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ANALYSIS OF SOLID WASTE MANAGEMENT PRACTICES IN HIGH-END SUBDIVISIONS IN DAVAO CITY – A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Urban sustainability depends critically on solid waste management (SWM), especially in high-end subdivisions where rich communities produce large volumes of non-biodegradable waste. With an eye toward implementation difficulties, community involvement, and adherence to national and local laws—particularly Republic Act 9003—this study examines SWM practices in high-end subdivisions in Davao City. Data from pertinent publications and peer-reviewed studies was synthesized using a systematic literature review (SLR).

Results show that although high-end subdivisions usually rely on private waste collecting services run by Homeowners' Associations (HOAs), compliance with waste segregation and recycling practices remains inconsistent due of behavioral gaps, limited community participation, and inadequate policy enforcement. Although HOAs are essential for planning collections and encouraging compliance, lack of technical support and limited resources sometimes hinder their capacity. Among the challenges noted are poor coordination between public and private stakeholders, low awareness campaigns, and insufficient infrastructure for recycling and composting.

This study emphasizes the necessity of integrating informal waste systems with formal solid waste management practices, enhancing institutional support, and implementing innovative technological solutions. Policy recommendations encompass the rigorous enforcement of RA 9003, the creation of centralized Material Recovery Facilities (MRFs), and the implementation of incentive systems for compliant households. The results emphasize the necessity for tailored interventions to meet the specific requirements of high-end subdivisions, ensuring that solid waste management systems are compatible with environmental sustainability and urban convenience. Future research should investigate the influence of technology, public-private collaborations, and community engagement strategies to improve solid waste management practices in affluent neighborhoods.

Keywords: Solid Waste Management (SWM), High-End Subdivisions in Davao City, Homeowners' Associations (HOAs), Waste Segregation, Republic Act 9003

1. INTRODUCTION

Solid waste management (SWM) is an essential component of urban sustainability, especially in high-end subdivisions where waste generation patterns diverge from those in other residential zones. High-income communities frequently generate substantial quantities of non-biodegradable waste, including plastics, electronic waste, and packaging materials, which needed customized solutions for effective management (Ferronato & Torretta, 2019; Wilson et al., 2013). Rapid urbanization in Davao City has made it even more important for these wealthy neighborhoods to have good SWM practices, since poor waste management can damage the environment and pose health risks to people (Olalo, Nakatani, & Fujita, 2022).

The Ecological Solid Waste Management Act of 2000 (Republic Act 9003) in the Philippines sets out a complete plan for dealing with SWM. However, its implementation in upscale subdivisions frequently encounters difficulties concerning compliance, enforcement, and infrastructure (Bagolong, 2017; Go & Caelian, 2020). Homeowners' associations (HOAs) in these communities are assigned the responsibility of enforcing waste segregation and disposal regulations, yet numerous individuals encounter challenges due to insufficient resources and disparate levels of resident engagement (Almaden, 2021).

Studies indicate that community engagement and conduct are critical determinants of solid waste management success (Baltazar & Seki, n.d.; Morales, 2015). In Davao City, upscale subdivisions generate a substantial amount of urban waste, requiring customized strategies to address specific issues like waste segregation, recycling programs, and community engagement. Research indicates that wealthy communities typically possess the resources necessary for the implementation of advanced solid waste management systems, yet may lack the motivation or awareness essential for active engagement (Limon et al., 2020). Addressing these gaps through strategic policies and community involvement can make waste management more sustainable.

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This research aims to look into how solid waste is handled in high-end neighborhoods in Davao City, with a focus on challenges in the implementation, community involvement, and compliance with local and national policies. The research questions are as follows:

1. What are the current SWM practices in high-end subdivisions in Davao City?
2. What challenges and barriers exist in implementing effective SWM in these areas?
3. How can policies and community engagement be improved to enhance SWM practices?

This study aims to identify deficiencies in existing solid waste management systems and propose practical solutions specifically designed for upscale subdivisions in Davao City.

2. METHODOLOGY

This study utilizes a systematic literature review (SLR) methodology to collect, analyze, and synthesize existing research on solid waste management (SWM) in residential areas, specifically in upscale subdivisions. The review process was structured as follows:

Search Strategy

The literature search was performed using academic databases, including Scopus and Google Scholar. Keywords and search strings included are "solid waste management", "high-end subdivisions", "affluent communities", "Davao City", "residential waste practices", "homeowners' associations", "waste segregation and recycling", and "residential waste practices". Boolean operators (AND, OR) were employed to combine search terms, ensuring comprehensive coverage of relevant studies.

