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A Integrated Waste Management in Supporting The Achievement of Sustainable Development Goals (SDGs)

Pengelolaan Sampah Terpadu dalam Mendukung Pencapaian Tujuan Pembangunan Berkelanjutan (SDGs)

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ARTICLE INFORMATION

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ABSTRACT

The problem of waste in densely populated coastal areas such as Kalibaru Village, Cilincing District, North Jakarta is still a serious challenge for urban environmental governance, with uneven service coverage and high daily waste generation. This study aims to analyze the contribution of integrated waste management in supporting the achievement of the Sustainable Development Goals (SDGs), especially the 11th, 12th, and 13th goals. The research uses a qualitative descriptive method with a case study design, data is collected through in-depth interviews with key informants from the Environment Agency, Kalibaru Village, and community leaders, complemented by field observations, documentation, and literature studies, then analyzed using the Miles and Huberman interactive model. An evaluation was carried out on eight indicators of Integrated Solid Waste Management (ISWM) according to The results of the study show that waste management in Kalibaru Village is still dominated by the conventional pattern of gathering-transport-disposal, with the effectiveness of the system at a moderate level (around 60%), infrastructure limitations in the form of only three conventional polling stations without 3R facilities, and community participation in waste sorting from sources which is still below 50%. The main inhibiting factors include low awareness of residents, limited infrastructure, and suboptimal institutional coordination, while supporting factors appear to be the start of the organic waste drop point program. This study conducts a comparative analysis of coastal urban villages and districts in North Jakarta to examine variations in practices and contextual factors, and develops an evidence-based policy model that can be replicated in other coastal areas.

Kata Kunci
Pengelolaan Sampah Terintegrasi; Integrated Solid Waste Management; Sustainable Development Goals; Tata Kelola Lingkungan; Partisipasi Masyarakat

ABSTRAK

Permasalahan sampah di kawasan pesisir padat penduduk seperti Kelurahan Kalibaru, Kecamatan Cilincing, Jakarta Utara masih menjadi tantangan serius bagi tata kelola lingkungan perkotaan, dengan cakupan layanan yang belum merata dan timbulan sampah harian yang tinggi. Penelitian ini bertujuan menganalisis kontribusi pengelolaan sampah terintegrasi dalam mendukung pencapaian Sustainable Development Goals (SDGs), khususnya tujuan ke-11, ke-12, dan ke-13. Penelitian menggunakan metode deskriptif kualitatif dengan desain studi kasus, data dikumpulkan melalui wawancara mendalam terhadap informan kunci dari Suku Dinas Lingkungan Hidup, Kelurahan Kalibaru, dan tokoh masyarakat, dilengkapi observasi lapangan, dokumentasi, dan studi literatur, kemudian dianalisis menggunakan model interaktif Miles dan Huberman. Evaluasi dilakukan terhadap delapan indikator Integrated Solid Waste Management (ISWM). Hasil penelitian menunjukkan bahwa pengelolaan sampah di Kelurahan Kalibaru masih didominasi pola konvensional kumpul-angkut-buang, dengan efektivitas sistem berada pada tingkat sedang (sekitar 60%), keterbatasan infrastruktur berupa hanya tiga TPS konvensional tanpa fasilitas 3R, serta partisipasi masyarakat dalam pemilahan sampah dari sumber yang masih di bawah 50%. Faktor penghambat utama meliputi rendahnya kesadaran warga, keterbatasan sarana-prasarana, dan koordinasi kelembagaan yang belum optimal, sementara faktor pendukung tampak pada mulai berjalannya program drop point sampah organik.Penelitian ini Melakukan Komparatif antara Kelurahan/Kecamatan Pesisirdi Jakarta Utara Untuk Melihat Variasi Praktik dan Faktor Kontekstual,Melakukan Mengembangan model Kebijakan berbasis bukti (evidence-based policy) yang dapat direplikasikan di wilayah pesisir lainnya.

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Introduction

The waste problem is an increasingly complex environmental issue along with population growth, urbanization, and an increase in economic activity in urban areas. Major cities in Indonesia, including the coastal area of North Jakarta, face serious challenges in waste management, both in terms of volume, type, and impact on the environment and society. Waste that is not managed properly can cause soil, water, and air pollution, as well as increase the risk of environmental disasters such as floods and the spread of diseases (Arifin, S. S., & Syukri, 2022).

