



Sustainable Digital Innovation for the Empowerment of Environmentally Friendly Batik MSMEs

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ABSTRACT

This Community Service Program aims to improve the competitiveness of batik SMEs in Desa Jarum, Klaten, by adopting environmentally friendly digital technology and supporting the regeneration of young batik artisans. The implementation method includes digital marketing training, financial management, batik training, and batik waste management. The partners involved are Paguyuban ARUMCAWERASA, the Government of Desa Jarum, and BUMDes Jarum, with participants predominantly female (80%) and aged between 25-50 years. Evaluation and monitoring were carried out through pre- and post-training surveys, observations, and interviews. The results showed an 85% increase in participants' knowledge and skills, as well as a 15-20% increase in batik product sales within one month. This program successfully introduced digital technology for marketing and business management while supporting the regeneration of young batik artisans. In conclusion, this program has provided a positive impact on the Batik SMEs of Desa Jarum and can serve as a model for SME development based on technology in the digital era.

Keywords: Digital Marketing, Waste Management, Regeneration, MSMEs

1. Introduction

The increasingly rapid transformation of science and technology (IPTEK), particularly during the COVID-19 pandemic, has brought significant changes to people's lifestyles. Digitalization has become a major trend, but new challenges, such as rising unemployment, have also emerged. According to data from the Central Statistics Agency (BPS) in August 2023, the unemployment rate in Indonesia reached 147.71 million people, an increase of 3.99 million compared to the previous year. In the context of batik MSMEs, Jarum Village, Klaten, faces the following problems:

1. Marketing limitations: The limited adoption of digital technology (Tolstoy et al., 2022) makes it difficult for batik MSMEs to reach wider markets, both nationally and internationally (Suherlan et al., 2023).
2. Lack of batik maker regeneration: The absence of training programs that attract the younger generation to continue traditional batik businesses threatens the sustainability of local culture (Ayu Kusumawardani et al., 2024; Sudantoko, 2005).
3. Ineffective business management: MSME owners face difficulties in managing production and data-driven business operations that align with market needs (Heubeck, 2023; Sariwulan, 2020).
4. Concerns about batik waste pollution: The batik production process often neglects health and environmental aspects, which can impact environmental sustainability (Ayu Kusumawardani et al., 2024).

This community service program is carried out because the MSME sector is the backbone of the Indonesian economy, and technology-based innovations such as technopreneurship can be a solution to increase competitiveness. Entrepreneurial success is strongly influenced by the entrepreneur's confidence and motivation to achieve business performance

(Farid Wajdi et al., 2012; Xu et al., 2018). This demonstrates the importance of community service programs that integrate aspects of technology, entrepreneurship, and cultural preservation (Farid Wajdi et al., 2012; Praswati et al., 2024; Setyawan Agus et al., 2015).

To address these issues, this community service program offers solutions through the SMART (Strategic, Modern, Safe, Environmentally Friendly, Traditional) approach, which includes:

1. Strategic: Providing training in digital-based strategic planning, such as social media management and e-commerce strategies (Praswati et al., 2024).
2. Modern: Training in the use of applications such as Canva, Kinemaster, and Instagram for promotional design and product marketing (Ilmadina et al., 2023).
3. Safe: Providing education on occupational safety and healthy production space management (Iriani et al., 2024).
4. Environmentally Friendly: Training in batik waste management and the use of natural dyes to support environmentally friendly practices (Ayu Kusumawardani et al., 2024).
5. Traditional: Implementing the Batik Fun Short Course program to support the regeneration of young batik makers while preserving batik culture (Sudantoko, 2005; Suherlan et al., 2023).

This program is supported by studies showing that digitalization and waste management contribute significantly to the sustainability of batik MSMEs (Arifin et al., 2023). This program is also relevant to the field of culture- and environment-based entrepreneurship, and supports the transformation of MSMEs into the digital era. The goal of this community service is to increase the competitiveness of the Jarum Village batik MSMEs through the adoption of environmentally friendly digital technology, support the regeneration of young batik makers, and promote sustainable business

practices. This program is expected to have a positive impact on the local community, cultural preservation, and the development of MSMEs in the modern era.

