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Waste Management Application through Digital System in Bengkulu City

Aplikasi Pengelolaan Sampah melalui system digital di Kota Bengkulu

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This article contributes to:

Highlights:
- Appreciation towards people behaves 3D principle of wastes management.
- Bank of wastes is the way to motivate people behaves 3D principle of waste management.
- The transaction with the Bank is run by online.
- Menus guarantees people separates wastes correctly.

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Abstract

The growing population and changing consumption patterns in Bengkulu City have led to an increase in waste volume, posing environmental pollution risks affecting soil, water, and air. As a solution, the SEHATI Central Waste Bank implements a structured, community-based waste management approach that involves waste collection, sorting, processing, and recycling of both organic and inorganic waste. This initiative is supported by a digital application that streamlines waste management processes, ensures transaction transparency, and enhances incentives for participating community members. The application also provides education on the importance of 3RB (Reduce, Reuse, Recycle, Benefit), aiming to reduce waste ending up in landfills. Community service results show that the use of this digital application not only increases community participation in waste sorting and management but also effectively reduces environmental pollution. The SEHATI Waste Bank has successfully promoted environmental sustainability through a circular economy that supports sustainable waste management.

Keywords:*3RB (Reduce, Reuse, Recycle, Benefit); Digital System, Waste Bank, SEHATI Central Waste Bank*

1. Introduction

The rapid population growth and changes in consumption patterns have significantly impacted the increase in waste volume, both in urban and rural areas. Research shows that this rise in waste correlates with serious environmental consequences, such as soil, water, and air pollution, affecting public health and reducing ecosystem quality (Kurniawan et al., 2020; Safitri & Nugraha, 2019). Therefore, effective and sustainable waste management has become an urgent challenge to mitigate increasingly severe environmental impacts. Unmanaged organic and inorganic waste has the

potential to cause environmental pollution, health threats, and a disposal space crisis in various areas (Putri & Santoso, 2021; Azizah et al., 2021).

In response to the growing need for sustainable waste management, the "SEHATI" Central Waste Bank has emerged as a community-driven initiative focused on community-based waste management. The "SEHATI" Waste Bank aims to shift society's perception of waste from something worthless to a resource that can be utilized. Organic waste, such as food scraps and leaves, can be processed into compost or organic fertilizer to support eco-friendly farming practices, while inorganic waste like plastic, paper, and metal can be recycled into economically valuable products (Siregar et al., 2022; Haryati & Wijaya, 2020).

The "SEHATI" Central Waste Bank operates as a business group in waste management services, handling both organic and inorganic waste. This business focuses on providing collection, sorting, processing, and recycling services for waste generated by the community. Through a structured, community-based approach, the "SEHATI" Waste Bank aims to contribute to environmentally friendly waste management while supporting a circular economy. After sorting, inorganic waste such as plastic, paper, and metal is sold to recycling industries, turning materials initially considered waste into economically valuable resources (Kurniawan et al., 2020; Yuliawati et al., 2023).

The "SEHATI" Waste Bank also offers economic incentives to members and the general community who exchange their sorted waste. This mechanism not only encourages waste sorting but also reinforces awareness of the importance of independent waste management. Collected organic waste is processed into compost, which is then marketed to farmers and entrepreneurs in the agricultural sector as part of sustainable agricultural practices (Putri & Santoso, 2021; Siregar et al., 2022).

Through this approach, the "SEHATI" Central Waste Bank serves more than just a waste management service provider. As an environmentally focused enterprise, "SEHATI" actively markets recycled products and maximizes reusable materials, contributing to the reduction of waste ending up in landfills (TPA) and creating economic opportunities for the community within a sustainable business ecosystem (Azizah et al., 2021; Rahmawati et al., 2022).

To optimize this waste management, the "SEHATI" Central Waste Bank has initiated the development of a digital application to facilitate waste collection, sorting, and processing at unit waste banks at the neighborhood and village levels. Through digital technology, this application is expected to simplify waste volume tracking, collection scheduling, and transparency in providing economic incentives to participating community members (Yuliawati et al., 2023).