Integrated Solid Waste Management (ISWM) is one of the strategic approaches in overcoming this problem. This approach not only emphasizes on the transport and disposal of waste to the final processing site, but also includes the reduction, sorting, processing, and reuse of waste through the active role of governments, communities, and the private sector, in line with sustainable development principles that balance environmental, social, and economic aspects (Nugroho *et al.,* 2023). Based on Law Number 18 of 2008 concerning Waste Management, waste is a national problem whose handling must be carried out comprehensively and integrally from upstream to downstream in order to provide economic benefits, healthy communities, and safe for the environment (Rahmah *et al*., 2024)

Kalibaru Village, Cilincing District, North Jakarta Administrative City is one of the areas that faces this problem in real life. This village has an area of ±246.70 hectares which is divided into 15 Rukun Warga (RW) and 172 Rukun Tetangga (RT), with a population of around 82,689–84,010 people and a density level of 341 people/ha, making it one of the most populous villages as well as being classified as one of the top ten villages with the highest number of slum RWs in North Jakarta, with eight RWs belonging to the slum category (Hayamadi *et al.*, 2024) Located in coastal areas with marine-based economic activities (fishermen, green clam cultivation, salted fish processing) also increases the volume of household waste generation and marine debris (Akadji *et al.*, 2026).

Addressing these issues requires a waste management strategy that goes beyond mere collection and transportation, necessitating an integrated approach spanning from the source to final processing. The Integrated Solid Waste Management (ISWM) approach views waste management as a system that integrates technical, institutional, infrastructural, and financial aspects, alongside community participation and equitable service delivery (Hossain *et al*., 2023). Explain that the success of ISWM can be assessed across several dimensions: management system effectiveness and efficiency, infrastructure adequacy, integration of management stages, institutional arrangements and governance, community participation,

service equity and fairness, and contributions to sustainable development (Missouri *et al*, 2023). This approach is highly relevant for analyzing waste management in Kalibaru Urban Village, as the challenges faced involve not only technical aspects but also issues regarding infrastructure limitations, community participation, institutional coordination, and service equity (Rahmawati *et al*., 2024).

Based on the latest data from the National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry (2024–2025), the total waste generation in Kalibaru Village reached 168,020 liters per day, with the highest generation being in RW 03 (13,376 liters) and the lowest in RW 09 (8,756 liters), as presented in Table 1.

Table 1. Number of Population and Waste Generation per RW in Kalibaru Village

PC	Total Population (Soul)	Waste Generation (Liters/Day)
PC 01	6.533	13.066
PC 02	5.375	10.750
PC 03	6.688	13.376
PC 04	6.392	12.784
PC 05	5.830	11.660
PC 06	6.170	12.340
PC 07	6.513	13.026
PC 08	5.532	11.064
PC 09	4.378	8.756
PC 10	4.690	9.380
PC 11	6.571	13.142
PC 12	6.594	13.188
PC 13	6.382	12.764
PC 14	6.362	12.724
Total		**168.020**

Source: National Waste Management Information System (SIPSN) of the Ministry of Environment and Forestry (2024–2025)

Waste collection services have reached almost all RWs (around 93%), but around 60% of the area is considered to have not been optimally served by the existing management system, while surveys based on BPS/KLHK data show that the level of concern and sorting of waste from sources by the community is still low. This problem is exacerbated by the practice of illegal dumping into rivers and coasts, which contributes to the high generation of household waste and marine debris (Arifin, S. S., & Syukri, 2022).

In the global context, Indonesia is committed to supporting the achievement of the Sustainable Development Goals (SDGs), especially Goal 11 (Sustainable Cities and Settlements), Goal 12 (Responsible Consumption and Production), and Goal 13 (Handling Climate Change). Integrated waste management at the village level is a strategic part of supporting the achievement of these goals at the local level (Hayamadi *et al*., 2024). However, its implementation in densely populated areas such as Kalibaru still faces obstacles in the form of limited infrastructure, low public awareness in sorting waste, and suboptimal coordination between stakeholders (Sasahara *et al*., 2024).

Waste management in dense, low-income coastal settlements such as Kalibaru, North Jakarta, is not only a technical service issue but also a test of how well local public administration can organize resources, institutions, and community action to deliver equitable and sustainable outcomes. In practice, waste services in these areas often remain partial, fragmented, and unevenly distributed, raising concerns about efficiency, effectiveness, and environmental justice. To analyze these issues systematically, this study situates village-level waste management within established theoretical frameworks on public administration, Integrated Solid Waste Management (ISWM), environmental governance, and the Sustainable Development Goals (SDGs).

Based on this description, the formulation of this research problem is: "How is integrated waste management in Kalibaru Village in supporting the achievement of the Sustainable Development Goals (SDGs)?" This study aims to analyze the contribution of integrated waste management in supporting the achievement of the SDGs in Kalibaru Village, Cilincing District, North Jakarta, as well as identify supporting and inhibiting factors for its implementation (Arpandi, A., & Aminah, 2023).

