, candle glass, candle wick, stearic acid, charcoal, paraffin, essential oils, and used cooking oil as the primary ingredient (Hanik Liskustyawati, 2025).

Figure 1. Used Cooking Oil Filtration Process

The first stage in making aromatherapy candles is the filtration process. The materials used in this stage are used cooking oil and activated charcoal. The oil is filtered by soaking it with activated charcoal for 24 hours. This process aims to eliminate the odor from the used cooking oil. By being soaked in activated charcoal, any remaining frying odor can be removed.

Figure 2. Aromatherapy Candle-Making Process

The second stage is the candle-making process, which consists of several steps. First, paraffin is melted until it becomes liquid. Then, the used cooking oil is heated until hot. Once the oil is heated, it

is mixed with the melted paraffin and stirred thoroughly. When the paraffin and used cooking oil are well blended, stearic acid is added as an additional ingredient in candle production. Paraffin and stearic acid are the main chemical components in candle-making, serving as hardening agents. The ratio between used cooking oil and paraffin is 1:1. For instance, if 200 grams of used cooking oil is used, the same amount of paraffin—200 grams—is also required. Additionally, 4 grams of stearic acid are added as a supplementary material.

Figure 3. Coloring and Scenting Process

The final stage is the coloring and scenting process. Coloring is applied after all the ingredients are well mixed. The coloring agents may include crayon shavings or powdered dyes. Once the coloring step is complete, essential oils are added as fragrance. The addition of fragrance is intended to produce a soothing aroma when the candle is burned, providing a relaxing effect for the user.

4. Conclusion

The community outreach and training program on processing used cooking oil into aromatherapy candles in Padukuhan Plembon Kidul successfully enhanced the community's knowledge, skills, and environmental awareness, particularly among the PKK women's group. Participants demonstrated active involvement during both the educational sessions and the practical candle-making activities, resulting in products of good quality in terms of shape, fragrance, and burning ability. This achievement not only contributes to reducing environmental pollution caused by improper disposal of used cooking oil but also creates opportunities for creative businesses based on the circular economy that can improve the residents' livelihoods. With continuous guidance and support from various stakeholders, this program is expected to develop further into a long-term productive activity that benefits the community's well-being.

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