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The Role of Stakeholders in Strengthening Waste Bank Management in Pekanbaru City

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Abstract: Urban waste management remains a critical challenge to sustainable development due to rising waste generation and the suboptimal implementation of the reduce reuse recycle approach. Waste banks have emerged as a community based alternative that emphasizes public participation and cross stakeholder collaboration. This study analyzes stakeholder roles in strengthening the management of the Mutiara The Gade Clean and Gold Waste Bank in Tuah Karya Village, Pekanbaru City, and identifies factors influencing its sustainability. A descriptive qualitative approach was employed using in depth interviews, observation, and documentation. Informants were selected through purposive and snowball sampling. Data were analyzed with the interactive model of Miles and Huberman. The findings show that stakeholder roles are not balanced. The private sector, particularly PT Pegadaian Persero, plays a dominant role through mentoring and operational support that improves management effectiveness and encourages participation. Conversely, the local government role as regulator and supervisor remains limited, especially in guidance, coordination, and sustained facilitation. Community participation is relatively strong in waste sorting and deposit activities, although challenges persist in incentive mechanisms. Weak cross stakeholder coordination and the absence of a sustainable collaborative governance model hinder management strengthening. This study concludes that stronger stakeholder synergy, long term commitment, and collaborative governance are essential to sustain community based waste bank management.

Keywords: Community Participation, Stakeholder Roles, Waste Bank, Waste Management, Cross Sector Collaboration.

INTRODUCTION

The issue of solid waste management has become a growing national concern in Indonesia along with rapid population growth, changes in consumption patterns, and the persistently low level of waste segregation at the source. Data from the Ministry of Environment and Forestry indicate that Indonesia generates approximately 33.621 million tons of waste annually, of which 39.91 percent remains inadequately managed. Improper waste handling not only contributes to environmental degradation such as ecosystem disruption and water pollution but also poses serious public health risks, including the spread of diseases such

as diarrhea, cholera, and dengue fever (Lestari & Utomo, 2025). These conditions underline the urgency of developing more effective and sustainable waste management systems that are capable of addressing both environmental and health challenges.

In response to this problem, the government has introduced several regulatory frameworks, including Law Number 18 of 2008 on Waste Management and Presidential Regulation Number 97 of 2017, which sets national targets for reducing waste by 30 percent and increasing waste handling to 70 percent by 2025. These policy commitments are further reinforced in the National Medium Term Development Plan for 2020 to 2024 and aligned with the achievement of the Sustainable Development Goals, particularly Goal 11 on Sustainable Cities and Communities, Goal 12 on Responsible Consumption and Production, and Goal 13 on Climate Action. Despite these comprehensive policy frameworks, the practical implementation of the reduce reuse recycle approach remains suboptimal across many regions.

Various local governments continue to face structural and social constraints, including limited infrastructure, weak community participation, and insufficient collaboration among stakeholders, which hinder the achievement of waste reduction targets. Similar challenges are evident in Pekanbaru City, where rapid population growth and high consumption patterns have resulted in increasing waste generation that is still largely managed through direct disposal to landfills without adequate processing. Although the local government has enacted Regional Regulation Number 8 of 2014 on Waste Management, its implementation continues to encounter significant obstacles. The condition of waste management in Pekanbaru City is illustrated in Table 1.

Table 1. Waste Management in Pekanbaru City

Year	Waste Generation (tons)	Managed Waste (tons)	Recycled Waste (tons)	Unmanaged Waste (tons)
2022	356,503	243,954	21,343	91,206
2023	369,019	273,284	15,911	79,824
2024	369,019	245,347	10,996	112,676

Source DLHK Pekanbaru City, 2025

The data presented in Table 1 indicate a concerning trend in which the volume of unmanaged waste in Pekanbaru City tends to increase, while recycling capacity continues to decline. This trend suggests that the existing waste management system has not been able to keep pace with the growth of waste generation nor effectively enhance waste utilization. In this context, waste banks emerge as a strategic alternative for reducing waste volume, strengthening recycling activities, and encouraging community participation within a circular economy framework. This approach is consistent with the Regulation of the Ministry of Environment and Forestry Number 14 of 2021, which positions waste banks as a key community based instrument for waste reduction and utilization. A waste bank operates in a manner similar to a financial institution, where community members engage in organized waste collection and transactional activities through a collective management system (Arini et al., 2023).

