



Community Empowerment Based Waste Management in Subsidized Housing

(A Case Study in Padang Pariaman Regency)

Tomi Satria Maggara ^{1*}, Aldri Frinaldi ², Syamsir ³, Siti Fatimah ⁴

¹⁻⁴ Master of Public Administration, Universitas Negeri Padang, Indonesia

*Penulis Korespondensi : tommysatriamaggara@gmail.com

Abstract. This study examines community empowerment-based waste management in subsidized housing areas in Padang Pariaman Regency. It aims to describe existing waste management practices, identify supporting and inhibiting factors, and formulate appropriate development strategies. The study employed a qualitative case-study design. Data were collected through in-depth interviews, observation, documentation, and a Focus Group Discussion involving 12 informants representing the Environmental Agency, nagari government, housing developers and managers, neighborhood organizations, community leaders, waste-bank administrators, and residents. Data were analyzed using an interactive process comprising data reduction, data display, conclusion drawing, and verification, followed by SWOT analysis. The results indicate that waste management remains focused on waste collection and transportation, while waste reduction at source, household sorting, and reduce, reuse, and recycle practices have not yet become established community routines. Community empowerment has been initiated through socialization, community meetings, communal disposal facilities, and coordinated collection services. However, empowerment and protection mechanisms remain limited because participation is uneven, technical skills are inadequate, local institutions are weak, training is irregular, and waste management depends heavily on transportation services. The study concludes that Weaknesses–Opportunities strategies should be prioritized through regular practical training, provision of separated waste bins, institutional strengthening, reactivation of the waste bank, and the establishment of a coordinated waste collection schedule.

Keywords: Community Empowerment; Public Participation; Subsidized Housing; SWOT Analysis; Waste Management.

1. INTRODUCTION

Waste has become one of the most complex environmental problems accompanying population growth, urbanization, changing consumption patterns, and the expansion of residential areas. The problem is not limited to visible litter; it also affects public health, drainage, neighborhood comfort, land quality, and the capacity of local governments to provide basic environmental services. National waste-management data reported through the Indonesian National Waste Management Information System indicate that approximately 34.97 million tons of waste were generated in 2024. Only about 33.09% was recorded as managed, while 66.91% remained unmanaged (Jasman et al., 2019). These figures demonstrate that collection and final disposal alone cannot solve the problem. Waste policy must increasingly focus on prevention and treatment at the source, particularly within households where daily waste is first generated (Ministry of Environment and Forestry of the Republic of Indonesia, 2024).

The situation is particularly important in Padang Pariaman Regency. In 2023, the regency generated approximately 79,593.54 tons of waste, but only 224.44 tons, or 0.28%, were reduced and about 5,058.90 tons, or 6.36%, were handled. The overall management rate was therefore only about 6.64%. This gap indicates that most waste was not yet addressed through an integrated chain of reduction, sorting, collection, transportation, reuse, recycling, and safe final disposal. The limited management rate also creates pressure on neighborhoods that do not have adequate temporary storage, regular transportation, or household-level sorting facilities. When these services are weak, residents may resort to vacant land, roadside spaces, drains, or informal burning, each of which produces new environmental and social risks (Rizani et al., 2021).

Indonesia's waste-management policy emphasizes the reduce, reuse, and recycle approach. Source reduction limits the volume of disposable products entering the waste stream, reuse extends the life of materials, and recycling returns selected waste to productive use. In practice, the success of the 3R approach depends on whether households understand waste categories, possess suitable containers, have access to collection or processing facilities, and see practical benefits from changing their routines. Studies in Padang Pariaman and other Indonesian localities show that 3R programs are frequently constrained by insufficient infrastructure, weak public understanding, limited organizational support, and inconsistent participation (Aziz et al., 2020; Brotosusilo et al., 2021). Thus, the issue is administrative and social as well as technical.