Beyond increasing efficiency, this application also aims to enhance community participation in the 3RB (Reduce, Reuse, Recycle, Benefit) program through educational and informational features. With access to information on waste separation and management, the community can better understand the positive impacts of their participation and gain benefits. This application represents a strategic step for the "SEHATI" Waste Bank to help reduce waste going to landfills and support the creation of a cleaner, healthier, and more sustainable environment (Rahmawati et al., 2022).

This digital application initiative also supports government programs in creating cleaner and more eco-friendly cities and villages. Through these efforts, the "SEHATI" Waste Bank hopes to pioneer sustainable, digitally-based waste management innovation while creating economic opportunities for the community through environmentally responsible waste management activities.

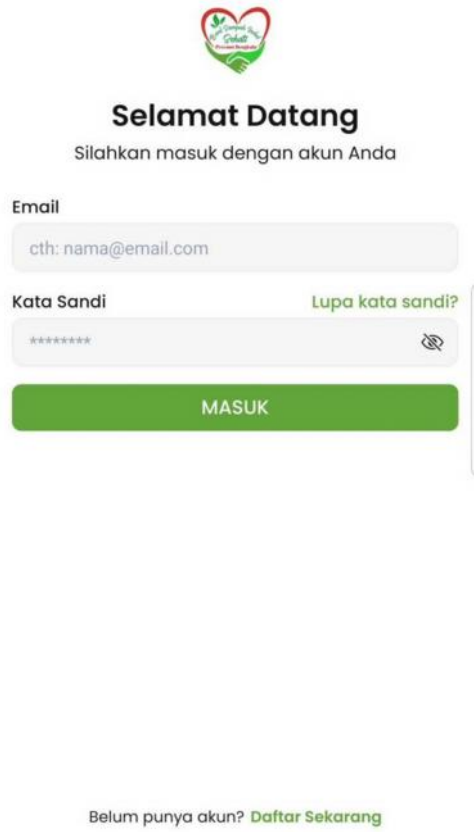


Figure 1. Front Display of the Sehati Waste Bank Application

2. Method

2.1 The Waste Management Process of SEHATI Central Waste Bank and the Use of Digital Applications

SEHATI Central Waste Bank (BSI "SEHATI") is a business focused on managing both organic and inorganic waste collected from the community through a network of Waste Bank Units at the neighborhood (RT) and village levels. The management process consists of the following stages:

a) Waste Collections

Organic and inorganic waste is collected from participating Waste Bank Units. Community members bring sorted waste to their local unit, separating organic waste (e.g., food scraps and leaves) from inorganic waste (e.g., plastic, paper, metal, and glass).

b) Waste Sorting

The collected waste is further sorted at a sorting facility according to type, to facilitate processing. This stage aims to separate materials that can be further processed, such as compostable organic waste and recyclable inorganic waste.

c) Waste Processing

- **Organic Waste:** Processed into compost or organic fertilizer through fermentation or composting techniques, creating products beneficial for agriculture and horticulture.
- **Inorganic Waste:** Sorted by type and quality, recycled, or sold to recycling industry partners.

d) Recycling and Trade

Recycled products, such as plastic, metal, and paper, are sold to industry partners. Meanwhile, compost derived from organic waste is packaged and marketed to farmers and agricultural businesses, generating economic value while reducing waste ending up in landfills.

e) ***Community Participation and Education***

Secara rutin, kampanye dan edukasi dilakukan untuk meningkatkan kesadaran masyarakat akan pentingnya pemilahan sampah dan pengelolaan sampah secara mandiri. Melalui program ini, masyarakat didorong untuk aktif dalam pengelolaan sampah yang efektif dan ramah lingkungan.

2.2 Digital Application Usage Method

The SEHATI Central Waste Bank also employs a digital application to streamline waste management processes and handle transactions transparently and efficiently. The steps for using the digital application include:

a) ***Account Registration***

New members can create an account through the SEHATI Waste Bank digital app. Registration allows users to have a digital record of transactions and points earned through waste collection.

b) ***Waste Collection and Weighing***

After registering, users can deposit their sorted waste at a Waste Bank Unit or central location. Each deposit is weighed using a digital scale to ensure accurate weight and economic value.

c) Recording and Point Assignment

Waste weights are recorded digitally, and points or financial incentives are added directly to the user's account. These points can be converted into other necessities or serve as economic incentives for the community.

d) ***Payment or Incentive Redemption***

Upon completing the weighing process, users can choose to withdraw their earned economic value or convert it into certain products through the app. This system ensures that transactions are transparent and efficient, supporting a community-based waste management model.