One of the waste banks operating in Pekanbaru City is the Mutiara The Gade Clean and Gold Waste Bank, located in Tuah Karya Subdistrict, Tuah Madani District. This area is among the most densely populated in the city, with a population of 42,637 residents, which directly contributes to the high volume of household waste generated daily. In the waste management system, the community is positioned as an active subject and is empowered through training programs focused on waste segregation and recycling, with the expectation of fostering empowerment grounded in responsibility and personal moral values (Sofyan & Solfema, 2024). However, the increasing volume of waste is not matched by the capacity and effectiveness of the existing waste management system.

Field conditions reveal persistent waste accumulation in several locations, limited waste management facilities, and low public awareness regarding waste segregation at the household level. These issues exacerbate the complexity of waste management problems in Tuah Karya Subdistrict and highlight the need for more structured and participatory interventions. Waste management must be conducted systematically, supported by clear government policies that guide the process from waste collection to processing, in order to ensure effective implementation (Saputra et al., 2023). As an alternative solution, waste banks function as a participatory community based model that emphasizes waste reduction at the source, supported by policy guidelines that promote environmentally friendly and clean living conditions (Baihaqy & Zulfa, 2023).

The Mutiara The Gade Clean and Gold Waste Bank represents an implementation of this model through collaboration with PT Pegadaian under the Corporate Social Responsibility program The Gade Clean and Gold. This program not only encourages residents to sort and deposit waste but also provides economic incentives in the form of gold savings derived from inorganic waste. Such an approach is expected to foster new and sustainable behavioral patterns in community based waste management. Nevertheless, the success of waste banks is highly dependent on the roles and synergy of multiple stakeholders. By 2023, the Mutiara The Gade Clean and Gold Waste Bank experienced declining support from the private sector, weak supervision from local government authorities, and insufficient cross actor coordination, creating a research gap related to the imbalance of stakeholder roles in strengthening waste bank management.

Stakeholders are a central concept in strategic management and public policy, referring to individuals or groups that have interests in and the capacity to influence decisions, policies, or activities of an organization or program. Stakeholders are not merely beneficiaries but also actors who can direct, alter, or exert pressure on policy implementation. Pouloudi as cited in Manullang (2022) emphasizes that stakeholder conditions must be reviewed periodically because stakeholder behavior is dynamic and directly affects stakeholder analysis. This view aligns with Santana as cited in Manullang (2022), who argues that stakeholder power, roles, and participation may weaken, strengthen, or even disappear over time due to changes in resources, objectives, processes, demands, and external environmental conditions.

Synergy among stakeholders is therefore a critical prerequisite for achieving integration, coordination, and collaboration that support program success. Bryson as cited in Maulidinia (2023) highlights that stakeholder evaluation has a direct impact on organizational performance, as it enables organizations to assess performance standards, understand their capacity to respond to stakeholder demands, and identify the extent to which stakeholders influence and contribute to the overall organizational process. However, most previous studies have focused primarily on community participation or the effectiveness of waste banks, while research that specifically examines the dynamics and imbalance of stakeholder roles in strengthening waste bank management remains limited, particularly in the context of collaboration among government, private sector, and community actors. Therefore, this study aims to analyze the role of stakeholders in strengthening the management of the Mutiara The Gade Clean and Gold Waste Bank in Tuah Karya Subdistrict and to identify factors influencing the sustainability of its management.

