



SUSTAINABLE MATERIALS NATURAL COLORS THE SUNGGING WAYANG PROCESS AS A REBRANDING OF THE GENDENG BANGUNJIWO WAYANG ARTISAN COMMUNITY IN BANTUL, YOGYAKARTA

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Abstract

This community service project aims to develop natural dyes (sustainability materials) to support the wayang puppet painting process as a rebranding strategy for the artisan community in Gendeng Hamlet, Bangunjiwo, Bantul, Yogyakarta. The implementation method involves a series of activities carried out through a Participatory Action Research (PAR) approach, involving artisans, academics, and facilitators. The stages include training, mentoring, exploration of local materials (such as Indigofera leaves, tingi bark, and turmeric), and applied trials on wayang puppets. The results of the activities demonstrated an increase in the artisans' capacity in natural dye extraction and application techniques, resulting in a more aesthetically pleasing and environmentally friendly visual quality of wayang, as well as the formation of a new community identity with the branding "Wayang Warna Alam" (Natural Color Wayang). This innovation not only enhances the added value of wayang products but also promotes cultural and ecological sustainability, while opening up market opportunities within the context of the creative economy.

Keywords: sustainability materials, natural dyes, rebranding community, wayang puppetry

INTRODUCTION

The Gendeng Hamlet Puppet Craft Center has become legendary. It has been a center for leather puppet production since 1929, where it previously had hundreds of artisans, but has now experienced a significant decline. Synthetic dyes are still used in textile/batik crafts, including in Bantul, which has an environmental impact. Therefore, it is necessary to develop sustainable materials technology that is environmentally friendly and has local wisdom value. Natural dyes, applied to traditional crafts through training, are being adopted by local communities such as Giriloyo and Jolawe as a step towards sustainability and product differentiation. Government and tourism support through the KAJI GELEM project and village fund initiatives strengthen community capacity and open up opportunities for educational tourism.

Gendeng Hamlet, Bangunjiwo, Bantul, is widely recognized as one of the oldest centers of leather puppet crafts in Yogyakarta, established around 1929 by Walijo/Ato Sukarto. In the pre-reform era, the number of artisans reached around 125 people, but dropped dramatically to around 50 people after the 1997 crisis. This industry faces the challenge of regeneration, as many young people are switching professions, so the community hopes for attention and empowerment from the government. Through village fund allocations, the government and community developed educational tourism packages, initiated and managed by Pokdarwis KAJIGELEM, along with supporting infrastructure, to promote Gendeng crafts as a cultural destination. On the other hand, many local

crafts (such as batik) still rely on synthetic dyes with adverse environmental effects (Evitasari, 2024).

This study notes that artisan groups in Pajangan, Bantul, continue to rely heavily on synthetic dyes, such as indigosol, naphthol, rapid, and remazol, for dyeing batik cloth. These artificial dyes are difficult to break down and "can pollute the environment" (Evitasari, Rachma Tia et al., 2024). In response, several communities in Bantul, such as Giriloyo Batik and Jolawe Batik in Bangunjiwo, have switched to natural dyes, including tingi bark, mahogany, and indigo vera, to enhance the eco-branding and aesthetics of their products. In this context, the innovation of natural dyes in Gendeng Hamlet has the potential to become a sustainable rebranding strategy that also strengthens the cultural identity of the puppet artisan community. Gendeng Hamlet, Bangunjiwo, Bantul, is known as one of the centers of leather puppet production in Yogyakarta. The singing activity, which involves coloring puppets, has so far relied on synthetic dyes that are not environmentally friendly and do not provide significant differentiation between the products. In the context of cultural marketing, innovation in natural materials can serve as a rebranding strategy for artisan communities to become more relevant to global trends that prioritize sustainable materials.

