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Regional Case Study

Evaluating Environmental Management Accounting of Community Driven Material Recovery Facility (CDRMF)

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Abstract

Environmental Management Accounting (EMA) has gained attention, yet its use in grassroots waste management remains limited, especially in communities with scarce resources. This study explores how Community driven Material Recovery Facility (CdMRF), or known as waste bank, Mitra Kita in Blitar, Indonesia, applies EMA principles in its daily operations. The focus is on how local groups adapt accounting practices to stay accountable, transparent, and sustainable despite financial and operational constraints. A qualitative case study was conducted through interviews, observations, and document analysis, supported by triangulation and member validation. Findings show that the CdMRF develops practical financial routines recording expenses, calculating unit costs, and preparing semiannual reports which strengthen transparency and trust among members. Community participation plays a central role, as routine activities generate financial, social, and ecological value. However, long-term sustainability is challenged by limited managerial skills, dependence on key leaders, and fluctuating waste prices. This study expands EMA discussions by shifting attention from formal institutions to community initiatives in developing contexts. It demonstrates that simplifying accounting can make environmental management more grounded and adaptable. The findings offer guidance for policymakers seeking to strengthen CdMRFs and similar programs within broader circular economy and sustainability efforts.

Keywords: Circular economy; community driven material recovery; environmental management accounting; sustainability; waste bank

1. Introduction

Indonesian cities continue to face persistent challenges in managing rapidly increasing volumes of solid waste, including in East Java. In Blitar, for example, the Blitar Djadoel Bazaar alone produces around 1.5 tons of waste per day, contributing to an estimated 500 tons generated regionally (Kinanti, 2025). Such figures highlight not only the magnitude of the problem but also the behavioral, infrastructural, and institutional constraints that limit the effectiveness of waste management efforts. Collection and disposal systems rarely keep pace with waste growth, leading to environmental degradation, public health risks, and increasing pressure on local governments to identify alternative solutions that can be sustained over time. In response to these limitations, community-driven material recovery facilities (CdMRFs) or known as waste banks, have emerged as grassroots mechanisms that fill the operational and governance gaps within local waste systems. CdMRFs represent community-based initiatives that incentivize waste separation at the household level through economic rewards, transforming waste into tradable commodities while fostering environmental awareness and social cohesion (Budihardjo et al., 2022). The Mitra Kita CdMRF in Blitar represents one such initiative. It functions not only as a collection point for paper and plastic but also as a community space for

environmental learning, participation, and accountability. Although its operational scope is modest, the initiative aligns with global sustainability priorities, particularly the Sustainable Development Goals (SDGs) related to responsible consumption, sustainable cities, and climate action. Its role becomes especially relevant in contexts where municipal systems are overstretched and communities must rely on their own organizational capacity to manage environmental flows.

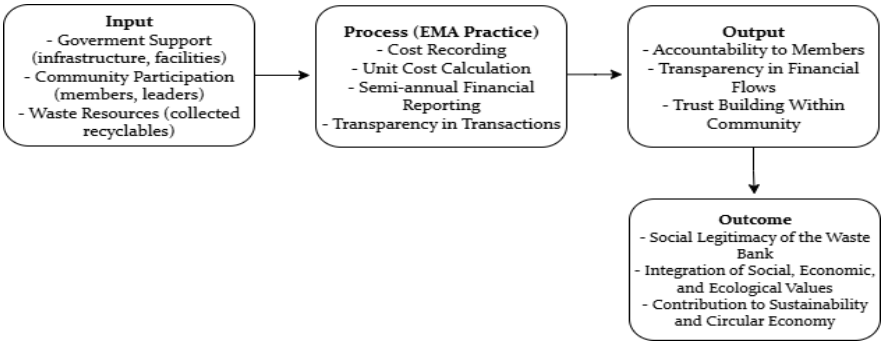
Effective waste management requires an integrated approach that links environmental measurement, regulatory compliance, internal decision-making, and transparency toward stakeholders. Environmental Management Accounting (EMA) provides the internal structure for these processes by tracing material flows, calculating environmental costs, and offering managers reliable information for sustainability-oriented decisions. EMA has been widely applied in industrial and institutional contexts, where it clarifies environmental cost distributions, reveals inefficiencies, and supports investment decisions in cleaner production. Many organizations use material flow costing, environmental cost allocation, or life-cycle-based analyses to strengthen their environmental performance and align their activities with long-term sustainability goals. In recent years, an external dimension has been added to these accounting processes. The Corporate Sustainability Reporting Directive (CSRD), for instance, institutionalizes sustainability disclosures to ensure the comparability, credibility, and assurance of environmental information (Sharma, 2025). Transparency across material, waste, and financial flows is increasingly viewed as a prerequisite for advancing circular economy practices, enhancing public trust, and improving resource efficiency(Nowaczek et al., 2021). Digital technologies such as artificial intelligence, blockchain, and the Internet of Things further strengthen this integration by converting internal EMA data into verifiable sustainability reports within the CSRD framework (Xia et al., 2025). Yet, findings from Vietnam indicate that technological or regulatory mechanisms alone are insufficient. EMA implementation depends heavily on managerial awareness, organizational commitment, and resource availability. Studies show that management understanding, stakeholder pressure, and financial capacity strongly influence EMA adoption (Anh, 2025; Nu et al., 2025; Tran and Nguyen, 2025). These determinants shape whether organizations can internalize EMA as a strategic tool rather than a compliance burden. For community-based organizations such CdMRFs where formal structures are weaker and resources are limited these internal factors become even more decisive.

Institutional theory enriches this perspective by explaining how external pressures, such as government regulations or societal expectations, work alongside internal motivations to shape EMA adoption (Wang et al., 2019). Evidence from the Middle East and North Africa further shows that technological capabilities, human resource practices, and coercive institutional pressures expand an organization's environmental accountability (Asiri et al., 2020). Building on this institutional-resource interplay, recent conceptual discussions suggest that organizations can utilize "resource bricolage" the creative recombination of limited resources to overcome financial and institutional constraints in adopting EMA (Al Safadi and Ooi, 2024). This idea is particularly relevant for grassroots communities in low-income regions, where weak institutions, unclear regulations, and resistance to change often impede EMA implementation(Komarudin et al., 2025). Empirical findings across sectors consistently highlight that management competency, stakeholder involvement, and available organizational resources remain central to successful EMA execution (Doan et al., 2023; Nu et al., 2025).

Previous studies have shown EMA's usefulness in manufacturing industries, rice mills, cement plants, municipal waste services, and university-based recycling initiatives. Environmental costs in many organizations remain hidden within overhead accounts, limiting managerial insight and discouraging sustainable investment. In Indonesia, studies on university CdMRFs highlight the role of sorting, recording, and information systems in strengthening environmental consciousness (Saputri et al., 2025; Sumiyati et al., 2021). Research conducted in Malang demonstrates how education, income, and awareness influence community involvement(Maryati et al., 2018), while studies on MSMEs suggest that EMA combined with simple waste management techniques can significantly improve sustainability

performance(Latifah and Soewarno, 2023). These findings collectively depict EMA as a flexible managerial tool that can be adapted to various organizational contexts.