METHODS

This study employed a descriptive qualitative approach. According to Creswell as cited in Hasan and Bora (2025), qualitative research primarily aims to obtain in depth insights into human behavior, perspectives, and experiences as well as how social and cultural factors shape these phenomena. This approach is considered highly relevant because the study seeks to capture the dynamics of waste bank program implementation within its natural setting.

Qualitative research is inherently humanistic in nature, positioning humans as the central subjects in social events and interactions (Safarudin et al., 2023).

Research informants were selected using purposive sampling, namely the selection of individuals who were considered to possess the most relevant knowledge and understanding of the phenomenon under investigation. To enrich and complement the required information, snowball sampling was also applied, whereby initial informants recommended other relevant informants. The informants consisted of the management of the Mutiara The Gade Clean and Gold Waste Bank, waste bank customers, representatives of PT Pegadaian Persero as the main partner, and officials from the Environmental and Sanitation Agency of Pekanbaru City. The inclusion of diverse informants was intended to explore multiple perspectives on waste bank management, the dynamics of its implementation, and the factors that contributed to the strengthening, weakening, or transformation of the program over time.

Data were collected through in depth interviews to comprehensively explore the meanings and experiences of the informants, while observations enabled the researcher to capture actual processes occurring in the field. In addition, documentation studies were conducted using activity reports, operational records, and other supporting documents. Data analysis followed the interactive analysis model proposed by Miles and Huberman as cited in Sugiyono (2021), which consists of data collection, data reduction, data display, and conclusion drawing as well as verification. These stages were conducted in a cyclical and interconnected manner. Data reduction was undertaken to select essential information and organize it into specific themes. Data display was carried out by presenting findings in narrative form to facilitate the identification of relationships among concepts. Conclusions were drawn gradually through an ongoing verification process, including member checking with informants to ensure the accuracy of the researcher interpretations.

The focus of the study was directed toward stakeholder dynamics that may weaken, strengthen, or even disappear over time, as explained in the stakeholder theory of Santana as cited in Manullang (2022). This perspective enabled the researcher to understand how such changes occurred and the factors influencing them. To ensure data trustworthiness, source triangulation was also employed. This effort was undertaken to enhance the credibility of the findings and to ensure that the results accurately reflect actual conditions in the field.

RESULTS AND DISCUSSION

Management of the Mutiara The Gade Clean and Gold Waste Bank

The management of the Mutiara The Gade Clean and Gold Waste Bank in Tuah Karya Subdistrict encompasses the formulation of vision, mission, strategic values, and operational mechanisms that support integrated waste management practices. This waste bank envisions becoming a waste management service center capable of handling, processing, and reducing waste in a sustainable manner while serving as a best practice model for waste management in Pekanbaru City. Community concern for environmental preservation through the management of organic and inorganic waste has been identified as a key driver for the establishment of waste banks, as highlighted by Ariefahnoor et al. (2020).

To realize this vision, the waste bank has defined four core missions, namely providing education and socialization to the community regarding the negative impacts of waste on health and the environment, encouraging the public to avoid improper waste disposal as an effort to reduce environmental pollution, providing facilities that enable proper and organized waste channeling, and positioning the Mutiara The Gade Clean and Gold Waste Bank as a role model for community empowerment based waste management. These missions align with findings by Dwicahyani et al. (2022), which indicate that high community enthusiasm and active participation as waste bank customers play a crucial role in strengthening waste bank operations, as demonstrated in the Simojawar Waste Bank in Surabaya.

The primary objective of establishing the waste bank is to address waste problems while simultaneously improving community economic conditions through the utilization of waste that was previously considered valueless. Through systematic processes of collection, sorting, and management, waste is transformed into an economic resource that benefits residents. The strategic values promoted include fostering a cleaner environment, enhancing public awareness of cleanliness, and optimizing waste as an item with economic value. These efforts contribute positively to environmental quality and the socioeconomic welfare of the Tuah Karya community. Research by Yazirin et al. (2024) supports this finding, noting that waste bank programs can increase household income and generate significant social impacts through creative processing of plastic waste into handicrafts.