Community empowerment offers a relevant approach because residents are not merely recipients of sanitation services. They are actors who produce, sort, store, and transfer household waste every day. Empowerment seeks to create conditions that encourage awareness, strengthen practical capabilities and collective organization, and protect the continuity of community initiatives. Community-based waste management can reduce environmental burdens when residents receive access to information, facilities, training, decision-making spaces, and reliable institutional support. Waste-bank programs, neighborhood cleanups, composting activities, and local collection systems are more sustainable when they are organized as shared responsibilities rather than temporary campaigns (Mardikanto & Soebiato, 2019; Brotosusilo et al., 2021; Kruahong et al., 2023).

Subsidized housing requires special attention because its physical and socioeconomic characteristics differ from those of low-density residential areas. House plots are generally small, buildings are close to one another, and households have limited space for separate storage, composting, or independent processing. Residents also rely heavily on communal

facilities and coordinated services. A problem created by one household can quickly affect neighboring homes, roads, drainage channels, and shared open space. Consequently, waste management in subsidized housing cannot be designed only as an individual household obligation. It requires clear roles for residents, neighborhood organizations, developers, nagari government, and the Environmental Agency. The provision and management of shared infrastructure are essential parts of the housing environment (Republic of Indonesia, 2011).

Preliminary observation in Manggara Permai 3 Subsidized Housing, Korong Koto Gadis, Sunur, Nan Sabaris District, showed that residents had limited capacity to manage household waste. Separate containers were unavailable, temporary storage was inadequate, and the restricted space of individual homes made independent processing difficult. Some waste was discarded on vacant land, in drainage channels, or along internal roads. The problem was influenced not only by household behavior but also by service availability, land limitations, information, collection costs, developer involvement, local rules, and government attention. Education without facilities and transportation provides knowledge but leaves residents without a realistic space to apply it. Conversely, facilities without community organization are likely to be poorly maintained or used without sorting.

Previous research has documented the contribution of waste banks and community participation to neighborhood cleanliness, environmental awareness, and economic benefits. Community empowerment through waste-bank programs can improve residents' knowledge and provide opportunities for collective environmental action (Adiatmika & Nain, 2022; Mustafirin et al., 2021). Other studies emphasize that participation is influenced by education, local leadership, facilities, and the ability of residents to perceive direct benefits from their involvement (Rusdiyana et al., 2024; Seltiawati et al., 2024). These studies provide an important foundation but often examine established community groups or waste banks without giving specific attention to the limited land, shared facilities, and multi-actor governance found in subsidized housing.

The research gap therefore concerns the integration of the empowerment process, local service arrangements, and strategic development within subsidized housing. It is not sufficient to determine whether a waste bank exists or whether residents participate in occasional cleanups. A deeper analysis is required to understand how awareness is created, how practical capacity is strengthened, how continuity is protected, which internal and external factors shape the process, and how local actors can combine their resources. The novelty of this study lies in examining waste management as a public-administration issue involving community capacity,

communal facilities, service reliability, institutional coordination, and the specific constraints of subsidized residential environments.

Accordingly, this study analyzes the implementation of waste management through community empowerment in subsidized housing in Padang Pariaman Regency, identifies the supporting and inhibiting factors, and formulates development strategies using SWOT analysis. The results are expected to contribute to public-administration studies on collaborative environmental services and to provide practical direction for the Environmental Agency, nagari government, housing developers, local organizations, waste-bank administrators, and residents.

2. RESEARCH METHOD

This study used a qualitative approach with a case-study design. The design was selected to examine waste management and community empowerment within their actual residential and institutional context. The study focused on subsidized housing in Padang Pariaman Regency, West Sumatra, with particular attention to the relationships among residents, neighborhood organizations, developers, nagari government, and the Environmental Agency. SWOT analysis was used as a strategy-formulation instrument after the qualitative findings had been interpreted; it was not used as a statistical measurement tool (Fiantika et al., 2022; Abdussamad, 2021).

Informants were selected purposively according to their knowledge, experience, and direct involvement in residential waste management. The study involved 12 informants: two representatives of the Padang Pariaman Environmental Agency, one nagari government representative, two representatives of housing development or management, four neighborhood and community figures, and three residents. This composition allowed the research to compare the perspectives of service providers, local coordinators, community organizations, and service users.