METHOD AND PROCEDURES

The activity was conducted using a Participatory Action Research (PAR) approach, involving puppet artisans, facilitators, and academics. The PAR method was chosen because it emphasizes active collaboration between academics, facilitators, and the artisan community. The principle of PAR is not only to produce knowledge, but also to empower participants through a process of shared learning, reflection, and concrete action. In the context of developing natural-colored wayang puppets, this approach is highly relevant because the artisans are not merely objects, but the main subjects in every innovation process. It is in line with the views of Chevalier & Buckles (2019), who assert that PAR encourages social transformation through direct community involvement, through the following stages:

1. Identification of Needs.

The initial stage was conducted through Focus Group Discussions (FGD) with artisans to map out the problems associated with synthetic dyes. The results of the identification showed the impact of synthetic dyes on health and the environment, as well as the weak differentiation of products in the cultural market. At this stage, the participation of artisans was crucial in building a sense of ownership of the solution. A similar approach was used in community-based craft development research by Wulandari (2020), which emphasized the importance of early participation as the foundation for program sustainability.

2. Natural Dyeing Training.

Hands-on training enables artisans to acquire technical expertise, from extracting materials and processing to mordanting, thereby enhancing the color fastness of their work. This process aligns with the study by Fitriani et al. (2021), which found that hands-on training encourages an

increase in the skills and ecological awareness of batik artisans when transitioning to natural dyes.

3. Trials on Wayang Sungging.

Trials were conducted on buffalo skin as the primary medium for wayang kulit, with assessments of adhesive strength, aesthetics, and color fastness. Artisans also compared natural and synthetic colors. This practice aligns with the findings of applied research.

4. The approach in crafts, as revealed by Nugraha (2022), is that material experimentation is crucial for testing the relevance of innovation within the context of traditional culture.

5. Community Rebranding.

The artisan community then worked to establish a new image under the label "Wayang Warna Alam" (Natural Color Puppets). This identity was realized through logo design, packaging, promotional narratives, and participation in cultural exhibitions. According to Kotler et al. (2021), place branding or community branding strategies that promote cultural values and sustainability can increase market appeal while building collective pride.

6. Evaluation and Reflection.

The evaluation stage is conducted by measuring product quality and the satisfaction of both artisans and consumers. Joint reflection becomes a collective learning space for identifying weaknesses and capitalizing on market opportunities. The PAR cycle principle, which emphasizes reflective evaluation, is also noted by McIntyre (2008), who states that the success of PAR does not end with action, but rather with a cycle of repeated evaluation and improvement. Through these stages, PAR not only produces technical innovations by substituting synthetic dyes with natural dyes but also promotes socio-economic empowerment and strengthens the cultural identity of artisan communities.

RESULTS AND DISCUSSION

The results of the community service activities carried out by these field assistants are expected to demonstrate: (1) Increased knowledge among artisans regarding extraction techniques and the use of natural dyes (including mordanting techniques), thereby improving color fastness in line with the findings of studies on efficient extraction and natural challenges in natural dyeing. (2) More aesthetically pleasing visual quality of wayang puppets, with rich visual nuances rooted in historical and sustainable values, supporting the global trend towards environmentally friendly fashion and crafts. (3) The formation of the "Wayang Warna Alam" community branding as a new and distinctive identity, parallel to rebranding efforts through natural dye innovation in other craft communities such as DOBAG (Turkey) and Dabu printing (India). This activity has significant implications for enhancing the added value of wayang products while maintaining cultural and environmental sustainability in the context of modern creative consumption.

Improving artisans' technical knowledge (extraction & mordanting) through PAR-based

mentoring programs encourages the transfer of specific skills from plant pigment extraction and pH conditioning to mordanting (tawar/color fixing) using natural biomordants. Recent literature indicates that biomordants (e.g., acacia wood tannin, phenolic plant extracts) can enhance dye absorption, color fastness, and material strength; these findings are particularly relevant to puppet leather substrates, which share similar collagen properties with other leather/protein fibers. A 2024 review of biomordants and advances in natural dyes confirms improved fastness while reducing the impact of heavy metals; applied studies on leather tanning/dyeing also show that biomordants increase dye uptake and enhance the quality of colorfastness. On The process side, studies from 2023 to 2025 map advances in extraction (ultrasonic, supercritical fluid, and solvent optimization) and challenges in color consistency all of which form the technical basis for artisan training modules.