Methods

This study uses a descriptive method with a qualitative approach. According to (Dan *et al*., 2024), qualitative research is based on the philosophy of postpositivism and is used to research the natural condition of objects, with researchers acting as key instruments in data collection and analysis. This approach was chosen because the research requires a comprehensive understanding of the implementation of integrated waste management, starting from the technical, operational, institutional, and community participation aspects, to its contribution to the achievement of SDGs targets, so it is not enough to be described but also needs to be interpreted in depth.

The location of the research is in Kalibaru Village, Cilincing District, North Jakarta Administrative City, considering that this area is still facing the problem of high waste generation and limited management from sources. Primary data was obtained through in-depth interviews with three key informants, namely staff of the North Jakarta Environmental Agency for Waste Management and B3 (PSLB3), the Head of the Economic and Development Section of Kalibaru Village, and local community leaders. Secondary data was obtained from the Ministry of Environment and Forestry's SIPSN document, the report of the Environment Agency, and laws and regulations related to waste management (Chandra, S. N. S., Hakim, L., & Febriantin, 2026)

Data collection techniques were carried out through semi-structured interviews, field observations of the condition of the polling stations and waste transportation processes, documentation, and literature studies on policies and scientific journals on Integrated Solid Waste Management (ISWM) (Ahsin *et al*., 2026). Data analysis uses the Miles and Huberman interactive model which includes data reduction, data presentation, and conclusion/verification, which is carried out continuously from the initial stage of data collection to the end of the study, with validity maintained through triangulation of sources and methods (Fadhly *et al*., 2025)

In analyzing the focus of the research, the approach used is not in the form of numerical measurements because this research is qualitative. The analysis was carried out based on the dimensions in the Integrated *Solid Waste Management* (ISWM) theory according to (Hossain *et al*., 2023), which include the effectiveness of the management system, management efficiency, adequacy of infrastructure, integration of management stages, institutional and governance, community participation, justice and equitable distribution of services, and contribution to sustainable development (*Sustainable Development Goals*). The eight dimensions are used as a conceptual framework to analyze the implementation of integrated waste management in Kalibaru Village. The validity of the data is maintained through source triangulation techniques and triangulation methods to ensure that the information obtained has a high level of validity and credibility (Nabilla *et al*., 2025).

Literature Studies

Public administraon is understood as the process of organizing and coordinating public resources to formulate, implement, and manage policies to meet the needs of the community effectively and efficiently (Santoso, n.d.). In this context, waste management is

a form of public service that requires professional, participatory, and responsive governance. Conceptually, integrated waste management is known as Integrated Solid Waste Management (ISWM), which is an approach that views waste as part of an interconnected system from the source of generation to final processing, including sustainable reduction, sorting, collection, transportation, processing, and final processing (Arifin, S. S., & Syukri, 2022). ISWM emphasizes integration between operational technical aspects, institutions, regulatory/policy, financing, and community participation, as well as coordination between government, society, and the private sector (Hossain et al., 2023). This study uses eight ISWM evaluation indicators from (Hossain et al., 2023) namely: (1) the effectiveness of the management system, (2) management efficiency, (3) the adequacy of infrastructure, (4) the integration of management stages, (5) institutional and governance, (6) community participation, (7) justice and equitable distribution of services, and (8) contribution to sustainable development (Astuti *et al*., 2025).

The success of ISWM is also highly determined by the quality of environmental governance, namely governance that prioritizes transparency, accountability, community participation, and inter-institutional coordination; without good governance, waste management has the potential to run partially (Nugroho *et al.*, 2023) The principle of environmental justice is also relevant considering that Kalibaru is one of the most populous and poorest areas in North Jakarta with a number of slum RWs, so that inequality in waste management services has the potential to worsen the environmental conditions of vulnerable communities (Putri, N. S., Febriyanti, N. S., & Noor, 2025).

The Sustainable Development Goals (SDGs) are a continuation of the Millennium Development Goals (MDGs) which are designed to be more comprehensive and universal, covering 17 goals with five main principles: People, Planet, Prosperity, Peace, and Partnership (Rashed, 2026) Integrated waste management is closely related to SDGs 11 (Sustainable Cities and Settlements), SDGs 12 (Responsible Consumption and Production), and SDGs 13 (Climate Change Management), so that waste management at the village level is a strategic part of achieving the SDGs at the local level Compared to previous research that highlighted inorganic waste sorting training (Arifin, S. S., & Syukri, 2022). or the implementation of waste management programs in general), this study focuses on a comprehensive integrated waste management evaluation involving the role of local governments, communities, and environmental institutions at the coastal village level (Dwiyanti *et al*., 2025).