Despite this expanding literature, a clear research gap persists: little is known about how EMA principles are operationalized within community-based CdMRFs in smaller cities such as Blitar (Budiyarto et al., 2024; Latifah and Soewarno, 2023). Most EMA studies assume a formal governance structure, stable financial capacity, and clear regulatory guidance conditions rarely found in grassroots organizations. CdMRFs operate through volunteerism, fluctuating leadership, and dynamic community interactions. Understanding how EMA unfolds in such settings is crucial for designing models that are not only technically sound but also socially embedded and context-sensitive.



Picture 1. Conceptual framework of Environmental Management Accounting in community-based waste management.

To address this gap, the conceptual framework of this study (Figure 1) positions Environmental Management Accounting as an intermediary mechanism linking internal governance, community participation, and environmental performance in a resource-constrained community setting. The framework illustrates three key relationships: (1) internal governance through rules, oversight, and leadership shapes the adoption and consistency of EMA practices; (2) EMA processes, including cost tracking, material recording, and information disclosure, support transparency and enhance community trust; and (3) the interaction between governance and EMA practices contributes to financial, social, and ecological outcomes aligned with SDG 11, SDG 12, and SDG 13. This integrative lens enables a more holistic understanding of how environmental accounting functions in grassroots environmental management. The urgency of this research is strengthened by three contextual factors. First, with the Blitar region generating approximately 500 tons of waste daily, CdMRFs have become critical frontline institutions whose accounting effectiveness influences broader municipal sustainability. Second, as Indonesia advances its SDG commitments, CdMRFs represent scalable models that require empirical evidence to guide policy formulation. Third, the COVID-19 pandemic exposed the fragility of community organizations, highlighting the importance of accounting transparency and adaptive capacity.

This study therefore investigates how EMA is practiced within the Mitra Kita CdMRF. Specifically, it examines how EMA is integrated into daily operations, how governance and member engagement influence these practices, how EMA supports cost measurement and environmental impact assessment, and how these processes contribute to the SDGs. The study contributes to EMA literature by extending its application to grassroots settings, demonstrating how simplified accounting practices can function effectively in resource-limited contexts, and revealing how transparent environmental accounting produces financial, social, and ecological value through trust, reciprocity, and shared community identity.

2. Methods

2.1. Research Design

This study uses a qualitative case study approach (Yin, 2018) to explore how community-based waste management operates at CdMRF Mitra Kita in Blitar City, Indonesia. Framed within an interpretive

paradigm (Creswell and Creswell, 2018), it views social reality as something shaped by people's experiences, interactions, and shared meanings. The case study design allows for a close look at the daily workings of the CdMRF how costs are recorded, unit prices are calculated, recyclable materials are traded, and how these activities create wider social and economic value for the community. The research also looks at informal and frequently undocumented procedures, like sorting techniques, how operating costs are handled, and local ideas about sustainability, in addition to formal systems. When you put all of these things together, you get a whole picture of how grassroots efforts help the environment and people's health.

2.2. Research Site

It chose CdMRF Mitra Kita as the research site because it has much community involvement from residents, collectors, and local government officials. This collaborative setting is a good place to look into how environmental, social, and economic values are made together in real life. The analysis looks at the whole process of waste collecting, weighing, and record keeping, as well as figuring out unit costs and setting pricing. Picture 2 shows how the process goes from waste collection to financial recording.

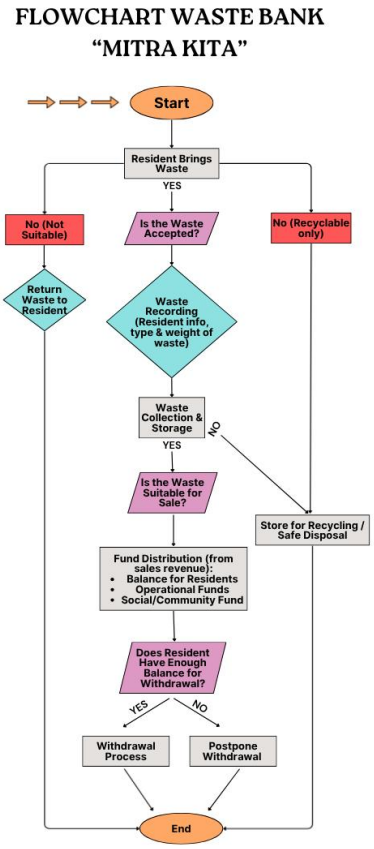


Figure 2. Process Flow of CdMRF Operations

2.3. Participants

The research examines the human aspects of these activities, encompassing alterations in community behavior, empowerment, and evolving attitudes towards sustainability. Participants were chosen using purposive sampling to guarantee alignment with the study's objectives. Two waste collection personnel, five people who regularly bring in recyclable products, and five administrators from Mitra Kita were among them. Community leaders also gave their thoughts on how the CdMRF affected the area in a bigger way. The objective was not statistical generalization but a profound comprehension of the lived facts and experiences of those most immediately engaged. Participants were selected purposive sampling to ensure comprised; 1) 5 administrators (chairman, treasurer, secretary, 2 coordinator), 2) 2 waste collection personnel (sorters/weighers), 3) 5 regular member-depositors (selected

for frequency: minimum 2 deposits/month), 4) 3 community leaders (neighborhood head, environmental cadres). Total 15 participants, ensuring data saturation across multiple stakeholder perspectives. Selection criteria included: (1) minimum 1-year involvement with CdMRF; (2) direct operational knowledge; (3) willingness to participate; (4) availability during fieldwork period. Second, participant observation recorded everyday activities like sorting, recording, recycling, and meetings using organized sheets and comprehensive field notes. Participant observation recorded everyday activities using structured observation sheets developed from EMA literature. Observations included: 1) waste sorting and weighing procedures, 2) recording and pricing practices, 3) monthly coordination meetings, 4) member transaction interactions. Field notes captured verbal exchanges, decision-making processes, and informal practices not documented in official records. The interviews were guided by semi-structured protocols covering four themes: (1) accounting and recording methods; (2) transparency mechanisms and reporting practices; (3) community involvement and participation drivers; (4) sustainability challenges and adaptive strategies. Third, document analysis looked at the CdMRF's archives, which included cost records, transaction logs, recycling reports, and other archival information. When used together, these methodologies gave a holistic view that combined personal experience with institutional data. The interview guide and observation sheets were created to get in-depth, context-rich information, and specialists checked them out before fieldwork started. Source triangulation utilized multiple participant categories (administrators, members, collectors, community leaders); technique triangulation integrated interviews, observations, and documents, and temporal triangulation gathered data at diffefent time point (March-April 2025) to capture operational variations (Denzin, 2017).

2.4. Data Collection

Data were gathered using three primary methods to enhance credibility and facilitate triangulation. First, participants were able to voice their thoughts freely in in-depth semi-structured interviews that lasted 60 to 90 minutes each. The interviews were guided by themes including accounting methods, transparency, involvement, and sustainability. We used (Miles et al., 2014) approach to evaluate the data, which included condensing, displaying, and deriving conclusions from it. The research prioritized the identification of repeating patterns and themes that embody operational reality, social dynamics, and environmental values, rather than adhering to conventional classification. To guarantee rigor, multiple validation procedures were employed. Source triangulation utilized several participant categories, technique triangulation integrated interviews, observations, and pdocuments, and temporal triangulation gathered data from many time points (Denzin, 2017). Member checking, in which individuals looked over the interpretations, made the study more credible. The research was conducted in four phases: preparation (instrument validation and access, January–February 2025), data collecting (March–April 2025), analysis (May 2025), and reporting (June 2025). The study encountered certain constraints, including restricted access to external stakeholders and the intrinsic subjectivity of qualitative research; yet, it offers a reliable and well-founded narrative regarding the emergence of environmental, economic, and social values within community-based waste management.