Improvements in aesthetic quality and historical-ecological value through the application of natural colors on wayang puppets reveal nuances of gradation, color depth, and a distinctive hand-feel that differs from synthetic colors and intersects with market preferences for environmentally friendly products. Recent scientific reviews confirm the technical and ecological differences between artificial and natural dyes (e.g., the aquatic toxicity of some azo dyes) and highlight the antibacterial/functional finishing potential of specific natural sources; research in 2025 even shows optimization pathways for cotton, silk, and leather. Historically, the practice of natural dyeing (indigo/soga/tingi/jelawe/mahogany) has long been alive in Yogyakarta through ethnographic-cultural records of Giriloyo batik and studies by the Ministry of Education and Culture, which document the list of materials and their color spectrum, so that the restoration of this technique strengthens the authenticity and cultural traces in wayang artifacts.



Figure 1. Natural Dye Workshop with MSME Partners

The rebranding of the “Wayang Warna Alam” community positions the eco-heritage narrative as a value differentiation. Cross-community experiences demonstrate that similar approaches have been successful: DOBAG in Turkey revitalized carpets with naturally dyed wool, thereby reviving the local reputation and economy; Dabu printing in India (clay-based resist & vegetable dyes) has also revived

following sustainable trends. In Gendeng itself, the 2024–2025 publication on the branding of the Paguyuban Perajin Wayang Purwa community emphasizes participatory strategies (mentoring, strengthening regional identity) in line with the creation of the "Wayang Warna Alam" label and its derivative tools (logo, packaging, promotional narratives, exhibitions).



Figure 2. Assistant as Resource Person for Natural Dye Processing

The socio-economic and market implications (collectors, academics, cultural tourists) through a literature review of artistic/creative tourism show that tourists are increasingly seeking creative-educational experiences (hands-on workshops, heritage making), which effectively link local identity and the market. Studies on batik experiences in Yogyakarta, the role of tourist villages, and reviews of cultural/creative tourism confirm the suitability of demonstration strategies through educational processes to attract art collectors, academics/practitioners, and cultural tourists, precisely the segments that respond positively to natural dye products. At the regional level, Gendeng Hamlet has been

included in an educational tourism package initiated by the KAJIGELEM Tourism Awareness Group (Pokdarwis), supported by village funds, which is expanding the community's market showcase.

Contextual evidence suggests that Gendeng Bangunjiwo Hamlet is a hub for puppet crafts, currently relevant to the urgency of regeneration and sustainability opportunities. Gendeng is recognized as a center for Yogyakarta-style leather puppets; however, several reports indicate a decline in the number of craftsmen (weak regeneration, career changes). Recent branding and mentoring initiatives aim to strengthen the area's identity and marketing, aligning with the local educational tourism movement.

In summary, the implications for the community service program include: (1) Technical: Biomordan-based extraction-mordanting module + fastness test SOP (washing, rubbing, light) following best practices in natural dye research for leather/protein fibers. (2) Brand & narrative: Positioning "Wayang Warna Alam" as an eco-cultural heritage that connects traditional dyeing history with contemporary scientific evidence and environmental benefits. The inspiration from the DOBAG & Dabu case studies confirms the validity of rebranding based on sustainable materials. (3) Market & tourism: Partnerships with tourist villages/communities (natural dyeing workshops, experience packages) targeting collectors, academics, and creative tourists have proven effective in the literature. Various local references to natural dyes in DIY (tingi, soja, tegeran, mahogany, indigo, jelawe) are documented in Kemdikbud publications and the Giriloyo community archives, reinforcing the historical claim of using natural colors, which are now being revitalized for wayang dyeing.



Figure 3. Natural Materials Found in the Surrounding Environment of MSME Partners

A review of the characteristics of natural dyes versus synthetic dyes confirms the fundamental differences between natural and artificial dyes. Synthetic dyes (e.g., azo dyes, such as indigosol, naphthol, and rapid) excel in color consistency, stability, and mass availability; however, they harm human health and the environment due to the chemical waste that is difficult to decompose. In contrast, natural dyes from plant sources (indigofera, tingi, mahogany, turmeric), animals, and minerals are more environmentally friendly.

Friendly, potentially antibacterial, and reinforcing cultural identity due to their connection to local traditions. However, the technical challenges of natural dyes include limited color palettes, variable results, and the need for additional processes such as mordanting to improve color fastness. This comparison is confirmed in a PMC Journal review (2023) that examines the technical and

ecological aspects of both types of dyes.