Table 1. Composition of Research Informants.

Stakeholder Group	Number	Information Contribution
Environmental Agency	2	Policy, transportation, technical services, and environmental outreach
Nagari government	1	Local coordination, community meetings, and collection support
Housing developer/management	2	Communal facilities, residential management, and potential cooperation
Neighborhood and community organizations	4	RT/RW coordination, community leadership, and waste-bank experience
Residents	3	Household practices, participation, constraints, and program expectations

Source: Field data processed by the researcher.

Data were collected through in-depth interviews, direct observation, documentation, and a Focus Group Discussion. Interviews explored current waste practices, empowerment activities, participation, institutional roles, facilities, service problems, and development opportunities. Observation examined household and communal waste conditions, disposal points, environmental cleanliness, and participation in local activities. Documents included regulations, service data, activity records, photographs, and relevant institutional information. The Focus Group Discussion was conducted after the initial analysis to validate the classification of strengths, weaknesses, opportunities, and threats.

The data were analyzed interactively through transcription and organization, data reduction and coding, categorization, data display, conclusion drawing, and verification. Codes were developed around source reduction, sorting, collection, transportation, 3R practices, enabling, empowering, protecting, participation, facilities, institutional support, and service constraints. Information from residents, local organizations, developers, nagari government, and the Environmental Agency was compared to identify convergent and contrasting accounts. The validated themes were then grouped into internal and external factors and combined in a SWOT matrix.

Trustworthiness was maintained through source triangulation, method triangulation, member checking, contextual description, and an audit trail. Interview findings were compared with observation, documentation, and Focus Group Discussion results. Important interpretations were rechecked with relevant informants, and the research process was documented through interview guides, transcripts, field notes, coding records, category matrices, and the SWOT formulation.

3. RESULT AND DISCUSSION

Existing Waste Management and the Community Empowerment Process

The findings show that waste management in the subsidized housing area has improved in terms of communal collection and transportation, but it has not yet developed into an integrated source-based system. Household waste is generally placed in a single container and transferred to a communal disposal point. Transportation is conducted on a relatively regular basis and has reduced visible piles and scattered waste. Nevertheless, this pattern remains oriented toward moving waste out of the neighborhood rather than reducing the amount generated or recovering useful materials.

Source reduction has not become a routine household practice. Residents still purchase and discard single-use products without a coordinated program that encourages reusable alternatives. Local government messages have emphasized cleanliness and the prohibition of indiscriminate dumping, but they have not been translated into practical household targets, examples, or monitoring. Nagari-level rules specifically addressing household waste reduction have also not been established. As a result, residents tend to consider waste management complete once waste has been placed at the collection point.

Sorting is another weak stage. Organic, recyclable, and residual waste are commonly mixed because separate household or communal containers are unavailable. This finding indicates that behavior and infrastructure are closely connected. Calls for residents to sort waste are difficult to implement when all materials are ultimately deposited in one container and collected together. Mixed waste also prevents organic materials from being composted and reduces the quality and value of plastic, bottles, cardboard, and other recyclable materials.

The application of 3R practices remains limited. A waste-bank initiative had previously operated, but it involved only a small group of residents and did not continue consistently. Some households occasionally separated bottles or plastic for reuse or sale, yet these individual actions were not connected to a stable neighborhood system. The lack of routine weighing schedules, storage space, clear management roles, and practical training reduced the ability of the waste bank to become a collective environmental institution. These results are consistent with studies showing that waste banks require both resident participation and organizational maintenance (Mustafirin et al., 2021), (Seltiawati et al., 2024).

The enabling dimension is visible in socialization, community meetings, reminders from government and local leaders, and the construction of communal disposal facilities. The developer's provision of a disposal point and collaboration with the nagari government for periodic collection created a more supportive environment for orderly disposal. This arrangement reduced waste accumulation in open spaces and provided residents with a clearer service pathway. However, enabling remains limited because information is still general and has not been followed by detailed guidance on reduction, sorting, composting, or waste-bank operations.