Result and Discusion

Kalibaru Village is located in the northern coastal area of Jakarta which is directly adjacent to the Java Sea, with an area of ±246.70 hectares divided into 15 RWs and 172 RTs, and a population of around 82,689 people spread over 36,383 families. The community's economic activities are dominated by the marine and coastal sectors, such as capture fishermen, green clam cultivation, and salted fish processing. Low topographic conditions make the region vulnerable to inundation and flash flooding, which also affects waste management and environmental sanitation (Setiawan *et al*., 2025).



Figure 1. Map of Kalibaru Village, Cilincing District
Source: Researcher observation and documentation (2026)

Waste management in Kalibaru Village was evaluated using eight indicators of Integrated Solid Waste Management (ISWM) according to (Hossain *et al*., 2023), based on the results of interviews with staff of the North Jakarta Environmental Agency for PSLB3 (Mrs. R. Imelda, S.Sos.), the Head of the Economy and Development Section of Kalibaru Village (Mr. Rezha Erdiansyah, S.STP., M.A.), and community leaders (Mr. Sahnam), which are summarized as follows (Taufik, 2023).

Effectiveness of Management Systems

Effectiveness shows the extent to which the waste management system achieves its main goal, which is to reduce waste generation and create a clean and healthy environment (Luthfan, uhammad Rizki Nur, 2026). Waste collection and transportation activities in Kalibaru have been running routinely, and the organic waste sorting program through the drop point system has begun to be implemented, but it is not comprehensive (Afandi *et al*., 2025). Based on an interview with Mr. Rezha Erdiansyah, S.STP., MA—a staff member at the Kalibaru Urban Village office serving as the Head of the Economy and Development Section—it was explained that waste management in the area is actually already underway, particularly regarding waste sorting. However, implementation remains suboptimal due to

low public awareness regarding waste management. The informant stated: The Head of the Economic and Development Section of Kalibaru Village explained:

> *"... It has actually started to run but not thoroughly, especially on the outskirts of the CICB embankment. Public awareness is still 50 percent and below to manage waste independently and sort waste. If it is rated from 1 to 100, the effectiveness is still around 60 percent."* ***(Interview Results, May 21, 2026)***

This low effectiveness is also justified by the Environmental Service Tribe, which states that the lack of community support is the main obstacle, as well as by community leaders who observe that there are still piles of garbage even though transportation runs regularly. In line with the concept of ISWM (Hossain *et al.*, 2023), effectiveness is not enough to see from the volume of waste transported, but also from the success at the upstream stage in the form of reduction and sorting. The system in Kalibaru is still more oriented towards transportation rather than reducing waste from the source, so it has an impact on the suboptimal contribution to SDGs 11 and SDGs 12 (Fathir *et al.*, 2026).

In addition, the Sub-agency for the Environment stated that the effectiveness of waste management in Kalibaru Urban Village remains suboptimal due to a lack of community support for sorting waste at the source. An informant said:

> *"The obstacle, as I mentioned earlier, is a lack of support from the residents. It has not yet been effective because the community does not fully support the waste management program in Kalibaru Urban Village."* ***(Interview conducted on May 25, 2026)***

Table 2. Recapitulation of Trip and Tonnage Data for Waste Transport Vehicles at the Bantar Gebang Landfill – North Jakarta Environmental Agency, 2026

Sub-district/Section	Sudin LH Utara – Trips	Sudin LH Utara – Tonnage	PD Pasar – Trips	PD Pasar – Tonnage	Total – Trips	Total – Tonnage	Monthly Avg – Trips	Monthly Avg – Tonnage	Daily Avg – Trips	Daily Avg – Tonnage
Penjaringan	13,794	97,795.81	1,083	3,366.46	14,877	101,162.27	1,860	12,645.28	61	414.60
Pademangan	7,620	36,392.81	485	1,106.06	8,105	37,498.87	1,013	4,687.36	33	153.68
Tanjung Priok	16,175	86,005.65	371	1,617.08	16,546	87,622.73	2,068	10,952.84	68	359.11
Koja	9,870	47,437.20	1,821	4,862.36	11,691	52,299.56	1,461	6,537.45	48	214.34
Cilincing	12,661	67,766.88	543	1,228.64	13,204	68,995.52	1,651	8,624.44	54	282.77
Kelapa Gading	11,388	54,148.50	490	691.84	11,878	54,840.34	1,485	6,855.04	49	224.76
PSLB3	1,235	10,353.88	–	–	1,235	10,353.88	154	1,294.24	5	42.43
TOTAL	72,743	399,900.73	4,793	12,872.44	77,536	412,773.17	9,692	51,596.65	318	~~1,691.69~~