Inclusion and Exclusion Criteria

Inclusion Criteria:

1. Peer-reviewed journal articles published within the last 10 years (2014-2024);
2. Studies focusing on SWM implementation in residential areas;
3. Papers addressing challenges, practices, or policy implications in SWM;

Exclusion Criteria:

1. Studies focusing on broader communities that extend beyond solely residential areas;
2. Non-peer-reviewed articles, opinion pieces, and reports;
3. Papers unrelated to SWM in residential contexts;

Data Extraction

Data were extracted using a standardized template, including: Author(s), Year, Title, Study Focus, Key Findings, Category, Geographical Scope, Relevance to the study, Primary Objectives (Appendix 1). The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) method was applied to document the screening process. From an initial pool of 15 papers, the titles, abstracts, and full texts were reviewed. Four papers were identified as highly relevant because they directly address residential solid waste management (SWM) practices, making them particularly significant to the systematic literature review. Additionally, four papers were classified as partially relevant, as they are somewhat related to the topic but have limitations in scope or focus.

3. RESULTS AND DISCUSSION

Current Solid Waste Management Practices

Almaden (2021) emphasized that residential subdivisions frequently depend on private waste collection services coordinated by Homeowners' Associations (HOAs). Key practices include waste segregation at the household level, recycling initiatives, and basic composting. However, segregation policies are still not always followed, mostly because they are not being monitored or enforced.

Bagolong (2017) found that community involvement in Davao City is important for RA 9003 to be carried out properly. While HOAs play a big role in making sure trash is properly sorted and collection times are followed, their abilities are often limited by a lack of resources. Go and Caelian (2020) observed that in highly urbanized cities, barangays are pivotal in solid waste management, executing waste segregation, collection, and disposal. Nonetheless, obstacles persist in reconciling local practices with national policies.

Behavioral and Community Participation Factors

Limon, Vallente, & Corales (2020) reported that rural households possess positive beliefs about SWM but face challenges in consistent application due to lack of awareness and proper facilities. This finding highlights the critical role of education and awareness campaigns in fostering sustainable waste management behaviors.

Morales (2015) observed similar patterns in urban households along the Tullahan River, where community behavior and attitudes often hinder effective SWM. Poor compliance with segregation guidelines and reliance on LGU-driven waste collection were cited as key issues.

Baltazar & Seki (2016) documented that household waste production and disposal behaviors vary significantly, with many households practicing improper disposal methods due to convenience or lack of awareness.

Challenges in SWM Implementation

General & Saguban (2024) identified key challenges in implementing SWM, such as insufficient infrastructure for recycling and composting, behavioral resistance to change, and weak enforcement of policies. These issues are exacerbated in high-income communities where waste generation rates are higher due to increased consumption.

Olalo, Nakatani, & Fujita (2022) highlighted that Davao City faces challenges in integrating sustainable SWM practices due to limited resources, technical expertise, and a lack of coordination between public and private stakeholders. The study proposed an optimized process network for integrated SWM to address these gaps.

Role of Institutional Support

Across the studies, HOAs emerged as critical players in SWM implementation, particularly in high-end subdivisions (Almaden, 2021; Bagolong, 2017). Their role includes organizing waste collection schedules, promoting compliance, and addressing resident concerns. However, resource limitations and lack of technical capacity often hinder their effectiveness.

The studies also emphasized the role of LGUs in providing technical and financial support to ensure compliance with RA 9003. Go & Caelian (2020) stressed that barangays in highly urbanized cities are pivotal in bridging the gap between policy and practice.

The findings align with global studies such as Ferronato & Torretta (2019) and Wilson et al. (2013), which highlight that waste management in developing countries is often hindered by weak policy enforcement, inadequate facilities, and limited community participation. For example, a study on gated communities in Metro Manila revealed that segregation and recycling rates improved significantly with targeted educational campaigns and strict enforcement of local ordinances (Renomeron-Morales, 2014). In Davao City, these issues are mirrored in high-end subdivisions where HOAs struggle with residents' inconsistent participation and limited awareness in general (Bagolong, 2017).

Troschinetz & Mihelcic (2009) emphasize the importance of integrating informal waste systems with formal SWM practices. This approach could be adapted to high-end subdivisions, where informal recyclers could complement formal collection and segregation systems.