3. Result and Discussion

3.1. Waste Characteristics and Collection Patterns

Mitra Kita CdMRF has come a long way since its opening in November 2018. Over the past seven years, waste collection patterns have shown dynamics that reflect the complex interactions between external and internal factors in the community.

Table 1. Data on the number of members of Mitra Kita CdMRFs (2018-2025)

Year	Customers	Woman	Man
2018	32	30	2
2019	74	71	3

Year	Customers	Woman	Man
2020	18	15	3
2021	3	2	1
2022	7	7	-
2023	4	3	1
2024	2	2	-
2025	1	1	-
Amount	**141**	**131**	**10**

Source: Primary data from Mitra Kita CdMRF, 2025

Table 1 shows the membership dynamics which peaked in 2019 with 74 new members, then experienced a drastic decline since the COVID-19 pandemic in 2020. The cumulative total until 2025 reached 141 members with the majority being women (121 people) and only 10 men, reflecting the dominant role of women in household waste management at the community level.

Table 2. Waste collection volume of Mitra Kita CdMRF (2018-2025)

Year	Time Period	Volume (kg)
2018	Nov-Des	402.65
2019	Jan-Des	4,170.61
2020	Jan-Des	2,872.75
2021	Jan-Des	4,020.9
2022	Jan-Des	3,237.2
2023	Jan-Des	3,605.7
2024	Jan-Des	3,121.2
2025	Jan-Juni	1,772.1

Source: Primary data from Mitra Kita CdMRF, 2025

The data in Table 2 reveals a narrative that goes far beyond mere statistics. In its first months (November-December 2018), Mitra Kita CdMRF managed to collect 402.65 kg of recycled materials a modest but promising start, demonstrating the community's initial enthusiasm for engaging with the local environmental movement. 2019 marked a significant milestone, with waste volume surging significantly to 4,170.61 kg a nearly tenfold increase from the previous year. This surge was directly correlated with the addition of 74 new members (see Table 1), marking a consolidation phase in which public trust began to build and CdMRFs became accepted as part of household waste management routines. The Chairperson recalls that period with enthusiasm:
"We record the weight of the waste, its type, total monthly sales, and the names of our customers. It's a small amount, but for us, the impact is more important: how much of it isn't dumped in landfills where it piles up and stinks."

However, 2020 brought unexpected challenges. When the COVID-19 pandemic hit, the volume of waste collected plummeted to 2,872.75 kg a decrease of approximately 31% from the previous year. More worryingly, the number of new members also dropped drastically to just 16, a far cry from the 74 members the previous year. Restrictions on mobility and community gatherings hampered waste collection activities, while changes in household consumption patterns also affected the composition and volume of waste generated. This global health crisis demonstrated the vulnerability of community-based systems to external shocks, as noted by (UNEP, 2020) that the pandemic affected social, economic, and environmental activities globally. Recovery began in 2021, with volumes rising to 4,020.9 kg, nearly approaching pre-pandemic levels. However, the pattern that emerged afterward showed erratic fluctuations: 3,237.2 kg (2022), 3,605.7 kg (2023), and 3,121.2 kg (2024). Interestingly, this decline in volume was also accompanied by a consistent decline in the number of new members from 9 (2021), 7 (2022), 4

(2023), to just 2 (2024) and 1 in the first half of 2025. By mid-2025, 1,772.1 kg was recorded, which, if projected, would result in an annual total of around 3,500 kg, close to the average of the last three years.

These fluctuations are not just numbers they reflect a community that continues to adapt, recovering from the global crisis, adapting to local needs, and remaining steadfast in its role of sustainably managing waste. The correlation between the decline in membership and the decline in waste volume suggests that community participation is a key factor in the operational sustainability of CdMRFs. This pattern suggests that CdMRF performance is determined not only by operational efficiency but also by the interaction between local resilience and broader socio-economic factors. This finding aligns with research by (Zurbrügg and Rothenberger, 2013) which showed that the effectiveness of community-based waste management depends heavily on two key factors: member motivation and price stability. These changes confirm that such projects, while socially significant, remain highly fragile within the broader economic and social context.

While detailed data on waste composition is not systematically recorded in the annual report, field observations and interviews with managers revealed that the collected materials fall into the following main categories: paper (cardboard, newspapers, archives), plastic (PET bottles, rigid plastic, plastic bags), metal (aluminum cans, iron), and glass. Each category carries a different price depending on its selling price to the vendor, with PET bottles and aluminum metal generally having the highest value. The chairman explained that while the recording focuses on the total weight per material type and the name of the customer, there is no systematic tracking of trends in waste composition over time information that is crucial for a more comprehensive material flow analysis within the EMA framework. Field observations reveal seasonal patterns closely linked to the economic and social cycles of society. For example, around Eid al-Fitr, consumption spikes, followed by an increase in household waste. Ironically, however, this is the most critical period for CdMRFs. The head of the CdMRF explained clearly:
"During Eid al-Fitr, waste prices dropped drastically because collectors were flooded with goods. We'd promised customers certain prices based on previous months, but the price was lower when we sold to collectors. We ended up losing money fortunately there was cash surplus from previous profitable months, so we could cover it. But we were confused: is this organizational loss or customer loss?"

This confusion reveals a fundamental dilemma in their financial record-keeping: the unclear separation between organizational assets and customer assets, and the difficulty in classifying losses due to market price volatility.

3.1. Waste Collection and Sorting Procedures

The waste collection system at Mitra Kita CdMRF is built on flexibility and trust, adapting to customer conditions and needs. Two main mechanisms are implemented; 1) Direct Drop-off System: Customers bring sorted waste from their homes to the CdMRF location at a predetermined time. This approach fosters a sense of individual responsibility for waste management, with customers actively taking the initiative to come and deposit their waste. 2) WhatsApp Pick-up System: For customers who cannot come in person due to busy schedules, limited mobility, or other reasons the CdMRF provides a pick-up service. The process is simple yet organized: the customer confirms via WhatsApp, then an officer uses a cart to collect the waste directly from the customer's home. The waste is then taken to the CdMRF location to be weighed. The Chairwoman explained:
"We understand that not everyone can come in person. Some are working, some are sick, some are taking care of small children. So we created a WhatsApp chat system. They confirm, and we come and pick them up with a cart. The waste is still weighed on site, photographed, and then recorded. Everything is transparent."

The flexibility of this system reflects a deep understanding of the local context and the realities of residents' lives. Unlike door-to-door collection systems, which are structured with fixed schedules but incur high operational costs, this on-demand approach is more cost-efficient while maintaining accessibility. Interestingly, this WhatsApp-based system also creates informal digital documentation screenshots of conversations, photos of scales, and confirmations which, while not yet integrated into

formal bookkeeping systems, provide a traceable transaction trail in case of disputes. Every waste transaction, whether delivered directly or picked up, follows the same standard protocol to ensure consistency and transparency. The chairwoman explained the process:
"We've started recording not just the money, but also the type of waste, its weight, and the customer's name directly when the customer collects the waste, so we can transparently see the changes every month."