Source: North Jakarta Environmental Agency (PSLB3 Division)

Based on the interview with Ms. R. Imelda, S.Sos.—a staff member of the North Jakarta Environmental Agency's Waste and Hazardous/Toxic Waste Management (PSLB3) division—it is evident that the waste management system in Kalibaru Urban Village is not yet operating at optimal capacity. Although the local administration and the Environmental Agency have made efforts to implement a waste management system based on waste segregation, low public awareness and participation remain the primary obstacles to achieving effective and sustainable waste management.

An interview with Mr. Sahnam, a community leader in Kalibaru Urban Village, further confirms that the waste management system is not yet functioning effectively. This is evidenced by the continued accumulation of waste in several locations, despite regular waste collection activities. Based on an interview with Mr. Sahnam, a community leader in Kalibaru Urban Village, he stated:

> *"In my opinion, waste management in Kalibaru is not yet fully effective. While waste is collected by personnel daily, piles of trash are still frequently found in certain locations—particularly in densely populated areas and coastal zones. This indicates that current waste management efforts have not succeeded in addressing all existing waste-related issues. Common challenges faced by the community include delays in waste collection, a lack of oversight regarding indiscriminate dumping, and a persistent lack of public awareness regarding the importance of maintaining a clean environment."* ***(Interview conducted on May 22, 2026)***

Thus, it is evident that the effectiveness of the waste management system in Kalibaru Urban Village is not yet optimal. Although waste collection and transportation activities are underway, various obstacles persist, preventing waste management objectives from being fully achieved.

Management Efficiency

Efficiency measures the comparison between the output and input of the resources used (Lubis, 2020). Waste management in Kalibaru has a structured division of tasks, with 71 personnel handling Public Infrastructure and Facilities (PPSU), 63 of whom are on duty in the field, supported by six units of motorcycle carts (germot), operating from 06.30 to 14.00 WIB. Based on an interview with Mr. Rezha Erdiansyah, S.STP., M.A.—a staff member at the Kalibaru Urban Village office serving as the Head of the Economy and Development Section—it was found that the waste management system features a well-structured division of labor and work schedules.The informant stated that: (Husna *et al*., 2025).

> *"In terms of time, I operate from half past seven in the morning to two in the afternoon. In terms of labor, we have 71 PPSUs here with 63 people on duty in the field... There are six units of moths."* ***(Interview Results, May 21, 2026***

However, the limitation of the number of fleets, manpower, and budget is the main obstacle. The habit of people who still dispose of waste without sorting ("disposed of, transported, disposed of, not processed") also weakens the efficiency of the system, as conveyed by the Agency: limited human resources, vehicles, and budgets cause "that efficiency to make our work less effective" (Interview Results, May 25, 2026). The efficiency of waste management in Kalibaru is therefore not optimal because the input of available resources has not produced maximum service output (Zainarti, Z., & Kirana, 2026). In practice, however, various obstacles remain that prevent waste management from operating efficiently. One of the primary challenges is the behavioral pattern of the community, which remains accustomed to the old system of disposing of waste without prior sorting. Informants explained that:

> *"The community here remains comfortable with the old pattern: discard, haul away, dump. Not processing the waste.**"(Interview conducted on May 21, 2026)***

Research findings indicate that limited fleets and infrastructure prevent the waste collection process from operating efficiently. This results in collection delays and the accumulation of waste at temporary collection points. Consequently, the current system has yet to achieve a balance between inputs (resources) and outputs (service outcomes). The Environmental Agency Sub-division also conveyed that limited human resources, operational vehicles, and budget act as obstacles to improving waste management efficiency. The informant stated:

> *"We are still short on manpower and vehicles. Sometimes vehicles are undergoing maintenance, so other teams have to assist with transport. Furthermore, budget cuts have impacted work effectiveness; we lack both personnel and vehicles, and our funds have been reduced. Consequently, the drive for efficiency has actually made our work less effective.**"(Interview conducted on May 25, 2026)***

Based on the interview with Ms. R. Imelda, S.Sos.a staff member of the North Jakarta Environmental Agency's Waste and Hazardous/Toxic Waste Management (PSLB3) Divisionit is evident that waste management efficiency in Kalibaru Urban Village remains suboptimal. Despite the existence of defined task allocations, operational schedules, and waste collection infrastructure, limitations in resources and low community participation have prevented the waste management system from operating efficiently and at full capacity.

