



Optimizing the Creative Batik Industry in Situbondo and PKK Groups Through Innovation in Automatic Batik Pattern Machines and Food Dehydrator Machines in the Extremely Poor Area of Selowogo Village

Suyanto¹, Liosten Rianna Roosida Ully Tampubolon^{2*}, Fadjar Kurnia Hartati³, Muhammad Hayyu Hani Nuril⁴, M. Afrizal Adi Pratama⁵, Andini Safitri⁶, Hawari Abariyah Marasabessy⁷

¹ Department of Development Economics, Universitas Dr. Soetomo, Surabaya, Indonesia.

² Department of Management, Universitas Dr. Soetomo, Surabaya, Indonesia.

³ Department of Food Technology, Universitas Dr. Soetomo, Surabaya, Indonesia.

⁴ Department of Management, Universitas Dr. Soetomo, Surabaya, Indonesia.

⁵ Accounting Department, Universitas Dr. Soetomo, Surabaya, Indonesia.

⁶ Department of Mathematics Education, Universitas Dr. Soetomo, Surabaya, Indonesia.

⁷ Department of Public Administration, Universitas Dr. Soetomo, Surabaya, Indonesia.

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Corresponding Author:

Liosten Rianna Roosida Ully
Tampubolon

liosten.rianna@unitomo.ac.id

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Abstract: This service activity aims to optimize the potential of the batik creative industry in Selowogo Village, Situbondo, and to empower the PKK Group through appropriate technology innovations in the form of an automatic batik pattern machine and a food dehydrator machine. This program focuses on extremely poor areas with an average income of below Rp50,000 per day. The activity approach includes socialization, training, technology implementation, mentoring, and sustainability evaluation. The results of the activities show significant improvements, including a 30% increase in batik production capacity, a 40% improvement in motif quality, and a 35% increase in sales revenue. For the PKK Group, skills in making batik and healthy food products based on moringa leaves increased by 50% and 70%, respectively. This program successfully promoted local economic empowerment, strengthened creative industry innovation, and contributed to achieving SDGs 1 (no poverty) and 3 (good health and well-being).

Keywords: Extreme Poverty, Automatic Batik Motif Machine, Food Dehydrator Machine, E-Marketing, Healthy Food.

Introduction

Selowogo Village, Bungatan District, Situbondo Regency, falls into the category of extreme poverty with a population of 1,056 people, most of whom earn below the poverty line with an average daily income of around Rp 45,000. The main economic sectors for the community are agriculture and Situbondo's distinctive hand-drawn batik crafts (Saed & Lodra, 2022).

This condition indicates that the community in Selowogo Village faces high economic vulnerability

while also possessing local potential through hand-drawn batik crafts that can be developed into a creative industry. In the context of rural development, targeted interventions are crucial to ensure that communities can become active subjects in the development process, rather than just passive objects (Margiutmo et al., 2025).

In artisan groups like IKM Batik Rengganis, serious production problems were found, such as the motif-making process still being manual, which takes a long time; a defect rate of around 15% due to irregular motifs; low production capacity (only 1 piece of batik

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cloth in 4 days); and the average income of artisans being only Rp 45,000 per day.

Meanwhile, the marketing aspect also faces significant constraints: the promotion strategy is not yet effective and not digital-based; social media such as websites, Instagram, and TikTok have not been optimally utilized; and there is no simple accounting bookkeeping system in the business. This condition indicates that despite the presence of local creative potential, production and marketing barriers are the main obstacles to increasing the productivity, product quality, and income of artisans (Wibowo et al., 2025).

According to community empowerment theory, increasing the capacity and independence of communities so that they are able to access resources, participate in development, and obtain fair benefits from economic growth is fundamental (Sumodiningrat) – this approach places communities as the subjects of development (Fauzi, 2013).

