

Solid Waste Management in the Municipality of Cardona Issues Praxes and Prospects in 18 Barangays a Qualitative Inquiry.

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Received: 📅 2025 Aug 01

Accepted: 📅 2025 Aug 20

Published: 📅 2025 Aug 31

Abstract

This study examined the issues, praxes, and prospects of Solid Waste Management (SWM) in the 18 barangays of Cardona, Rizal. Employing a qualitative phenomenological approach, it explored the lived experiences of 54 barangay officials, including secretaries, chairpersons, and environment committee heads, through focus group discussions. Findings showed that all barangays have functional Materials Recovery Facilities (MRFs) as mandated by Republic Act 9003, yet challenges persist. These include inadequate budget, lack of manpower, community non-compliance with segregation, and limited equipment such as trucks and protective gear. Despite these constraints, best practices were observed: continuous MRF operations, barangay clean-up drives, school-based segregation, youth involvement, and linkages with junkshops for recycling and income generation. Prospects identified include stricter policy enforcement, stronger municipal support, sustained community education, and technological innovations such as composting and waste-to-energy facilities. The study concludes that effective SWM in Cardona requires not only compliance with RA 9003 but also integrated strategies combining governance support, active community participation, and appropriate technological solutions to achieve sustainability.

Keywords: Solid Waste Management, Barangay Praxes, RA 9003, Cardona Rizal, Community Participation, Environmental Governance

1. Introduction

Solid waste management (SWM) has become one of the most pressing environmental challenges in the Philippines. With a growing population, rapid urbanization, and increasing consumption patterns, the country generates an estimated 61,000 tons of solid waste per day, a figure projected to rise in the coming years [1]. Household waste makes up the largest portion of this volume, followed by commercial, institutional, and industrial sources. Improper handling of these wastes contributes to clogged waterways, urban flooding, greenhouse gas emissions, and health-related risks, particularly in densely populated and ecologically sensitive areas. To address these challenges, the Philippine government enacted Republic Act 9003, or the Ecological Solid Waste Management Act of 2000, which serves as the cornerstone of the country's SWM policy. This law prescribes a systematic, comprehensive, and ecological approach to waste management, with strategies including waste avoidance and reduction at source, segregation of waste, recycling, composting, and the establishment of Materials Recovery Facilities (MRFs) in every barangay or cluster of barangays. The law emphasizes shared responsibility across national government agencies, LGUs, the private sector,

and communities in ensuring effective implementation. Complementing RA 9003 is the Republic Act 7160, or the Local Government Code of 1991, which devolves the responsibility for solid waste management to LGUs. Under this code, LGUs are mandated to enact ordinances, allocate resources, and establish mechanisms for proper collection, segregation, and disposal of waste within their jurisdictions.

At the local level, municipalities and barangays bear the brunt of the responsibility for ensuring compliance with RA 9003. The Municipality of Cardona, located in the province of Rizal and composed of 18 barangays, faces unique challenges and opportunities in solid waste management. Cardona's geographical location as a lakeshore municipality adjacent to Laguna de Bay underscores the urgency of managing solid waste effectively. The Laguna Lake Development Authority (LLDA) has consistently warned about the ecological threats posed by untreated or improperly disposed waste that flows into the lake, including water pollution, decline in aquatic biodiversity, and threats to the livelihood of fishing communities. Waste management in Cardona, therefore, is not only a matter of local compliance but also a regional and national ecological concern.

Despite the mandates of RA 9003, several barangays in Cardona continue to face issues in solid waste management. These include weak compliance with household waste segregation, insufficient collection vehicles and facilities, lack of fully operational MRFs, inconsistent monitoring and enforcement of local ordinances, and financial constraints in implementing longterm programs. Some barangays still resort to open dumping or irregular collection schedules, which contribute to public health risks and environmental degradation. On the other hand, there are praxes (best practices) worth noting within the municipality. Certain barangays have implemented regular IEC (Information, Education, and Communication) campaigns, organized barangay clean-up drives, and partnered with schools, NGOs, and civic groups to raise awareness and mobilize communities. Some have also developed backyard composting initiatives and recycling programs that reduce the volume of residual waste. These examples reflect the potential of localized, community-driven solutions to complement municipalwide SWM programs.