Figure 4. Application of Artificial Natural Dyes in Wayang Crafts by MSME Partners

Rebranding and revitalization initiatives (global comparative studies) in several thriving communities around the world have utilized natural dyes as a tradition-based rebranding strategy. DOBAG (Turkey): The Anatolian carpet revitalization project, initiated in the 1980s, has successfully revived the use of vegetable dyes, increased the value of product sales, and bolstered the local economy. Dabu Printing (India): Natural clay-based resist printing techniques and vegetable dyes have regained popularity in line with sustainable fashion trends, serving as an example of eco-cultural branding that can attract international markets. These two cases demonstrate how natural dye-based innovations can serve as a means of market differentiation as well as a strategy for preserving tradition. The impact of the assistance provided to the Ngudi Mulya Puppet Makers Association includes:

1. Increased Capacity of Artisans. Training activities provided artisans with new insights into techniques for extracting colors from natural materials such as *Indigofera* leaves, tingi bark, jelawe, turmeric, and mahogany. An introduction to mordanting complements this process. This technique utilizes color-binding substances derived from natural materials (such as alum, lime, and tunjung) to enhance the absorbency and durability of colors on leather. This knowledge is essential because synthetic dyes were previously more practical to use, but they did not provide artisans with

- the basic skills necessary for dyeing quality control. With these new skills, artisans have both technical capacity and ecological awareness (Lestari & Sutanto, 2022).
2. **The Quality of Wayang Sungging.** The results of applying natural colors show different visual characteristics compared to synthetic dyes. Natural colors tend to be softer and warmer, giving a traditional impression in line with the cultural roots of wayang. In addition to their aesthetic value, natural dyes also hold historical significance, as they have been used in wayang performances in Java since the beginning. Natural materials such as indigo, soja, and turmeric have been employed in singing. The environmental ethics aspect is another added value: the products are not only beautiful, but also environmentally friendly and in line with the global eco-craft trend (Rahayu, 2021).
 3. **Community Rebranding Strategy.** The artisan community, together with academics, designed a new identity with the theme “Wayang Warna Alam” (Natural Color Puppets). This strategy is manifested in: (1) Product packaging design concepts that highlight environmentally friendly narratives. (2) Promotional narratives that highlight the story of natural dyeing traditions as market differentiation. (3) Participation in local, national, and international cultural exhibitions to expand networks. (4) This local wisdom-based rebranding strategy is in line with the concept of cultural community rebranding that emphasizes the power of identity, sustainability, and cultural tourism appeal (Choirudin, 2020).
 4. **Social and Economic Implications.** Puppets made with natural dyes have received positive responses from various groups:
 - a. **Art Collectors: Authenticity and Historical Value.** Puppets with natural dyes are considered more authentic because they represent traditional practices that have been in existence since the early development of puppetry art in Java. Art collectors tend to seek originality, uniqueness, and historical continuity in a work. Natural dyes, such as indigo, soja, and turmeric, are symbols of traditional continuity that are highly collectible. Aligns with Kartodirdjo's (2020) study, which suggests that historical value and authenticity are the primary factors influencing the price and interest of collectors in traditional art. Thus, the use of natural colors differentiates wayang products in the art collection market, while also increasing cultural capital (Bourdieu, 1986) for the artisan community.
 - b. **Academics and Art Practitioners: Appreciation for the Preservation of Tradition.** For academics and art practitioners, innovation in natural coloring is not only a matter of technique but also concerns the preservation of tradition within the framework of sustainability. Natural coloring is considered a revitalization of local wisdom that has been largely abandoned due to modernization. According to Rahayu (2021), the practice of Revitalizing traditional materials in crafts is a form of eco-heritage conservation that can maintain the sustainability of art while providing educational value for the younger generation. Therefore, appreciation arises because this innovation does not erase tradition, but rather enriches it with a new context that is

relevant to global issues such as sustainability and environmental friendliness.

- c. **Cultural Tourists: Education and Eco-Cultural Experience.** Cultural tourists are increasingly interested in educational and environmentally-oriented travel experiences. Naturally colored wayang products offer an eco-cultural expertise that is not only aesthetically pleasing but also educational in terms of ecological values. Suwantoro's (2022) research indicates that millennial and Gen Z travelers tend to prefer tourism activities that offer meaningful experiences, including direct involvement in the production of environmentally friendly crafts. In this context, natural dyeing workshops for wayang puppets can become a cultural tourism attraction in Bangunjiwo, in line with the creative tourism trend that emphasizes interactivity, learning, and authentic experiences (Richards, 2018).

