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Development of Environmentally Appropriate Technology Through Creativity Cooking Oil into Aromateraphy Candles in Dupak Magersari Surabaya

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Abstract

The utilization of used cooking oil into aromatheraphy candles is an effort to develop the creativity of residents to reduce liquid waste pollution in the surrounding environment. Due to the large amount of used cooking oil produced by daily home activities in Dupakmagersari, there is a wonderful chance to manage waste more effectively by turning it into aromatherapy candles. The residents can use this innovation as a creative enterprise since they can sell the products to make money. The purpose of this research is a way to minimize waste oil pollution that can threaten environmental damage and human health. This research uses methods from the problem solving, determination, manufacture, and distribution stages. So that the results of this research, the Dupak Magersari community, Jepara Village, Bubutan Subdistrict, Surabaya City, especially Srikandi Kapirel squad can have the skills to utilize waste oil into goods that have selling value, namely aromatheraphy candles. The community will benefit from the ability to produce and market aromatherapy candles made from used cooking oil, which will increase revenue.

Keywords Appropriate Technology, Aromatheraphy Candles, Sustainable Development, Used Cooking Oil.

1. INTRODUCTION

Everyone has to understand what sustainable development is, as it is a worldwide issue (Javanmardi et al., 2023). In today's development discourse, sustainable development has gained popularity as a catchphrase (Mensah, 2019). The idea of sustainable development has evolved into a paradigm for development and a point of reference for environmental science (Alvarado-Herrera et al., 2017; Ruggerio, 2021). Starting from 1972 the United Nations (UN) held the first Conference on the Human Environment in the history of sustainable development (Subandi, 2022). The conference was attended by delegates from developing and developed countries including Indonesia with the result that an agreement was needed to consider environmental issues with development programs that were being carried out without damaging natural resources. In 1987, following the Stockhol conference, the UN published a report entitled Our Comman Future or Brundland Report through the World Conference on Environment and Development (WCED) (Situmeang et al., 2021). The report contains the concept of sustainable development by paying attention to meeting the needs of the present without damaging or sacrificing the next generation. Sustainable development refers to a development that addresses current demands while guaranteeing positive consequences for future generations (Latue & Rakuasa, 2023; Pan et al., 2021; Qidi, 2021; Sain et al., 2024; Silveira et al., 2020).

Since its publication by WCED, experts from various disciplines have not stopped discussing the topic of sustainable development. Until finally it was continued again in 1992 by the United Nations' Earth Summit in Rio Janerio which contained the results in the form of agenda 21. Then these results were continued by the UN General Assembly which adopted the Millennium Development Goals in 2000 at a meeting in Johannerburg and the 2002 World Summit (Saputri et al., 2021). These meetings indicate that sustainable development is very important and impactful. Thus it can be concluded that sustainable development is not shown in the environmental / ecological field alone, but also includes the social and economic fields. Until finally the appropriate sustainable development concept model which focuses on the integration of environmental conservation and economic development was delivered by the International Union for Conversation of Nature and Nature Resources (IUCN) (Sudrajat, 2018).

In today's modern world, trash production is on the rise due to increased industrialization and urbanization, making waste management an increasingly

pressing issue. Waste management and control must be done well in order to reduce pollution to the environment and safeguard public health. Waste comes in a variety of forms, and dealing with its disposal and management presents issues that must be understood as it continues to build up.

Any material that is thrown away after its intended use or that is worthless, flawed, or useless is referred to as waste (Akinsemolu, 2020). Anything that is above capacity or inventory is considered waste (Thürer et al., 2017). Waste is a discharge from a production process in an industry or from domestic residential areas (Widiyanto et al., 2015). The type of waste itself is divided into two, namely solid and liquid waste. Solid waste treatment is usually regulated by the government or the community, while liquid waste usually ends up in disposal connected to the river so that it can pollute water or soil if not managed properly. One of the liquid wastes produced by many people is used cooking oil. Cooking oil itself is an important staple and is often used in household needs. The use of cooking oil is generally used continuously and massively on a household or industrial scale (Vanessa & Bouta, 2017).

