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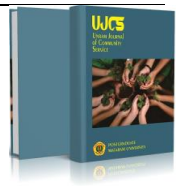

Optimization Of Product Diversification and Product Quality Through Digital Sewing Machine Technology and Copper Wax Melting Vats for Batik Craftsmen in Tanjung Bumi

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Abstract: Community Empowerment for Regional Superior Products (PM-UPUD), with the title "Improving the Quality, Capacity, and Competitiveness of Green Economy-Based Hand-Drawn Batik Products in Bangkalan Regency," with target partner 1 being *Zulpah Batik* and target partner 2 being *Naraya Batik*, operates in the hand-drawn batik, *gentongan* hand-drawn batik, and uniform industries. The purpose of the PM-UPUD Program is to improve the quality, production capacity, and competitiveness of target partner products so they can compete in both domestic and foreign markets. The problems faced by target partners 1 and 2 are that the number of product variations produced is still limited, they are not keeping up with current fashion trends without abandoning the characteristics of batik, and the production system for making finished clothes and applying *malam* is still conventional, resulting in low product quality. The solution to solve the partners' problems is the implementation of innovative digital sewing machine technology and a copper wax bath. The methods used to implement the proposed solution are training, mentoring, and practical operation and maintenance of digital sewing machines and copper wax baths. The PM-UPUD achievement target shows an increase in the number of batik fabric diversification products, namely fashion clothing, party suits, and home interior accessories made from batik. There is an increase in production capacity of 25 hand-written batik pieces per day and an increase in sales volume of 35 pieces per day. The external outputs of PM-UPUD are articles in Sinta 4 community service journals, videos, publications in mass media, posters, and the Unitomo YouTube channel. Thank you to the DPPM KEMDIKTISAINTEK for funding this PM-UPUD program in the 2025 fiscal year.

Keywords: Competitiveness, Copper Vat, Digital Sewing Machine, Handwritten Batik, Quality.

Introduction

This PM-UPUD activity involves 2 partners: partner-1: UD ZULPAH BATIK MADURA on Pelabuhan Sarimuna Street, Paseseh Village, Tanjungbumi District, Bangkalan Regency, Madura, East Java, and partner-2: CV NARAYA BATIK on Pelabuhan Paseseh Street, Paseseh Village, Tanjungbumi District, Bangkalan Regency, East Java. Mitra-1 and Mitra-2 produces hand-drawn batik and Gentongan hand-drawn batik with natural and synthetic dyes. The product types for Mitra-1 and Mitra-2 are hand-drawn batik fabric by the piece, fashion clothing, jackets, and uniforms. Gentongan hand-drawn batik is

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hand-drawn batik produced in a clay barrel buried in the ground, requiring a long production process of up to 1-3 years (Sari & Miftah, 2020). Gentongan hand-drawn batik in Indonesia is only produced in Tanjungbumi, Bangkalan Regency, Madura. Due to the time-consuming production process of Gentongan hand-drawn batik, its price is very high. Therefore, partners 1 and 2 only produce Gentongan hand-drawn batik for 20% of their total production, with the remaining 80% being natural and synthetic dyed hand-drawn batik (Bawono et al., 2023). Gentongan hand-drawn batik is produced for a niche market, specifically for consumers who are fans of Gentongan hand-drawn batik and for the upper class (Bahrin & Wisnu, 2016). Partner-1 and Partner-2 still relies on traditional motifs that have been passed down from their ancestors (Habiby & Hariyanto, 2018). The development of hand-drawn batik is so rapid in Indonesia that Mitra-1 and Mitra-2 faces significant challenges in competing in the market, where many batik SMEs are producing hand-drawn batik with more varied motifs, designs, and product types, following evolving fashion trends without abandoning the characteristics of their region (Subekti et al., 2020).

The Bangkalan District Industry and Manpower Office is paying significant attention to the development of hand-drawn batik in Bangkalan through training programs, but this has not been maximized according to the needs of hand-drawn batik artisans (Hasanah et al., 2025; Wibowo et al., 2021). With the high level of competition in the market, it can be concluded that the priority issues, proposed solutions, and implementation methods for the proposed solutions to address partner problems are shown in the table below:

Tabel 1. Priority Issues, Solutions, and Implementation Methods

No	Priority Issues	Proposed Solution	Implementation Method	Success Indicators
1	The number of hand-drawn batik product types is still limited	Application of product diversification technology	Mentoring and practical training on product types: fashion clothing, party suits, and household interiors made from hand-written batik.	There is an increase in 3 types of hand-written batik diversification products, namely fashion clothing, party suits, and household interiors made from hand-written batik
2	The quality of batik hand-written ready-made clothing products is still low	Application of digital sewing machine technology and a copper wax melting pot	Mentoring training and practical operation and maintenance of digital sewing machines and copper melting wax pellets	- There is an increase in production capacity of 25 hand-written batik pieces per day - There is an increase in sales volume of 35 pieces per day
3	The marketing system relies on direct sales through galleries, exhibitions, and orders	Implementation of digital marketing innovation technology	Mentoring and practical training in digital marketing and promotional content creation	- There is a 60% increase in the knowledge and skills of artisans in creating promotional content - There is a 70% increase in the knowledge and skills of artisans in applying digital marketing strategies

Method

The methods used in implementing the PM-UPUD Community Service are:

a. Socialization Socialization of the coordination of the PM-UPUD program implementation between the proposing team and partners 1 & 2; determining the schedule; program implementation; machine investment; and partner involvement and roles.
b. Training and mentoring for the PM-UPUD program, including the operation and maintenance of modern sewing machines and copper nite slide tubs, innovative product diversification technology, digital marketing, and the creation of promotional content to address partners' priority issues.
c. Technology Application and TTG Creation Designing and creating technological innovations: modern sewing machines, copper nite slide tubs, websites, e-commerce, promotional YouTube and Instagram content, and reseller partnerships.
d. Mentoring and Evaluation After all training programs are completed, the proposing team provides mentoring and evaluation to assess the effectiveness of the training provided and to evaluate the program's success rate by comparing the situation before and after the training.
e. Program Sustainability After the second year of the PM-UPUD program is completed, the proposing team continues to provide mentoring to partners, and there is certainty that partners can ensure the continuation of the PM-UPUD program that has

been implemented by partners 1 and 2 by maintaining and caring for all technology investments provided to the partners.

