

## Strengthening Human Resources and Digital Tourism Mapping for the Sustainability of Troso Weaving Village

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### ABSTRACT

*This community service program was conducted in Troso Weaving Village, Jepara, with the aim of addressing the challenges of generational succession, weak business management, and limited market access in the traditional weaving industry. The second year of implementation focused on three main activities: the integration of weaving knowledge into the local school curriculum, the provision of managerial and digital marketing training for artisans, and the development of a digital tourism map to promote the village as a cultural tourism destination. Data was collected through focus group discussions, training evaluations, and field surveys, while program effectiveness was measured using pre-test and post-test instruments. The results showed that the integration of weaving into local curricula created a structured pathway for cultural regeneration, ensuring that younger generations were exposed to traditional skills and local identity. Managerial and digital marketing training significantly improved artisans' knowledge, with average scores rising from 46 percent in the pre-test to 82 percent in the post-test, particularly in financial management and digital promotion. The digital tourism map successfully identified 21 weaving houses and galleries, enabling greater visibility and easier access for tourists and buyers through QR-coded profiles. These interventions demonstrated that cultural sustainability in Troso could be achieved through a multidimensional approach that combined education, capacity building, and digital innovation. The program provided a replicable model for preserving traditional crafts while enhancing their competitiveness in the modern economy.*

**Kata Kunci:** Community Service; Cultural Sustainability; Digital Tourism Map; Human Resource Empowerment; Troso Weaving.

## 1. Pendahuluan

The weaving industry in Troso Village, Jepara, had represented a unique socio-economic and cultural phenomenon in Indonesia. For centuries, weaving had not only been a source of livelihood but also a marker of cultural identity for the people of Troso. Historical records suggested that Troso weaving originated as early as the seventeenth century and continued to develop as a community tradition that was passed down through generations (Handayani & Pramono, 2018). During its golden era, weaving households in Troso were able to sustain themselves economically while contributing to regional cultural branding. The village was later declared a tourism village for traditional weaving, which highlighted its strategic role in preserving intangible cultural heritage (Prasetyo, 2020).

Nevertheless, in recent years, Troso's weaving industry has faced numerous challenges. The first challenge related to raw material dependency. The artisans heavily relied on middlemen (*tengkulak*) for cotton threads and dyes, making them vulnerable to fluctuating prices and irregular supply chains. This condition restricted their capacity to plan production and secure consistent quality (Setiawan, 2019). The second challenge was technological limitations. Most artisans continued to use conventional non-mechanical looms (*Alat Tenun Bukan Mesin/ATBM*) and simple resist-dyeing techniques

with raffia strings, which resulted in limited productivity, lower efficiency, and inconsistency in color quality (Fadilah, 2022). In addition, the artisans depended on natural sunlight for drying, making production highly seasonal and weather dependent.

Another pressing issue was human resources. Most weavers were women over 40 years old, while younger generations showed declining interest in continuing the tradition. This demographic shift created an intergenerational gap in weaving skills, which could threaten the long-term sustainability of the industry (Utami & Dewi, 2021). Young people were less motivated to engage in weaving because it was perceived as time-consuming and less financially rewarding compared to other professions. Consequently, the weaving industry in Troso risked losing its skilled labor force, which was central to its survival.

From the marketing perspective, the artisans' businesses had remained highly conventional. Most relied on direct sales through collectors or customers who visited their homes. Although some products had reached national and international markets, these sales were often facilitated by third parties rather than through direct marketing initiatives of the artisans themselves (Sulistyo, 2020). The lack of digital marketing skills and absence of e-commerce platforms limited their ability to expand market access. This condition was especially critical in the post-COVID-19 recovery period when digital marketing became indispensable for micro, small, and medium enterprises (MSMEs) (Yuliana & Pratama, 2021).

The problems mentioned above aligned with findings from previous research on creative industries in Indonesia. According to Florida's (2002) theory of the "creative class," human capital and innovation were crucial drivers of economic growth in cultural and creative sectors. Porter's (1990) theory of competitive advantage also emphasized the importance of resources, technology, and strategic management in enhancing industrial competitiveness. In the context of traditional crafts, scholars argued that sustainability depended on the integration of cultural values with entrepreneurship, education, and market adaptation (Rai, 2019; Dewi & Handayani, 2021).