There are 5 procedures implemented, namely: 1) Receipt and Verification: Waste is received and an initial inspection is carried out on the condition and category of the material, 2) Weighing: Each type of material is weighed separately using the available scales, 3) Visual Documentation: The weighing results are photographed as evidence a practice that is starting to be implemented especially for pick-up transactions to ensure transparency, 4) Recording: Officers record the type of material, weight, and calculate the value based on the current price, 5) Double Bookkeeping: Transactions are recorded in two places the CdMRF ledger and the customer's savings book.

This dual-record system provides a simple yet effective check and balance mechanism. Customers have their own personal records to take home, while the CdMRF maintains complete records for periodic reporting. This transparency is key to building trust between managers and members, especially in contexts where external audits or formal accounting systems are lacking. The treasurer said:
“We record every incoming waste transaction, including the amount, the price, and who deposited it. Everything is entered into the CdMRF's ledger and each customer's savings account. Every six months, we prepare a simple financial report that is discussed at a member meeting. Everyone can see where the money is going.”
However, this system is not without its problems. One shopkeeper revealed a rarely seen technical flaw:
"The scales there are no longer accurate. Sometimes waste differs by half a kilo. I know because I reweigh at my place. But they seem unaware or have no budget for calibration."

This scale accuracy issue reveals another dimension of limited technical and financial capacity. A half-kilogram inaccuracy may seem trivial, but in the long run, it can result in losses for both customers and the organization and potentially erode established trust. Furthermore, this demonstrates the absence of regular calibration procedures as part of the quality control that should be standard operating procedure.

3.2. Financial Reporting and Pricing Mechanisms

In Indonesia's informal recycling ecosystem, waste collectors (lapak) are key actors connecting community CdMRFs with the larger recycling industry. Mitra Kita CdMRF, like most other CdMRFs, relies heavily on the pricing system set by the lapak. The mechanism is simple but fraught with risk: the CdMRF purchases recycled materials from customers at a price typically Rp 100-200 per kilogram lower than the selling price to the lapak. This thin margin reflects an effort to balance two interests simultaneously: maintaining community participation while ensuring the CdMRF has the financial capacity to sustain its operations. The goal of this approach is to maintain community participation while ensuring the organization remains financially stable. However, the market logic they follow is actually the source of their greatest vulnerability. When stall prices fluctuate rising during high demand, falling when the market is saturated, especially during holiday seasons like Eid al-Fitr the CdMRF's financial stability is shaken.

This structural dependency is not unique. This pattern aligns with what previous studies have observed: many community-based CdMRFs in Indonesia struggle with structural limitations rooted in their dependence on middlemen (Kubota et al., 2020). This dependency makes their revenue streams unreliable and puts them at risk of financial loss, as prices for recycled materials fluctuate due to market forces and the control of middlemen. Unlike formal recycling companies that can generate income through various means, these community projects typically generate minimal revenue, making them highly vulnerable to market fluctuations (Budiyarto et al., 2024). The results of this study suggest that

market logic guides pricing decisions, but the dependency that sustains them creates uncertainty for both the institution and its members.

To maintain accountability to its members and local stakeholders, Mitra Kita CdMRF provides reports twice a year, from January to June and from July to December (Miftahorrozi et al., 2022). The chairman proudly explains this practice:

"We make reports every six months. Later read at member meetings income from waste sales, expenses for operational costs, remainder. Everything recorded in the big cash book. If anyone wants to see original records, they're welcome we are open."

This process demonstrates an awareness of fiduciary responsibility and provides the information needed for short-term business decision-making. Reports are read at member meetings, creating a space for dialogue and strong social accountability. Every customer can see where their money is going, how much revenue is generated from waste sales, and how much is used for operational costs. However, behind this local transparency lies methodological limitations. The chairwoman frankly admitted:

"We don't really know what the official accounting standards look like. What matters to us is that records are clear, all members trust us, and the money matches the records. We created our own simple reporting format so residents can understand it easily."

Their reporting still focuses primarily on conventional monetary figures and internal accounting (Gündüz and Gündüz, 2025). There has been no integration with the broader environmental accounting framework advocated by academics, which combines physical material flow data with environmental cost information (Burritt and Christ, 2016; Khalid, 2023). At the international level, systems such as the UN System of Environmental-Economic Accounting (SEEA) and ISO 14051 on Material Flow Cost Accounting offer defined methods for integrating environmental and economic data. This enables comparisons between organizations and ensures they are working towards sustainability goals such as the SDGs (ISO, 2011; SEEA, 2020).

This is where methodological and conceptual tensions arise: the practice of semi-annual reporting from CdMRFs works well for local governance and community-level accountability, but it does not provide the standardized environmental metrics needed for global comparability and recognition (Burritt and Christ, 2016; SEEA, 2020). On the one hand, periodic financial reports are sufficient for decision-making and transparency at the local level. On the other hand, the lack of standardized environmental accounting standards makes it more difficult to measure and communicate broader contributions to sustainability goals, including the Sustainable Development Goals (SDGs). One crucial issue that emerged in the interview was the lack of clarity regarding the separation of assets, the treasurer said:

"Money from waste sales belongs to customers, but they do not immediately take it. So the money stays with us first. We record who owns how much, but physically the money mixes with organizational operational money. So far there's been no problem because we trust each other, but in accounting language this might not be correct."

This admission reveals a problematic accounting practice: the mixing of client funds with the organization's operating funds. While this practice has not led to any conflicts due to high levels of social trust, it carries risks especially in the event of a leadership change or financial crisis. Formal accounting standards state that the separation of client funds (custodial funds) from the organization's funds is a fundamental principle for transparency and accountability.

3.3. EMA Implementation and Transparency Practices

Environmental Management Accounting (EMA) advocates the integration of environmental data with financial information for more sustainable decision-making. However, the practice at Mitra Kita CdMRF is far from this ideal. They record waste transactions in detail type, weight, price, and customer name but have not integrated this with broader environmental impact metrics. The chairwoman explained their orientation:

"We record every waste transaction that comes in how much, what price, who deposited it. Everything goes into the CdMRF ledger and each customer's passbook. Every six months we prepare a simple financial report that we discuss at member meetings. Everyone can see where the money is."

This record-keeping, while simple, demonstrates the basic elements of transparency. However, what's missing is the environmental cost information dimension for example, how many tons of CO_2 were reduced, how many cubic meters of landfill space were saved, or the economic value of reducing environmental pollution. Another issue arose in asset recording. The CdMRF's main equipment scales, tables, chairs, and storage were all donated by the Environmental Agency (DLH). The chairwoman explained:

"Scales, tables, chairs, and warehouse all donations from Environmental Services. We do not record them as assets because we feel they're not ours, but government property loaned to us. So these asset values don't appear in our reports."

This approach, while understandable from an ethical perspective, results in financial statements not reflecting the actual value of assets used in operations. Under standard accounting, assets held for operations even if on loan must still be reported to provide a complete picture of the resources managed by the organization. Despite methodological limitations, Mitra Kita CdMRF has successfully created a transparency mechanism tailored to its local context. Their self-developed reporting format is easier for residents to understand than formal financial reports filled with technical jargon. Six-monthly member meetings serve as a space for social accountability where everyone can ask questions, criticize, or offer suggestions. This aligns with the view that environmental accounting frameworks need to be tailored to the needs and capacities of grassroots organizations (Bebbington and Larrinaga, 2014). Implementing rigid standards without building capacity can discourage community actors, while flexible and simple models can actually increase local ownership and accountability.

