

## THE CONCEPT AND IMPLEMENTATION OF SUSTAINABILITY ACCOUNTING IN THE CIRCULAR ECONOMY OF WASTE MANAGEMENT (CASE STUDY: BONTANG CITY WASTE BANK)

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### Abstract

This study analyzes the implementation of sustainability accounting in the circular economy of waste management at the Bontang City Waste Bank. Using a qualitative case study approach, data were collected through in-depth interviews, observation, and document analysis. The findings reveal an uneven implementation of the Triple Bottom Line (TBL). While the economic aspect is well-structured with financial records, the social and environmental impacts remain undocumented. Key barriers are limited human resource capacity and a minimalistic accounting system. This study contributes empirically to sustainability accounting literature in community-based circular economy initiatives and recommends simple TBL based reporting templates and training.

**Keywords:** Circular Economy, Sustainability accounting in the circularkey, Sustainability Accounting, Waste Bank, Economy of waste management at the Bontang

### INTRODUCTION

Waste has become a complex issue threatening global environmental sustainability. Without significant intervention, global waste generation is projected to increase from 2.24 billion tons in 2020 to 3.88 billion tons per year by 2050 (World Bank, 2023). In Indonesia, the waste problem is equally acute. The Ministry of Environment and Forestry (KLHK, 2024) reports that national waste generation reaches approximately 70 million tons per year, dominated by organic waste (55%) and plastic (16%). The current management system, which still relies heavily on the *end of pipe* approach with landfills as the mainstay, has triggered various crises, such as overcapacity of Final Processing Sites (TPA), groundwater pollution, and methane gas emissions contributing to global warming (Dwiyanto, 2022).

Bontang City, although known as a relatively well-organized industrial city, is not exempt from this waste management challenge. Economic and population growth directly correlates with an increase in the volume and complexity of waste generated. The linear economy paradigm (*take make dispose*) that has been applied so far is proven to be no longer sustainable. Therefore, the transition towards a circular economy has become a necessity. The circular economy concept, as defined by the Ellen MacArthur Foundation (2015), is an industrial system that is restorative and regenerative by design, aiming to keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles. Its principle is to create a closed-loop system where waste is considered a new raw material.

At the grassroots level, Waste Banks have emerged as key institutions in realizing the principles of a circular economy. The Waste Bank concept, first developed in Yogyakarta by Bambang Suwerda, is essentially a community-based waste management system that adopts the 3R principle (Reduce, Reuse, Recycle) with a banking mechanism, where the community "saves" waste that has economic value (Suwerda, 2012). The Bontang City Waste Bank is one example of an initiative that has been operating and making a real contribution to diverting waste from the TPA, while also creating economic value for the community. Its activities, which include sorting, collecting, weighing, and selling recyclable materials, are a concrete manifestation of the technical cycle in a circular economy.

However, the sustainability and scalability of community-based circular economy models like Waste Banks depend not only on their operational activities. Research by Septriadi et al. (2023) shows that one of the main challenges in waste bank management is the weakness of the administrative and accounting systems. The majority of waste banks only record simple financial transactions (cash income and expenditure) without measuring and reporting the broader social and environmental impacts generated. This is where the concept of Sustainability Accounting becomes relevant. Sustainability Accounting, according to Gray et al. (2014), is the process of communicating the social and environmental effects of an organization's economic actions to particular interest groups within society and to society at large. This concept extends the focus of traditional accounting, which is solely profit-oriented (*single bottom line*), to a tripartite accountability: economic, social, and environmental (*triple bottom line* People, Planet, Profit) as popularized by Elkington (1997).

Implementing sustainability accounting in organizations like Waste Banks is crucial for several reasons. First, sustainability accounting can provide a holistic and balanced picture of organizational performance, not only in financial terms but also its contribution to community welfare (*social capital*) and ecosystem health (*natural capital*) (Bebbington & Unerman, 2018). Second, comprehensive reporting can enhance the accountability and legitimacy of Waste Banks in the eyes of stakeholders, such as local government, donors, and the general public. Third, the information generated from a sustainability accounting system can serve as a strong basis for strategic decision-making, program planning, and advocacy for supporting policies (Schaltegger & Burritt, 2017).

Although the urgency of sustainability accounting is increasingly recognized, research specifically examining the integration between sustainability accounting concepts and circular economy practices at the micro-level (waste banks) is still limited. Most previous studies have focused more on aspects of waste management, community participation, or the financial feasibility of waste banks separately (e.g., Wulandari et al., 2021; Pratiwi & Agustina, 2022). Studies delving into how circular economy values are operationalized in the form of accounting recording, measurement, and reporting are still rare. This is the gap that this research aims to fill.