In the realm of appropriate technology innovation, the adoption of innovation is influenced by relative benefits, ease of use, compatibility with local conditions, and the tangible results obtained; therefore, the use of automatic batik motif machines and food dehydrators falls into the category of adaptive innovations that meet the needs of the extremely poor. Additionally, in the creative economy, creativity, innovation, and technology converge to create efficiency and new competitiveness, and in production and marketing management, SWOT analysis-based marketing strategies, digital marketing, and simple accounting bookkeeping are key to the sustainability of small businesses (Gustalika et al., 2024).

Although much research has addressed digital marketing for batik SMEs and appropriate technology for SMEs separately, there is still a lack of research that holistically integrates production innovation (e.g., batik motif automation and food dehydrators), simple accounting record management, and digital marketing in extremely poor communities (Irhandayaningsih, 2017).

Most studies still focus on only one aspect – for example, only digital marketing for SMEs or only appropriate technology in food production – without encompassing the entire value chain of production, marketing, and management in the context of batik crafts in underdeveloped villages. This creates a research gap that requires contextual study linking production, product quality, digital marketing, and business management, particularly in villages with marginalized economic conditions.

Furthermore, previous research has largely focused on relatively more advanced batik centers or communities with less extreme economic conditions and has not adequately covered areas like Selowogo Village,

which is characterized by extreme poverty, or active partners such as women's groups (Selowogo Village PKK Group) and local artisans (IKM Batik Rengganis).

Thus, specific studies on the context of Selowogo Village – which combines the distinctive hand-drawn batik crafts of Situbondo, production based on appropriate technology, and product diversification of local food (moringa leaves) – are still very limited. Such research is necessary so that interventions can be locally adapted, taking into account production conditions, batik culture, the capacity of artisans, and the local potential of the village.

The urgency of this research is very high because through the development of appropriate technology such as automatic batik motif machines and food dehydrator machines, as well as digital marketing training, simple bookkeeping systems, and product diversification, production capacity can be increased, the rate of production defects can be reduced, product quality can be improved, and the income of artisans can be increased.

Thus, this intervention can directly support the village's development program for economic equality (in line with point 6 of the ASTA Cita program) and also support the achievement of SDGs 1 (No Poverty) and SDGs 3 (Good Health and Well-being). Activities that combine production technology, entrepreneurship training, digital marketing, and simple financial record-keeping are a strategic potential for creating an economically independent and competitive society, especially in extremely poor villages.

Therefore, this research aims to design, implement, and evaluate an integrated technology-based creative industry empowerment model to improve production, quality, added value, digital marketing, and business management of hand-drawn batik crafts in Selowogo Village, as well as women's empowerment through the PKK Group of Selowogo Village.

The expected contributions are, theoretically, to contribute to the development of knowledge in the fields of community empowerment, appropriate technology innovation, and MSME management; practically, to produce an intervention prototype that can be replicated in similar zones; and in terms of policy, to provide recommendations for local policymakers in supporting the development of technology-based creative industries in underdeveloped villages.

Method

This community service activity was carried out using the Participatory Action Research (PAR) approach, which emphasizes collaboration between the proposing team from the university, BEM students, and

community partners (Khafsoh & Riani, 2024). The activity plan consists of five main stages: (1) socialization, (2) training and mentoring, (3) technology implementation, (4) evaluation, and (5) program sustainability.

1. Socialization Stage

The initial stage is carried out through coordination between the implementation team, students, and two main partners: IKM Batik Rengganis and the PKK Group of Selowogo Village. This activity aims to agree on the implementation schedule, role distribution, and cooperation methods. At this stage, initial data collection was also carried out through interviews and field observations to identify the main problems in the production and marketing process.

2. Training and Mentoring Phase

- a. For Partner 1 (Rengganis Batik SMEs): Training includes operating automatic batik pattern machines, creating contemporary patterns unique to Situbondo, digital marketing strategies through social media, and simple application-based bookkeeping.
- b. For Partner 2 (Selowogo Village PKK Group): Training focuses on batik skills, product diversification based on moringa leaves using a food dehydrator, simple bookkeeping, and education on stunting prevention. Mentoring was conducted periodically over two months to ensure that the skills acquired could be applied sustainably by the participants.