Looking at prospects, Cardona has opportunities to further improve its SWM system by scaling up successful barangay initiatives, investing in modern waste reduction technologies, and strengthening partnerships with stakeholders such as private companies and civil society organizations. Additionally, the municipality can align with innovative practices such as waste-to-energy conversion, zero-waste initiatives, and stronger integration of circular economy principles. With stronger policy enforcement, increased budget allocation, and greater citizen participation, Cardona can position itself as a model municipality for ecological solid waste management in the Laguna lakeshore area.

As the current Municipal Environment and Natural Resources Officer (MENRO) of Cardona, the researcher has observed firsthand the day-to-day realities of SWM implementation across the 18 barangays. Field visits and monitoring activities have revealed that while some barangays are able to sustain operational MRFs and engage residents actively in segregation and recycling, others lag behind due to lack of infrastructure, limited manpower, or weak compliance. Recurring issues such as improper disposal of residual waste, indiscriminate dumping in waterways, and irregular waste collection schedules remain common. These challenges hinder the municipality's full compliance with RA 9003 and highlight the unevenness of SWM practices across barangays.

At the same time, the researcher has also noted the resilience and creativity of local communities in addressing waste concerns. Barangays that leverage strong leadership, consistent IEC campaigns, and partnerships with schools or private organizations often demonstrate better compliance and stronger environmental stewardship. Such insights point to the importance of examining both the problems and praxes, as well as envisioning the prospects of solid waste management in Cardona. In this light, the present study seeks to undertake a qualitative inquiry into the solid waste management practices of the Municipality of Cardona. Specifically, it aims to identify the issues faced by barangays,

document the best practices that can be replicated, explore the prospects for strengthening waste management systems, and put forward recommendations for more effective and sustainable implementation. This research is timely and significant, as it not only contributes to Cardona's compliance with national mandates but also supports the larger goal of safeguarding Laguna de Bay and promoting ecological balance in the region.

1.1. Objectives of the Study

This study aims to explore the issues, praxes, and prospects in implementing Solid Waste Management across the 18 barangays of Cardona, Rizal. Specifically, it seeks:

- To identify the issues encountered in the implementation of solid waste management.
- To determine the praxes being practiced by the barangays in managing solid waste.
- To assess the prospects of strengthening solid waste management in the municipality.
- To recommend improvements for more effective and sustainable implementation of solid waste management.

1.2. Literature Review

Solid Waste Management (SWM) in the Philippines is anchored on Republic Act 9003, the Ecological Solid Waste Management Act of 2000, which requires barangays and local government units (LGUs) to institutionalize segregation, establish Materials Recovery Facilities (MRFs), and implement ten-year SWM plans. Despite this comprehensive framework, the gap between national policy and local practice remains pronounced, particularly in rapidly urbanizing and resource-limited communities. Rola emphasized that weak governance, limited institutional capacity, and the persistence of the "sachet economy" are major impediments to proper SWM implementation [2]. The study highlighted that as of 2017, only about 31% of barangays nationwide had functional MRFs, while open dumping and poorly managed landfills remained common. These findings demonstrate the difficulty of enforcing RA 9003, especially in municipalities struggling with scarce resources and enforcement challenges.

At the grassroots level, Balutan and Borja explored the case of Barangay Washington in Surigao City, where irregular waste collection, poor facilities, and weak community compliance were identified as major barriers [3]. Despite these challenges, the study revealed opportunities through community education, recycling for income generation, and youth involvement in awareness campaigns. This suggests that participatory and community-based approaches can partly address infrastructure gaps. In Lipa City, Batangas, Villanueva, Magsino, Hernandez, and Hernandez examined SWM conditions and found that despite strict enforcement of policies, inefficiencies persisted due to the city's large volume of waste, averaging 167 kilos per day in selected barangays [4]. The researchers proposed BIOCUM, a biodegradable composter, to address organic waste diversion. Their study demonstrates the role of technological innovations in complementing policy and behavioral change in achieving sustainable waste practices.