In addition to economic benefits, waste bank programs encourage communities to become more creative, productive, and innovative in utilizing waste, resulting in cleaner, healthier, and greener living environments. However, this study also reveals challenges consistent with the findings of Halid et al. (2022), which identify real conflicts in waste bank management systems related to institutional, managerial, technical, and social aspects that may hinder program sustainability. These challenges highlight the complexity of managing community based waste initiatives.

The organizational structure of the Mutiara The Gade Clean and Gold Waste Bank consists of a director, operational head, secretary, treasurer, and divisions responsible for weighing, recording, and transportation. Each role carries specific responsibilities that collectively strengthen waste bank governance. Although households have begun sorting waste at the source, further sorting by the management team is often required to ensure that the waste meets acceptance standards. This finding indicates ongoing gaps in household level waste segregation practices.

The establishment of the waste bank was initiated through a project by PT Pegadaian aimed at transforming slum environments into cleaner and greener areas, as reported by Rachmah and Purwandari (2024). Routine socialization activities related to the program of converting waste savings into gold have increased public understanding of the program mechanism and encouraged participation. Operationally, the waste bank relies on collaboration between its management and PT Pegadaian, while the role of local government remains limited, particularly in terms of monitoring, capacity building, and the development of supportive regulations.

Consistent with the findings of Fithri et al. (2024), the waste bank offers various service mechanisms for waste value utilization, including direct cash payments and point based exchanges. At the Mutiara The Gade Clean and Gold Waste Bank, the process begins with residents depositing pre sorted waste, which is then weighed and recorded in individual savings books. The monetary value of the waste is converted into gold savings and transferred to customers gold accounts at PT Pegadaian. As a result, each customer holds two types of savings, namely waste savings recorded in monetary or weight units and gold savings measured in grams.

Despite these innovations, constraints remain in the gold redemption mechanism. Gold savings can only be withdrawn after reaching a minimum of one gram, which poses a dilemma for customers requiring immediate liquidity. This condition reflects challenges identified by Mudviyadi (2021), where limited human resources and restricted market access for waste based products can impede community economic outcomes. Nevertheless, the waste bank conducts routine documentation of all waste deposit activities to maintain transparency and accountability. Evaluation results indicate improvements in waste quality, increasing numbers of customers, and significant enhancements in the management system. These findings demonstrate the positive development of the Mutiara The Gade Clean and Gold Waste Bank as a sustainable community based waste management model.

Stakeholder Roles in Strengthening Waste Bank Management

In waste bank management, the role of stakeholders constitutes a crucial aspect in ensuring operational continuity and sustainability. Stakeholder involvement functions not only as administrative support but also as a driving force in program planning, implementation, and evaluation. This perspective is consistent with Law Number 18 of 2008 on Waste Management, which positions waste banks as a community based waste management strategy. Previous research by Handana et al. (2022) highlights that waste banks in Padang City have established close cooperation with several private actors, including Bank Nagari, Bank BRI, and PT Pegadaian, demonstrating the importance of multi actor engagement in waste bank operations.

Waste banks are positioned as collaborative instruments that connect government institutions, the private sector, and local communities. The government plays a role in providing regulatory frameworks, supporting facilities, and technical guidance. The private sector contributes through partnerships, funding support, technological innovation, and market access for recycled products. Meanwhile, the community serves as the main actor in waste sorting, depositing, and reutilizing waste as an economic resource. Ariyanto and Marom (2021) found that subdistrict and district governments consistently performed monitoring, supervision, and advisory roles, which strengthened program implementation. Synergy among these three stakeholder groups determines the effectiveness and sustainability of waste banks, particularly in encouraging behavioral change and reinforcing environmental management at the local level.