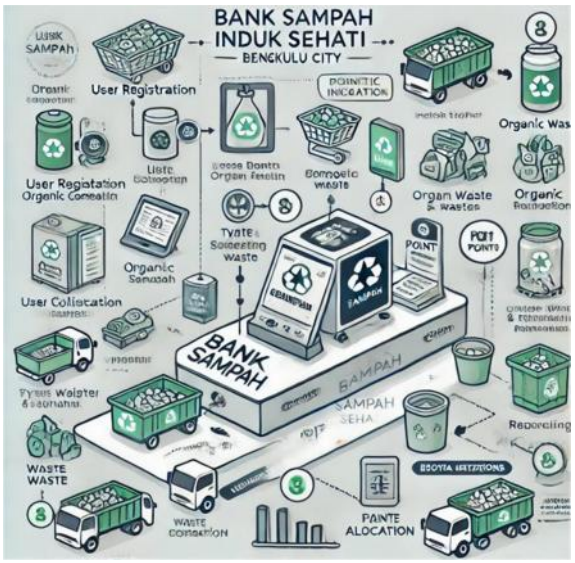


Figure 2. Process Flow Diagram of the Sehati Waste Bank Digital System

2.3 Equipment Used in Waste Management

SEHATI Central Waste Bank uses various equipment to ensure efficient processing, from sorting to recycling. Equipment includes:

a) Digital Scales: Ensure accurate weight and economic value of weighed waste.
b) Waste Shredders: Simplify composting and recycling processes.
c) Composters: Composting tools to process organic waste into fertilizer.
d) Waste Press Machine: Reduces the volume of inorganic waste for efficient storage.
e) Sorting Stations: Equipped with containers for sorting each waste type.
f) Plastic Shredders: Break down plastic waste for easier recycling.
g) Fermentation Equipment (Bio-digester): Processes organic waste to produce biogas or liquid fertilizer.

h) Packaging Machines: Package products like compost and recycled materials.

With structured processes and digital application utilization, SEHATI Central Waste Bank is committed to creating economic value from waste while providing environmental benefits by reducing the amount of waste ending up in landfills.

3. Result and Discuss

3.1 Result finding of devotion

The "SEHATI" Central Waste Bank in Bengkulu City emerged in response to the growing waste management challenges due to population growth and changing consumption patterns. Through a community-based approach, SEHATI aims to reduce the negative environmental impacts of waste by leveraging digital technology. The developed digital application supports the collection, sorting, and processing of waste across various Waste Bank Units (BSUs) spread across neighborhood and village levels. This initiative has shown that the digital application not only facilitates tracking waste volumes and scheduling collections but also increases transparency in providing economic incentives to the community.

Figure 3. One of the Waste Bank Units

Figure 4. Account Waste Bank Units and account member Sehati Waste Bank Digital System

Based on collected data, the SEHATI Waste Bank application has successfully increased community participation in waste management through features supporting the 3RB (Reduce, Reuse, Recycle, Benefit) program. These findings are relevant to the issues discussed in the introduction, namely the rise in waste volume and its negative environmental impacts, such as soil, water, and air pollution, affecting public health (Kurniawan et al., 2020; Safitri & Nugraha, 2019).

