Sustainability in Ceramics: Exploring Waste Utilization and Community Engagement through Baravia Pottery and Workshop

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Abstract

The awareness of sustainable practices in the field of ceramics has grown significantly over the last decade, evidenced by a rising number of ceramic practitioners and institutions exploring material reuse and environmental responsibility. This study continues the author's previous research on ceramic waste reuse, including clay waste, glaze overspray, and glasswool insulation from kilns. The research integrates material experimentation and participatory design through the establishment of *Baravia Pottery and Workshop* in Yogyakarta. The studio functions not only as a production space but also as a pedagogical platform for sustainability-based ceramic practices, offering workshops and training modules to students and the broader community. Methodologically, the research follows a seven-stage approach combining experimental techniques and community engagement. The goal is to produce a replicable and inclusive model of sustainability in ceramics that supports environmental, educational, and economic dimensions. While results emphasize circular material use and collaborative learning, the study acknowledges the need for further quantification and long-term impact evaluation.

Keywords: sustainability, ceramic industry, waste utilization, material experimentation, community education

Purpose

Sustainability in ceramic art practices has emerged as a major area of focus over the past decade (Ceramic Arts Network, 2022a). Numerous studies have addressed waste reduction strategies in the ceramics industry, especially regarding clay waste, glaze overspray, and insulating materials such as glasswool. For instance, Ipekoglu (2021) explored cullet-based glazes as eco-friendly alternatives, while Martín-Márquez et al. (2016) investigated the recycling of glaze slurry waste in industrial settings. Despite these advancements, reuse efforts remain limited to isolated practices and have yet to become widespread within community-based or educational ecosystems (Ceramic Arts Network, 2022b).

This study extends the author's long-term research since 2016 and aims to bridge that gap by integrating sustainable material reuse with participatory practices. It addresses two primary research questions:

1. How can participatory and educational approaches enhance community engagement in sustainable ceramic practices?
2. How can regenerative material cycles be applied to open studio models like Baravia?

The objective is to develop an adaptable training module grounded in experimental material methods and participatory pedagogy, fostering greater sustainability awareness and capacity building across the ceramic arts community.

Approach

Several previous studies support the idea that ceramic waste holds significant potential for reuse. Mishra et al. (2020) emphasize the importance of recycling waste to reduce environmental impact in tile production. Dondi et al. (2016) demonstrate that industrial residues such as fly ash can serve as alternative raw materials in ceramics. Adediran et al. (2020) and Rywotycki et al. (2024) explore glasswool waste as a fluxing agent, showing that

it enhances mechanical properties and lowers sintering temperatures. Strecker & Costa (2014) indicate that up to 30% of glass waste can be reformulated into ceramic glaze. In Indonesia, Fitriani & Suharson (2023) developed a reuse approach rooted in religious values and creative education for glass and ceramic waste. This concept serves as the foundation for the establishment of *Baravia Pottery*, an open studio that integrates experimentation, training, and production.

Meanwhile, the author's previous research, which forms the basis for the continuation explored in this study, is illustrated in the diagram below:

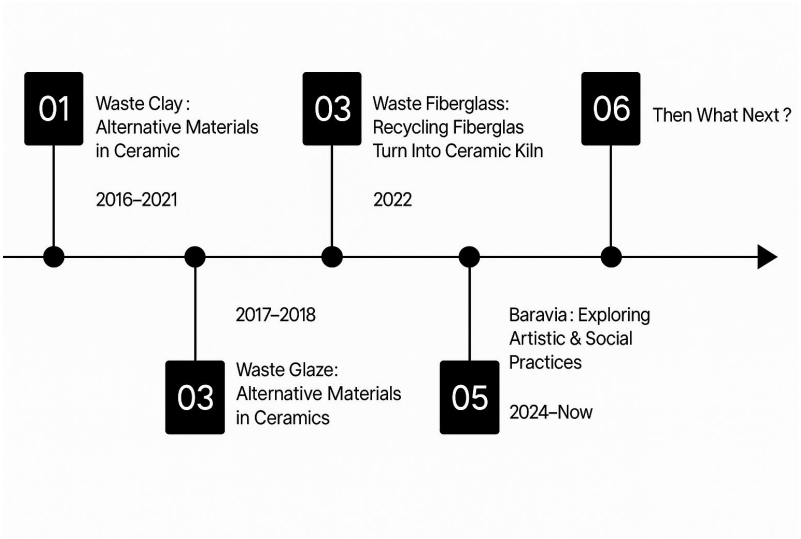

Figure 1. Previous Research Conducted
Source: Author

Method

This research employs a hybrid methodology combining **material experimentation** with **participatory action research**to explore the sustainable reuse of ceramic waste. The experimental aspect focuses on clay waste, glaze overspray, and glasswool residue, investigating their properties and applications in studio practices. The participatory component includes structured workshops involving students, local artisans, and community participants.