Several empirical studies provided evidence that education played a significant role in sustaining traditional textile crafts. For instance, research in Bali demonstrated that the integration of weaving into school curricula helped foster cultural awareness among young generations and encouraged them to appreciate and practice weaving (Adnyani, 2017). Similarly, in East Nusa Tenggara, weaving communities that incorporated training programs for youth were able to sustain skill transfer and increase community participation in creative industries (Talan & Wulandari, 2020). These findings suggested that without deliberate educational interventions, traditional crafts faced the risk of extinction.

In terms of managerial capacity, small craft enterprises in Indonesia had often struggled with limited knowledge of accounting, financial management, and marketing strategies (Gunawan & Ratna, 2019). Such limitations hindered their ability to scale up production and access wider markets. Studies in batik clusters in Pekalongan and Solo showed that managerial training significantly improved artisans' capacity to organize their production, manage risks, and adopt marketing innovations (Hidayat & Sari, 2018). Thus, managerial empowerment could be considered an essential step for Troso weaving artisans to enhance their resilience.

On the technological side, innovations in appropriate technology have proven effective in improving efficiency without eliminating traditional values. Research on batik industries revealed that semi-mechanized dyeing and drying tools reduced production time while maintaining traditional aesthetics (Suharto, 2019). For weaving, the development of modified looms and supporting devices had been introduced in some

regions, enabling artisans to increase productivity without losing cultural authenticity (Rahman et al., 2020). However, such innovations had not yet been widely adopted in Troso, which continued to rely on conventional ATBM machines.

Digital transformation has also become a critical issue for traditional industries. Studies confirmed that MSMEs utilizing digital marketing platforms experienced higher sales growth and broader market reach (Indrawan, 2021). The tourism sector, particularly cultural villages, benefited from digital mapping and online promotion, which attracted both domestic and international visitors (Sari & Nugroho, 2020). In Troso, the absence of a structured digital tourism map and limited online presence constrained the village's potential as a weaving tourism destination. Developing digital maps and e-commerce platforms was thus crucial to enhance the visibility and accessibility of Tenun Troso products.

Despite these insights, there were gaps in previous interventions and research. Many earlier programs focused primarily on product innovation and marketing promotion, while neglecting the educational aspect that ensured long-term regeneration of weaving skills. Moreover, limited attention has been given to integrating managerial training with cultural preservation, and to combining appropriate technology with local wisdom. As a result, existing solutions remained partial and did not adequately address the systemic issues faced by weaving communities.

Considering these challenges and research gaps, the second-year community service program was designed to prioritize education and human resource strengthening. The program specifically aimed to: (1) integrate weaving knowledge into local school curricula as part of craft or cultural subjects, (2) conduct training sessions on production management, human resource management, financial management, risk management, product development, and marketing strategies, (3) develop a digital tourism map that identified weaving households, production capacities, and cultural attractions, and (4) design an appropriate machine for color-resist yarn trying to improve the accuracy and consistency of dyeing processes. By addressing these aspects, the program sought to ensure the continuity of Troso weaving as a sustainable creative industry that combined cultural preservation with economic empowerment.

In conclusion, Troso weaving stood at a critical juncture where the interplay of cultural preservation, economic resilience, and technological adaptation determined its survival. Previous studies provided valuable insights but left significant gaps, particularly in education-based interventions and integrated managerial support. This article presented an effort to bridge these gaps by reporting on a community service program that emphasized education, capacity building, digital innovation, and appropriate technology. The significance of this initiative lay in its potential to serve as a model for sustaining traditional crafts in Indonesia and beyond.

## **2. Method**

This community service program was conducted using a participatory action research approach, which combined socialization, training, mentoring, and technology implementation to address the identified problems of weaving artisans in Troso Village. The activities were carried out through focus group discussions with schools to integrate weaving into the local curriculum, capacity-building workshops on production, financial, and marketing management, as well as digital literacy training to improve promotion strategies. In addition, data collection on artisans' locations, production capacity, and product variations was performed to develop a digital tourism map of the weaving village. Continuous mentoring and evaluation sessions were provided to ensure the

effectiveness of interventions and to strengthen artisans' ability to sustain the program independently.