2. Method

The partner of this community service activity is the ARUMCAWERASA Association, which consists of members of the Batik MSMEs of Jarum Village, Klaten. This association has 30 active members with a gender composition

that is predominantly female (80%) and aged between 25-50 years. Other partners include the Jarum Village Government and the Jarum Village-Owned Enterprise (BUMDes), which plays a role in supporting facilities and providing local data. Participants in this activity include MSME owners, batik makers, and the younger generation who are targeted for workforce regeneration. This community service activity is carried out through the following stages:

Table 1. Stages of SMART-Preneur Community Service

Numb.	Stages	Date	Activity	Material	Speaker
1	Activity Preparation	August 8–15, 2024	- Needs analysis. - Development of training modules. - Formation of a mentoring team.	Identifying problems and needs.	Proposing Team
2	Digital Marketing Training	August 20–22, 2024	Training on digital application usage.	Canva, Kinemaster, Instagram.	Digital Marketing Expert
3	Financial Assistance	August 25, 2024	Financial management training.	Catatan Warungku MSME application.	Financial Practitioner
4	Batik Fun Short Course	August 30–September 1, 2024	Batik maker regeneration training program.	Basic techniques and development of batik motifs.	Experienced Batik Artist, Local Artist
5	Batik Waste Management	September 5, 2024	Environmentally friendly waste management training.	Waste management techniques.	Waste Management Expert
6	Digital Solution Implementation	September 10–12, 2024	Installation and guidance on digital application usage.	Soloraya application for marketing.	Proposing Team
7	Monitoring and Evaluation	September 15–20, 2024	Observation, interviews, and evaluation of activity results.	Evaluation of program success.	Proposing Team

The table above summarizes the stages of community service implementation designed to provide solutions to the problems of the Jarum Village Batik MSME. The activity began with preparation in the form of a needs analysis, the development of training modules, and the formation of a mentoring team. Next, a series of training sessions covering digital marketing, financial management, batik worker regeneration, and environmentally friendly waste management were conducted, involving expert speakers in their fields.

The implementation of digital solutions was carried out through mentoring in the use of applications such as Canva, Kinemaster, Soloraya, and Catatan Warungku MSME. Monitoring and evaluation were carried out through observation, interviews, and questionnaires to measure the success of the activities, such as improving participant skills and business sustainability. This program is expected to help MSMEs overcome challenges, increase productivity, and ensure sustainable business development through

further mentoring by the ARUMCAWERASA Association as the main partner.

3. Results and Discussion

The results of this community service program demonstrate a satisfactory level of achievement in increasing the capacity of the Batik MSME in Jarum Village. Through the SMART approach, various important aspects of the batik business have been improved, including digital marketing, financial management, workforce regeneration, and environmental awareness.

1. Digital Marketing

Digital marketing training successfully improved partners' skills in using applications such as Canva, Kinemaster, and Instagram. Partners were able to produce creative marketing content in the form of visual designs, promotional videos, and content calendars. This helped increase the reach of batik products nationally and internationally. Achievement indicators showed increased product visibility on various digital platforms.