Based on initial observations and interviews with the manager of the Bontang City Waste Bank, Mr. Mastono, it was found that current record-keeping is still focused on financial transactions with customers (waste savings) and simple income expenditure bookkeeping. Meanwhile, social impacts such as increased environmental awareness, creation of informal jobs, and environmental impacts such as reducing waste volume at the TPA and reducing carbon emissions, have not been documented systematically and measurably. Therefore, this

study aims to explore in depth the concept and implementation of sustainability accounting in the context of the circular economy run by the Bontang City Waste Bank. By understanding the actual conditions in the field, it is hoped that applicable recommendations can be formulated to strengthen the waste bank's reporting system towards genuinely sustainable and accountable practices.

## LITERATURE REVIEW

### The Concept of Circular Economy

The circular economy has emerged as a transformative paradigm challenging the traditional linear economic model of *take make dispose*. According to the Ellen MacArthur Foundation (2015), a circular economy is an industrial system that is restorative or regenerative by intention and design. It aims to keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles. In the biological cycle, biodegradable materials are designed to feed back into the biosphere, often through processes like composting or anaerobic digestion. In the technical cycle, products, components, and non-toxic materials are designed to be recovered, renewed, and reused through strategies such as repair, reuse, remanufacturing, and recycling. This concept is based on three core principles: designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.

### Triple Bottom Line (TBL) Theory and Sustainability

The *Triple Bottom Line* (TBL) concept, coined by John Elkington in 1997, expands an organization's performance measurement beyond the single financial indicator (profit) to three interconnected dimensions: Profit (Economic), People (Social), and Planet (Environmental). The TBL framework argues that for long-term sustainability, an organization must be responsible and perform well in all three areas (Elkington, 1997). TBL serves as the philosophical foundation for sustainability accounting, as it provides a structure for organizing and reporting non-financial performance (Norman & MacDonald, 2004).

### Sustainability Accounting

Sustainability accounting is defined as the process of identifying, measuring, and communicating the social and environmental impacts of an organization's economic activities to particular stakeholder groups and to society at large (Gray et al., 2014). It is an extension of conventional financial accounting aimed at providing more comprehensive information on how an organization performs in advancing sustainability goals. According to Schaltegger & Burritt (2010), sustainability accounting encompasses two main perspectives: (1) Accounting for Sustainability, which supports internal sustainable decision-making, and (2) Sustainability Accounting as Reporting, which involves preparing and delivering sustainability-related information to external stakeholders.

## Waste Bank as an Instrument of Circular Economy and Community Empowerment

A waste bank is defined as a place for sorting and collecting dry waste that can be recycled and/or reused, managed like a banking system, but what is saved is waste (Ministry of Environment and Forestry, 2020). Its functions extend beyond mere waste collection (Suwerda, 2012): (1) Environmental Function: Reducing waste volume to landfills, preventing pollution, and saving natural resources; (2) Economic Function: Creating economic value from waste, providing financial incentives for the community, and creating jobs; (3) Social Function: Increasing community awareness and participation, strengthening social capital through mutual cooperation, and serving as an educational tool. In a circular economy perspective, waste banks operate as *material collectors* and *value recoverers* in the recycling supply chain, bridging the gap between households and the recycling industry (Wulandari et al., 2021).

## Legitimacy Theory and Stakeholder Theory

Two theories are often used to explain the motivations behind social and environmental accounting practices:

1. Legitimacy Theory (Suchman, 1995) posits that organizations operate based on an implicit "social contract" with society. To continue existing, an organization must be seen as legitimate its actions must align with prevailing social values and norms. One strategy to gain, maintain, or repair legitimacy is through social and environmental disclosure (Deegan, 2002). By reporting positive social and environmental activities, a waste bank can strengthen its legitimacy.
2. Stakeholder Theory (Freeman, 1984) states that an organization's longterm success depends on its ability to manage relationships with all parties affected by or who can affect the achievement of its objectives (stakeholders). This theory argues that organizations must be accountable not only to capital owners but to all relevant stakeholders (Gray et al., 1996). A waste bank's stakeholders include customers, managers, local government, recyclers, NGOs, and academics.