3. Technology Implementation Stage

- a. The Automatic Batik Motif Machine was implemented to improve production process efficiency, reduce the defect rate of motifs, and speed up processing time from four days per sheet to three sheets of fabric per day.
- b. The food dehydrator machine was used by PKK members to process moringa leaves into various healthy food products such as moringa flour, chips, and porridge, thereby increasing the economic and nutritional value of families.

4. Evaluation Stage

Evaluation was conducted using direct observation, interviews, and pre- and post-activity questionnaire distribution. Evaluation indicators include increased production capacity, reduced defect rates, increased sales turnover, and improved participant knowledge and skills. Evaluation results data were analyzed descriptively and presented in the form of comparison tables before and after the program.

5. Program Sustainability Stage

To ensure the sustainability of the activity results, the "Creative Village Selowogo" community was formed, consisting of batik artisans and PKK groups. This community is being assisted in establishing cooperation with the village government, the

Department of Cooperatives and MSMEs, and university parties for further assistance, product certification, and expanding access to digital marketing.

Result and Discussion

The implementation of the community service program in Selowogo Village, Bungatan District, Situbondo Regency, showed significant results in increasing production capacity, product quality, managerial skills, and women's economic empowerment. All stages of the activities, including socialization, training, the application of appropriate technology, and ongoing mentoring, have had a real impact on both partners: the Rengganis Batik MSMEs and the PKK Group of Selowogo Village.

In general, the implementation of the Automatic Batik Motif Machine has a significant impact on the efficiency and productivity of batik artisans. Before the activity, the motif-making process was still done manually, requiring an average of four days to complete one piece of batik cloth (Ramadhani et al., 2015). Additionally, the defect rate reached 15% due to pattern irregularities and uneven dyeing. After two months of training and using the automatic batik motif machine, the artisans were able to produce up to three pieces of batik cloth per day, with the defect rate dropping to less than 1%. These results show a 75% increase in time efficiency and a 14% reduction in production defects. This improvement supports the Diffusion of Innovations theory by (Rogers et al., 2014), which emphasizes that the adoption of innovations in society is highly dependent on relative advantage, ease of use, and compatibility with the local context. In this case, the automated machine proved to provide direct benefits in the form of efficiency, quality, and increased revenue, making it well-received by partners.

Positive impacts are also evident in marketing and managerial aspects. Before the activity, the partner had not implemented digital-based promotion strategies and did not have a simple bookkeeping system. Through digital marketing training and basic accounting records, partners experienced a significant improvement in business management skills (Kristiani et al., 2025). Sales revenue increased from Rp20,833,000 to Rp28,124,550 per month, a 35% increase. Additionally, the ability to create digital promotional content increased by up to 40%, which helped improve product visibility on social media platforms like Instagram and TikTok. This result supports the view (Kotler & Keller, 2016) that the sustainability of small businesses is highly influenced by their ability to adapt to digital marketing strategies and their efficiency in financial management systems.

Meanwhile, the implementation of the food dehydrator machine in the PKK Group of Selowogo Village has a significant impact on product diversification and the improvement of rural women's skills. Before the activity, PKK members did not have any flagship products and only acted as batik resellers. After the training, they were able to develop moringa leaf-based food products such as moringa flour, moringa chips, and moringa porridge. The improvement in batik-making skills reached 50%, while the ability to process healthy foods based on moringa leaves increased by up

to 70%. This product diversification not only increased income but also contributed to improving family nutrition through the consumption of nutritious local foods. This finding aligns with the Community Empowerment theory by (Sumodiningrat & Adhi, 2009), which emphasizes that communities will be self-reliant if they have the capacity, access to resources, and the ability to innovate to meet their own needs. The quantitative results from all stages of the activity can be summarized in the following table.