Manalad, Buenaseda, and Gomez studied waste management utilization in selected barangays of District 6, Zone 64, Manila, and observed that residents continued to rely heavily on traditional disposal methods, with limited adoption of recycling and composting [5]. The authors stressed the importance of public education, infrastructure development, and stricter regulatory enforcement, recommending initiatives such as in-service training, seminars, and investment in recycling technologies. Their study reflects the reality of urban barangays, where sustainable practices remain underutilized despite the availability of legal frameworks. More recently, Gamao and Caelian assessed the implementation of a city ordinance on SWM in Sagay City, Negros Occidental [6]. Their descriptive-comparative study revealed that while implementation was rated to a “great extent” in areas such as waste generation, it was weakest in handling and on-site storage. Challenges identified were clustered into administrative, procedural, and policy-related issues. Notably, their analysis showed significant differences in implementation depending on geographic location—lowland communities rated higher than coastal and upland communities—pointing to the uneven capacity of communities to implement SWM programs. Their findings highlight the importance of contextual factors, such as geography and administrative capacity, in shaping SWM outcomes.

Taken together, these studies underscore several key insights. First, persistent challenges such as weak enforcement, inadequate facilities, and poor compliance hinder RA 9003’s implementation [2,5]. Second, community participation and innovative grassroots practices provide important opportunities for strengthening SWM [3]. Third, the adoption

of technological innovations, such as composters, can enhance waste diversion efforts [4]. Finally, governance and contextual variables— including geography, administrative capacity, and local ordinances—play a critical role in shaping the extent and effectiveness of SWM implementation [6]. These findings collectively suggest that for municipalities like Cardona, sustainable waste management requires a multi-pronged approach that combines governance reforms, community empowerment, technological innovation, and context-sensitive strategies

2. Methodology

In this research, the phenomenological approach of qualitative inquiry was employed. A phenomenological approach seeks to understand and interpret individuals’ lived experiences and the meanings they attach to those experiences. In the context of this study, it aimed to explore the experiences of solid waste management workers and officials in Cardona, Rizal, particularly in relation to occupational hazards and compensation requirements. A total of 54 barangay officials directly involved in solid waste management were purposively selected as participants. These included 18 Barangay Secretaries, 18 Barangay Chairpersons, and 18 Sangguniang Barangay Committee Chairpersons for Environment. Data were gathered through focus group discussions (FGDs) to obtain in-depth insights into the issues, praxes, and prospects in implementing solid waste management across the municipality.

3. Results and Discussion

3.1. The Issues Encountered in the Implementation of Solid Waste Management

Theme	Responses (Tagalog)	Meaning (English Interpretation)
Limited Resources	“Kulang talaga ang pondo para sa dagdag na kagamitan at pasahod sa mga tauhan.”	Insufficient budget allocation limits the purchase of equipment and hiring of additional personnel.
	“Iisa lang ang regular staff, kaya nahihirapan kami sa araw-araw na operasyon.”	Lack of manpower makes daily operations difficult, relying mostly on volunteers or job orders.
	“May MRF naman kami, pero hindi sapat ang pondo para sa maintenance at dagdag na workers.”	While MRFs are functional, inadequate budget hinders their maintenance and expansion.
Behavior of the Community	“Kahit paulit-ulit naming ipinaaalala, hindi pa rin nagsesegregate ng basura ang karamihan ng residente.”	Many residents still do not practice proper waste segregation despite repeated reminders.
	“May mga kabahayan na itinatapon ang basura kung saan-saan, minsan sa kanal o bakanteng lote.”	Some households indiscriminately dump waste in canals or vacant lots, causing sanitation problems.
	“Kapag may collection schedule, huli na naglalabas ng basura kaya nagkakat sa kalsada.”	Residents often disregard collection schedules, leading to scattered waste along streets.
Limited Equipment	“Iisa lang ang garbage truck kaya hindi nasasakop lahat ng area sa tamang oras.”	Having only one garbage truck causes delays and incomplete coverage in waste collection.
	“Kulang kami ng mga pushcart at drum na ginagamit sa barangay level.”	Lack of basic equipment such as pushcarts and drums limits efficiency in waste gathering.
	“Wala ring sapat na protective gear para sa mga garbage collector namin.”	Insufficient protective gear exposes waste collectors to occupational hazards and health risks.

Table 1: The Issues Encountered in the Implementation of Solid Waste Management

The discussions with barangay officials revealed that limited resources remain a persistent challenge in solid waste management. As one participant emphasized, *“Kulang talaga ang pondo para sa dagdag na kagamitan at pasahod sa mga tauhan”*, pointing to the inadequacy of financial support for equipment and staff salaries. Another official added, *“Iisa lang ang regular staff, kaya nahihirapan kami sa araw-araw na operasyon,”* underscoring the lack of manpower to handle day-to-day operations. While all barangays reported having functional MRFs, a participant admitted, *“May MRF naman kami, pero hindi sapat ang pondo para sa maintenance at dagdag na workers.”* These findings echo Rola (2019), who argued that while barangays may comply with RA 9003’s requirement of establishing MRFs, their long-term sustainability is undermined by limited funding and insufficient human resources [2]. Similarly, Gamao and Caelian (2023) noted that administrative and resource-related constraints remain among the biggest obstacles in the successful implementation of city ordinances on waste management [6].

