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Utilization of Kitchen Waste as Natural Dyes in the Production of Eco-Friendly Batik in Giriloyo Batik Center

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Abstract.
This community service activity aims to provide solutions to environmental problems due to the use of synthetic dyes in the batik production process at the Giriloyo Batik Center, Bantul Regency, Yogyakarta. One of the approaches offered is the utilization of kitchen waste as a base material for environmentally friendly natural dyes. The method used in this activity is a participatory approach that actively involves batik MSME players in three stages, namely preparation, implementation, and evaluation and follow-up. In the preparation stage, observations and interviews were conducted to explore the potential of natural dyes from kitchen waste. The implementation stage included technical training on the color extraction process and application to batik cloth. The results of the activity showed that materials such as onion skin, turmeric, and mangosteen skin are able to produce distinctive natural colors and are quite attractive to artisans. The evaluation showed a positive response and strong encouragement from participants to continue this innovation in a sustainable manner. As a follow-up, a strategy was developed in the form of forming a working group, developing "eco-batik" branding, and collaborating with academics. This innovation is considered to contribute to strengthening an environmentally friendly and competitive batik industry.
Keywords: *Eco-friendly Batik; Natural dyes; Kitchen waste; Batik MSMEs.*

I. INTRODUCTION

The batik industry in Indonesia is growing rapidly in various regions, with a very diverse style and diversity of motifs, reflecting the characteristics and local cultural wealth of each region. Each region has unique batik motifs and colors that have been passed down from generation to generation, in accordance with traditional values and local wisdom. This uniqueness makes batik one of the cultural identities of the Indonesian nation (Apriyani, K. T., et.al, 2021).

World recognition of Indonesian batik was further strengthened when in 2009, UNESCO designated batik as Indonesia's original cultural heritage (Subekti et al., 2020). Since then, the existence of batik has not only gained recognition at the national level, but has also successfully penetrated the international market. The batik industry in Indonesia covers a wide range of scales, from home industries to large-scale industries (Chafidz & Lestari, 2021). Indonesian batik products have even managed to penetrate the global market.

One of the traditional batik centers that still exists today is Giriloyo Batik, located in Wukirsari Village, Bantul Regency, Yogyakarta. (Muliasari & Widiastuti, 2020). The process of making batik

in Giriloyo still maintains traditional techniques that are done manually, so it has a high artistic and philosophical value. In addition to being a source of livelihood for the local community, the existence of Giriloyo Batik is also an educational tourism attraction that elevates the cultural and economic values of the region (Dwi Lestari et al., 2024). The uniqueness and distinctiveness of Giriloyo handmade batik has attracted the attention of both domestic and foreign tourists, as well as being a clear example of how traditional batik has survived and developed in the modern era.

On the other hand, the successful preservation and development of Giriloyo Batik is also faced with serious challenges, especially from the environmental aspect. Although some craftsmen still use traditional techniques, the use of synthetic dyes in the production process of written batik remains a problem. The use of these chemicals has the potential to cause negative impacts on the environment, especially if the dye waste is discharged directly into the environment without adequate treatment (Primiani et al., 2022). This can contaminate the water and soil around the area, threatening the sustainability of local ecosystems and public health.

The problem of synthetic dye waste pollution in batik centers such as Giriloyo is an important issue in realizing the sustainability of the batik production process. Chemical waste derived from synthetic dyes can degrade the quality of the environment, especially water and soil, and potentially disrupt the ecosystem and health of the surrounding community (Aditya et al., 2025). Therefore, innovative breakthroughs are needed to minimize these negative impacts, one of which is by replacing synthetic chemicals with natural dyes that are more environmentally friendly and safe for humans. This step is important to ensure that batik-making activities can still run sustainably without destroying the balance of nature.

One of the creative solutions that can be implemented in Giriloyo Batik Center is the utilization of kitchen waste as a base material for natural dyes. Organic materials such as fruit peels, vegetable scraps, and various spices have great potential to produce unique and authentic natural colors (Laksmi et al., 2024). This approach not only supports the reduction of household waste, but also simultaneously reduces dependence on harmful chemicals in the batik dyeing process. Thus, this solution provides a positive double impact, both for environmental conservation and preservation of local culture.

Through the development of kitchen waste-based natural dyes, Batik Giriloyo has a great opportunity to strengthen its identity as an environmentally friendly and sustainability-oriented batik center. This innovation not only safeguards environmental quality and public health, but also enhances the competitiveness of batik products through higher added value and a healthier product image. To realize this transformation, collaboration and support from various parties, including the government, academia, and the community, are needed so that the batik industry can continue to develop sustainably and competitively in the global market.

II. METHODS

The method used in the activity uses a participatory approach, which emphasizes the active involvement of the community, especially batik MSME players in the Giriloyo Batik Center in every stage of the activity (Irwan et al., 2021). The interview process was conducted using a participatory approach, where MSME actors were actively involved in recognizing problems, exploring business potential, and developing solutions based on local wisdom (Setiawan et al., 2023). Activities are carried out through three main stages:

1. Preparatory Stage: Conduct participatory observations and interviews to explore the problems and potential of natural dyes from kitchen waste available in the surrounding environment.
2. Implementation Phase: Carry out training and technical assistance to batik artisans on the manufacturing process and application of natural dyes in batik production.
3. Evaluation and Follow-up Phase: Evaluate the results of the activities in a participatory manner and develop a strategy for program sustainability, including product development and marketing of eco-friendly batik.