3.4. Community Participation and Governance

Field observations indicate that members' involvement in the CdMRF cannot be adequately explained through economic rationality alone. Many residents still sell recycled materials for a small profit, not because they want to make money, but because they believe in the project's environmental and social goals. They do so because they feel a sense of belonging and know that their actions help keep the community clean and strengthen it. This aligns with other research showing that community-based environmental programs thrive when there are not only financial incentives but also shared norms, trust, and communal values (Ives and Kidwell, 2019). The chairperson revealed a deeper motivation:

"We don't get paid at all; this is all social work, but we feel a responsibility to protect this environment. If not women like us, who else? We, who inhabit this earth, want to preserve it. Because we have the slogan: 'Waste is not an inheritance for our children and grandchildren."

This statement reveals a dimension of value that goes beyond calculations of profit and loss. Their participation is driven by a sense of collective responsibility, an identity as an environmentally conscious community, and a moral commitment to not pass on the waste problem to future generations. In this way, the sustainability of CdMRFs emerges from a hybrid foundation: economic logic provides structure, while social and ethical commitments provide life. Together, they create a form of resilience that allows participation to persist even when market pressures fluctuate (Bennett et al., 2018; Ives and Kidwell, 2019).

Leadership also plays a crucial role in this resilience. The Chair's consistent presence and hard work have kept the organization going, even when some of the original members resigned. This type of leadership isn't about having power; it's about caring for others and helping them do things by showing them how and trusting them. This kind of community-centered leadership is crucial for voluntary organizations, where inspiration often outweighs hierarchy (Bebbington et al., 2021). The case of Mitra Kita CdMRF demonstrates that enduring leadership depends as much on emotional labor and moral commitment as it does on managerial skills. However, this strength also poses a vulnerability. Heavy reliance on a single leader creates institutional risks: what happens if the Chairperson is incapacitated or

resigns? Will the system continue to function? Experience from many voluntary organizations shows that overly centralized leadership can threaten long-term sustainability. Equally vital is the spirit of volunteerism that underpins daily operations. People perform tasks like sorting and weighing waste, tracking money, and so on without pay. These unpaid activities should not be interpreted as mere charity; they should be seen as a sign of social unity and community investment in the health of all. This emphasizes that the CdMRF operates not merely as an economic enterprise but as a social institution rooted in local values, reciprocity, and mutual care.

3.5. Challenges and Sustainability Constrains

Volatility in retail prices is the most serious challenge facing Mitra Kita CdMRF. As previously explained, during Eid al-Fitr, prices for recycled materials can plummet due to a market oversupply. CdMRFs that have promised customers a certain price based on previous months are forced to bear losses when the selling price to retailers is lower. This experience reveals a dilemma: should these losses be borne by the organization or passed on to customers? If borne by the organization, reserves would be eroded and sustainability would be threatened. If passed on to customers, trust would be undermined and participation could decline. This confusion reflects the lack of a clear framework for managing the risk of market fluctuations something that should be part of a more mature EMA system.

Despite their high enthusiasm, the CdMRF administrators face limited technical capacity in planning and record-keeping. The chairman frankly admits they are unfamiliar with formal accounting standards. Their self-developed record-keeping system, while effective for the local context, lacks sufficient methodological depth to support long-term strategic decision-making. This problem is exacerbated by the lack of structured training from external parties. The Environmental Agency (DLH) does provide assistance, but it largely consists of physical infrastructure scales, warehouses, and equipment without any accompanying capacity building in financial management or environmental accounting. This phenomenon is part of a broader trend in Indonesia, where many community-based CdMRFs still struggle with management and accountability due to inadequate technical support from government institutions (Budiyarto et al., 2024). As mentioned previously, dependence on the Chairman poses a structural vulnerability. There is no formal mechanism for leadership regeneration or distribution of managerial responsibilities. Operational knowledge, networks with vendors, and stakeholder relationships remain largely centralized in one person. A sudden change in leadership can result in the loss of institutional memory and disrupted operations.

The local Environmental Agency (DLH) has been instrumental in keeping CdMRFs operational. DLH assists communities by providing basic tools and infrastructure that would cost significant amounts of money to purchase on their own. This helps communities in the area stay on top of their daily tasks, such as collecting waste, sorting it, and selling recyclables. However, most assistance remains physical and infrastructural, rather than developmental. What is missing is systematic assistance in management or finance. There has been little structured training in areas like financial reporting, cost tracking, or environmental accounting skills that could strengthen institutional capacity and long-term sustainability. This phenomenon is part of a broader trend in Indonesia, where many community-based CdMRFs still struggle with management and accountability because government institutions do not provide sufficient technical assistance (Budiyarto et al., 2024). The study's findings align with those of other studies on circular economy practices. This research shows that community-based recycling programs are only successful when supported by systems that consider technical, institutional, and financial issues. Without such comprehensive support, grassroots programs often stall, even when physical infrastructure is in place (Winans et al., 2017).

3.6. Integration of Social-Economic-Ecological Values

The results show that the community CdMRF has grown into a system with remarkably complex operational characteristics since it opened in 2018. The most complicated parts of this are how pricing for

recyclable materials is set, how waste is collected, and how financial reporting is set up. The CdMRF sells sorted recyclables to intermediaries, called lapak in the area, who are the most important link between the village and the wider recycling business. The CdMRF's business strategy and long-term stability depend heavily on lapak pricing. The CdMRF uses a basic margin principle to set pricing. For example, they buy recyclables from households at rates that are usually IDR 100–200 lower than the lapak price per kilogram. The purpose of this approach is to keep people in the community interested in participating while also making sure that the organisation stays financially stable. However, this same arrangement puts the garbage bank in danger. The CdMRF's stability depends on the unpredictable swings of the secondary recycling market because scrap prices go up when demand is high and down when demand is low, especially during holidays like Eid.

This pattern aligns with what earlier studies have observed: many community-based CdMRFs in Indonesia struggle with structural limitations rooted in their dependence on intermediary buyers. This dependence renders their income streams unreliable and puts them at risk of losing money because the prices of recyclable materials often change due to market forces and the control of middlemen (Kubota et al., 2020; Muljaningsih et al., 2025). Formal recycling firms can make money in many different ways. Nonetheless, these community projects generally generate minimal revenue, rendering them very susceptible to market fluctuations (Budiyarto et al., 2024). The results of this study show that market logic guides price decisions, but the dependency that keeps them going also makes things unclear for both the institution and its members. To keep members and local stakeholders informed and accountable, the CdMRF provides reports twice a year, from January to June and from July to December (Miftahorrozi et al., 2022). This process shows that you know about your fiduciary duty and gives you the information you need to make short-term business decisions. However, the reporting remains focused mainly on conventional monetary figures and internal bookkeeping (Gündüz and Gündüz, 2025). It does not yet incorporate the broader scope of environmental accounting that scholars advocate, one that combines physical material-flow data with environmental cost information (Burritt and Christ, 2016; Khalid, 2023). Internationally, systems such as the UN's System of Environmental-Economic Accounting (SEEA) and ISO 14051 on Material Flow Cost Accounting offer defined methods for integrating environmental and economic data. This lets you compare organizations and make sure they are working toward sustainability goals like the SDGs (ISO, 2011; SEEA, 2020). The CdMRF's practice of reporting every six months creates both a methodological and conceptual tension: it works well for local governance and community-level accountability, but it does not provide the standardized environmental metrics that are needed for global comparability and recognition (Burritt and Christ, 2016; SEEA, 2020). On the one hand, regular financial reports are enough for making decisions and being open at the local level. On the other hand, the lack of standardized environmental accounting standards makes it harder to measure and talk about bigger contributions to sustainability goals, including the Sustainable Development Goals (SDGs). In this situation, financial accountability is more tailored to the local level than to the global level.