## Previous Empirical Studies and Research Gap

Previous research has explored various aspects of waste banks. Ghisellini et al. (2016) conducted a comprehensive review of circular economy implementation but focused less on supporting accounting information systems. Pratiwi & Agustina (2022) analyzed the financial feasibility of a waste bank but only focused on the economic (profit) aspect. Septriadi et al. (2023) identified administrative and financial recording weaknesses in waste banks as a primary challenge. Wulandari et al. (2021) measured the social impact of waste banks using external questionnaires.

The research gap identified is the limited integration of sustainability accounting concepts with circular economy practices in the context of waste banks. Most studies focus on single aspects, measure impacts externally, and do not explore the internal accounting systems capable of holistically measuring TBL impacts. This study aims to fill this gap by exploring the understanding and implementation of sustainability accounting from the internal perspective of the Bontang City Waste Bank.

## METHOD

This research uses a qualitative approach with a single intrinsic case study method (Stake, 1995; Yin, 2018). The location is the Bontang City Waste Bank. Data collection was conducted over three visit periods (August-September 2025) through:

1. Semi structured in depth interviews with the primary manager (Mr. Mastono), two active customers, and one administrative staff member.
2. Participatory observation of operational and recording processes.
3. Document study of passbooks, financial reports to the Central Waste Bank (BSI), and other supporting documents.

Informants were selected purposively based on the principle of data saturation. Data analysis used the interactive model of Miles, Huberman, and Saldana (2014), involving data condensation, data display, and conclusion drawing. Data validity was tested through triangulation of sources, methods, and member checking.

## RESULT

### Overview of Bontang City Waste Bank

The Bontang City Waste Bank is a government-driven initiative inaugurated in May 2025 through a decree from the Environmental Agency (DLH). Located at the Neighborhood Association (RT) level, it is managed communally with initial funding of IDR 60,000,000 from the RT fund (Robita). It operates in partnership with the Central Waste Bank (BSI).

### Analysis of Findings Based on Research Questions

#### *Manager's Understanding of Sustainability Accounting and Circular Economy*

The manager's (Mr. Mastono) understanding of the circular economy is implicit and limited to recycling activities that create economic value. He understands the waste bank mechanism as a cycle: sorted waste is saved, sold to BSI, and the money is returned to customers. However, the concept of accounting is perceived conventionally as recording financial transactions to fulfill reporting obligations to BSI. There is no understanding of sustainability accounting that integrates social and environmental aspects. Implementation of Triple Bottom Line (TBL)

Actual implementation shows a significant disparity among the TBL pillars, as summarized in Table 1.

Table 1. Gap in Sustainability Accounting Implementation Based on TBL

TBL Pillar	Ideal Practice (Theory)	Practice at Bontang Waste Bank	Existing Recording/Data Form	Main Gap
Profit	Measuring economic value, costs, profitability	Recording customer transactions &	Passbooks, sales records, reports to BSI	Simple cash-basis financial reports, no profitability analysis,

		sales to BSI; periodic financial reporting		mixed funding
Pe ople	Measuring social impacts (participation, empowerment)	Social impacts are felt and narrated, but not measured	No systematic data, only anecdotes	No customer/volunteer database, no measurement of behavioral change
Pla net	Measuring environmental impacts (waste reduction, emissions)	Recycling activities are carried out, but impacts are not calculated	No systematic data	No recording of waste weight/volume, no calculation of environmental impacts

1. Profit Aspect is already structured with individual recording systems, standardized prices from BSI, and periodic reporting. However, financial reports are cash-based and do not detail operational costs.
2. People Aspect is evident from family economic empowerment (e.g., "for children's pocket money"), environmental education through sorting, and the creation of social spaces. However, there is no recording of the number of active customers, volunteers, or other social impacts.
3. Planet Aspect is reflected in waste diversion from the TPA, but there is no data on the weight of waste managed by type, so environmental impacts like carbon emission reduction are unmeasured.

## Driving and Inhibiting Factors for Implementation

### Driving Factors:

1. Strong top-down policy from the city government (Mayor's decree, DLH support).
2. Initial funding from Robita (IDR 60,000,000) for infrastructure.
3. Network with the Central Waste Bank (BSI) providing a market and price guidelines.
4. Local leadership (RT Head) taking responsibility.

### Inhibiting Factors:

1. Limited human resource capacity: difficulty recruiting young volunteers, no formal training yet.
2. Minimalist accounting system: only focuses on fulfilling financial obligations.
3. Dependence on communal funding (RT cash fund, contributions), so sales margins are not yet sufficient to cover operations.
4. Limited conceptual understanding of sustainability accounting.