One of the essential needs of humans is cooking oil for food processing (Febrianto et al., 2020). Cooking oil is a food item that is primarily made up of triglycerides that are derived from vegetable sources without going through any chemical processes like hydrogenation, cooling, or refining before being used for frying (Denni et al., 2019). Cooking oil that has been used produces waste called used cooking oil. In general, used cooking oil can be reused a maximum of 3-4 times frying because it can be dangerous chemical compounds. The limit of cooking requirements in the standard quality of cooking oil SNI 3741: 2013 where the maximum permissible acid number is 0.6 mg KOH/g. While used cooking oil without adsorption has an acid number of 15.50 mg NaOH/g which shows that it has exceeded the maximum acid number limit (Pramitasari et al., 2024).

Used cooking oil waste that is left unmanaged can threaten human health and environmental damage. Some innovations in the utilization of this waste oil waste can vary, such as being used as soap raw material (Intan et al., 2022) or utilized as biodesel fuel (Garnida et al., 2022). Ine Suharyani's 2023 study, "Utilization of Waste Cooking Oil into Aromatherapy Candles," examines initiatives to lessen the amount of waste cooking oil used in home industries in Cipeujeuh Kulon Village, Cirebon, by using it as a base material for aromatherapy candle production (Suharyani et al., 2023). Research conducted by Emil Wahdi states that waste cooking oil can be used as a raw material for active charcoal dishwashing cream soap (Wahdi, 2023). The solid active

charcoal soap is made by adding waste cooking oil with 137 grams of NaOH, 500 ml of water, 2.5 grams of NaCl, 1 gram of 4Na-EDTA, and 40 grams of fine active charcoal (Wahdi, 2023). Furthermore, as shown in a community service project carried out in 2023 in Pandeyan Village, Ngemplak District, Boyolali Regency, by Nur Cahyani and associates, leftover cooking oil may be processed and used to manufacture candles (Cahyani et al., 2023).

The village on the edge of the Dupak Magersari railroad, Jepara Village, Bubutan Subdistrict, Surabaya City, is a densely populated village. Researchers observed that the use of cooking oil is almost used daily in household needs. There are roughly 77 families in the region, and every household gets rid of 0.5 liters of spent cooking oil on average every week. According to this estimate, the community as a whole produces 50 liters of garbage every week. Given the size of the amount of oil waste being disposed of—as this number suggests—management research is essential to minimizing the detrimental effects on the environment and public health. Seeing these conditions, it can be said that the waste of cooking oil in Dupak Magersari Village is very much. Finally, it is left or just thrown away around community settlements. Therefore, researchers through community service activities invite the Dupak Magersari community, especially mothers of kapirel (railside village) srikandi to jointly utilize the unused cooking oil into an appropriate technology that has selling value, namely aromatheraphy candles.

2. METHODS

The activity of making appropriate technology in utilizing used cooking oil into aromatherapy candles was carried out in April - May 2024 in Dupak Magersari, Jepara Village, Bubutan District, Surabaya City, East Java Province. This community service approach was designed to engage local residents and promote sustainable practices. Several stages are used in making this aromatherapy candle, namely: the problem identification stage, where the problem of environmental damage due to used cooking oil waste is troubling residents, so researchers take the utilization of waste oil to be used as aromatherapy candles. In addition, researchers also directly visited Dupak Magersari village as an initial observation regarding how the community cares about used cooking oil waste. This direct engagement allowed researchers to better understand community needs and perceptions. The appropriate technology selection stage is carried out by discussing between researchers, residents, and Arkom Jatim as an innovation in the utilization of used cooking oil waste into useful goods and has a

selling value. This form of utilization is needed by the community because the results can later return to the community again and can help the needs of the village through money. Therefore, the entire community and the Srikandi women involved have agreed to make this aromatherapy candle in Dupak Magersari Village, Jepara Village, Bubutan District, Surabaya City.

The targeting stage for users of appropriate technology is carried out by determining the target which is the general public who will make and market it. The focus of the place taken by researchers is the village of Dupak Magersari railroad, Jepara Village, Bubutan District, Surabaya City. Furthermore, the recipe stage for making aromatheraphy candles and designing the design is based on the results of discussions between residents and researchers, and is assisted by the direction of Arkom Jatim and some information from the internet.

The stage of making aromatheraphy candles begins with preparing some tools and materials. The items needed are specialized from unused items and voluntary assistance from Dupak Magersari residents so as not to spend a lot of money. Some of the tools needed are stoves, pans, measuring cups, pipettes, scissors, spoons and digital scales. The distribution stage of aromatheraphy candles is carried out after they have been made. This stage is carried out by selling aromatheraphy candles at various events, such as car free day, healthy markets, or receiving orders as souvenirs. The next stage is monitoring and evaluation. Evaluation of making aromatheraphy candles to determine the usefulness of using used cooking oil that threatens environmental pollution through interviews. Interviews were conducted with the makers of aromatheraphy candles, namely Kapirel women.

