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Assistance in the Processing and Maintenance of Waste Incinerators at Bank Sampah Berkah Srikandi Pondok Bambu

Sudarno P Tampubolon[1]*, Medyawanti Pane[2], Irene Vista Simanjuntak[3], Antonius D. Tyas Prasetyo[4], Deviana P Munthe[5], Yohan K. Kafolapada[6], Charly David Hutagalung[7]
[1,2,3,4,6,7]Universitas Kristen Indonesia
[5]Universitas Negeri Manado
Corresponding Author: Sudarno P Tampubolon
sudarno.tampubolon@uki.ac.id

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A B S T R A C T

Effective and environmentally sustainable management of organic waste remains a major challenge at Bank Sampah Berkah Srikandi, a community-based waste management initiative located in Pondok Bambu, East Jakarta. The outcomes indicate that the incinerator at Bank Sampah Berkah Srikandi was successfully upgraded and optimized. The redesigned system enhanced operator safety, combustion efficiency, and ease of maintenance while significantly reducing emission levels. Continuous community engagement further strengthened residents' capacity to operate and maintain the incinerator effectively, promoting sustainability in organic waste management practices. Overall, this program demonstrates the importance of integrating technical innovation with community education to achieve long-term environmental sustainability. The results also suggest that such community-based technological interventions can serve as a model for other waste banks and urban settlements in Indonesia facing similar waste management challenges.

INTRODUCTION

Waste refers to materials or objects that no longer have use value or have been discarded after utilization, whether originating from households, industries, or other human activities. Waste can be categorized into several types, including organic waste (food residues, leaves, paper), inorganic waste (plastic, metal, glass), and hazardous waste (batteries, medical residues, or chemical materials). Improper waste management can result in various negative impacts on the environment, human health, and the economy, depending on the waste type and disposal method. Particularly, poor management of organic waste especially leaves can cause air pollution, soil degradation, disease transmission, and an overall increase in waste accumulation.

Burning dry leaves remains a common but harmful method of disposal. Leaf burning produces smoke containing fine particulates, carbon monoxide (CO), and hazardous organic pollutants (POPs) that contaminate the air, degrade air quality, and contribute to respiratory illnesses. Additionally, the process releases greenhouse gases such as carbon dioxide (CO_2) and methane (CH_4), contributing to global warming. Uncontrolled decomposition of leaf litter can also generate harmful leachate containing pathogens and chemicals that damage soil fertility and contaminate water sources, ultimately affecting public health.

In the Pondok Bambu area, where residential areas coexist with large green spaces, leaf and branch waste presents a distinct challenge. Common issues include improper disposal such as dumping in drainage channels or open burning lack of specific collection facilities, and limited community knowledge on converting organic waste into useful products such as compost or biomass fuel. Furthermore, local waste management policies often focus on household waste (plastics and food scraps) while neglecting garden waste. This situation increases the burden on public waste facilities and contributes to pollution.

Bank Sampah Berkah Srikandi serves as a community-based solution to improve waste management at the neighborhood level. It functions not only as a collection center but also as an educational hub promoting recycling, waste segregation, and eco-conscious behavior. Through a waste-saving system, residents deposit both recyclable inorganic materials and organic waste that can be processed into compost and eco-enzymes. The waste bank also collaborates with schools and local organizations to promote environmental awareness and economic self-reliance through sustainable waste practices.

To enhance organic waste management effectiveness and reduce the negative effects of open burning, Bank Sampah Berkah Srikandi developed an organic waste incinerator designed to process waste rapidly and hygienically with reduced emissions. However, due to design limitations, the initial construction posed safety risks for operators. Therefore, a redesign and technical improvement were deemed necessary to ensure both functionality and user safety.

The current condition of the organic waste incinerator utilized at Bank Sampah Berkah Srikandi is shown in Figure 1. The equipment, while operational, demonstrates several structural and safety issues that require further modification to improve its efficiency and ensure safe operation for users.

Figure 1. Current Condition of the Organic Waste Incinerator

IMPLEMENTATION AND METHODS

The community service project titled 'Assistance in the Processing and Maintenance of Organic Waste Incinerators at Bank Sampah Berkah Srikandi Pondok Bambu' was implemented through the following stages:

1. Coordination with the waste bank management for project approval.
2. Scheduling and preparing the site for implementation.
3. Designing a safer organic waste incinerator system.
4. Repairing and modifying the incinerator according to the revised design.
5. Selecting participants for training (operators and community members).
6. Preparing materials and instructional tools.
7. Conducting evaluations to identify areas of improvement.
8. Compiling a final implementation report.

A schematic of the project implementation workflow included: site survey and condition assessment, design and modification of the organic waste incinerator, testing and validation by the technical team, followed by community training and education on safe operation and maintenance.