The role of stakeholders in strengthening the management of the Mutiara The Gade Clean and Gold Waste Bank is a determining factor for its operational success and long term sustainability. Effective strengthening cannot be achieved without the support and contribution of all involved stakeholders. The Mutiara The Gade Clean and Gold Waste Bank has developed cooperation with private actors, government agencies, and the community throughout the waste management process. This collaboration enables regulatory support, funding availability, technical assistance, and active community participation in waste sorting and depositing activities, thereby allowing the waste bank to operate more effectively and sustainably. The distribution of roles and levels of influence among stakeholders involved in strengthening waste bank management is presented in Table 2.

Table 2. Roles and Influence of Stakeholders in Strengthening the Management of the Mutiara The Gade Clean and Gold Waste Bank

No	Stakeholder Category	Stakeholder Role	Stakeholder Influence
1	Government Environmental and Sanitation Agency	Regulator and supervisor of waste management implementation	Technical direction and assignment of responsibilities remain suboptimal resulting in weak supervision
2	Private Sector PT Pegadaian Persero	Initiator and driving partner of the waste bank	Improves operational effectiveness and efficiency through mentoring capacity building and program support
3	Community Waste Bank Management and Customers	Waste collection sorting and processing	Directly involved in waste management processes thus influencing operational effectiveness and sustainability

Source processed by the authors, 2025

As shown in Table 2, the strengthening of the Mutiara The Gade Clean and Gold Waste Bank involves three main stakeholder groups with distinct roles and levels of influence. The government through the Environmental and Sanitation Agency holds a strategic role as regulator and supervisor of waste management implementation. However, governmental influence remains limited because technical guidance, policy support, and capacity building have not been implemented optimally. Weak supervision has resulted in program execution that lacks clear direction. In contrast, Putri et al. (2022) found that the Environmental Agency

of Depok City played a consistent coordinating role by facilitating inter stakeholder meetings and formal communication, enabling rapid responses from other actors. This comparison indicates the need for stronger governmental commitment to enhance coordination and clarify responsibilities in supporting waste bank management.

The private sector, represented by PT Pegadaian Persero, acts as both the initiator and main partner driving the waste bank program. Its influence is significant, particularly in providing mentoring, capacity building, and programmatic assistance that enhance operational efficiency and effectiveness. The involvement of private actors demonstrates that cross institutional collaboration can accelerate institutional strengthening and improve the competitiveness of community based waste management programs. Auliani (2020) similarly reported that private sector involvement through corporate social responsibility initiatives, such as financial support from PT Unilever, played a substantial role in strengthening waste bank development.

The community, consisting of waste bank managers and customers, represents a key actor in implementing core waste bank activities such as sorting, collection, and processing. Their active participation has a direct impact on the effectiveness and sustainability of waste bank operations. The level of community participation reflects the extent to which the program is accepted and implemented at the local level. However, since 2023, the management performance of the Mutiara The Gade Clean and Gold Waste Bank has declined due to the weakening roles of stakeholders, particularly the private sector and government, in supporting program sustainability. Maimunah et al. (2024) identified similar problems in other waste banks, including operational stagnation, organizational dysfunction, inadequate facilities, and limited community capacity building related to waste processing.

Field observations and interviews further indicate that the declining role of stakeholders has significantly contributed to the weakening of management strengthening efforts at the Mutiara The Gade Clean and Gold Waste Bank in Tuah Karya Subdistrict, Pekanbaru City. Stakeholder roles that were previously strong in providing guidance, mentoring, and supervision have diminished, directly affecting waste bank sustainability and daily operations. Although waste bank governance is regulated under the Ministry of Environment and Forestry Regulation Number 14 of 2021, its implementation continues to face challenges, particularly due to weak inter stakeholder coordination.