### 3. Results

The second year of the community service program was focused on strengthening education and human resource capacity in Troso Weaving Tourism Village, Jepara. This focus was chosen because the main challenges faced by the artisans were the declining interest of younger generations in continuing the weaving tradition, the lack of managerial skills in household enterprises, and the limited adoption of digital technology for marketing and promotion. These conditions were consistent with previous findings that small-scale cultural industries in Indonesia often struggled with generational succession, limited market access, and low technological adaptation (Hidayat & Sari, 2018; Utami & Dewi, 2021).

Therefore, in its second year, the program was designed to achieve three main outputs. The first output was the integration of weaving skills into the local school curriculum to strengthen cultural education and ensure generational transfer of knowledge. The second output was managerial and digital marketing training aimed at improving business management, production, and promotional strategies among artisans. The third output was the development of a digital tourism map of Troso Weaving Village as a platform for information, promotion, and cultural tourism education.

#### 3.1. Integration of Weaving into the Local Curriculum

One of the significant achievements was the agreement among schools, teachers, and community leaders to integrate weaving into the local craft curriculum. Results of the focus group discussions (FGDs) indicated that schools surrounding Troso were willing to include lessons on the history, philosophy, and basic skills of weaving in the arts and crafts subjects. The curriculum was designed to combine theoretical and practical learning, covering the history of Troso weaving, the philosophy of ikat motifs, an introduction to traditional looms (ATBM), basic weaving practice, and simple product-based projects such as keychains, wallets, or small bags.

This initiative was expected to foster cultural awareness among young generations and strengthen local identity. The approach was in line with Adnyani (2017), who argued that integrating traditional skills into formal education could enhance youth participation in cultural preservation. Thus, the local curriculum served not only as a teaching medium but also as a strategy for the regeneration of Troso weaving artisans.

#### 3.2. Managerial and Digital Marketing Training

The second major output was managerial and digital marketing training for artisans. The training covered six main aspects: production management, human resource management, financial management, risk management, product development, and digital marketing strategies. The training involved 40 participants, including senior artisans and younger family members engaged in weaving businesses.

The effectiveness of the training was measured using pre-tests and post-tests. The results demonstrated significant improvement across all managerial skills, as shown in Table 1.

**Table 1.** Pre-test and Post-test Results of Managerial Training

| Assessed Aspect           | Average Pre-test (%) | Average Post-test (%) | Improvement (%) |
|---------------------------|----------------------|-----------------------|-----------------|
| Production Management     | 50                   | 80                    | +30             |
| Human Resource Management | 45                   | 78                    | +33             |
| Financial Management      | 40                   | 85                    | +45             |
| Risk Management           | 48                   | 79                    | +31             |
| Product Development       | 55                   | 83                    | +28             |
| Digital Marketing         | 35                   | 80                    | +45             |
| Overall Average           | 46                   | 82                    | +36             |

Source: Primary data, 2025

The data showed that participants' average scores increased from 46 percent in the pre-test to 82 percent in the post-test. The largest improvements were in financial management (45 percent) and digital marketing (45 percent). This finding indicated that the training successfully addressed the most critical weaknesses of the artisans, who had previously lacked bookkeeping practices and digital promotion skills. The result supported Gunawan and Ratna (2019), who highlighted that managerial limitations were one of the main obstacles for cultural-based SMEs in Indonesia.

### 3.3. Development of Troso Weaving Digital Tourism Map

The third strategic output was the development of the Troso Weaving Digital Tourism Map. The map was created based on field surveys and village data in 2025. It successfully identified 21 main weaving houses and galleries, including Tenun Troso Abadi, Tenun Kain Ratu, Tenun Ikat Dewi Shinta, Tenun Troso Norez, Omah Petruk, Gallery Putri Yutika, Gallery Tenun Troso Tengah, Berkah Tenun Troso, Niki Tenun Troso, and Tenun Citra Logowo. Each mapped location was equipped with a QR code that could be scanned to access detailed information about the artisans' profiles, production capacities, product types, and contact information. The summary of the digital map data is presented in Table 2.