3. FINDINGS AND DISCUSSION

The activity of making aromatheraphy candles by utilizing used cooking oil begins with a direct visit to the village on the edge of the Dupak Magersari railroad, Jepara Village, Bubutan District, Surabaya City. In addition, researchers also held discussions with residents to analyze and identify potential and problems to determine the activities of making aromatheraphy candles as an innovation to utilize used cooking oil so as not to pollute the environment. This problem is seen because some residents do not know how to manage the remaining cooking oil so that it accumulates in the home environment or is left unattended. If left unchecked, this used cooking oil can threaten environmental pollution in the short and long term. The residents were initially not very enthusiastic about the suggestion of utilizing used cooking oil because they generally do not pay much attention to waste oil. But after

we directed them by explaining the benefits and results that can be obtained from this activity, the residents of Dupak Magersari began to arouse their interest and willingness to try this creative activity.

The results of the discussion decided to utilize the used cooking oil into goods that have selling value using simple tools and materials. The materials and methods for making aromatherapy candles made from used cooking oil include the following.
Tools needed:

1. Stove
2. Pot
3. Measuring cup
4. Pipette
5. Scissors
6. Spoon
7. Digital scales

Materials:

1. Used cooking oil
2. Beswax
3. Essential Oil
4. Aroma Flavoring
5. Flower Topping

How to make aromatherapy candles:

1. Boil enough water to stir the beswax until it melts.
2. Measure beswax on a scale weighing 150 grams.
3. Put the beswax into a heat-resistant glass / container.
4. Measure the jelanta oil on the scale weighing 87.5 ml.
5. Mix the jelanta oil into the beswax.
6. Then heat it by placing the container into a pot of hot water and stirring until it melts.
7. When the beswax has melted, add 12.5 ml of essential oil.
8. After stirring, take and put it into the candle mold container.
9. Then install the candle wick.
10. Sprinkle flower toppings according to taste.
11. Then drip the scent flavoring liquid using a dropper as much as 2 drops.
12. Wait for it to dry, and the aromatherapy candle is ready to use.

Figure 1. Aromatheraphy Candle Making Process

The activity of making aromatheraphy candles was assisted by the residents of Dupak Magersari, especially the srikandi kapirel women who turned out to have a spirit of skill. At that time our aromatheraphy candles used lemon and lavender aroma flavorings. The tools and materials needed also did not cost much money because the rest were voluntarily assisted by the Dupak Magersari residents themselves. With the innovation of aromatheraphy candles, the community realized that coming from waste oil can be an item that has a selling value and the results can be felt again together.

Some of the obstacles during the aromatheraphy candle making activity include the need for time to instill awareness to the community of the importance of managing liquid waste so that it does not become a threat of pollution that disrupts daily life. In addition, to carry out this activity must also adjust the time and busyness between residents. If the concept of making already exists but the time to do it is not there, then it is the same as not being able to realize this innovation together. Therefore, to overcome some of these obstacles, we made a program concept design and program implementation schedule according to the agreement between residents so that this activity could later be carried out together independently in the long term.

Figure 2. Srikandi Kapirel Squad

Figure 3. Aromatheraphy Candle

4. CONCLUSION

The utilization of used cooking oil into aromatheraphy candles in the railroad village of Dupak Magersari, Jepara Village, Bubutan Subdistrict, Surabaya City is an innovation in making simple appropriate technology to reduce unmanaged oil waste. The use of used cooking oil materials is a major factor in preventing environmental pollution and health threats in both the short and long term. Therefore, making aromatheraphy candles is a useful innovation because it only requires simple tools and materials.

The actual results show that the community disposing of used cooking oil has decreased. Many people are starting to learn that leftover cooking oil can be recycled into aromatherapy candles as awareness of waste management increases. This use not only cuts down on the quantity of waste that is thrown away, but it also adds value

and inspires innovation in the application of materials that would otherwise be abandoned. In addition to reducing waste oil pollution, these aromatheraphy candles can be distributed and marketed, earning money that can be used for the needs of the village or community together. Some suggestions related to appropriate technology that has been made can be further reproduced and developed so that it can be spread throughout the region or even abroad. This aromatheraphy candle making can support a creative and innovative economy that can be used as an opportunity by the Dupak Magersari community.

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