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Case Study Article

The Communication System of Surabaya Main Waste Bank (BSIS): A Study on Environmental Education and Community Empowerment through Participatory Waste Management

Abstract

The Surabaya Main Waste Bank (BSIS) represents an innovative approach to urban waste management by integrating environmental, social, and educational dimensions. This study aims to explore the communication system of BSIS and its role in supporting environmental education and community empowerment, particularly in the context of its integration with educational institutions. Employing a descriptive qualitative approach through a case study method, data were collected via observation, interviews, and document analysis. The findings reveal that BSIS functions not only as a waste management center but also as an environmentally oriented community learning space. Its structured and educational communication strategies enable BSIS to serve as a real-life learning laboratory for schools, particularly in supporting Adiwiyata programs and contextual, cross-curricular learning. Nevertheless, the study identifies key challenges, including the limited formal integration with educational institutions and the lack of teacher training related to community-based environmental education. To address these challenges, the study highlights the need for curriculum integration and community-based teacher training programs to strengthen the synergy between environmental management and sustainable education.

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Introduction

The issue of waste management has become a complex and pressing global concern, posing serious threats to ecological balance and human well-being. According to the World Bank, global waste generation is projected to reach 3.4 billion tons by 2050 if no significant interventions are undertaken (World Bank, 2018). In Indonesia, the dominant waste management paradigm remains linear collect-transport-dispose a model that proves increasingly ineffective in addressing the rapid

growth of waste volume, especially in densely populated urban areas such as Surabaya.

As a proactive response to this challenge, the Surabaya City Government initiated the development of the Bank Sampah Induk Surabaya (BSIS), or Surabaya Main Waste Bank, an innovative initiative that integrates community participation with circular economy principles and environmental education. BSIS is designed not merely to reduce the volume of waste reaching final disposal sites (TPA), but also to foster a cultural shift in waste handling behavior—encouraging source-level waste separation and transforming waste into economic assets. This approach aligns with the zero-waste principle and supports the Sustainable Development Goals (SDGs), particularly Goal 11 (Sustainable Cities and Communities) and Goal 12 (Responsible Consumption and Production).

What makes BSIS particularly noteworthy for academic inquiry is its distinctive communication strategy. The communication system employed within BSIS extends beyond the dissemination of technical information; it functions as a participatory learning platform that actively involves the public in behavioral transformation processes. Communication in this context is not unidirectional but rather interactive and educational, contributing to improved environmental literacy and the development of ecological identity, especially among students and youth.

From an environmental education perspective, BSIS can be conceptualized within the framework of Community-Based Environmental Education (CBEE), serving as a bridge between formal educational theories and everyday social practices. Through educational visits, hands-on training, and direct engagement in waste recycling processes, BSIS offers young people contextual and transformative learning opportunities. These experiences cultivate a sense of environmental responsibility and practical skills, essential for fostering long-term behavioral change.

This study aims to explore the role of the BSIS communication system in not only supporting integrated waste management but also advancing environmental education and empowering local communities. The central focus is to examine how communication serves as a conduit between environmental initiatives and the cultivation of collective environmental consciousness. Specifically, the study investigates the communicative dimensions that facilitate sustainable behavior development within educational settings and the broader community context.

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2. Materials and Methods

This study employs a descriptive qualitative approach using a case study method centered on the Surabaya Main Waste Bank (BSIS). This approach was chosen to enable an in-depth exploration of the social, cultural, and educational contexts that frame BSIS's communication system and its impact on public environmental awareness (see [7]).

The case study method is deemed appropriate for analyzing complex and context-dependent phenomena such as community-based waste management, which involves multiple actors and interrelated variables (see [8]). The study seeks not only to understand how communication is carried out within the BSIS system, but also how these processes evolve into educational practices that promote ecological literacy and community empowerment, particularly within the framework of community-based environmental education (see [9]).