## Discussion: Connecting Findings with Theory and Previous Studies

The findings show that the Bontang City Waste Bank has operationally implemented circular economy principles at the recycling stage but has not integrated them with an accounting

system that measures holistic impacts. This aligns with Ghisellini et al. (2016), who stated that micro-level initiatives are often fragmented.

The application of legitimacy theory (Suchman, 1995) explains why the waste bank focuses solely on financial reporting: legitimacy is obtained from the government through administrative compliance and awards, not from public demands to report social and environmental performance. Consequently, there is no "legitimacy threat" driving the adoption of TBL reporting. This confirms the findings of Septriadi et al. (2023) on limited accountability focused on financial aspects.

From a stakeholder theory perspective (Freeman, 1984), the current accounting information system only meets the needs of certain primary stakeholders (government, BSI, individual customers) but ignores the needs of secondary stakeholders like the wider community, academics, and NGOs. Real social and environmental impacts remain undocumented, making the waste bank's contribution to the SDGs (specifically SDG 11, 12, 13) "silent" and unmeasurable (Bebbington & Unerman, 2018).

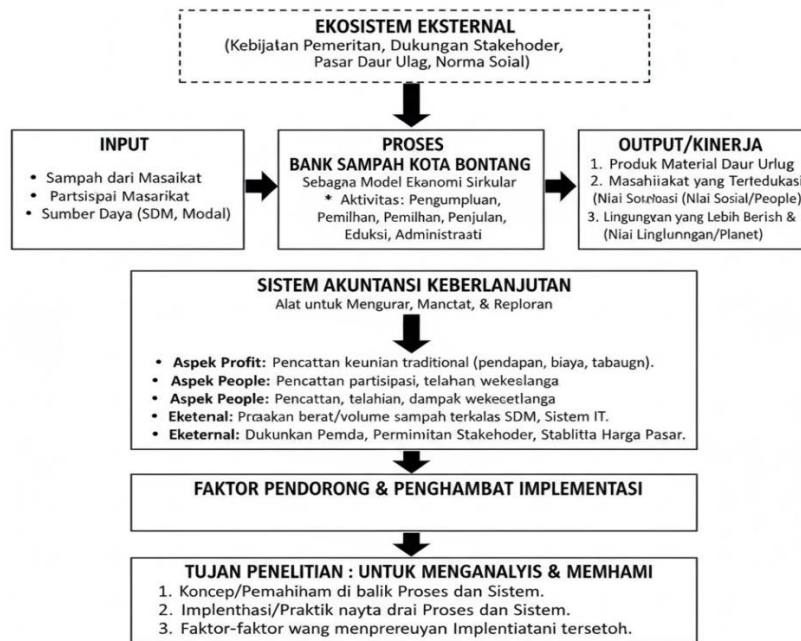
This study enriches previous research by showing that the administrative challenge is not merely "simple recording" but "non-comprehensive recording" that fails to integrate TBL. Unlike Wulandari et al. (2021), who measured social impacts externally, this study reveals that the waste bank itself lacks the internal system to measure these impacts.

## **Practical Implications and Initial Development Model**

Based on the discussion, the following practical implications and a simple model are proposed:

1. For the Bontang City Government (DLH) and BSI: Develop simple reporting *templates* covering TBL indicators (e.g., total waste collected, number of active customers, financial summary) and conduct holistic management capacity-building training.
2. For Waste Bank Managers: Start basic non-financial recording, such as a customer registration book and a daily/weekly *logbook* for waste weight by type.

Figure. 1. Simple Conceptual Model of Waste Bank Sustainability Accounting



This model emphasizes the integration of non financial recording into existing routines, aiming to produce more comprehensive reports for various stakeholders.

## CONCLUSION

This study concludes that the Bontang City Waste Bank has operated as an effective circular economy agent in managing materials and creating economic value, but it does not yet have an adequate sustainability accounting system. The manager's understanding is limited to conventional accounting, TBL implementation is uneven (economy structured, social and environment unmeasured), and the main barriers are human resource capacity and a minimalist system design.

Suggestions for managers are to start basic non-financial recording (customer registration, waste weight *logbook*). The government and BSI need to develop simple TBL report *templates* and conduct holistic training. Future research can design a sustainability accounting model or digital application suitable for waste banks' capacity and conduct quantitative studies to measure the impact of its implementation.

## Acknowledgement

The researchers thank the managers and customers of the Bontang City Waste Bank for their participation, and the Bontang City Environmental Agency for its support. This research was funded by an internal grant from Universitas Mulia in 2025.

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