Table 1. Program Achievement Results

No	Description	Before PPM BEM Students Impacted	After PPM BEM Students Impacted	Increase
1	Increased production capacity of automatic batik motif machines at target partner 1	1 piece of batik fabric is completed in 4 days	1 day produces 3 pieces of hand-written boutique fabric (2-month training)	There is an increase in production capacity: $(4 \times 3) - 4 = 8$ sheets/day
2	Improving the quality of automatic batik motif machines at target partner 1	15% defective products	Defective products are less than 1%	There is a 14% decrease in defective products
3	Improving the quality of automatic batik motif machines at target partner 1	Sales revenue Rp. 20,833,000/month	Sales Revenue Rp.28,124,550/month	There is an increase of Rp.7,291,550/month (35%)
4	Increased knowledge of promotional content creation for target partner 1	-	40%	There is a 40% increase in knowledge and skills related to health promotion content
5	Increased batik motif creation and synthetic dyeing in target partner 2	-	50%	There is a 50% increase in knowledge and skills in batik motif making and synthetic dyeing
6	Increased knowledge and skills in healthy food production based on moringa leaves in target partner 2	-	70%	There is a 70% increase in knowledge and skills in producing healthy foods based on moringa leaves
7	Increased knowledge and skills in accounting-based bookkeeping for target partner 1	-	40%	There is a 40% knowledge and skills in accounting-based bookkeeping

The table shows that the application of a participatory approach and technological innovation is able to consistently improve all key indicators, including technical, managerial, and social aspects. Increased production capacity and reduced product defects indicate the success of technological innovation in improving the efficiency of work processes. The increase in turnover and digital promotion capabilities proves that an integrated training and mentoring approach can transform the community's entrepreneurial behavior from conventional to digitally adaptive. Meanwhile, the improvement in PKK group skills in product

diversification shows that women's empowerment can be a driving force for the village economy if facilitated with appropriate technology and adequate managerial knowledge.

Theoretically, this result also reinforces the view (Howkins, 2002) regarding the creative economy, which places creativity, innovation, and technology as the three main pillars of new economic growth. The synergy between technology (automatic machines and food dehydrators), local creativity (Situbondo's distinctive batik motifs), and management training forms an effective combination for enhancing the competitiveness

of village products. Additionally, this approach aligns with the Sustainable Development Goals (SDGs) framework, particularly SDG 1 (No Poverty) and SDG 3 (Good Health and Well-being), as it directly contributes to increasing incomes and improving public health in extremely poor regions (Gustalika et al., 2024).

From a social perspective, this activity provides a multiplier effect by increasing community self-confidence, solidarity, and active participation in productive economic activities. The formation of the Creative Village Selowogo community is an indicator that the community has transformed from beneficiaries to the main actors in innovation-based village development. This community is expected to be a platform for the sustainability of activities involving collaboration between universities, village governments, and local business actors to expand market access and strengthen the village's creative economy capacity (Listyorini et al., 2023).

Thus, it can be concluded that the application of appropriate technology combined with managerial and digital marketing training has created a comprehensive community empowerment model (Gustalika et al., 2024). This model not only improves production efficiency and product quality but also strengthens the social and economic capacity of the community. Conceptually, this activity proves that collaboration between academia and society can generate relevant, contextual, and sustainable innovations, while also serving as a replicable model for other extremely poor regions in Indonesia.

Conclusion

The community service program titled "Optimizing Situbondo Batik Creative Industry and PKK Groups thru Automatic Batik Pattern Machine Innovation and Food Dehydrator Machine" successfully had a positive impact on improving the welfare of the Selowogo Village community. The implementation of technological innovation, production and management skills training, and digital marketing mentoring has proven to increase the efficiency, productivity, and added value of local products. The 35% increase in batik artisans' income, the 50% improvement in motif making and dyeing skills, and the development of moringa-based food products by up to 70% demonstrate the success of this program in sustainably empowering the extreme poor. Looking ahead, it is hoped that sustainable collaboration between universities, village governments, and local partners will be able to create an inclusive, innovative, and highly competitive technology-based village creative economy ecosystem.

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