An examination of waste collection data from 2018 to mid-2025 uncovers a cyclical pattern that reflects both external disturbances and internal community dynamics. In its first few months (November–December 2018), Mitra Kita CdMRF collected 402.65 kg of recyclable materials. This was a small but promising start that showed that people in the area were excited about the project. By 2019, the amount of rubbish collected had grown to 4,170.61 kilos, showing that the community was starting to trust the CdMRF and that it was becoming more stable as an institution. However the following year, when the COVID-19 pandemic started, the number dropped sharply to 2,872.75 kilograms. This was because the pandemic affected social, economic, and environmental activity around the world (UNEP, 2020). Restrictions on movement and community meetings made it harder to collect waste, while changes in how people used things changed how much waste households made. In 2021, things started to get better, and the amount collected went back up to 4,020.9 kilograms. However, the pattern was uneven after that, with 3,237.2 kilos in 2022, 3,605.7 kilos in 2023, and 3,121.2 kilos in 2024. The overall amount by the middle of 2025 was 1,772.1 kg, which means that the yearly total will probably be close to the three-year average.

This change reveals a bigger story: the CdMRF's performance is not only based on how well it runs, but also on how local resilience interacts with larger social and economic factors. It shows a community that is constantly changing, recovering from global problems, adapting to local needs, and asserting its role in managing garbage in a way that is good for the environment.

These changes show how closely linked outside factors and inside factors are in determining how well a community CdMRF works. Changes in market prices, public health issues, and new rules all have a direct effect on how actively people participate on the outside. The strength of leadership, the level of trust inside the institution, and the consistency of volunteer engagement all affect how robust the organization may be. Prior research indicates that the efficacy of community-based waste management frequently depends on two essential factors: member motivation and pricing stability (Zurbrügg and Rothenberger, 2013). The information provided confirms that these kinds of projects, even while they are socially significant, are nonetheless very fragile in the bigger picture of the economy and society. The core of this system is a pricing mechanism that uses two different types of logic to balance economic rationality with social solidarity. The CdMRF serves as a middleman between families and lapak (local recyclers) from an economic point of view. It uses a simple margin-based approach to stay financially stable. This method is based on the well-known market ideas of supply and demand. Still, it is tempered by a community spirit that emphasizes participation and the shared good over making the most money.

Field observations indicate that members' involvement in the CdMRF cannot be adequately elucidated through economic rationale alone. Many residents still sell recyclables at minor profits, not because they want to make money, but because they believe in the project's environmental and social goals. They do what they do because they feel like they belong and know that what they do helps keep communities clean and makes the community stronger. This is in line with other research that shows that community-based environmental programs do well when there are not only financial incentives but also shared norms, trust, and communal values (Ives and Kidwell, 2019). In this way, the CdMRF's sustainability emerges from a hybrid foundation: economic logic provides structure, while social and ethical commitments give it life. Together, they create a form of resilience that allows participation to endure even when market pressures fluctuate (Bennett et al., 2018; Ives and Kidwell, 2019). Leadership also plays a pivotal role in this endurance. The chairperson's constant presence and hard work have kept the school going, even if some of the first members left. This kind of leadership is not about having power; it is about caring about others and helping them do things by showing them how to do it and trusting them. Such community-centered leadership, is essential for voluntary organizations, where inspiration often matters more than hierarchy (Bebbington et al., 2021). The case of Mitra Kita CdMRF demonstrates that enduring leadership depends as much on emotional labor and moral commitment as on managerial skill. Equally vital is the spirit of voluntarism that sustains daily operations. People do things like sorting and weighing waste, keeping track of money, and more without getting paid. People should not conceive of this unpaid activity as just charity; it should be seen as a sign of social unity and a community investment in everyone's health. It underscores that the CdMRF operates not simply as an economic enterprise but as a social institution rooted in local values, reciprocity, and mutual care.

The local Department of Environment (DLH) has been benefical in keeping the garbage bank open. The DLH helps the community by giving them basic tools and infrastructure that would cost the community much money to buy on their own. This helps people in the area stay on top of their daily tasks, like picking up waste, sorting it, and selling things that can be recycled. However, much of the help is still physical and infrastructural, not developmental. What is missing is systematic help in the areas of management or finance. There has been little structured training in areas such as financial reporting, cost tracking, or environmental accounting skills that could strengthen institutional capacity and long-term sustainability. This phenomenon is part of a bigger trend in Indonesia, where many community-based CdMRFs still have trouble with management and accountability because government institutions do not give them enough technical help (Budiyarto et al., 2024).

The results are in line with what other research has found about circular economy practices. This research shows that community-based recycling programs only work when they are backed by systems that take into account technical, institutional, and financial issues. Without this kind of all-around support, grassroots programs often hit a wall, even when there is physical infrastructure (Winans et al., 2017). The CdMRF's system of reporting every six months is a practical way to hold people accountable. To keep things open and honest, members share reports, especially about money coming in and going out. Nonetheless, these records are still relatively basic and lack the methodological depth that is shared in environmental accounting frameworks (Bebbington and Larrinaga, 2014). This gap shows a tension that keeps coming up between local practices and global standards. Community-level reporting fosters trust and social cohesion; however, it has not yet generated systematic data that can inform comprehensive sustainability assessments at regional or national levels. These changes in theory show that environmental accounting frameworks need to change to fit the needs and abilities of grassroots groups. Enforcing strict rules without building capacity can make community actors lose interest, but flexible and simple models may increase local ownership and responsibility. From the point of view of the circular economy, the CdMRF is a small but important part of the larger network of resource circulation. It actively reduces environmental externalities by collecting, sorting, and sending recyclables away from landfills. However, its impact is still small compared to the 500 tons of waste that are thrown away every day in Blitar Regency (Kinanti, 2025).

A circular economy cannot be sustained by technical solutions alone; it also depends on institutional frameworks that encourage cooperation among the public, private, and community sectors (Geissdoerfer et al., 2017). The CdMRF analyzed in this study exhibits only partial integration. It has been successful in getting households involved, but its links to municipal systems and private-sector innovations are still weak. Consequently, although it encapsulates the essence of circularity, its potential for transformation is limited by the lack of extensive multi-stakeholder involvement. The study finds several problems that are linked to each other and threaten the institution's long-term viability. First, the prices of lapak change all the time, which makes recycling financially risky and less motivating for members. Second, the leadership is still very centralized. The CdMRF depends a lot on the chairperson's dedication and charm, which makes it weak when the leadership changes. Third, poor management, especially when it comes to planning and keeping records, makes it hard to see the big picture and learn from mistakes. Finally, changes in how many people in a community take part directly affect how much waste is picked up. This shows how fragile voluntary participation is. These problems are similar to what happens in community-based waste management around the world, where grassroots efforts often have trouble with a lack of resources, inconsistent participation, and being affected by changes in the market (Alam and Ahmade, 2013; Kumar et al., 2017). So, the problems that the CdMRF is having are not unique. Instead, they show the bigger problem of turning small environmental projects into strong, flexible systems that can support long-term sustainability.