III. RESULT AND DISCUSSION

1. Preparation Stage

In the initial stage, field observations and participatory interviews with batik artisans in Sentra Batik Giriloyo were conducted. The identification results show that most MSME players still rely on synthetic dyes due to the ease of use and availability of materials. However, the artisans also show enthusiasm for the use of natural dyes, especially if the raw materials are easily obtained from the surrounding environment.

In group discussions, it was found that kitchen waste such as shallot skin, mangosteen skin, teak leaves, turmeric, and vegetable scraps are materials that are often available and have the potential to be used as a source of natural dyes. Awareness of environmental issues is also growing, especially among young artisans who are open to innovation and environmentally friendly production concepts.

Figure 1 Activities Group discussion with Giriloyo Batik business owners

2. Tahap Pelaksanaan

This stage focused on technical training on how to process kitchen waste into natural dyes and their application in the batik cloth coloring process. Training activities include color extraction techniques, mixing mordant materials (color binders), and testing on batik cloth.

The test results showed that some kitchen waste materials were able to produce quite attractive natural colors, such as brown from onion skin, yellow from turmeric, and purplish red from mangosteen skin. Although the intensity of natural colors is not as sharp as synthetic dyes, the resulting products have visual uniqueness and high selling value because they carry the concept of environmentally friendly.

During the mentoring, the artisans were provided with written guidelines and hands-on mentoring, which made it easier for them to understand the process of converting waste materials

into natural dyes. The participants' response was very positive, and several artisans expressed commitment to start integrating natural dyes in their production.

Figure 2 Coloring Process Using Kitchen Waste

3. Tahap Evaluasi dan Tindak Lanjut

In the evaluation and follow-up stages, the activities were conducted in a participatory manner through group discussions and the distribution of simple questionnaires. The results showed that the training was considered very useful and in accordance with the needs of MSME players, especially in introducing alternative natural dyes from kitchen waste. The artisans also expressed aspirations for further assistance, especially related to natural color diversification and marketing strategies for environmentally friendly batik products. As a follow-up step, several program sustainability strategies were formulated, including encouraging the formation of an environmentally-based batik craftsmen working group, developing a product branding concept with the "eco-batik Giriloyo" approach, and establishing partnerships with academics and related institutions to support further research and product promotion. These efforts are expected to strengthen the position of Batik Giriloyo as a batik center that is not only culturally sustainable, but also environmentally sound and globally competitive.

Figure 3 Coloring Process Result

Discussion

The implementation of the innovation program on the utilization of kitchen waste as natural dyes in batik products at the Giriloyo Batik center has a positive impact on increasing

environmental awareness and strengthening local cultural values among batik MSME players. Through training and technical assistance conducted in a participatory manner, the craftsmen not only gained new knowledge about natural dye making techniques, but also understood the importance of environmentally friendly production practices for business sustainability and the welfare of the surrounding community.

The results of the service showed that some kitchen waste materials such as shallot skin, turmeric, teak leaves, and mangosteen peel were able to produce quite diverse natural colors even though their intensity was not as strong as synthetic dyes. However, the added value of the eco-friendly concept carried through the use of natural dyes is actually an advantage in attracting the attention of consumers, especially domestic and foreign tourists who are increasingly concerned about sustainability issues and local wisdom-based products.

The mentoring process that actively involved the artisans also had a positive impact on creating a sense of ownership and motivation to continue innovating. Some artisans expressed their commitment to start integrating natural dyes in their batik production process. In addition, group discussions conducted at the evaluation stage led to the idea of forming a working group of eco-friendly batik artisans as well as developing the concept of Giriloyo eco-batik branding, which is expected to expand the market and strengthen the image of sustainable local batik products.

This collaborative approach based on local potential and environmental awareness not only contributes to the preservation of traditional hand-written batik culture, but also becomes a strategic step in supporting community economic development through local wisdom-based product diversification that has competitiveness in the global market.

IV. CONCLUSION

The community service activity in Giriloyo Batik Center succeeded in introducing a natural dye innovation based on kitchen waste as a solution to pollution caused by synthetic dyes. Through a participatory approach, this training showed positive results both in terms of the acceptance of craftsmen and the effectiveness of natural dyes. The enthusiasm and commitment of the MSME players showed great potential to develop environmentally friendly batik production. The evaluation of the activities confirmed that the program is relevant to the needs of the artisans, and strategic follow-ups in the form of the formation of working groups, “eco-batik” branding, and cross-sectoral cooperation are important steps to support the sustainability of the environmentally sound traditional batik industry.

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increasing competitiveness, and ensuring the sustainability of Batik Wukirsari as a superior village product that carries cultural values and local wisdom.

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