The process is organized into **seven sequential stages**, beginning with material collection and preparation, followed by experimentation, training, evaluation, and product realization. The participatory sessions are designed to evaluate public engagement, knowledge transfer, and the viability of integrating reused materials into broader ceramic practices. While this method provides a robust framework, further specification of sampling techniques, workshop duration, and qualitative/quantitative analysis tools would enhance reproducibility and research rigor.

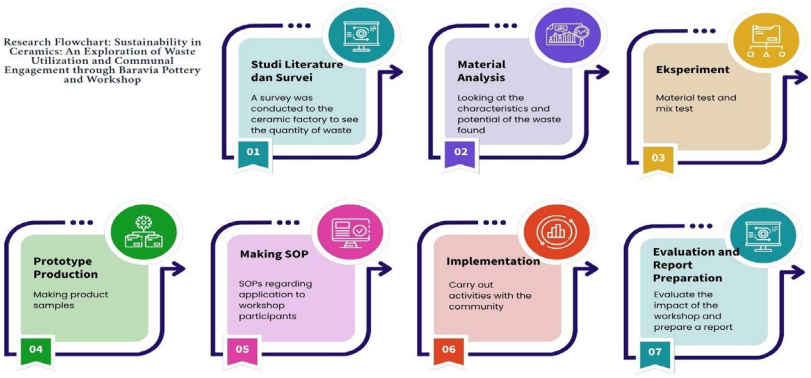

Figure 2. Research Flow Diagram
Source: Author

Results

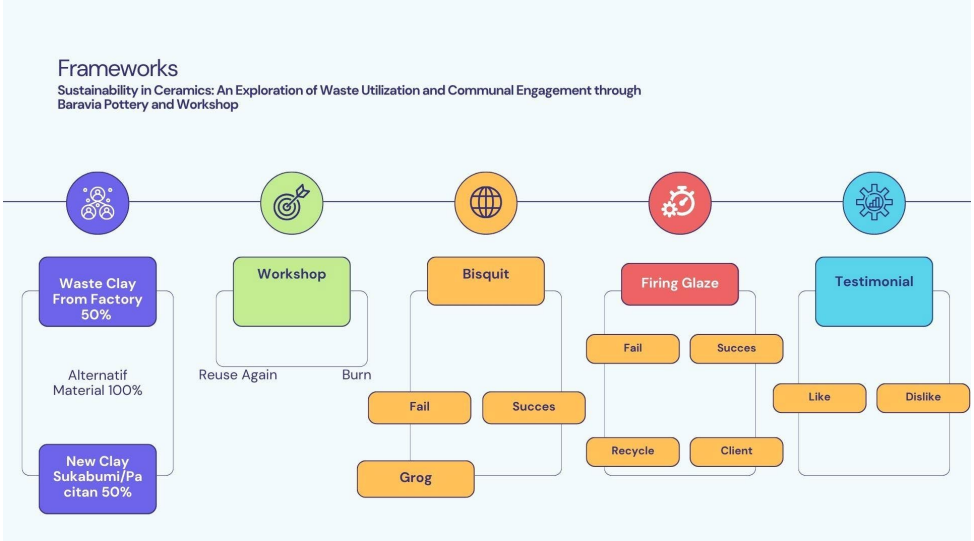

Figure 3. Frameworks Baravia
Source : Author

The framework titled "Sustainability in Ceramics: An Exploration of Waste Utilization and Communal Engagement through Baravia Pottery and Workshop" illustrates a sustainable workflow in ceramic practice that prioritizes waste utilization and community involvement. The process begins with the use of clay sourced from two origins: 50% clay waste from factories and 50% new clay from the Sukabumi or Pacitan regions. This combination produces a 100% alternative material that serves as the main medium in the workshop activities.