Figure 3. Thematic map of findings

One of the most significant problems that CdMRFs have to deal with is that waste prices change all the time, which makes people unsure and less likely to join. To solve this problem, some communities have set up internal catalog pricing systems that set rates for specific periods of time. This lets members know how much their deposits will be worth ahead of time. Regular and clear price changes also help keep people from being unhappy. At the same time, making long-term deals with prominent recyclers, like pre-purchase agreements or contractual partnerships, can help keep prices and supply steady. Many CdMRFs are now looking into product diversification, which means making crafts or upcycled goods out of recyclable materials to make them more valuable. This is in addition to managing prices. This way of doing things not only gives you a more stable income, but it also strengthens the social and creative aspects of community entrepreneurship. Another problem that keeps coming up is the ability of managers. For long-term resilience, it is important to strengthen human resources by giving them hands-on training in basic accounting, financial management, and organizational coordination. Like the one in Padang, CdMRFs that used to keep track of their records by hand are now adopting digital tools like Excel-based accounting systems to make their records more accurate and their job faster (Dahar et al., 2023). People are less dependent on one person when they change who is in charge and share management duties. This encourages shared ownership and responsibility. Management stays responsive and learns from problems as they come up, thanks to regular internal monitoring and evaluation.

A third major issue is that companies rely on individual leaders, which could threaten their long-term survival. It is important to keep things going when important people leave by making sure everyone knows who will take over and that everyone is a leader. Keeping track of procedures, operational standards, and financial records systematically helps keep the organization's memory alive and makes sure that work does not stop when people leave. Building stronger ties with local businesses, government agencies, and non-profits also helps share responsibilities and not depend too much on your own resources. Everyone in the group should also feel like they all own it. The people who work there as depositors, decision-makers, and managers make the organization stronger from the inside. This sense of belonging transforms the CdMRF from a mere service provider into a collective movement founded on shared values. Surabaya's CdMRFs show that getting people involved and working together with different groups can make environmental governance and institutional legitimacy better (Wijayanti and Suryani, 2015). Research on collaborative governance in village-level CdMRFs in Gresik (Ngargosari) indicates that structured cooperation among governmental, business, and community stakeholders improves institutional adaptability and long-term resilience (Hertati and Arif, 2022).

The empirical findings from CdMRF Mitra Kita delineate three interconnected dimensions that affect the implementation of Environmental Management Accounting (EMA) at the grassroots level: transparency and accountability in financial and operational reporting, community participation as both a catalyst and an outcome of collective action, and the persistent challenges that obstruct long-term sustainability. The thematic map in the study shows how market rationality, social solidarity, and leadership dynamics work together in real life. The results indicate that the durability of CdMRFs cannot be comprehended solely through economic models. It is the combination of social trust, a shared identity, and community values that keeps people involved and makes them more committed to the group. This perspective corresponds with the growing calls in the literature for more inclusive frameworks that recognize both the tangible and intangible dimensions of environmental governance (Bebbington and Larrinaga, 2014). It is also important for the study to know what is wrong with universal or standardized ways of keeping track of the environment. CdMRFs and other local groups often change how they keep track of their money to meet their own needs. These changes may not be in line with official rules, but they are still essential and helpful in their communities. Recognizing this diversity affirms the importance of various accounting systems that link global sustainability frameworks with local social structures. From a practical perspective, the research emphasizes the imperative of surpassing mere infrastructural assistance. Government agencies need to spend money on improving their management and accounting skills if they want to make institutions stronger. CdMRFs can also make their money more stable by

working with businesses and finding new ways to make money besides just trading raw waste. Adding simpler parts of environmental accounting to financial reporting can also make both internal accountability and external legitimacy stronger. Finally, continuity and resilience need to encourage collective leadership instead of relying on individual leaders. These insights collectively indicate a more inclusive and flexible model of community-based waste management that aligns economic rationality with social objectives in promoting the circular economy.

This study illustrates that community-oriented waste management practices at CdMRF Mitra Kita serve not only as a technical means to reduce household waste volume but also simultaneously produce social, economic, and environmental advantages. The cost recording, unit cost calculation, and recyclable material transactions show that CdMRF managers and community members work together to do simple accounting. Another important finding is that the community is actively involved in sorting, weighing, and recording transactions. This shows that the process is open and builds social trust. The study also finds that participants changed their behavior, especially when it came to being aware of the environment and being able to link everyday actions to economic benefits and the well-being of the group. These results show how CdMRF Mitra Kita creates social, economic, and environmental value at the same time through its daily activities. Picture 4 shows how these three parts fit together by showing them as an "Integration Triangle," with adaptive community-based governance through EMA at its center.

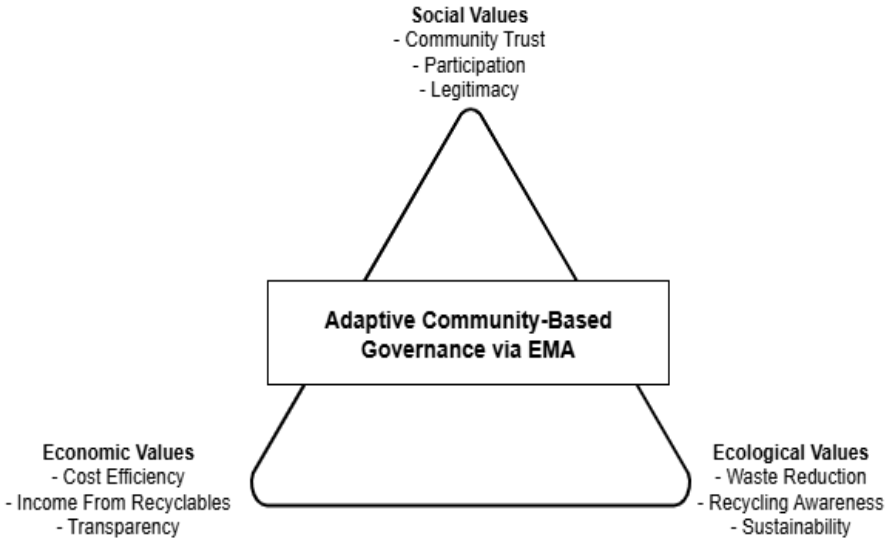


Figure 4. Integration triangle (Social-Economic-Ecological Values)

Empirical findings from Mitra Kita CdMRF illustrate three interrelated dimensions influencing the implementation of Environmental Management Accounting (EMA) at the grassroots level: transparency and accountability in financial and operational reporting, community participation as both a catalyst and outcome of collective action, and persistent challenges hindering long-term sustainability. The thematic maps in this study demonstrate how market rationality, social solidarity, and leadership dynamics work together in real-world practice. The research findings indicate that the resilience of CdMRFs cannot be understood solely through economic models. It is the combination of social trust, shared identity, and community values that sustains engagement and strengthens group commitment. This perspective aligns with growing calls in the literature for a more inclusive framework that recognizes both tangible and intangible dimensions of environmental governance (Bebbington and Larrinaga, 2014).