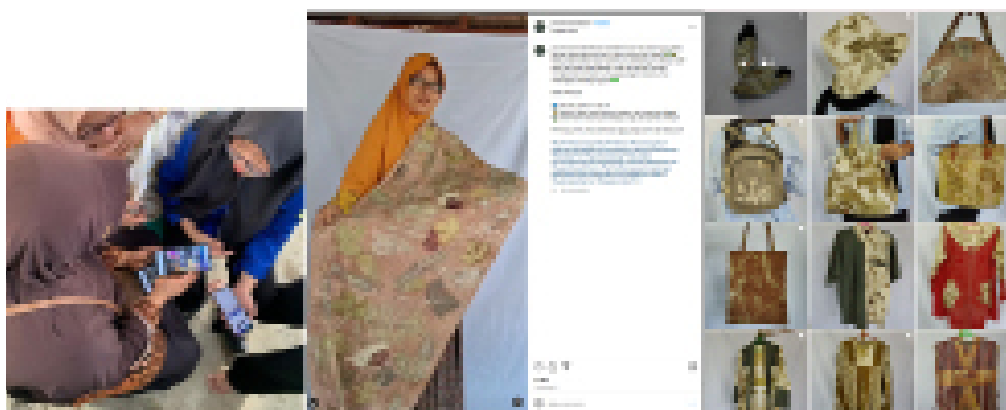


Figure 1. Digital Marketing Mentoring Process and Results

2. Financial Management

Training using the Catatan Warungku application provides partners with a new understanding of how to systematically

record income and expenses. Partners feel more confident in making accurate, data-driven business decisions, which also impacts business management efficiency.

Rekap Keuangan 03 2024 Batik Suparman (Usaha)						
No	Tanggal	Transaksi	Jenis	Harga	Jumlah	Total Harga
1	02-03-2024	Penjualan kain cap	Pemasukan	Rp. 125.000	50 Pcs	Rp. 6.250.000
2	12-03-2024	Beli lilin malam	Pengeluaran	Rp. 33.000	10 Kg	Rp. 330.000
3	15-03-2024	Beli bahan warna	Pengeluaran	Rp. 150.000	10 Kg	Rp. 1.500.000
4	18-03-2024	Beli bahan kain	Pengeluaran	Rp. 25.000	100 Meter	Rp. 2.500.000
Total Pemasukan						Rp. 6.250.000
Total Pengeluaran						Rp. 4.330.000
Total Profit						Rp. 1.920.000

Figure 2. Results of Financial Management Assistance

3. Workforce Regeneration Through Batik Training

The Batik Fun Short Course program was attended by 31 participants, mostly young people. This program not only improved

batik skills but also sparked a new interest among the younger generation. One significant achievement was the formation of a new group ready to produce batik independently.

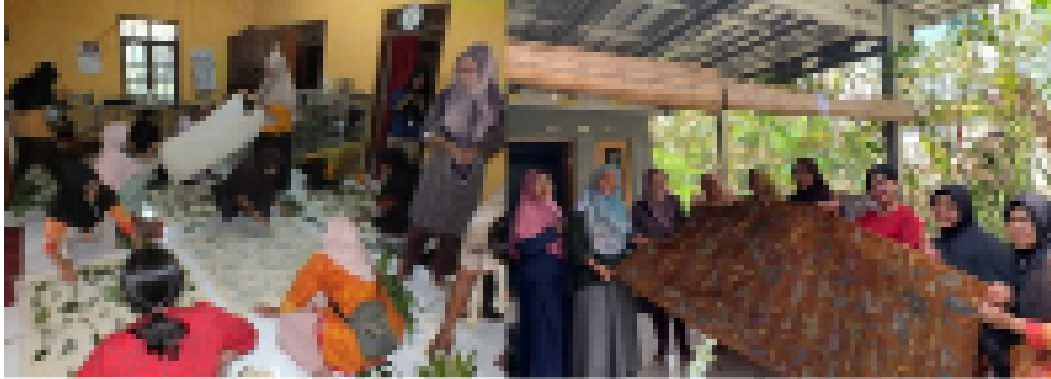


Figure 3. Assistance in Making Eco-print Batik

4. Environmental Awareness Education

Education on batik waste management provides partners with insight into the importance of environmentally friendly production. Partners now understand how

to manage liquid and solid waste, creating a healthier and more environmentally friendly workplace, while also enhancing their business image in the eyes of consumers.



Figure 4. Delivery of Material to Community Service Partners

5. Monitoring and Evaluation

Monitoring results showed an 85% increase in partner knowledge and skills, as assessed by pre- and post-training

questionnaires. Product sales increased by 15-20% within one month, demonstrating the effectiveness of the digital marketing solution.

