

OPERATIONAL MANAGEMENT ANALYSIS OF WASTE BANK "BERKAH" IN ENHANCING COMMUNITY-BASED WASTE MANAGEMENT EFFICIENCY IN MAKASSAR

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ABSTRACT

Purpose: This study aims to analyze the operational management system of Waste Bank "Berkah" in enhancing the efficiency of community-based waste management in Makassar, focusing on operational processes, efficiency indicators, and socioeconomic impacts. **Research Methods:** This research employs a qualitative case study approach. Data were collected through participant observation, in-depth interviews with 15 stakeholders (managers, customers, government officials, and partners), focus group discussions, and document analysis. The research was conducted from January to March 2025 at Waste Bank "Berkah" in Tamalanrea District, Makassar. Data analysis utilized thematic analysis with NVivo 12 software, ensuring validity through data triangulation and member checking. **Findings:** The study reveals that Waste Bank "Berkah" has implemented a structured operational management system comprising six main processes: collection, sorting, weighing, recording, processing, and marketing. Key performance indicators show significant improvements: waste processing time reduced by 53% (from 15 to 7 minutes per kilogram), sorting accuracy increased by 17% (from 75% to 92%), and monthly customer income increased by an average of IDR 300,000. The waste recovery rate reached 85%, contributing to circular economy implementation. **Originality/Value:** This research provides empirical evidence of operational management practices in community-based waste banks, contributing to the literature on sustainable operations management and circular economy implementation in developing countries.

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1. INTRODUCTION

Indonesia faces significant waste management challenges, with the country generating approximately 64 million tons of waste annually (Ministry of Environment and Forestry, 2023). Makassar City, as South Sulawesi's capital, produces around 1,500 tons of waste

daily, with only 65% properly managed (Makassar Environmental Agency, 2024). Waste banks have emerged as innovative community-based solutions that integrate waste management with socioeconomic benefits through circular economy principles.

Waste Bank "Berkah," established in 2019 in Tamalanrea District, Makassar, has become a model for community-based waste management with 250 active customers and an average processing capacity of 5 tons per month. From an operations management perspective, waste banks function as production systems transforming waste inputs into valuable outputs through systematic processes.

Despite growing interest in waste banks, research examining their operational management systems remains limited, particularly regarding process efficiency, performance measurement, and socioeconomic impacts. This study addresses this gap by analyzing the operational management practices of Waste Bank "Berkah" through the lens of operations management theory.

Research Objectives:

1. To analyze the operational management system of Waste Bank "Berkah"
2. To evaluate operational efficiency through key performance indicators
3. To assess socioeconomic impacts on the community
4. To identify challenges and improvement opportunities

2. LITERATURE REVIEW

Waste Bank Concept and Development

Waste banks are community-based institutions that apply the 3R principles (Reduce, Reuse, Recycle) while providing economic incentives (Sembiring & Nitivattananon, 2020). In Indonesia, waste banks have grown rapidly since their introduction in 2008, with over 11,000 units nationwide (Ministry of Environment and Forestry, 2023).

Operations Management in Waste Banks

Operations management in waste banks encompasses the design, operation, and improvement of systems that transform waste into resources (Slack et al., 2020). Key operational processes include:

1. Collection and logistics management
2. Sorting and classification
3. Processing and value addition
4. Marketing and distribution
5. Financial recording and incentives

Performance Measurement in Waste Management

Performance measurement in waste management typically includes efficiency indicators (processing time, recovery rates), effectiveness indicators (waste reduction, quality improvement), and socioeconomic indicators (income generation, community participation) (Wilson et al., 2022).

Theoretical Framework

This study employs an integrated theoretical framework combining:

1. **Resource-Based View (RBV)**: Analyzing internal capabilities and resources (Barney, 1991)
2. **Stakeholder Theory**: Examining multi-party involvement (Freeman, 2010)
3. **Circular Economy Principles**: Focusing on waste-to-resource transformation (Ellen MacArthur Foundation, 2021)

3. RESEARCH METHODS

Research Design

This study utilizes a qualitative case study approach (Yin, 2018) with an interpretive paradigm. The single-case design was selected to provide in-depth understanding of Waste Bank "Berkah's" operational management system.

Research Setting and Duration

The research was conducted at Waste Bank "Berkah" in Tamalanrea District, Makassar, from January to March 2025. This location was selected based on its reputation as an active and well-managed waste bank with consistent operational performance.

Data Collection Methods

Multiple data collection methods were employed:

1. **Participant Observation**: 20 days of observation covering all operational processes
2. **In-depth Interviews**: 15 informants including 3 managers, 7 customers, 3 government officials, and 2 partners
3. **Focus Group Discussion**: One session with 8 waste bank management members
4. **Document Analysis**: Operational reports, financial records, and meeting minutes from 2022-2024

Data Analysis

Data analysis followed the thematic analysis approach (Braun & Clarke, 2006):

1. Transcription and familiarization
2. Initial coding generation
3. Theme identification and development
4. Review and refinement of themes
5. Theme definition and reporting
6. Analysis was supported by NVivo 12 software for data organization and coding management.