Another recurring theme is the behavior of the community, which hinders effective implementation. A barangay chairperson expressed frustration, *“Kahit paulit-ulit naming ipinaaalala, hindi pa rin nagse-segregate ng basura ang karamihan ng residente.”* Others observed that, *“May mga kabahayan na itinatapon ang basura kung saan-saan, minsan sa kanal o bakanteng lote,”* reflecting a culture of improper disposal. Moreover, officials complained, *“Kapag may collection schedule, huli na naglalabas ng basura kaya nagkakalat sa kalsada.”* These statements illustrate low compliance with segregation policies, improper disposal practices, and disregard for collection schedules. These observations resonate with the findings of Manalad,

Buenaseda, and Gomez (2021), who reported that many urban communities in Manila still rely on traditional waste disposal methods and show weak adoption of recycling and composting [5]. Likewise, Cabulong and Dizon (2021) emphasized that community behavior particularly awareness and discipline play a decisive role in the success or failure of SWM programs [7].

Finally, barangay officials pointed out the problem of limited equipment, which further complicates waste collection and worker safety. One participant shared, *“Iisa lang ang garbage truck kaya hindi nasasakop lahat ng area sa tamang oras,”* while another added, *“Kulang kami ng mga pushcart at drum na ginagamit sa barangay level.”* Waste workers are also at risk, as revealed in the statement, *“Wala ring sapat na protective gear para sa mga garbage collector namin.”* These equipment-related challenges mirror the findings of Villanueva et al. (2022), who reported that while Lipa City barangays had SWM facilities, their efficiency was compromised by inadequate logistics and worker protection [4]. Similarly, Balutan and Borja (2025) highlighted how limited vehicles and safety gear weakened SWM implementation in Surigao City [3]. In sum, the findings show that although Cardona has functional MRFs in all barangays, the trifecta of insufficient resources, community non-compliance, and inadequate equipment continues to obstruct the full realization of RA 9003’s objectives. Addressing these issues requires not only stronger LGU investment in manpower and logistics but also sustained education campaigns and policy enforcement to influence community behavior, as emphasized across related studies.

3.2. Praxes Being Practiced by the Barangays in Managing Solid Waste

Theme	Responses	Meaning
Functional MRFs	“May MRF kami na ginagamit para sa segregation ng nabubulok at dinabubulok.”	Barangays operate functional MRFs for segregation of biodegradable and non-biodegradable waste.
	“Tuloy-tuloy ang operasyon ng MRF kahit kulang ang pondo.”	Despite budget limitations, barangays maintain continuous MRF operations.
	“Nagagamit din ang MRF sa pagbebenta ng recyclable materials para may dagdag na pondo.”	MRFs serve as venues for recycling and generating funds through the sale of recyclables.
Community Participation	“May mga residente na aktibo sa paglilinis tuwing barangay clean-up drive.”	Residents actively participate in barangay clean-up drives.
	“Nagtutulungan ang kabataan sa information drive tungkol sa tamang pagtatapon ng basura.”	Youth volunteers support information campaigns on proper waste disposal.
	“Sa mga paaralan, tinuturuan na ang mga bata kung paano mag-segregate ng basura.”	Schools integrate waste segregation practices in student activities.
Barangay Initiatives	“Nagbibigay kami ng insentibo sa mga bahay na consistent sa segregation.”	Some barangays incentivize households that consistently practice segregation.
	“Nagsasagawa kami ng seminar at IEC campaign para mas maintindihan ng tao ang RA 9003.”	Barangays organize seminars and information campaigns to raise awareness about RA 9003.
	“May pakikipag-ugnayan kami sa junkshop para maibenta ang mga recyclable materials.”	Barangays collaborate with junkshops to strengthen recycling and income generation.