Based on an interview with Mr. Sahnam, a community leader in Kalibaru Urban Village, it is understood that efficiency can be measured by comparing the output produced with the input used. In waste management, efficiency relates to the ability of the government and the community to utilize available resources to reduce waste volume through 3R

(Reduce, Reuse, Recycle) activities.Based on the interview with the community leader from Kalibaru Urban Village, he stated:

> *"In my opinion, waste sorting and reduction efforts within the community are not yet operating efficiently. While programs do exist, not everyone is implementing them. Consequently, the volume of waste entering temporary disposal sites remains very high on a daily basis. Many residents still mix their waste because they find sorting it to be a hassle. Furthermore, facilities for sorted waste disposal are limited, and government outreach efforts have been uneven."* ***(Interview conducted on May 22, 2026)***

It is evident that waste management efficiency in Kalibaru Urban Village is not yet functioning effectively. This is indicated by the persistently high volume of disposed waste, as well as the suboptimal implementation of waste sorting and reduction activities at the source.

Adequacy of Infrastructure

Infrastructure adequacy assesses the extent to which facilities and infrastructure — TPS, transport fleets, and processing facilities — are able to meet waste management needs. Kalibaru has three polling stations (in RW 9, RW 2, and RW 14) with conditions that the informants assessed to be on a scale of 5-6 out of 10, not equivalent to the 3R polling station which has complete facilities (Wijaya *et al*., 2024)



Figure 2. Condition of TPS in RW 09, Kalibaru Village
Source: Researcher field documentation (2026)

Of the 548 units of transport fleet owned by the North Jakarta Environment Agency, their use must be distributed to all villages in the region, while the condition of coastal areas accelerates the corrosion of operational vehicles. Budget limitations caused fleet repairs to be carried out in stages (Arya Raditya & Royke R. Siahainenia, 2025). This condition confirms that the number and capacity of TPS, fleets, and processing facilities such as TPS 3R or waste banks are still minimal, so the system focuses more on collection and disposal than processing (Anisafarah, S., & Wahyuni, 2025).

Integration of Management Stages

This indicator is at the core of the ISWM concept, which emphasizes the integration of all stages of management from reduction, sorting, collection, transportation, to final processing and processing. The Kalibaru Village Government has directed the community to separate household organic waste through a drop point system at the RT/RW level, which is then transported by the Environment Agency to be processed into organic pulp as animal feed as a first step towards a circular economy(Alfi *et al.*, 2026). However, in practice, the waste that has been sorted by residents is often remixed during transportation, so that the system that runs is still partial and dominated by a collect-transport-throw pattern, has not fully applied the ISWM principle in an integrated manner from upstream to downstream (Mauluddin, M. R. E., & Isnainazzahra, 2024).

Institutions and Governance

Waste management institutions in Kalibaru involve coordination between Kelurahan, the Environment Agency Tribe, Dasawisma, the Waste Sorting Movement (GPS), PPSU, and RT/RW. The involvement of these various elements shows that there are efforts to build collaborative governance. However, coordination is still administrative rather than operational: The Dinas Tribes must serve several villages at once so that the transportation of organic waste is carried out alternately and often late (Azzahrah, 2025). The community also considers that not all residents understand the division of tasks between agencies, and complaints related to services have not always been followed up quickly. In line with ISWM (Hossain *et al.*, 2023). Strong institutions are a prerequisite for a sustainable waste management system; in Kalibaru, the basis for coordination has been established, but the effectiveness of supervision and responsiveness still needs to be improved, a condition that is also relevant to the achievement of SDGs 16 (Resilient Institutions).

Community Participation

Community participation, such as community service and waste banks, already exists, but the number of residents who are actively involved is still relatively small (Kasim, 2025). One of the main obstacles is the mindset of people who think their obligations are completed after paying waste service dues, so they do not feel the need to sort waste from the source. Based on an interview with Mr. Rezha Erdiansyah, S.STP., MA—a staff member at the Kalibaru Urban Village office serving as the Head of the Economy and Development Section—it was revealed that the local government has undertaken various efforts to boost

community participation through persuasive approaches, education, and outreach regarding waste sorting (Agustina *et al*., 2026) The Department of Environment stated:

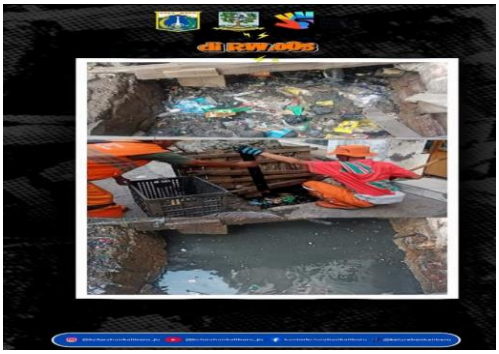
> *"We, the Urban Village administration, conduct education, outreach, and persuasive engagement with the community through PPSU personnel, Dasawisma groups, RT/RW officials, and the Waste Sorting Movement. Additionally, the Urban Village provides organic waste containers and drop-point bins, while also encouraging every RT to ensure that households begin sorting their waste."* ***(Interview conducted on May 21, 2026)***



Figure 3. Public Participation in The Waste Sorting Movement, Kalibaru Villag
Source: Researcher field documentation (2026)

In addition, the sub-district office also explained that some households in each RT have begun sorting their waste, although the number remains limited. The informant stated:

> *"...disposing of waste without sorting it. Education levels, public mindset, and a lack of willingness to utilize the provided facilities are the primary factors behind low community participation; waste-sorting stations have already been established in each Community Unit (RW)—on average, two to three stations per Neighborhood Unit (RT)."****(Interview conducted on May 21, 2026)***



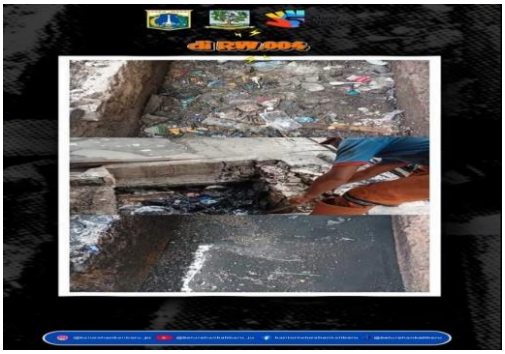


Figure 4. Public Participation in The Waste Sorting Movement, Kalibaru Villag
Source: Researcher field documentation (2026)

Although the Dinas have carried out repeated socialization with the Waste Bank and the sub-district, low awareness and lack of economic incentives still hinder the active involvement of the community, something that according to ISWM is an important prerequisite for successful waste management from the source (Hossain *et al*., 2023). Based

on the research findings, community participation in waste management in Kalibaru Urban Village remains low. Despite various educational and outreach efforts by the local government, low public awareness and a continued reliance on old waste management practices hinder efforts to increase active community involvement in source-based waste management. This is evident from the minimal practice of waste sorting and the persistence of indiscriminate waste disposal. These conditions indicate a need to further raise environmental awareness among the community through education and outreach. Based on an interview with Ms. R. Imelda, S.Sos.—a staff member of the North Jakarta Environmental Agency's Waste and Hazardous & Toxic Waste (B3) Management Division—it was revealed that efforts to boost public participation are carried out through repeated outreach and awareness-raising activities. Additionally, the Agency collaborates with various stakeholders, such as waste banks and urban village administrations, and supports educational programs in schools and the community. Operationally, the Waste and Hazardous & Toxic Waste (B3) Management Section focuses primarily on waste collection and providing guidance, while activities aimed at increasing public participation are conducted collaboratively with waste banks and local urban village governments. The informant stated.

> *"We repeatedly conduct outreach to the public. To boost community participation, we also collaborate with waste banks and sub-district offices, and implement programs for schools and the community through available channels. Our role focuses primarily on collection and providing guidance, while community participation is managed in partnership with waste banks and sub-district offices."****(Interview conducted on May 25, 2026)***

Table 3.Waste Management Data Facility in Kalibaru Urban Village Environmental Agency of the North Jakarta Administrative City

No.	District	Waste Bank	Composting Facility	Maggot Facility	Notes
1	Cilincing	SDN 01 Kalibaru	BS KPK	Kalibaru Urban Village Office	
2		SMK 36 Kalibaru	Semut	BS Bendari Mandiri RW 10	
3		SDI Al Islamiyah	Berdaya Mandiri		
4		SDN 03 Kalibaru			
5		SDN 09 Kalibaru			
6		SMPN 53 Kalibaru			
7		(Maju Mandiri)			
8		SDN 05 Kalibaru			
9		SDN 07 Kalibaru			
10		PESISIR 04 (POSPAT)			
11		Kancil PPSU (Semut)			
12		Bank Sampah RW 06 (BERSAMA)			
13		(Germapin)			
14		Bank Sampah Kalibaru (Kreatif)			
15		Berkah Mandiri			
16		Family			
17		BRI 05			
18		Kerang Hijau Berkah			
19		Sampah Mandiri 02			
20		Bersama Menuju Sukses			
21		Berdaya Mandiri RW 10			
22		Bintang Mandiri			
23		RW 07			
Total		23 Waste Banks	3 Composting Facilites	2 Maggot Facilites	