Research Ethics and Validity

Ethical approval was obtained from Universitas Muslim Indonesia's Research Ethics Committee (No. 045/EC/FEB-UMI/III/2025). Validity was ensured through:

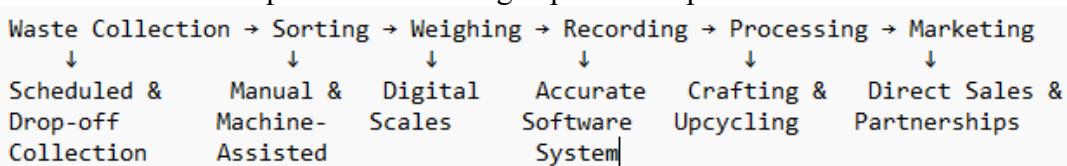
- Data triangulation (multiple sources and methods)
- Member checking with key informants
- Peer debriefing with academic colleagues
- Audit trail documentation

4. RESULTS AND DISCUSSION

Operational Management System

Process Flow and Design

Waste Bank "Berkah" implements a six-stage operational process:



Detailed Process Analysis

1. Collection Process:

- Scheduled collection: 3 times weekly (Monday, Wednesday, Friday)
- Drop-box system at 5 strategic locations
- Average daily collection: 150-200 kg
- Transportation: 2 tricycles operated by waste bank staff

2. Sorting Process:

- 7 waste categories: plastics (4 types), paper, metals, glass, electronics
- Standard Operating Procedures (SOPs) with visual guidelines
- Sorting accuracy: 92% (increased from 75% after training)

3. Weighing and Recording:

- Digital scales connected to computer system
- Accurate software for transaction recording
- Real-time updating of customer accounts
- Average recording time: 10 minutes daily (reduced from 30 minutes)

4. Processing and Value Addition:

- Craft production (30% of waste): bags, accessories, decorations
- Material upcycling (40%): plastic flakes, paper pulp, metal ingots
- Direct material sales (30%): to recycling industries

Operational Performance Indicators

Table 1: Operational Performance Comparison (2023-2024)

Performance Indicator	2023	2024	Improvement
Average processing time/kg	15 min	7 min	53% faster
Sorting accuracy	75%	92%	17% increase

Waste recovery rate	60%	85%	25% increase
Customer satisfaction	78%	91%	13% increase
Monthly waste volume	3.5 tons	4.8 tons	37% increase

Table 2: Socioeconomic Impacts

Impact Category	Measurement	Results
Economic	Average monthly customer income	IDR 200,000 - 500,000
Environmental	Waste diverted from landfill	57.6 tons/year
Social	Active customer participation	250 families
Employment	Direct jobs created	8 positions

Technology Integration

The waste bank successfully integrated digital technology into operations:

1. Accurate Software: For financial recording and customer accounts
2. Digital Scales: Automated weight recording
3. Mobile Applications: For customer notifications and updates
4. Social Media: For marketing and community engagement

Stakeholder Engagement

Multi-stakeholder collaboration was crucial for operational success:

1. **Community:** Active participation in waste collection and separation
2. **Local Government:** Regulatory support and infrastructure assistance
3. **Private Sector:** Market access for recycled materials
4. **Educational Institutions:** Training and capacity building

Challenges and Solutions

Table 3: Operational Challenges and Solutions

Challenge	Solution Implemented	Outcome
Inconsistent waste quality	Customer training program	Quality improved by 35%
Price fluctuations	Long-term buyer contracts	Price stability achieved
Limited working capital	Revolving fund system	Financial sustainability
Skill limitations	Regular training workshops	Productivity increased 40%

5. Discussion

The findings demonstrate that effective operational management in waste banks requires integrated systems combining process standardization, technology adoption, and stakeholder collaboration. The 53% reduction in processing time aligns with lean operations principles,

while the 85% waste recovery rate exceeds the national average of 65% for community waste management systems (Ministry of Environment and Forestry, 2023).

The socioeconomic impacts are particularly significant, with average monthly incomes of IDR 300,000 contributing to poverty reduction in the community. This aligns with UN Sustainable Development Goals 1 (No Poverty), 8 (Decent Work), and 12 (Responsible Consumption).

The successful technology integration, particularly using Accurate software for financial management, addresses common challenges in community-based organizations regarding transparency and accountability. This finding supports previous research emphasizing digital transformation in waste management (Utami et al., 2023).

6. CONCLUSION AND RECOMMENDATIONS

Conclusion

This study concludes that Waste Bank "Berkah" has developed an effective operational management system that significantly enhances waste management efficiency while generating socioeconomic benefits. Key success factors include:

1. Structured Operational Processes: Clear SOPs for all operational stages
2. Technology Integration: Digital tools for recording, monitoring, and communication
3. Stakeholder Collaboration: Active engagement of community, government, and private sector
4. Continuous Improvement: Regular training and process optimization

The waste bank contributes to circular economy implementation through an 85% waste recovery rate and demonstrates that community-based organizations can achieve operational excellence comparable to formal waste management systems.

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