Table 2: Praxes Being Practiced by the Barangays in Managing Solid Waste

Despite resource and equipment challenges, the barangays of Cardona demonstrated several best practices (praxes) that support the effective implementation of Solid Waste Management. Foremost among these is the operation of functional Materials Recovery Facilities (MRFs). One barangay secretary noted, *“May MRF kami na ginagamit para sa segregation ng nabubulok at di-nabubulok,”* while another explained, *“Tuloy-tuloy ang operasyon ng MRF kahit kulang ang pondo.”* A third participant added, *“Nagagamit din ang MRF sa pagbebenta ng recyclable materials para may dagdag na pondo.”* These statements illustrate that MRFs not only comply with RA 9003 but also generate supplemental funds through recycling. This aligns with Villanueva et al. (2022), who highlighted the importance of MRFs in Lipa City as focal points for segregation and recycling [4]. Similarly, Rola (2019) emphasized that localized MRF operations remain central to waste diversion strategies in the Philippines [2].

Another key praxis is community participation. Barangay leaders highlighted that residents support clean-up drives, youth groups assist in awareness campaigns, and schools integrate segregation into student activities. One official shared, *“May mga residente na aktibo sa paglilinis tuwing barangay clean-up drive,”* while another said, *“Nagtutulungan ang kabataan sa information drive tungkol sa tamang pagtatapon ng basura.”* In addition, *“Sa mga paaralan, tinuturuan na ang mga bata kung paano mag-segregate ng basura.”* These practices strengthen collective responsibility and reflect the findings of Balutan and

Borja (2025), who observed that youth participation and education campaigns are vital in reinforcing sustainable waste management at the barangay level [3]. Likewise, Manalad et al. (2021) emphasized that strong community education and mobilization are key drivers of compliance in urban barangays [5].

Finally, barangays also employ local initiatives such as incentive schemes, partnerships with junkshops, and IEC campaigns. A barangay chairperson stated, *“Nagbibigay kami ng insentibo sa mga bahay na consistent sa segregation,”* while another explained, *“Nagsasagawa kami ng seminar at IEC campaign para mas maintindihan ng tao ang RA 9003.”* Others mentioned collaboration, as in, *“May pakikipag-ugnayan kami sa junkshop para maibenta ang mga recyclable materials.”* These practices show proactive local governance and align with the study of Gamao and Caelian (2023), who found that LGU ordinances and community-based initiatives significantly improve compliance and reduce waste generation. In sum, the praxes in Cardona’s barangays demonstrate that despite budget and equipment constraints, officials and communities have found ways to sustain SWM [6]. Functional MRFs, community participation, and barangay-led initiatives serve as concrete examples of localized strategies that align with RA 9003’s objectives and echo the broader findings of national and local SWM studies.

3.3. Prospects of Strengthening Solid Waste Management in the Municipality

Theme	Responses	Meaning
Policy Strengthening	“Kung mas magiging mahigpit ang pagpapatupad ng ordinansa, mas susunod ang tao.”	Stricter enforcement of ordinances can improve community compliance.
	“Kailangan din ng dagdag na suporta mula sa munisipyo para sa pagpapatupad ng RA 9003.”	Greater support from the municipal government is needed to fully implement RA 9003.
	“Kung may dagdag na pondo, mas mapapalakas ang mga proyekto at operasyon.”	Additional funding can strengthen programs and daily operations.
Community Engagement	“Mas malaki ang posibilidad kung maituturo nang maaga sa mga kabataan ang tamang pagtatapon.”	Early education for children increases the prospects of longterm compliance.
	“Kung regular ang IEC campaign, mas maiintindihan ng tao ang kahalagahan ng segregation.”	Sustained IEC campaigns can improve awareness and cooperation.
	“Kung mas magiging aktibo ang mga residente sa clean-up drive, mas lilinis ang kapaligiran.”	Greater resident involvement in clean-up drives will lead to a cleaner community.
Technological Innovation	“Malaking tulong kung makakapagpatayo ng waste-to-energy facility sa hinaharap.”	Establishing waste-to-energy facilities is seen as a future opportunity for waste reduction.
	“Kung maibibigay ang mga composting equipment, mas mababawasan ang basurang nabubulok.”	Providing composting equipment can reduce biodegradable waste.
	“Makakatulong kung magkakaroon ng mas maayos na tracking system para sa collection schedule.”	A better tracking system for waste collection can improve efficiency and reliability.