Source: North Jakarta Environmental Agency (PSLB3 Division)

Based on the interview results, it can be concluded that the Environmental Agency has endeavored to increase public participation through outreach and collaboration with various stakeholders. However, the effectiveness of public participation remains constrained by low awareness, a mindset that does not yet support waste sorting, and a lack of incentives to encourage active community involvement. Based on an interview with Mr. Sahnam, a community leader in Kalibaru Urban Village, the success of waste management relies heavily on community involvement. Such participation can be realized through activities such as waste sorting, community cleanup drives, waste banks, and various other environmental initiatives.

> *"Many residents still consider waste management to be entirely the government's responsibility. Awareness regarding independent waste management still needs to be raised."* ***(Interview conducted on May 22, 2026)***

Thus, it is evident that community participation in waste management in Kalibaru Urban Village remains low and requires improvement through education and community empowerment.

Justice and Equitable Service

Waste transportation services have basically been sought to reach all Kalibaru Villages through the placement of 71 PPSU personnel and the provision of TPS in several RWs. However, around 60% of the area is still considered to be not optimally served, especially areas with narrow road access and coastal areas such as RW 13 which is adjacent to the pier, which often experience transportation delays compared to other areas. In accordance with the principles of ISWM (Hossain et al., 2023)and basic service justice, a sustainable waste management system must provide equal services regardless of geographical conditions in the region, a principle that in Kalibaru is still not fully realized, thus affecting the achievement of SDGs 10 (Reducing Gaps) and SDGs 11 (Marlina, 2024).

Contribution to Sustainable Development (SDGs)

The drop-point-based organic waste sorting program that is processed into animal feed shows the direction towards a circular economy and contributes to SDGs 12 (Responsible Consumption and Production), SDGs 11 (Sustainable Cities and Settlements), and SDGs 13 (Climate Change Management) through reducing emissions from organic waste decay (Elis Viranda, Rachmawati Novaria, 2024). However, this contribution is still in its early stages: low community participation, waste mixing habits, limited infrastructure, and suboptimal inter-agency coordination have caused the benefits of the program to not be widely felt. According to ISWM theory (Hossain *et al*., 2023), the achievement of sustainable development is only possible if all indicators of effectiveness, efficiency, infrastructure, integration, institutional, participation, and justice of services run in an integrated manner, so that improvements in one aspect alone are not enough to realize truly sustainable waste management (Arifani *et al*., 2026).

Inhibiting and Supporting Factors

The main inhibiting factors include low public understanding and awareness due to the lack of socialization and education, limited facilities and infrastructure (TPS and fleet), and institutional coordination that is not optimal (Subekti, 2010). On the other hand, supporting factors include the existence of government policies and programs as the basis

for implementation, socialization activities that have begun to run, the availability of supporting facilities although limited, as well as the participation of some communities through community service work and community-based initiatives such as waste banks and independent waste management (Dwiyanti *et al*., 2025).

Conclusion

Integrated waste management in Kalibaru Village, Cilincing District, has basically been running but has not been optimal in supporting the achievement of the Sustainable Development Goals (SDGs) (Yojana *et al*., 2025). This can be seen from the still dominance of conventional management patterns (gathering-transport-disposing), limited facilities and infrastructure such as polling stations and transport fleets, and uneven services throughout the region. Low public participation and awareness in sorting and managing waste from sources is the main factor that hinders the effectiveness of the system (Muflihuddin *et al*., 2025). From an institutional aspect, the role of the Environment Agency already exists but still faces obstacles in coordination, supervision, and funding limitations. The stages of waste management have not been fully integrated from upstream to downstream, so the generation of waste that is not handled optimally is still high. Nevertheless, integrated waste management in Kalibaru Village has the potential to support the achievement of the SDGs, especially Goals 11 (Sustainable Cities), 12 (Responsible Consumption and Production), and 13 (Climate Change Management), if comprehensive improvements are made, including improving infrastructure, strengthening governance, optimizing institutions, and increasing active community participation through sustainable education and community-based programs such as waste banks (Sri Rahmatullah, 2024)

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Author Contributions

Student Bintang Ramadhan Firdaus was responsible for developing the research concept, collecting data, conducting interviews, analyzing research findings, and drafting the manuscript. Lecturer Ika Widiastuti served as the research supervisor, providing academic direction, methodological guidance, critical evaluation, and manuscript revisions. Both authors contributed to reviewing and approving the final version of the manuscript.

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