Coordination among the Environmental and Sanitation Agency, the community, and the private sector has not been optimally established, resulting in fragmented roles that fail to reinforce one another. The absence of regular coordination forums exacerbates this condition, causing management processes to become overlapping, inefficient, and poorly directed. Auliya et al. (2020) emphasize the importance of village level government involvement in conducting socialization activities and exploring local potential waste resources, particularly plastic waste, as a foundation for effective waste management.

Conversely, Siregar and Irfan (2024) demonstrate that collaborative initiatives involving private companies, nongovernmental organizations, and academics can foster effective communication, shared understanding, and synergistic cooperation among stakeholders. Such interactions highlight coordination as a key factor in the success of community based waste management. In the case of the Mutiara The Gade Clean and Gold Waste Bank, weak coordination has led to reduced technical support from both the private sector and government, which in turn has diminished community trust and participation.

The decline in community participation is also influenced by reduced capacity building efforts from PT Pegadaian Persero as the driving partner. The lack of sustained educational and training programs has lowered community motivation and capacity to actively engage in waste bank activities. Retno et al. (2025) found that participatory approaches involving residents, government representatives, and students strengthened collaboration and encouraged positive

environmental behaviors such as regular participation in educational activities and household waste sorting.

Furthermore, limited incentives, whether economic or social, have reduced community motivation to participate. Without clear and sustained benefits, community engagement becomes difficult to maintain. These challenges are compounded by limited financial support and economic resources, making it increasingly difficult to strengthen waste bank management in a sustainable manner. The cessation of mentoring support from PT Pegadaian has created a gap in stakeholder roles, particularly in strengthening waste bank management in Tuah Karya Subdistrict.

Currently, there is no continued communication from the corporate social responsibility unit of PT Pegadaian regarding program sustainability, partly due to internal regulatory changes and leadership transitions within the company. These changes have resulted in the termination of operational support that previously played a vital role in sustaining waste bank management. Limited private sector support is further reflected in inadequate access to facilities and infrastructure, as well as the suboptimal role of regulators in supervision and responsibility integration.

The absence of a clear collaborative governance model has further aggravated these challenges. Waste bank management remains fragmented without standardized guidelines that could serve as a reference for stakeholders in performing collaborative roles effectively. Without a structured collaborative framework, stakeholders operate independently, undermining efficiency, accountability, and sustainability. Similar conditions were reported by Sari et al. (2022) in the Gemah Ripah Waste Bank, where operational cessation, organizational restructuring, and weakened stakeholder roles disrupted management strengthening efforts.

These findings reinforce the argument that weakened stakeholder roles, particularly from the government and private sector, hinder the strengthening of waste bank management. In line with Santana as cited in Manullang (2022), the weakening of stakeholder roles reflects shifts in power and interests that directly affect program sustainability. This condition indicates that imbalances in stakeholder roles have the potential to obstruct the long term sustainability of community based waste bank management.

Community Participation in Strengthening Waste Bank Management

Community participation in Tuah Karya Subdistrict represents one of the key components in the successful strengthening of the management of the Mutiara The Gade Clean and Gold Waste Bank. Active community involvement plays a vital role in ensuring operational sustainability, increasing the volume of waste managed, and achieving the intended environmental and economic objectives. This finding is consistent with Safitri et al. (2022), who identified limited community involvement as a major challenge in waste bank implementation in Jatiasih District, particularly reflected in suboptimal waste collection despite ongoing programs.

Over its five years of operation, the Mutiara The Gade Clean and Gold Waste Bank has demonstrated positive growth in community participation. At the initial stage of establishment, approximately 450 residents were involved, and this number increased to 780 participants through continuous educational efforts, invitations, and socialization conducted by the waste bank management. The management consistently motivated residents through outreach activities focusing on waste management practices, the benefits of waste savings, and the waste to gold exchange program. These efforts fostered public awareness that waste holds economic value and can provide tangible benefits for households.