Table 3: Prospects of Strengthening Solid Waste Management in the Municipality

The prospects identified by barangay officials point to three central areas of improvement: policy strengthening, community engagement, and technological innovation. First, stricter policy enforcement and municipal support were frequently mentioned by participants. As one official emphasized, *“Kung mas magiging mahigpit ang pagpapatupad ng ordinansa, mas susunod ang tao,”* underscoring the importance of discipline through consistent enforcement. Another pointed out, *“Kailangan din ng dagdag na suporta mula sa munisipyo para sa pagpapatupad ng RA 9003,”* highlighting the need for stronger municipal backing. Similarly, *“Kung may dagdag na pondo, mas mapapalakas ang mga proyekto at operasyon.”* These perspectives echo Rola, who noted that enforcement gaps and limited funding weaken the effectiveness of SWM laws, and align with Gamao and Caelian, who stressed that administrative and policy support from LGUs is critical for sustaining compliance.

Second, community engagement was seen as a long-term solution. Officials expressed that educating the youth is vital, as one said, *“Mas malaki ang posibilidad kung maituturo nang maaga sa mga kabataan ang tamang pagtatapon.”* Another explained, *“Kung regular ang IEC campaign, mas maiintindihan ng tao ang kahalagahan ng segregation,”* while others noted that *“Kung mas magiging aktibo ang mga residente sa clean-up drive, mas lilinis ang kapaligiran.”* These statements emphasize that continuous education and participation are key to achieving behavioral change. This is consistent with the findings of Manalad, who highlighted the role of awareness campaigns in promoting sustainable waste

practices, and Balutan and Borja, who observed that youth-led initiatives increase community compliance.

Finally, the participants recognized the value of technological innovations to improve efficiency and sustainability. One official shared, *“Malaking tulong kung makakapagpatayo ng waste-to-energy facility sa hinaharap,”* while another added, *“Kung maibibigay ang mga composting equipment, mas mababawasan ang basurang nabubulok.”* Others envisioned digital tools, *“Makakatulong kung magkakaroon ng mas maayos na tracking system para sa collection schedule.”* These ideas reflect the growing interest in integrating technology into local waste management systems. Villanueva et al. already recommended BIOCUM, a composting technology, to reduce biodegradable waste, while Santos and Flores stressed the potential of community-based recycling hubs and digital systems for sustainable waste diversion [8]. Overall, the findings suggest that the future of SWM in Cardona lies in a combination of stronger policy enforcement, deeper community participation, and the adoption of innovative technologies. These prospects not only align with the mandates of RA 9003 but also resonate with emerging national and international studies that emphasize governance, behavioral change, and technological adaptation as key pathways toward sustainable solid waste management.

3.4. The Recommendations for Improving Solid Waste Management

Theme	Responses	Meaning
Increased Funding & Manpower	“Kung madagdagan ang pondo, mas makakabili pa kami ng kagamitan at makakadagdag ng tao.”	Additional funds would allow the purchase of equipment and hiring of more staff.
	“Kailangan talaga ng regular na empleyado, hindi lang puro job order.”	Hiring regular employees instead of relying on job orders will strengthen operations.
	“Dagdag pondo para sa maintenance ng MRF at suweldo ng collectors.”	More funds are needed for MRF maintenance and salaries of waste collectors.
Community Education & Discipline	“Mas marami pang seminar at IEC para maintindihan ng tao ang tamang pagtatapon.”	More seminars and information campaigns are needed for proper disposal awareness.
	“Kung may parusa sa hindi nagsesegregate, baka matuto na ang mga residente.”	Imposing penalties on violators may improve compliance.
	“Dapat tuluy-tuloy ang information drive para sa kabataan at matatanda.”	Sustained information drives should target both youth and adults.
Technology	“Dagdagan pa ang mga truck at pushcart para mas mabilis ang collection.”	More trucks and pushcarts are needed to improve waste collection efficiency.
	“Magbigay ng tamang protective gear para sa collectors.”	Providing protective gear is necessary for the safety of waste collectors.
	“Mag-invest sa composting at wasteto-energy technology para mabawasan ang basura.”	Investing in composting and waste-to-energy facilities will help reduce waste volume.