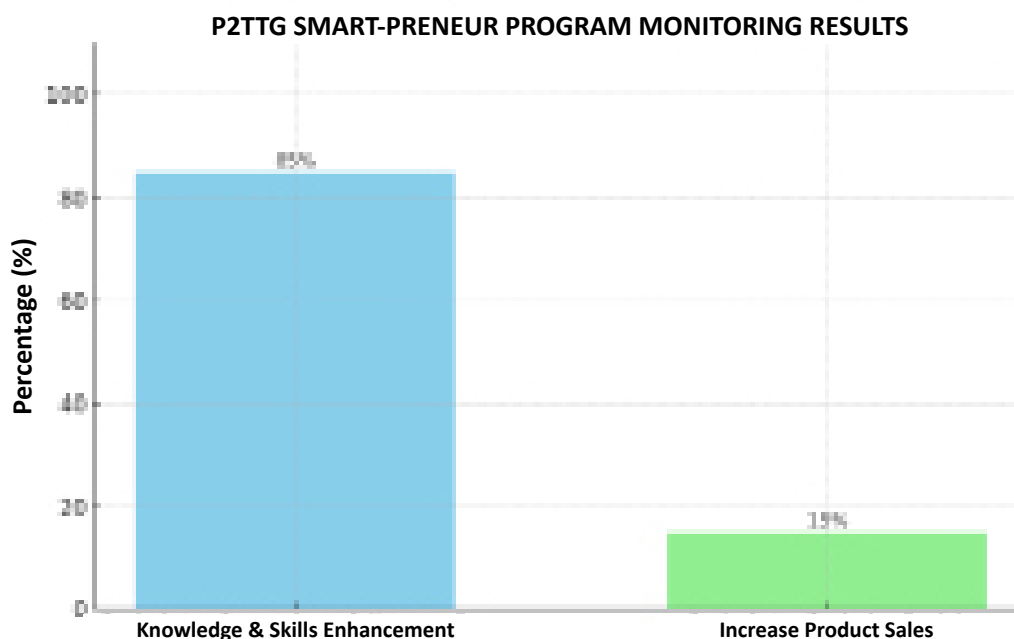


Figure 5. Results of Monitoring the P2TTG SMART-Preneur Program

The main obstacle was the limited training time, which limited the depth of material delivered. The solution was to provide training modules that partners could access independently for further learning. Overall, the program has had a significant impact in increasing the capacity of the Jarum Village Batik MSME, supporting business sustainability, and providing holistic solutions to the challenges faced. The program also created a strong foundation for further development through ongoing mentoring.

4. Conclusion

Conclusions from the P2TTG SMART-Preneur program demonstrate that the goal of improving the skills and knowledge of batik MSME partners was successfully achieved. The program successfully had a positive impact on partner business development, particularly in enhancing digital marketing and financial management capabilities. Monitoring results showed an 85% increase in partner knowledge and skills, as recorded in pre- and post-training questionnaires. Furthermore, product sales experienced a significant 15-20%

increase within one month, demonstrating the effectiveness of implementing digital marketing strategies using platforms like Instagram, Canva, and Kinemaster. The program also successfully introduced digital technologies that facilitate marketing and business management. Meanwhile, the Batik Fun Short Course training successfully attracted the interest of the younger generation, who have the potential to become the next generation of batik makers and ensure the future sustainability of the batik industry.

However, despite these positive results, challenges in waste management and business sustainability still require greater attention. Therefore, it is recommended to continue community service programs related to environmentally friendly batik waste management, as well as expand digital training to include e-commerce and market analysis (Ayu Kusumawardani et al., 2024; Joka et al., 2022; Wijayanti et al., 2022). This program could also be expanded to other sectors, such as developing handicraft-based products with a digital approach, to achieve a broader and more sustainable impact on MSMEs in Indonesia.

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6. AI Disclosure Statement

The authors acknowledge the use of artificial intelligence (AI) tools, specifically ChatGPT, to assist with language refinement, paraphrasing, and improving manuscript clarity. The use of AI was limited to editorial support and did not involve the generation of core research ideas, data analysis, original findings. All content has been carefully reviewed, revised, and validated by the authors to ensure its accuracy, originality, and academic integrity.

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