The private sector, particularly PT Pegadaian Persero, previously played an active role in providing training and education to waste bank managers. This knowledge transfer was subsequently disseminated to the wider community through regular socialization sessions held

twice a week. The materials delivered during these sessions covered household waste sorting practices, both organic and inorganic, as well as proper procedures for waste deposit. Community attendance at these activities reflects a collective commitment to participate in strengthening waste management efforts.

Despite these positive developments, several obstacles remain in the implementation of community participation, particularly related to the absence of a waste collection or pickup system. This condition creates difficulties for some residents in delivering waste directly to the waste bank. This finding aligns with Oktaviana et al. (2022), who emphasized that fundamental forms of community participation in waste management include household level waste collection and sorting. The most significant impact in promoting participation arises from consistent socialization activities, especially regarding the importance of waste sorting prior to deposit.

The mechanisms of community participation in strengthening the management of the Mutiara The Gade Clean and Gold Waste Bank include sorting organic and inorganic waste at the household level, independent waste collection, and active involvement in socialization and training programs organized by the management. These mechanisms play a crucial role in maintaining program sustainability and improving the quality of community based waste management in Tuah Karya Subdistrict. In addition to waste sorting activities, residents also contribute through monthly membership fees. These contributions represent a tangible expression of community awareness and concern in supporting the strengthening of waste bank management, indicating a sense of ownership and long term commitment to the sustainability of the waste bank operations.

The benefits perceived by the community are substantial. From an economic perspective, deposited waste generates direct financial value, complemented by the gold savings program which serves as a major incentive for participation. However, Sopian et al. (2025) noted the emergence of disparities in independent waste banks related to system limitations and critical reflections on ecological and economic potential in waste management. Nevertheless, the program enables residents to obtain added value from waste collection and deposit activities. From a social perspective, community members also receive various forms of household assistance from external parties through partnerships established by the waste bank management. These benefits provide tangible advantages for residents of Tuah Karya Subdistrict and enhance the positive image of the Mutiara The Gade Clean and Gold Waste Bank at the local level.

Furthermore, the waste bank management routinely provides education on environmental issue mitigation. The knowledge gained by community members through these educational activities has been successfully applied in addressing environmental problems previously encountered in their neighborhood. This finding is consistent with Megow et al. (2025), who emphasized the significant impact of community based waste management programs in positioning education as a key instrument for building collective awareness. These results indicate that community participation not only contributes to economic benefits but also strengthens environmental awareness and environmentally responsible behavior at the community level.

CONCLUSION

This study concludes that the role of stakeholders in strengthening the management of the Mutiara The Gade Clean and Gold Waste Bank is crucial yet remains unbalanced. The private sector, particularly PT Pegadaian Persero, has played a dominant role through mentoring, capacity building, and operational support that contributed to an increase in the number of customers, improved management transparency, and better waste sorting quality. In contrast, the role of the government as regulator and supervisor has not been optimal, especially

in providing consistent guidance, monitoring, and sustained institutional support. Community participation has shown a relatively positive level, particularly in household waste sorting as a result of continuous education delivered by waste bank managers and private partners, although challenges remain in the gold savings withdrawal mechanism that affect community motivation. Weak synergy and limited coordination among stakeholders have emerged as the main factors constraining the effectiveness of management strengthening efforts. Therefore, it is recommended that stronger commitment be established among all stakeholders, with particular emphasis on ensuring the continuity of private sector mentoring and optimizing governmental functions in supervision, facilitation, and policy integration. The establishment of a cross stakeholder coordination forum is suggested as a strategic step to integrate roles, enhance community participation, and secure the sustainability of community based waste bank management. From an industrial engineering and broader scientific perspective, this study contributes to the understanding of collaborative governance and stakeholder integration in community based waste management systems, highlighting how coordinated processes, role clarity, and feedback mechanisms can improve system efficiency, sustainability, and social impact. The findings provide practical implications for designing more effective waste management models that integrate technical processes, organizational coordination, and human behavior, thereby offering insights applicable to environmental management practices and interdisciplinary research on sustainable urban systems.

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