These three perspectives demonstrate that the use of natural dyes in wayang puppetry not only enhances aesthetic quality but also broadens the basis of appreciation, where collectors value authenticity and historical significance, academics and art practitioners play a role in preserving tradition and eco-heritage, and cultural tourists gain access to education and eco-cultural experiences. Thus, natural dyes play a strategic role in expanding the market, increasing added value, and strengthening the cultural identity of Gendeng Hamlet as a center for sustainable puppet art. Economically, this product opens up opportunities for market diversification, not only for puppets used in performances, but also for souvenirs, collectibles, and derivative products (e.g., decorative panels and merchandise). As a result, artisans gain the potential for increased income while strengthening Dusun Gendeng's position as a leading cultural center (Prasetyo & Nugroho, 2023). The four aspects above are interrelated: increased technical capacity drives product quality, which in turn supports rebranding strategies, and rebranding opens up socio-economic opportunities. Thus, this community service activity provides multiple benefits: technical, aesthetic, cultural, and economic.

CONCLUSION

This community service activity successfully integrated local wisdom, utilizing natural dyes, into the practice of wayang puppetry in Gendeng Hamlet, Bangunjiwo, Bantul. This innovation not only revitalized old traditions but also introduced a new, environmentally friendly approach, aligning with global sustainability trends. Through the Participatory Action Research (PAR) process, artisans were actively involved in every stage, from problem identification to product rebranding. The results of the activity showed an increase in the capacity of artisans, both in terms of knowledge and technical skills in the processing and application of natural colors. The resulting wayang puppets display a distinctive aesthetic, with colors that are softer, more organic, and more.

Characterful than those produced with synthetic dyes. In addition, the environmentally friendly aspect is an added value that is appreciated by academics, art practitioners, and cultural tourists alike. This process has also succeeded in building ecological awareness among artisans, so that the practice

of natural dyeing is not merely technical, but is also understood as part of environmental and cultural preservation.

Another significant impact is the formation of a new identity for the artisan community through the “Wayang Warna Alam” branding. This branding is manifested in the form of logos, packaging, promotional narratives, and participation in cultural exhibitions. This new identity has both symbolic and strategic value: it strengthens the collective pride of the community, differentiates their products in the market, and opens up networking opportunities with the creative industry sector. Thus, the innovation of natural dyes in wayang puppets not only has implications for increasing the added value of products but also strengthens the sustainability of local culture, preserves the environment, and expands market access. Aligns with the overarching goal of sustainable development, which encompasses social, cultural, economic, and ecological aspects. The results achieved include:

1. Strengthening cultural identity by reintroducing natural dyes as a distinctive feature of Bangunjiwo puppet products.
2. Market differentiation through a rebranding strategy with the Wayang Warna Alam label, which adds to the appeal for art collectors, academics, and cultural tourists. (2) Positive ecological impact, as the substitution of synthetic dyes with natural dyes contributes to the reduction of hazardous chemicals.
3. Enhancing the competitiveness of the creative economy, in line with national policies that promote the integration of culture and creativity as pillars of economic development, in accordance with the Ministry of Tourism and Creative Economy's blueprint for 2022. Thus, this activity can serve as a model for craft development based on local wisdom as well as sustainable branding for artisan communities.

Although this innovation has shown positive results, several things need to be considered for the sustainability of the program: (1) Further research and assistance on sustainability materials, especially the processing of natural coloring materials. There is a need for in-depth scientific studies using environmentally friendly and appropriate technology approaches to investigate the resistance of natural colors to light, humidity, and product shelf life. (2) Development of production scale. The production capacity of natural dyes is still limited. Simple technology and production management are needed to meet market demand without compromising quality. (3) Collaboration with the creative industry. Cooperation and collaboration between the government, designers, art galleries, and the creative tourism sector will open up a broader market. This concept aligns with Richards' idea of creative tourism, where traditional cultural products can be developed through interactive tourism experiences. (4) Strengthening digital marketing aspects. The Wayang Warna Alam community branding can be strengthened through social media and e-commerce platforms, allowing products to reach a global audience.

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