Data collection was conducted using three primary techniques:

- Document Analysis: This included the review of policy documents, educational modules, BSIS record-keeping systems, and outreach materials such as pamphlets and presentation media. These documents were analyzed to identify message structures, communication objectives, and embedded educational values.
- Participant Observation: Conducted during routine BSIS activities, including waste deposit transactions, school outreach programs, and community training sessions. The researcher documented the dynamics of communication among stakeholders (BSIS management, members/customers, and educational partners) as well as the physical and social contexts that influence behavior.
- In-Depth Interviews: Conducted with BSIS administrators, teachers and students from partner schools, and community facilitators. The interviews focused on participants' perceptions of BSIS

as an environmental education space, the effectiveness of its communication strategies, and observed or experienced behavioral changes.

Data were analyzed thematically with attention to three key dimensions: (1) the structure and patterns of communication, (2) the educational function of messages and interactions, and (3) the impact on environmental awareness and community empowerment. This analytical framework draws upon the principles of community-based environmental education, which emphasizes direct experience, active participation, and contextual learning within the community setting (see [6], [9]).

To ensure data validity and reliability, triangulation was applied across methods (documents, observation, interviews) and informants from diverse backgrounds. Additionally, member checking was conducted by confirming key interpretations of data with selected primary participants.

3. Results

3.1 BSIS Communication System as an Educational Medium

The findings of this study indicate that the communication system implemented by the Surabaya Main Waste Bank (BSIS) is systemically and functionally designed to support the goals of environmental education. The communication structure of BSIS incorporates key components of development communication, including senders (e.g., the city government, BSIS management), messages (e.g., education on waste sorting and the economic value of waste), channels (e.g., face-to-face interaction, informational pamphlets, and digital recording systems), and receivers (e.g., waste bank members, partner schools, and recycling institutions) [3], [5].

This communication process goes beyond merely transmitting information. It is persuasive and educational, engaging both the affective and cognitive dimensions of participants. Through this approach, BSIS fosters a shared narrative that redefines waste not as disposable material, but as a potential economic resource [2], [5]. Such a narrative serves to reframe public attitudes and behaviors, positioning BSIS as a public learning space that bridges environmental education with tangible action.

In an educational context, BSIS functions as a field-based learning laboratory. Schools in Surabaya, particularly those involved in the Adiwiyata green school program—integrate visits to BSIS into their localized curriculum. Students are not only introduced to the 3Rs (Reduce, Reuse, Recycle) conceptually, but also observe first-hand how the circular economy model operates in practice [6], [9]. This immersive exposure enables students to connect theoretical knowledge with real-world application.

3.2 Integration of BSIS into the Educational System

The integration of BSIS into formal education occurs through collaborations with primary and secondary schools, implemented via educational visits, hands-on training sessions, and extracurricular activities rooted in environmental themes. This collaboration aligns with the principles of experiential learning, which emphasize active engagement with real-life contexts as a core pedagogical strategy [7].

Students are not only passive recipients of information about waste management; they actively participate in the collection, classification, and processing of inorganic waste. Observational and interview data suggest that BSIS activities stimulate cross-curricular learning. For instance, in science (IPA) lessons, students learn about plastic recycling processes; in social studies (IPS), they explore the microeconomics of waste banking transactions; and in civic education (PKn), they engage with values such as social responsibility and active citizenship [6], [9].

Furthermore, the educational model facilitated by BSIS reinforces the principles of place-based education (PBE), in which learning is rooted in the local context and addresses real community needs. This model effectively cultivates an emotional connection between students and their immediate environment, while fostering a sense of ownership over the solutions they help implement [9].

3.3 Impacts on Environmental Education and Ecological Literacy

Participation in BSIS programs has had a significant impact on improving environmental literacy among students and the broader community. Interviews reveal that many students and parents have adopted waste sorting practices at home after participating in BSIS educational activities. There is also a growing awareness of the importance of reducing waste generation and embracing sustainable consumption habits [5], [6].

Teachers, too, experience a transformative effect. Several reported that their direct engagement with BSIS inspired new ideas for designing contextual and locally relevant teaching materials. This not only enhances the quality of environmental education but also reinforces the role of teachers as agents of change within their school communities [7].