Table 4: The Recommendations for Improving Solid Waste Management

Barangay officials strongly recommended improvements centered on funding, manpower, education, discipline, and technology. Many underscored the need for greater financial support and stable staffing. As one official stressed, “Kung madagdagan ang pondo, mas makakabili pa kami ng kagamitan at makakadagdag ng tao.” Another added, “Kailangan talaga ng regular na empleyado, hindi lang puro job order.” The sentiment, “Dagdag pondo para sa maintenance ng MRF at suweldo ng collectors,” illustrates how funding gaps directly affect both infrastructure and human resources. These findings echo Rola, who emphasized that inadequate budgets and manpower are key constraints in sustaining SWM programs. Similarly, Gamao and Caelian stressed that stable administrative and resource support is essential for effective ordinance implementation. Community education and discipline were also repeatedly mentioned. One barangay leader noted, “Mas marami pang seminar at IEC para maintindihan ng tao ang tamang pagtatapon,” while another insisted, “Kung may parusa sa hindi nagse-segregate, baka matuto na ang mga residente.” Sustained campaigns were also highlighted: “Dapat tuluy-tuloy ang information drive para sa kabataan at matatanda.” These recommendations point to the need for continuous awarenessbuilding and stricter enforcement, aligning with Manalad, who highlighted education campaigns and sanctions as crucial for compliance. Likewise, Balutan and Borja showed that participatory education programs are effective in instilling community discipline and awareness.

Finally, upgrading equipment and integrating technology were seen as vital for long-term improvements. A participant pointed out, “Dagdagan pa ang mga truck at pushcart para mas mabilis ang collection,” while another emphasized, “Magbigay ng tamang protective gear para sa collectors.” In terms of innovation, one said, “Mag-invest sa composting at waste-to-energy technology para mabawasan ang basura.” These recommendations align with Villanueva, who proposed BIOCUM composting technology as an effective tool for reducing biodegradable waste, and Santos and Flores, who stressed the role of community-based recycling hubs and waste-to-energy systems in improving sustainability [8]. In conclusion, the recommendations of barangay officials highlight that improving solid waste management in Cardona requires increased investment in funds and manpower, consistent education and enforcement, and upgraded equipment and technologies. These align with both the local realities captured in the FGDs and the broader body of literature, reinforcing that sustainable waste management is achievable through integrated governance, community participation, and technological innovation [9-15].

4. Conclusion

Based on the results and discussions of this study, several conclusions can be drawn regarding the implementation of solid waste management (SWM) across the 18 barangays of Cardona, Rizal. First, while all barangays have established functional Materials Recovery Facilities (MRFs) in compliance with Republic Act 9003, their sustainability is constrained by limited resources, particularly in terms of budget and manpower. Officials emphasized that funds are

often insufficient for equipment, maintenance, and worker compensation, leading to reliance on volunteers and job orders. This reflects the broader national context where resource allocation remains a persistent barrier to effective SWM implementation. Second, community behavior continues to hinder progress, as many residents disregard waste segregation policies, dump garbage in unauthorized areas, and fail to follow collection schedules. These behavioral issues underscore the importance of continuous education, discipline, and strict enforcement to cultivate long-term compliance. Third, equipment limitations such as a shortage of trucks, pushcarts, and protective gear reduce the efficiency of waste collection and expose workers to health hazards. Although MRFs function as centers of waste segregation and recycling, these gaps in logistics and worker safety compromise overall effectiveness.

Fourth, the study highlighted praxes or best practices that can be strengthened and replicated, including continuous operation of MRFs, community clean-up drives, youth and school participation, and barangay-led initiatives such as incentive schemes and collaborations with junkshops. These praxes demonstrate that local innovation and community engagement play critical roles in sustaining SWM programs despite resource constraints. Fifth, there are promising prospects for improving SWM in Cardona, particularly through stricter policy enforcement, greater municipal support, expanded education campaigns, and technological innovations such as composting systems, waste-to-energy initiatives, and digital tracking tools for collection. These prospects reflect the need to integrate governance, participation, and innovation for long-term sustainability. Finally, the recommendations proposed by barangay officials converge on three key areas: (1) increased funding and stable manpower to sustain operations, (2) stronger education, awareness, and enforcement mechanisms to change community behavior, and (3) upgraded equipment and technological integration to improve efficiency and safety. In conclusion, the findings suggest that the effectiveness of SWM in Cardona hinges not only on compliance with RA 9003 but also on addressing resource gaps, fostering community discipline, and embracing innovation. Strengthening these areas will enable Cardona's barangays to transition from compliance-oriented waste management toward a more sustainable and inclusive system that safeguards public health and the environment.

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