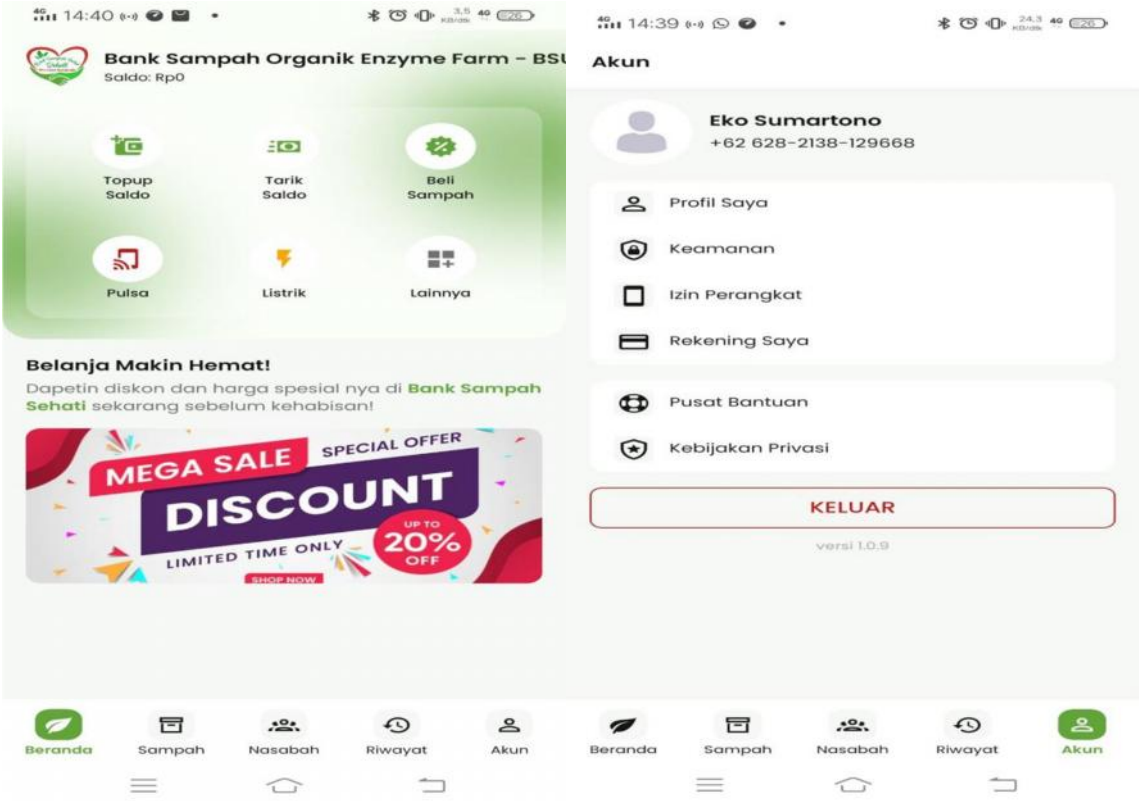


Figure 5. Account Waste Bank Units with service and payment Digital System

The application functions as an educational medium, offering information on waste separation and management so that people can better understand the benefits of their participation. Based on implementation data, this application has significantly reduced the amount of waste ending up in landfills (TPA). This demonstrates that the SEHATI Waste Bank application is effective in supporting clean and sustainable environmental programs and aligns with government initiatives (Rahmawati et al., 2022). The SEHATI application is integrated with the regional Bank of Bengkulu's conventional system and several e-Wallets for digital payment processing.

The findings and application from this initiative support the hypothesis presented in the introduction: that community-based waste management through Waste Bank Units, assisted by a digital application, can provide a solution to facilitate community transactions, reduce the volume of waste ending up in landfills, and minimize environmental impact. With the digital application, the waste collection process becomes more efficient, transparent, and engaging for the community. This aligns with previous studies indicating that digital-based waste management initiatives can offer solutions to environmental pollution issues and reduce pressure on disposal space (Putri & Santoso, 2021; Azizah et al., 2021).