Empowering is reflected in neighborhood cleanups, mutual-cooperation activities, community meetings, and the earlier waste-bank experience. Residents have opportunities to participate, but participation is uneven and often involves the same active individuals. Attendance depends on work schedules and personal availability, while technical capacity has not been broadly developed. Cleanups improve the immediate appearance of the neighborhood

but do not automatically change how waste is managed inside each home. Empowering therefore needs to move from invitations to attend activities toward practical training, clear division of responsibilities, and opportunities to manage environmental programs independently.

Protecting is represented by transportation services, developer-provided facilities, nagari support, and the role of community figures in maintaining collective concern. These elements protect the neighborhood from uncontrolled accumulation and give residents a degree of service certainty. Yet the protection is fragile because the system depends on limited transportation capacity, informal coordination, and a small number of active organizers. Sustainable protection requires written schedules, maintenance responsibilities, financing arrangements, complaint channels, supervision, and periodic evaluation. The three dimensions are therefore interdependent: awareness must be connected to skills, skills must be supported by facilities, and participation must be protected by reliable institutions and services.

Internal Supporting and Inhibiting Factors

Internal supporting factors arise from resources already available within the residential community. The first is the presence of neighborhood managers, RT and RW leaders, community figures, and former waste-bank administrators. These actors have experience disseminating information, inviting residents, coordinating cleanups, and communicating with transportation officers. Their presence provides an organizational foundation that can be strengthened rather than creating a new structure from the beginning.

The second strength is the continued existence of mutual-cooperation values among part of the community. Although participation is not universal, a group of residents remains willing to join cleanups and maintain shared spaces. The third strength is the availability of a communal disposal point that channels waste away from drains, roadsides, and vacant land. The fourth is prior experience with waste-bank activities. Even though the program is inactive or inconsistent, the community already recognizes the basic idea that selected waste can have environmental and economic value.

The most significant internal weakness is uneven awareness. Some residents continue to regard waste management as the sole responsibility of cleaning officers or government. This perception limits willingness to reduce and sort waste at home. A second weakness is uneven participation and weak coordination. Local organizers find it difficult to gather all residents, and environmental activities are repeatedly carried by the same small group. Information may be distributed, but attendance and follow-through remain inconsistent.

A third weakness is the absence of routine sorting and limited 3R capability. Mixed waste prevents the waste bank from receiving clean recyclable materials and makes organic processing impractical. A fourth weakness is the limited strength of community organizations. Tasks are not formally divided, operational schedules are unclear, and program continuity depends heavily on individual initiative. A fifth weakness is incomplete internal infrastructure, especially separated containers, recyclable storage space, and simple organic-waste processing facilities.

These weaknesses reinforce one another. Limited knowledge reduces household sorting; mixed waste weakens the potential of the waste bank; an inactive waste bank prevents residents from seeing concrete benefits; and low perceived benefits further reduce participation. The issue cannot therefore be solved through a single campaign. Internal improvement must combine education, facility provision, leadership development, operating procedures, and incentives that make collective action visible and useful.

Table 2. Evaluation of Internal Factors in Community-Based Waste Management.

No.	Internal Factor	Evaluation
1	Local neighborhood leadership	RT/RW leaders, community figures, housing managers, and former waste-bank administrators can coordinate residents and services.
2	Mutual-cooperation values	A group of residents remains willing to join cleanups and maintain shared environmental facilities.
3	Communal disposal facility	The available disposal point reduces roadside and open-space dumping and provides a common collection location.
4	Previous waste-bank experience	The community already recognizes the possibility of collecting recyclable materials and generating economic value.
5	Uneven environmental awareness	Some residents still consider waste management the responsibility of cleaning officers or government.
6	Low and inconsistent participation	Environmental activities are repeatedly supported by the same residents and are affected by personal schedules.
7	Absence of routine sorting and limited 3R skills	Organic, recyclable, and residual materials are mixed, reducing opportunities for composting and recycling.
8	Weak local organization	Task allocation, operating schedules, supervision, and continuity depend on a small number of active individuals.
9	Incomplete internal facilities	Separated containers, recyclable storage, and simple organic-processing facilities are not yet available.