Policy implications include the need for RA 9003 to be strictly enforced and for HOAs and LGUs to work together more. Putting in place centralized MRFs and setting up reward systems for households that follow the rules are practical ways to deal with problems that already exist. Using technology like digital platforms for waste management can also make things clearer and work better.

4. CONCLUSION

The studies that were looked at showed how behavioral, institutional, and infrastructure factors all work together to make SWM work well in residential areas, even in upscale subdivisions in Davao City. Although the roles of HOAs and LGUs are very important, there are still big issues with public knowledge, compliance, and infrastructure. Future research should look into how to combine new technologies with partnerships between the government and the private sector to solve these issues. It's also important to change policy frameworks to fit the needs of high-income areas. This is to make sure that environmental sustainability is balanced with usability and ease of use.

APPENDIX

Appendix 1. List of research papers retained following the PRISMA screening process.

Question	Paper 1	Paper 3	Paper 10	Paper 13	Paper 2	Paper 6	Paper 9	Paper 11
Author	Almaden, A. M.	M.R. Limon, J.P.C. Vallente, N.C.T. Corales	Saidamin Bagolong	Dalton Erick Baltazar,	Sheryl Renomeron-Morales	Kristin Faye Olalo, Jun Nakatani,	Lucelle E. Saguban, John Robert D. General	Joedcel M. Go, Merlita V. Caelian

				Erika Seki		Tsuyoshi Fujita		
Year	2021	2020	2017	2016	2014	2022	2024	2020
Title	Development of a Better Solid Waste Management Program for Sustainable Development in a Residential Subdivision	Solid Waste Management Beliefs and Practices in Rural Households Towards Sustainable Development and Pro-Environmental Citizenship	Community participation on the implementation of ESWM in Davao City	Household Waste Production and Disposal in Barangay Looc	Household-Level Needs Assessment on Solid Waste Management of Selected Residents Living Along Tullahan Riverways	Optimal Process Network for Integrated Solid Waste Management in Davao City, Philippines	Dichotomy of Solid Waste Management: Practices and Challenges	Implementation of SWM in Barangays in a Highly Urbanized City
Study Focus	Sustainable SWM program for residential subdivisions.	Rural household beliefs and practices on SWM.	Community engagement in ESWM in Davao City	Household waste in a flood-prone area	Assessing SWM practices in urban informal settlements.	Integrated SWM system optimization for urban settings	Challenges and practices in SWM across barangays	Implementation challenges of SWM under RA 9003 in barangays
Key Findings	Identified inefficiencies in waste segregation and collection. HOAs have a crucial role but lack advanced infrastructure.	Positive beliefs but inconsistent practices. Barriers include lack of facilities and weak institutional support.	Community participation is critical but inconsistent	High volume of unmanaged recyclables, limited	Found reliance on LGU collection, limited recycling, and improper disposal like illegal dumping in riverways.	Proposed system reduces GHG emissions but needs better plastic waste management	Low participation, lack of resources, and weak relationships between governance and residents	Moderate implementation and enforcement; urban barangays face more challenges

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				awareness				
Category	SWM Implementation in Residential Areas	Beliefs, Practices, and Barriers	Community participation, ESWM	Waste management behavior and perception	Community Behavior and SWM Challenges	SWM system optimization	Governance, Challenges, Community Involvement	Policy implementation, urban waste management
Relevance	Highlights the importance of HOA participation, which is directly applicable to high-end subdivisions in Davao City.	Provides insights into community behavior and barriers to SWM implementation, which may overlap with behavioral challenges in affluent subdivisions.	High—focus on Davao City	Highlights public awareness and local SWM challenges	Useful as a contrast to affluent areas, showcasing differences in waste generation and management challenges across income levels.	Offers insights on advanced SWM systems relevant for urban high-income settings	High—comprehensive analysis of SWM in Philippine barangays	Moderate—examines urban areas broadly
Primary Objectives	Developing a sustainable SWM program for residential subdivisions.	Examining SWM beliefs and practices of rural households.	Evaluate community participation in ESWM	Assess waste practices, identify potential improvements	Assessing SWM needs of households along Tullahan River for project development.	Develop an optimized SWM system to reduce GHG emissions	Examine SWM practices, challenges, and governance	Assess implementation of RA 9003 in barangays