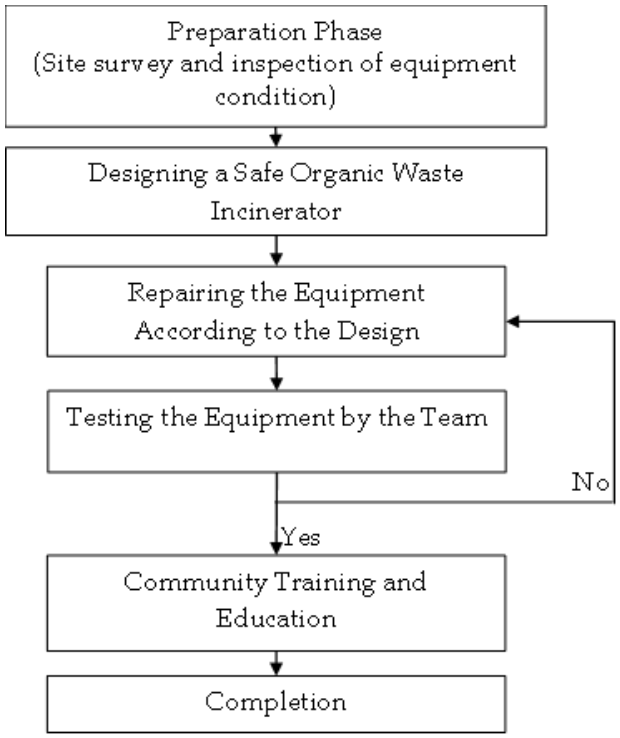

Figure 2. Flowchart of the Community Service Program Implementation

RESULTS AND DISCUSSION

The project was conducted on September 10, 2025, at Bank Sampah Berkah Srikandi, Pondok Bambu, East Jakarta, involving 21 participants (2 operators and 19 local residents). The activities comprised redesigning and repairing the incinerator as well as conducting workshops and public education sessions. The major outcomes included:

1. Successful redesign of the incinerator structure.
2. Development of a safer waste-loading door.
3. Elimination of gas leaks in the blower unit to prevent air pollution.
4. Reconstruction of the condensation discharge channel by elevating the condenser chamber.
5. Installation of a temperature sensor to monitor combustion control.
6. Improved operator skills in equipment maintenance.
7. Enhanced community awareness regarding the environmental impact of waste burning.

Figure 3 illustrates the repair process of the waste incinerator, which was preceded by an inspection to identify existing issues with the equipment.

Figure 3. The PkM Team Carried Out Innovations and Improvements on the Organic Waste Incinerator

Following the repair and re-inspection of the incinerator cover, as well as the verification and replacement of the combustion temperature gauge and adjustment of the incinerator chamber height, a performance test was conducted on the repaired equipment. Figure 4 shows the repaired incinerator after the inspection process.

Figure 4. The PkM Team Conducted a Re-Inspection of the Repaired Organic Waste Incinerator

After the inspection of the repaired equipment, the next step was to conduct a performance test. Figure 5 presents the testing of the waste incinerator conducted by the PkM team.

Figure 5. The Pkm Team Performed Testing on the Repaired Organic Waste Incinerator

After completing the repair and testing processes, the subsequent stage conducted by the PkM team was a socialization and dissemination session on the waste incinerator for Bank Sampah Berkah Srikandi. Figure 6 illustrates the outreach activity regarding the operation and maintenance of the waste incinerator.

Figure 6. The Pkm Team Conducted an Outreach and Dissemination Session on the Use of the Waste Incinerator

CONCLUSIONS AND RECOMMENDATIONS

The community service project 'Assistance in the Processing and Maintenance of Organic Waste Incinerators at Bank Sampah Berkah Srikandi Pondok Bambu' was successfully executed. The project outcomes included redesigning the incinerator system, improving the safety and efficiency of waste burning, mitigating air pollution, and equipping the community with knowledge on responsible organic waste management. As a result, the facility now operates more effectively, safely, and sustainably.

Evaluation results indicated that 100% of the operator participants comprehended the operational and maintenance techniques necessary for safe equipment use. The educational component of the program also raised community awareness of sustainable waste management practices and the importance of minimizing environmental impact. These outcomes collectively contribute to the establishment of a long-term, eco-friendly waste management culture within the Pondok Bambu community.

Continuous training should be provided to operators to ensure ongoing skill development and adaptation to technological advancements. Regular monitoring and evaluation must be conducted to maintain safety and performance standards. Institutional support from local authorities is encouraged to expand outreach and public education. Community participation should remain active to preserve and optimize the incinerator's role in achieving a cleaner, healthier environment.

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