The workshop functions as a participatory space where the public or participants are directly involved in the ceramic-making process. If the resulting pieces from the workshop do not meet the quality standards, the material can be reused. Meanwhile, successful pieces proceed to the initial firing stage, known as bisque firing. At this stage, failed works are crushed and turned into *grog*, ceramic fragments that can be mixed back into fresh clay as part of the material cycle. Successful bisque-fired pieces then undergo the glazing process, where they are coated and fired again.

The glaze firing stage also presents two possible outcomes: failure or success. Failed pieces in this stage can be recycled back into the production system, while successful works are delivered to clients or users. At the end of the process, clients provide testimonials on the final products they receive. Their feedback, whether appreciation (like) or dissatisfaction (dislike), serves as input for future improvements.

Overall, this framework emphasizes not only sustainability by minimizing waste and recycling materials, but also strengthens community engagement in the creative process. The system integrates educational, ecological, and social values into a cohesive and sustainable workflow.

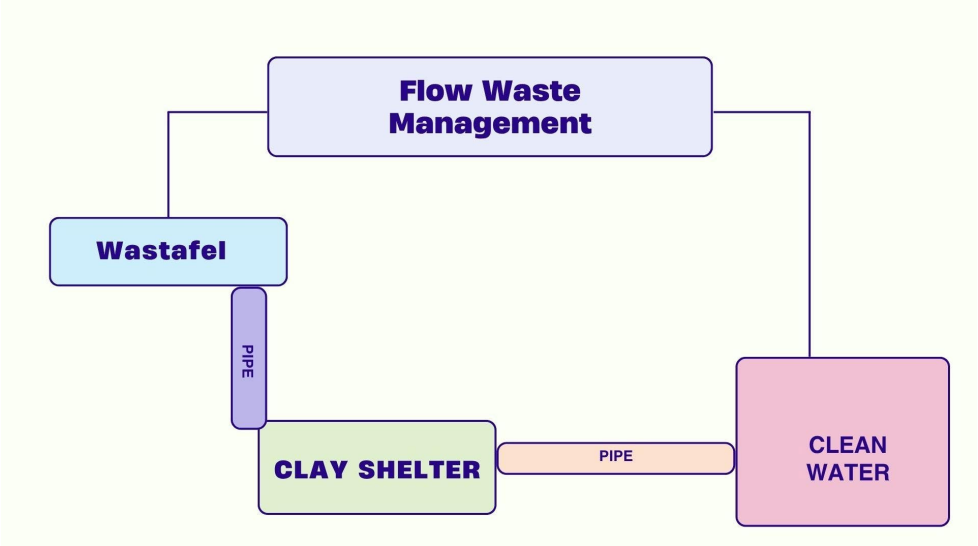

Figure 4. Flow Waste Management
Source : Author

This diagram illustrates a wastewater management system derived from handwashing or tool-cleaning activities involving clay (ceramics), designed with an environmentally friendly and sustainable approach. The system begins at the **sink**, which serves as the primary site for washing activities. The wastewater from the sink is channeled through a pipe to the **Clay Shelter**, which functions as a natural filtration area or **clay trap**, where clay particles and other solid materials are allowed to settle and separate from the water.

After passing through the Clay Shelter, the filtered water continues through a second pipe into the **Clean Water system**, a holding area for the processed water. This clean water has the potential to be reused for non-consumptive purposes such as watering plants, cleaning the studio, or even for other recycling processes.

The entire system operates within a larger framework called **Flow Waste Management**, which governs the flow and circulation of wastewater to ensure it is not directly discharged into the environment, but rather reused after proper treatment. This system exemplifies a best practice in implementing sustainability principles in a ceramic studio, by minimizing waste and preserving the quality of discharged water.

Conclusion

This research demonstrates that sustainable ceramic practices can be developed holistically through a combination of material experimentation and participatory approaches involving the community. Through the Baravia Pottery and Workshop initiative, the concept of sustainability is applied not only to the reuse of clay waste, glasswool, and glaze but also expanded into education, social empowerment, and local economic development. Studio workflows such as the Flow Waste Management system provide concrete examples of how wastewater can be managed efficiently and environmentally friendly. Training modules, open workshops, and community-based recycling systems make this initiative a model of an integrated, educational, and replicable sustainable ceramic ecosystem.Thus, this research contributes to establishing a new paradigm for ceramic practices that are both environmentally responsible and inclusive of community participation.

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