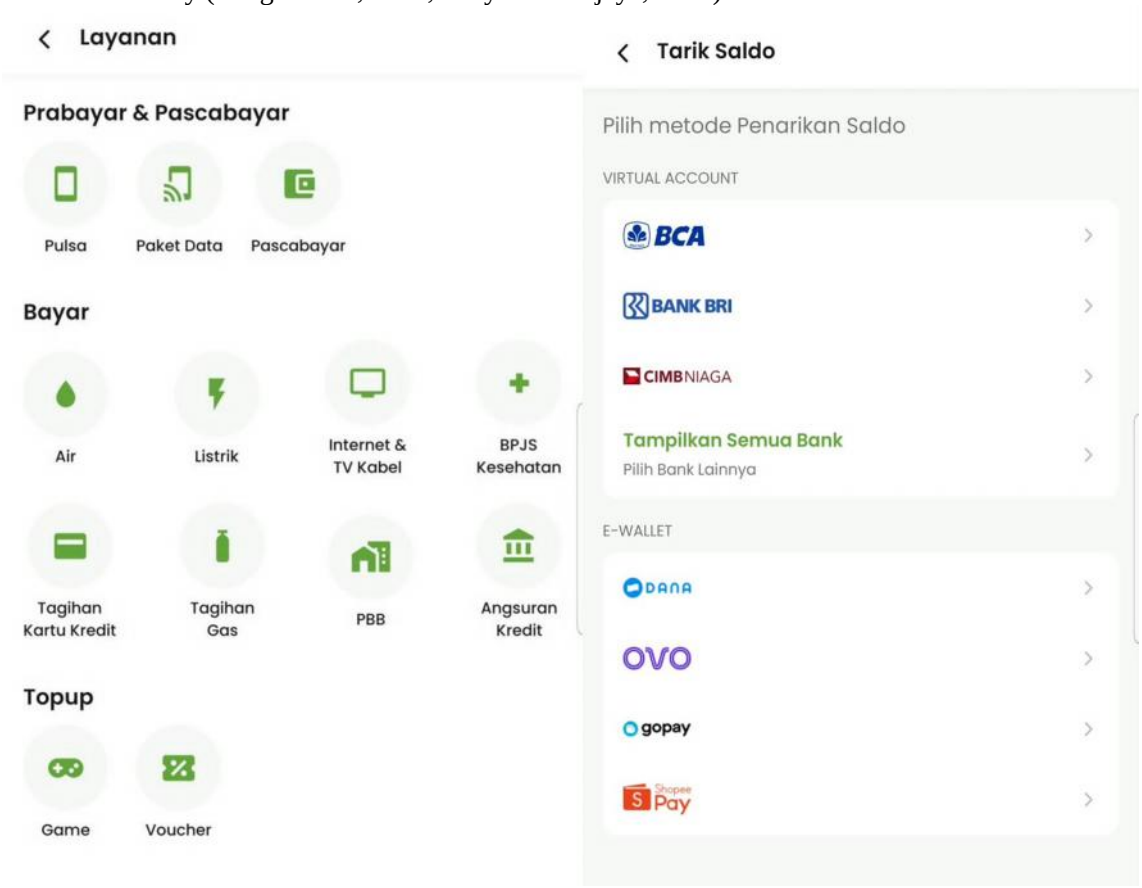
3.2 Discuss

The development of the digital application at SEHATI Central Waste Bank provides several benefits for the community and the environment. First, this application improves efficiency in waste management, from the member registration process and waste weighing to point recording and economic incentive distribution. The feature that allows points to be converted into economic incentives has proven to increase community motivation to actively sort and manage waste.

Additionally, the application facilitates community education on separating organic and inorganic waste and provides insight into the environmental impact of poor waste management. With this understanding, people are motivated to properly separate and sort waste, which in turn reduces pollution and extends landfill lifespan.

The application also supports economic empowerment through the sale of recycled products and compost produced from organic waste. Recycled inorganic waste, such as plastic, paper, and metal,

is sold to recycling industry partners, while compost is sold to local farmers, creating economic value and providing positive environmental impacts. Thus, this application not only serves as a waste management solution but also enhances the community's quality of life and fosters the creation of a circular economy (Siregar et al., 2022; Haryati & Wijaya, 2020).



Overall, the digital waste management application developed by SEHATI Central Waste Bank has successfully increased community participation and supported more efficient, environmentally friendly, and economically valuable waste management. These findings demonstrate that digital technology has great potential to address complex waste management challenges in the modern era, contributing significantly to the creation of cleaner, healthier cities.

4. Conclusion

The digital waste management application developed by the SEHATI Central Waste Bank has successfully increased community participation and supported more efficient, environmentally friendly, and economically valuable waste management. The community service initiatives undertaken through SEHATI Central Waste Bank have proven effective in addressing waste issues in Bengkulu City by employing a community-based management approach supported by digital technology. The developed digital application facilitates waste collection, sorting, and assessment, while also enhancing community participation through transparent economic incentives. Additionally, the educational feature in the application encourages the community to understand the benefits of proper waste management, thereby reducing the volume of waste disposed of in landfills. This initiative makes a meaningful contribution to environmental cleanliness, sustainable waste management, and a more eco-friendly circular economy.

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