Result and Discussion

The implementation stages of PM-UPUD are as follows:

1. Socialization

The socialization of PM-UPUD was attended by target partners 1 and 2, representatives of craft groups, and the implementation team. It explained the types of training, mentoring, and practices: operating and maintaining copper vats for batik wax, operating and maintaining modern sewing machines, collaborating with resellers, digital marketing, web, managing IPR registration, and dyeing techniques.

Figure 1. Socialization of the PM-UPUD Program

2. Training, Mentoring, Operational Practice, and Maintenance of the Night-Falling Copper Vat

Training, mentoring, operational practice, and maintenance of the night-falling copper vat are PM-UPUD activities for target partner 2: Naraya Batik. In the first year, target partner 2 received an investment in nite wax removal technology that can be used for nite wax removal with medium wax thickness because it uses synthetic dyes. For hand-drawn batik products with thick synthetic dyes, a copper nite wax removal tool is needed because the dye thickness cannot be removed in a single process using the nite wax removal machine. Therefore, a copper nits wax removal tool is required that can be used repeatedly for nits wax removal. Like copper nite pellets, copper nite wax is used specifically for batik fabrics with a high wax thickness, such as in *gentongan* hand-drawn batik.

Figure 2. Training, Mentoring, and Practical Operation of the Nite Pellet Copper Tank

3. Training, Mentoring, and Practical Operation and Maintenance of Modern Sewing Machines

Training, mentoring, and practical operation and maintenance of modern sewing machines were conducted at target partner 1: Zulpah Batik. This training aimed to improve the skills of the artisans in using digital sewing machines. Previously, the artisans at target partner 1 used conventional sewing machines for a long time, resulting in many defective products, especially for slightly thick batik fabric. Digital sewing machines make it easier for artisans to sew fashion garments with various variations, as well as to create embroidered accessories on batik fashion clothing (Siradjuddin et al., 2018).

Figure 3. Training, Mentoring, and Practical Operation of Digital Machines

4. Training, Mentoring, Digital Marketing Practice, Web

Training, mentoring, and digital marketing and web practice are conducted to enhance the knowledge and skills of target partners 1 and 2 in using digital marketing, web, and creative content.

In the era of global industrialization, digital marketing and web challenges are needed for market expansion (*Batik Tulis Tanjung Bumi Bangkalan*, 2024; Tampubolon et al., 2022).

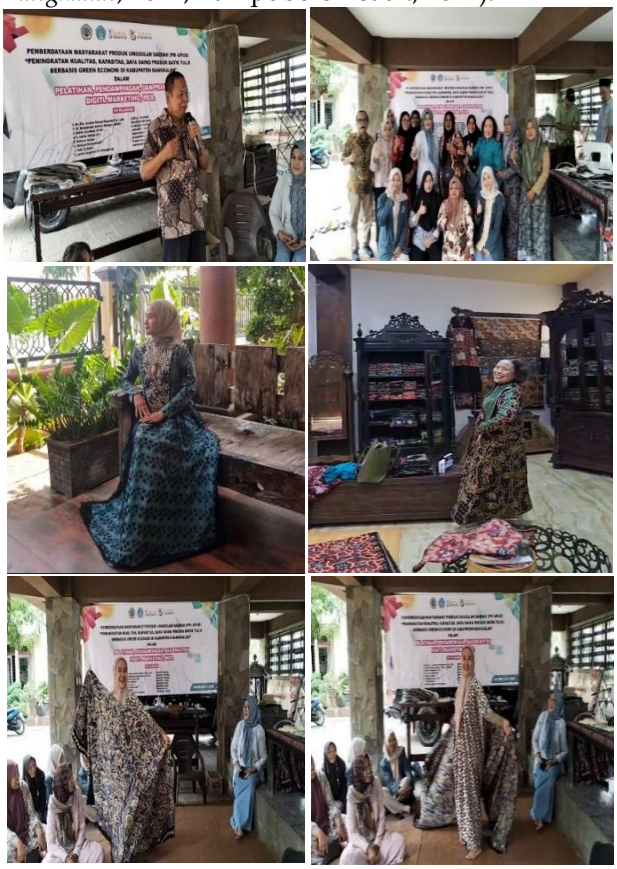

Figure 4. Digital Marketing and Promotional Content Mentoring and Practice Training

Conclusion

1. The achievement indicators for training, mentoring, and practical operation and maintenance of copper vats are a 50% increase in product quality and a 3% reduction in defective products.
2. The achievement indicators for training, mentoring, and practical operation and maintenance of digital sewing machines are an increase in 3 types of hand-written batik diversification products, namely fashion clothing, party jackets, and household interiors made from hand-written batik; an increase in production capacity by 25 hand-written batik pieces per day; and an increase in sales volume by 35 pieces per day.
3. The achievement indicators for training, mentoring, and practice in digital marketing and promotional content creation are a 60% increase in artisans' knowledge and skills in creating promotional content and a 70% increase in artisans' knowledge and skills in applying digital marketing strategies.

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