Source: Interview, observation, documentation, and Focus Group Discussion data processed by the researcher.

External Opportunities and Threats

External opportunities are available from several institutions. The Padang Pariaman Environmental Agency provides transportation, socialization, and technical support. These services can be expanded from general cleanliness messages to practical training in sorting, composting, and waste-bank management. The nagari government also represents an important opportunity because it is closer to residents and can facilitate meetings, local rules, scheduled collection, coordination, and conflict resolution.

Housing developers and private-sector corporate social responsibility programs can support infrastructure that is difficult for residents to finance independently. Potential assistance includes covered communal containers, separated bins, cleaning tools, storage for recyclable materials, scales, carts, and simple composting equipment. Such assistance should be connected to clear management and maintenance arrangements so that facilities remain functional after they are handed over to the community.

The economic value of recyclable waste is another opportunity. Residents indicated greater interest when a program offered visible environmental and economic benefits. Plastic bottles, cardboard, metal, and selected household items can be aggregated through a waste bank. Economic incentives should not be treated as the only motivation, but they can make sorting more concrete, strengthen participation, and generate modest operational funds for environmental activities.

The first external threat is limited transportation capacity. Although collection is relatively regular, vehicle shortages or operational delays may cause waste to remain longer at communal points. The risk becomes greater when all waste is mixed and the volume is not reduced at the source. The second threat is irregular training and mentoring. Residents receive reminders, but not all groups have access to repeated practical assistance. Programs may therefore be active at the beginning and decline after outside attention is reduced.

The third threat is dependence on transportation. The existing system encourages the assumption that the problem ends when waste is removed from the housing area. If transportation is disrupted, the community has limited capacity to reduce, store, or process waste safely. This dependence can be reduced by increasing household sorting, reviving the waste bank, developing simple organic treatment, and creating a communication mechanism between local organizers, nagari government, and transportation officers.

The analysis confirms that external support must strengthen community capacity rather than substitute for it. Government, developer, or corporate assistance that only provides facilities may create new assets without changing daily routines. Conversely, training without containers, schedules, and transportation leaves residents unable to practice what they learn. Effective support must integrate enabling information, empowering skills and organization, and protecting services and supervision.

Table 3. Evaluation of External Factors Affecting Community-Based Waste Management.

No.	External Factor	Evaluation
1	Environmental Agency support	Transportation, outreach, and technical assistance can be expanded into practical sorting and waste-bank training.

2	Nagari government collaboration	The nagari can facilitate rules, meetings, collection schedules, coordination, and community assistance.
3	Developer and corporate social responsibility support	External assistance can improve separated bins, storage, carts, scales, and communal facilities.
4	Economic potential of recyclable waste	Visible environmental and economic benefits can increase participation and help finance local activities.
5	Limited transportation capacity	Vehicle shortages and operational delays may cause overflow and renewed accumulation at communal points.
6	Irregular training and mentoring	General reminders do not provide all residents with repeated practical knowledge and organizational support.
7	Dependence on transportation services	The system lacks sufficient source reduction and treatment capacity when external collection is disrupted.

Source: Interview, observation, documentation, and Focus Group Discussion data processed by the researcher.

Development Strategy Based on SWOT Analysis

The SWOT analysis combined the internal and external factors validated through interviews, observation, documentation, and the Focus Group Discussion. Strengths-Opportunities strategies use local leadership, mutual cooperation, communal facilities, and previous waste-bank experience to benefit from government, nagari, developer, corporate, and market support. The principal actions are to formalize cooperation between neighborhood organizations and nagari government, reactivate the waste bank with technical mentoring, use mutual cooperation for sorting and facility maintenance, and improve communal infrastructure through developer or corporate assistance (Rangkuti, 2016).