On a broader scale, BSIS contributes to strengthening local community participation. Its active and communicative presence fosters stronger social networks among residents, promotes collaborative learning ecosystems, and builds grassroots environmental solidarity [4], [9]. Programs such as these demonstrate that environmental education need not be confined to the classroom; instead, it can be effectively realized through collective community practices that integrate learning with everyday life.

4. Discussion

Building on the findings discussed earlier, the Surabaya Main Waste Bank (BSIS) has demonstrated considerable effectiveness as an educational medium in promoting environmental awareness. However, several challenges continue to hinder the optimal integration of BSIS into a sustainable education system, particularly in terms of its formal alignment with the broader educational framework.

4.1 Limited Curricular Integration

One of the key challenges lies in the lack of systematic curricular integration between BSIS and formal educational institutions. While some schools have established partnerships through field visits or participation in the Adiwiyata green school program, such activities remain sporadic and are not embedded within the core curriculum [3], [6]. As a result, the full potential of BSIS as a site for contextual learning remains underutilized by many schools across Surabaya.

This is especially unfortunate given the proven efficacy of place-based education (PBE) models like BSIS in enhancing student engagement and the real-world relevance of learning [9]. When students learn directly from their local environment and social context, they tend to be more emotionally and cognitively invested in the learning process and are more likely to translate their knowledge into meaningful action.

4.2 Limited Teacher Capacity

The study also reveals that many teachers lack the capacity to effectively integrate environmental education into their respective subject areas. Most have not received adequate training in community-based pedagogical approaches such as those practiced by BSIS [5], [7]. This gap presents a major obstacle to the implementation of participatory and contextual environmental education within the school system.

To address this, there is a need to develop teacher training programs that go beyond technical skills (e.g., waste sorting) and focus on methodological competencies—such as how to creatively and interdisciplinarily embed environmental topics into the existing curriculum. As Jensen and Schnack have argued, transformative environmental education should aim to build students' action competence—the ability to critically reflect and take informed action in addressing environmental challenges [9].

4.3 Strategic Recommendations

In response to the above challenges, this study proposes several strategic recommendations:

Formal Curricular Integration: The Surabaya city government, in collaboration with the Department of Education, should develop environmentally themed learning modules that position BSIS as a living learning laboratory. These modules can be integrated into subjects such as Science, Social Studies, and Civic Education, and used in interdisciplinary project-based learning formats.

Community-Based Teacher Training Programs: Training initiatives should equip educators with contextual and participatory pedagogical strategies. Collaborative workshops involving BSIS facilitators and environmental education practitioners could provide valuable experiential learning opportunities for teachers [7].

Sustainable Partnership Mechanisms: The formation of a coordinating forum involving BSIS, schools, and the education department is recommended to support long-term program planning, monitoring, and evaluation of community-based environmental education efforts.

Digitalization and Replication: To extend the reach of BSIS to schools not yet directly involved, a digital learning platform can be developed. This platform could host educational materials, best practice case studies, and interactive simulations of waste sorting activities—thus enhancing both accessibility and environmental digital literacy.

These efforts are essential not only to elevate BSIS as a model of local best practice but also to position it as a national exemplar in creating synergy between waste management systems and community-rooted environmental education.

5. Conclusions

This study reveals that the Surabaya Main Waste Bank (BSIS) functions not merely as a waste management unit but also as a key actor in community-based environmental education. The communication system implemented by BSIS—targeting local communities, schools, and industry partners—has proven effective in delivering educational messages on waste separation and processing. Beyond information dissemination, BSIS has evolved into a participatory learning space that is both contextual and practical, aligning closely with the principles of place-based education and the development of action competence within environmental education.

Despite these strengths, several challenges remain, particularly regarding the uneven curricular integration and the limited capacity of teachers to deliver community-based environmental content effectively. In response, this study recommends stronger policy support from the Department of Education, including the formal integration of environmental thematic modules into school curricula and the provision of community-based teacher training programs. With such strategic support, BSIS holds the potential to be replicated as a national model, bridging sustainable waste management practices with transformative education aimed at fostering long-term environmental sustainability.

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