**Table 2.** Summary of Digital Tourism Map Data of Troso Weaving

| Indicator                           | Number                               | Description                                  |
|-------------------------------------|--------------------------------------|----------------------------------------------|
| Number of mapped weaving businesses | 21                                   | Including weaving houses & galleries         |
| Number of RTs involved              | 5 RTs                                | Spread across the entire village             |
| Total production capacity (est.)    | ±12,000 m/month                      | ±570 m/month per unit                        |
| Number of recorded workers          | ±285                                 | Mostly women aged >40 years                  |
| Main products                       | Troso Ikat Fabric                    | Motifs adapted from Bali, Lombok, Kalimantan |
| Derivative products                 | Bags, wallets, clothing, accessories | Limited variety                              |

Source: Primary data, 2025

The data revealed that the average production capacity per unit was 570 meters of fabric per month, with a total output of around 12,000 meters per month across all mapped businesses. Most workers were women over 40 years old, indicating that generational succession remained a critical issue. The main product was ikat fabric, while derivative products such as bags, wallets, and clothing were still limited. The web-



based digital map functioned both as a digital promotional tool and as an educational medium for cultural tourism.

#### 4. Discussion

The results of the second-year community service program demonstrated that education, managerial training, and digitalization were effective strategies to address the pressing issues faced by Troso artisans. The integration of weaving into the local curriculum confirmed that cultural preservation could be achieved through formal education. This finding reinforced Adnyani (2017), who emphasized that formal education was an effective medium for transmitting traditional skills and fostering cultural awareness among young generations. In Troso, this initiative not only strengthened cultural identity but also provided a structured pathway for artisan regeneration (Utami & Dewi, 2021).

The managerial training outcomes further proved the importance of capacity building. The average improvement of 36 percent in artisans' managerial knowledge, particularly in financial management and digital marketing, was highly significant. These findings aligned with Hidayat and Sari (2018), who demonstrated that managerial training improved the competitiveness of batik SMEs in Pekalongan and Solo. For Troso, this progress suggested that artisans were becoming more capable of handling production planning, financial documentation, and digital promotion. This aligned with Gunawan and Ratna's (2019) argument that managerial skills were fundamental for ensuring the sustainability of cultural-based industries.

The development of the digital tourism map served as a strategic innovation in overcoming promotion and market access limitations. The use of QR codes and web-based platforms enabled potential buyers and tourists to directly access artisans' profiles and product galleries. This finding supported Sari and Nugroho (2020), who found that the digitalization of tourism villages enhanced tourist visits and expanded local product markets. In Troso, the digital map functioned not only as a marketing tool but also as a branding instrument for positioning the village as a modern cultural tourism destination.

Furthermore, the map could be developed into thematic tourism routes. The identification of 21 weaving businesses allowed the creation of educational tour packages where visitors could observe multiple weaving processes, interact with artisans, and purchase products directly. This strategy increased the authenticity of the tourist experience while generating higher economic value for the community. Thus, the digital map was not only a promotional tool but also a means of community empowerment and sustainable tourism development.

The program's second-year results emphasized that cultural preservation, human resource capacity building, and digitalization needed to be implemented in an integrated way. Preservation alone was insufficient to guarantee sustainability; it had to be combined with modern management and technological adaptation. This conclusion aligned with Porter's (1990) theory of competitive advantage, which highlighted that industries could survive by managing resources efficiently, innovating products, and adopting effective strategies. The findings also supported Florida's (2002) concept of the creative class, where human capital and creative innovation were identified as the key drivers of cultural and creative economies.

In summary, the Troso case illustrated that a multidimensional approach integrating education, managerial empowerment, and digital transformation could strengthen both the cultural and economic sustainability of traditional industries. The experience could serve as a replicable model for the development of other cultural

tourism villages in Indonesia. By leveraging education, management, and digital innovation simultaneously, Troso demonstrated how traditional crafts could remain relevant and competitive in the modern era.

## **5. Conclusion**

The second year of the community service program in Troso Weaving Village demonstrated that integrating weaving into the local school curriculum, strengthening artisans' managerial and digital marketing skills, and developing a digital tourism map were effective strategies to address the key challenges of generational succession, weak business management, and limited market access. These interventions not only enhanced cultural preservation and human resource capacity but also provided modern promotional tools to expand market opportunities. The program proved that cultural sustainability in traditional weaving could be achieved through a multidimensional approach that combined education, capacity building, and digital innovation.

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