Weaknesses-Opportunities strategies use available external resources to correct internal limitations. They include routine awareness and practical training from the Environmental Agency, provision of separated bins through developer or corporate support, development of 3R activities with visible economic benefits, community meetings supported by the nagari government, and institutional mentoring for local organizers and waste-bank administrators. These strategies directly connect identified weaknesses with realistic sources of support.

Strengths-Threats strategies use existing local capacity to reduce vulnerability to service disruption. Neighborhood organizers can create a collection and communication system for delays, the communal disposal point can be managed through clear rules to prevent overflow, and the waste bank can reduce the amount of recyclable material requiring transportation. Mutual cooperation can also be mobilized to maintain cleanliness when external services are temporarily constrained.

Weaknesses-Threats strategies minimize internal limitations while preventing external risks. The proposed actions are source reduction and sorting to decrease dependence on transportation, flexible but fixed environmental schedules, repeated mentoring, stronger local organizations, clear task allocation, safe temporary storage, and joint supervision. These

measures are defensive in orientation but are necessary to prevent the return of open dumping and uncontrolled accumulation.

Table 4. SWOT Strategies for Community Empowerment-Based Waste Management.

Strategy	Strategic Direction
Strengths-Opportunities	Formalize cooperation between neighborhood organizations and nagari government; reactivate the waste bank with Environmental Agency mentoring; use mutual cooperation for sorting and facility maintenance; and improve communal infrastructure through developer or corporate support.
Weaknesses-Opportunities	Provide regular practical training; install separated household and communal containers; strengthen neighborhood and waste-bank organizations; develop economically useful 3R activities; and establish coordinated meetings and collection schedules.
Strengths-Threats	Use local leadership to manage communication during collection delays; establish rules for communal disposal points; reduce recyclable waste through the waste bank; and mobilize mutual cooperation when external services are constrained.
Weaknesses-Threats	Reduce and sort waste at the household source; define fixed but flexible activity schedules; provide repeated mentoring; clarify task allocation and supervision; and maintain safe temporary storage to reduce dependence on transportation.

Source: SWOT matrix developed from validated qualitative findings.

Among the four groups, Weaknesses-Opportunities strategies should receive the highest priority. The housing area has substantial external opportunities, including institutional support, available local-government coordination, potential developer and corporate assistance, and the economic value of recyclables. At the same time, the community's internal capability remains weak in awareness, sorting, 3R practices, participation, and organization. The most urgent program package therefore consists of quarterly practical training, separated containers, institutional strengthening, a fixed waste-bank weighing schedule, and coordinated collection with nagari government and the Environmental Agency.

Implementation should be phased. The first phase establishes responsible actors, household sorting rules, collection schedules, and basic facilities. The second phase conducts practical demonstrations and restarts the waste bank in one pilot block. The third phase evaluates participation, the number of sorting households, recyclable volume, transportation frequency, and facility cleanliness. Programs that show consistent results can then be expanded to other blocks or subsidized housing locations. This phased approach connects community empowerment with measurable public-service improvements and reduces the risk of short-lived projects.

4. CONCLUSION

Waste management through community empowerment in subsidized housing in Padang Pariaman Regency has begun but is not yet optimal or sustainable. The system is strongest in communal collection and transportation, while source reduction, household sorting, and 3R

processing remain limited. Enabling is visible through socialization, meetings, facilities, and coordinated collection; empowering is reflected in cleanups, local leadership, and prior waste-bank activity; and protecting is provided through government services, developer support, and community figures. However, the three dimensions have not been fully integrated. Uneven awareness, participation, technical skills, organization, facilities, mentoring, and transportation capacity continue to restrict performance. The SWOT analysis identifies local organizers, mutual cooperation, communal facilities, and waste-bank experience as strengths; government, nagari, developer, corporate, and economic support as opportunities; and service limitations and dependence as threats. Weaknesses-Opportunities strategies are prioritized through regular practical training, separated bins, stronger local institutions, reactivation of the waste bank, and coordinated collection schedules. Sustainable improvement requires residents to become active managers of waste from the household source, supported by reliable services, clear responsibilities, continuous mentoring, and collaboration among all local actors.

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