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Geographical Scope	Urban, residential subdivisions.	Rural, coastal municipality (Currimao, Ilocos Norte).	Davao City	Calamba City, Philippines	Urban, informal settlements near Tullahan River.	Davao City, Philippines	Dumaguete City, Negros Oriental	Highly Urbanized City, Negros Occidental
Focus on High-Income Communities?	Yes, focuses on residential subdivisions, potentially high-end.	No, focuses on rural, low-income communities.	Not specified	No	No, focuses on informal settlements along riverways.	No, focuses on municipal waste	No	Moderate—includes income comparisons
Study Area Description	Residential area, socio-economic characteristics not detailed.	Rural, coastal, low-income households with basic livelihoods.	Urban setting in Davao City	Flood-prone barangay	Urban, informal settlements with low-income households near riverways.	Urban setting with high waste generation due to population growth	Covers all barangays in Dumaguete	Urban and suburban barangays
Focus on Waste Challenges in Affluent Settings	Limited; general SWM implementation issues in residential areas.	No, focus on general SWM practices and lack of facilities.	Limited	No	No, challenges include improper waste disposal, lack of recycling.	Addresses urban challenges, not specific to affluence	Not focused on affluent settings	Moderate
Challenges in SWM	Limited facilities for segregation, collection inefficiencies.	Lack of awareness, insufficient recycling facilities, public disinterest.	Limited awareness, inconsistent participation	Insufficient collection capacity, pub	Illegal dumping, reliance on government collection, non-compliance.	Infrastructure gaps, plastic waste processing	Weak community involvement, lack of funds and garbage trucks	Financial constraints, lack of expertise

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Comparison of Income Groups?	No explicit comparison.	No explicit comparison.	No	No	No explicit compariso n.	No	No	Yes—income groups compared
Community Sampled	Homeowners in residential subdivisions.	Rural households in coastal areas.	Communities in Davao City	120 household s in Barangay Looc	Households in informal urban settlements.	Municipal waste sources, including residential and market areas	Barangay officials and residents from Dumaguete	Purok leaders, 261 respondents
Existing SWM Practices	Segregation, recycling, and composting mentioned but not detailed.	Minimal reuse, slight recycling, improper disposal methods.	Localized waste collection and segregation	Basic collection, limited recycling	Reliance on LGU collection, some recycling and composting, illegal dumping.	Composting, recycling, and reliance on landfilling	Establishment of SWM committees, composting, material recovery	Moderate compliance with RA 9003 provisions
Community Awareness and Attitudes	Not explicitly analyzed.	Positive beliefs toward SWM but inconsistent practices.	Varying levels of awareness	Low awareness, unwilling to pay for SWM	Positive attitudes toward SWM but low compliance with proper practices.	Limited awareness of advanced SWM methods	Passive participation	Moderate awareness
Community Par	Limited engagement discussed.	Moderate awareness; weak participation in	Low to moderate	Low	Reliance on local government; low	Low participation in waste	Low	Moderate participation in suburban barangays

ticipation Level		systematic SWM programs.			individual initiative.	segregation		
Role of HOAs or Governance	HOAs and LGUs as key implementers of SWM.	Local government support mentioned but weak institutional structures.	Limited mention	City-led initiatives, limited HOA involvement	Strong dependence on LGU for collection and programs.	City government pivotal in infrastructure development	Barangay officials lead committees	Limited—focus on LGUs
Barriers to SWM	Lack of facilities, non-compliance by residents.	Financial, technical, and institutional constraints.	Lack of education, financial constraints	Lack of awareness, funding, and enforcement	Low compliance, lack of awareness, and improper waste disposal methods.	Limited sorting capacity, reliance on basic landfilling	Lack of resources, weak governance, poor community involvement	Insufficient funds, technical expertise
Policy Evaluation	Compliance with RA 9003 partially addressed.	Weak enforcement of policies; minimal local government involvement.	General overview of RA 9003	RA 9003, weak local enforcement	Compliance with RA 9003 limited by community practices and informal settings.	Proposes adaptations to RA 9003 for urban growth	City and barangay ordinances partially implemented	Moderate—focus on barangay-level challenges
Suggestions for Improvement	Emphasis on better facilities and resident compliance.	Community workshops, recycling programs, and increased LGU support.	Increase education campaigns	Larger facilities, technology, pub	Dynamic, community-based programs, including recycling and segregation.	Enhance infrastructure, develop plastic waste treatment	Strengthen governance, improve training and resources	Training and local ordinances

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Degree of Relevance	Highly relevant	Highly relevant	Highly relevant	Highly relevant	Partially relevant	Partially relevant	Partially relevant	Partially relevant

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