This study shows that community-oriented waste management practices at Mitra Kita CdMRF not only serve as a technical means to reduce household waste volume but also simultaneously generate social, economic, and environmental benefits. Cost recording, unit cost calculations, and recycled material transactions demonstrate that CdMRF managers and community members collaborate to perform simple accounting. Another important finding is that the community is actively involved in sorting, weighing,

and recording transactions. This demonstrates an open process that builds social trust. The study also found that participants changed their behavior, particularly in terms of environmental awareness and the ability to connect daily actions to economic benefits and group well-being. These results demonstrate how Mitra Kita CdMRF simultaneously creates social, economic, and environmental value through its daily activities.

Figure 4 above shows how these three parts fit together by representing them as an "Integration Triangle," with adaptive community-based governance through EMA at its center. At the apex of the triangle are Social Values, encompassing community trust, participation, and legitimacy. In the lower left corner are Economic Values, encompassing cost efficiency, revenue from recycled materials, and transparency. In the lower right corner are Ecological Values, encompassing waste reduction, recycling awareness, and sustainability. These three values reinforce each other and integrate through adaptive community-based governance.

When looked at through the lens of Ecological Modernization Theory (Figure 4), these results show how new ways of doing things in institutions and in society can make ecological concerns a part of both the economy and everyday life (Atkinson-Palombo, 2010; McCammon et al., 2004). When people in a community work together to manage waste, they create a process of co-construction of value that is not just financial, but also social and ecological. Being open about costs and transactions that can be recycled is a way for people to hold each other accountable, which makes the CdMRF more legitimate in the community. This aligns with the view that the implementation of sustainability practices at the community level strengthens participation and generates adaptive community-based governance in response to environmental challenges (Razak and Tajuddin, 2020). The upward trend of community participation can be understood as a response to the direct benefits they gain, both in the form of financial incentives from the sale of waste and in the strengthening of a collective identity as an environmentally conscious community. The more transparent the process of recording and transactions, the higher the level of trust and participation. This trend shows that the variables of transparency and social accountability function as key drivers for sustaining the program. At the same time, the practice of unit cost calculation and cost recording, although still relatively simple, encourages internal efficiency and provides a tangible picture of the economic contributions generated by CdMRF operations.

The results of this study are very similar to those of earlier studies on community-based waste management in Southeast Asia, which showed that social participation is a key factor in program success (Burritt and Christ, 2016; Schaltegger and Burritt, 2017). Evidence from Thailand and the Philippines, for example, shows that when communities take an active role in environmental management accounting, they not only save money but also raise awareness of environmental issues as a group. These insights confirm that the effectiveness of CdMRFs relies not solely on technical operations but also on promoting social cohesion and shared environmental values. CdMRF Mitra Kita is a real-life example of how managing things in the community can bring together the social, economic, and environmental parts of sustainability in a meaningful way.

In practical terms, the results teach us important things about how to make community-based waste programs better in developing countries. They show that even basic Environmental Management Accounting (EMA) practices, like keeping clear records of costs, doing basic unit-cost calculations, and reporting finances every six months, can build trust and responsibility in local communities. These techniques could be structured into training modules for grassroots organizations, facilitating increased transparency without the implementation of intricate or resource-intensive systems (Burritt and Christ, 2016; Schaltegger and Burritt, 2017). The study also stresses that government agencies and local governments need to do more than build infrastructure. Although equipment and facilities are important, the long-term success of CdMRFs depends on training for managers, programs to improve digital literacy, and customized capacity-building in environmental accounting (Budiyarto et al., 2024). Collaborative incubator programs that connect governments, universities, and local communities could help make these institutions stronger (Winans et al., 2017).

This research, however, has its constraints. As a single-case study conducted in Blitar City, the results may not comprehensively reflect the varied socio-economic and institutional contexts of other regions. The reliance on qualitative methods provides depth but limits generalizability and the ability to quantify economic or ecological impacts (Liu et al., 2023). Additionally, the short duration of fieldwork and dependence on self-reported data may lead to potential bias. Nonetheless, these limitations create opportunities for future research. Comparative studies of several CdMRFs, both in Indonesia and elsewhere, could help us understand the different types of institutions and what makes them successful. Adding quantitative methods like cost-benefit modeling or material flow analysis would help people understand the economic and environmental contributions even better. Investigating digital innovations such as mobile platforms for transaction monitoring or blockchain for transparent reporting also facilitates the modernization of community waste management systems.

The research also links problems with local waste management to problems with the environment around the world. Poorly managed solid waste not only pollutes the area, but it also causes problems around the world, such as greenhouse gas emissions, loss of biodiversity, and health risks for people. In 2020, it cost $361 billion to deal with municipal solid waste and its harmful effects on the environment (United Nations Environment Programme, 2024). If things do not change much, this number is likely to go up a lot by 2050, and the most vulnerable groups will be the most affected (Group, 2022). It is not only a policy goal to make local solutions work on a global scale as cities grow; it is also the right thing to do.

This research primarily concentrated on governance, transparency, and participation, neglecting a comprehensive analysis of the technical dimensions of cost accounting and pricing. Previous research indicates that environmental costs, such as fuel, maintenance, or community initiatives, are frequently categorized as general operational expenditures, revealing minimal distinction among prevention, detection, and failure costs (Mustika et al., 2023). For instance, in the TPST 3R Mulyoagung Bersatu facility in Malang, Indonesia, environmental costs are recorded in cash but are not fully disclosed. Environmental Management Accounting can make cost structures more formal, which helps identify cost drivers, measure hidden environmental impacts, and support decision-making based on data. More generally, explicitly recognizing and allocating environmental costs can improve sustainability performance by connecting accounting systems to ecological outcomes (Latifah and Soewarno, 2023).

Future research should therefore expand beyond governance and participation to include the development of adaptive cost and pricing models that integrate environmental externalities, life cycle costing, and value-added product margins. Localized CdMRF systems could grow into larger systems for long-term waste management. This study shows that grassroots CdMRFs can play a significant role in setting up circular economy frameworks in developing countries (Alam and Ahmade, 2013; Geissdoerfer et al., 2017). Their ability to bring together social, economic, and environmental values shows how community-driven systems can improve the way formal waste management works. To make this potential happen, though, we need policies that support it, collaboration between many groups, and accounting systems that are flexible and reflect the needs of the area. The future of sustainable waste management depends on both new technologies and governance models that bring together local efforts with national and global goals for sustainability.

4. Conclusions

The conclusion of this study shows that the Mitra Kita CdMRF is not just a place to exchange waste for money, but a space where residents learn responsibility, trust each other, and care for the environment together. Over the course of seven years, they have faced many changes pandemics, price fluctuations, and resource constraints yet they have persevered through simple and honest methods. Although they do not use a formal accounting system, regular record-keeping, six-monthly reporting, and openness among members have fostered accountability born of trust. The manual system, communication via WhatsApp, and ledger recording may seem simple, but therein lies its strength: efficient, familiar, and down-to-earth.

The sustainability of this CdMRF is not based solely on numbers, but on human values. Its members don't save just for the money, but because they want to protect the environment and build a sense of community. Every record and report is more than just an administrative document, but a reflection of shared concern and commitment. From this practice, we learn that accountability can grow from social relationships from honesty, closeness, and mutual trust not just from complex systems. The challenge going forward is how to strengthen transparency with more formal reporting tools without losing the human values that make it alive.

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