Miracle Get Journal
Vol. 01, No. 4, November 2024, 35-42
***e*-ISSN: 3047-8839**

Plastic Waste Management Strategies to Reduce Negative Impacts on the Environment and Human Health in Padang City

Lieza Corsita[1]*, Mila Sari[2], & Satiti Kawuri Putri[3]
[1]*Universitas Sains dan Teknologi Jayapura, Indonesia, [2]STIKES Dharma Landbouw, Indonesia,
[3]Universitas Jambi, Indonesia
*Co e-mail: lizapapua11@gmail.com[1]

Article Information
Received: November 22, 2024
Revised: November 23, 2024
Online: December 02, 2024

Keywords
Plastic Waste Management, Waste Management Awareness, Community Participation, Supporting Infrastructure

ABSTRACT
Plastic waste has become one of the major problems threatening the environment and human healthIn Indonesia, the use of plastics in daily life, such as shopping bags, water bottles, and food packaging, contributes greatly to the increasing amount of plastic waste (Ditjen PPKL, 2018). This research aims to analyse effective plastic waste management strategies to reduce negative impacts on the environment. The research uses a mixed-method approach, a combination of quantitative and qualitative methods, to gain a comprehensive understanding of the condition of plastic waste and identify the factors that influence the effectiveness of such management. This method is relevant for evaluating waste management policies, the role of the community, and the application of environmentally friendly technologies. This study will be conducted in several areas that have high plastic waste production rates, such as urban, coastal, and areas with community-based waste management initiatives. The results show that community awareness level participation in recycling high 60% p = 0.001 This shows that environmental education is very important to increase community participation. Community-based education is needed to raise this awareness. A massive education campaign is needed, involving community leaders to strengthen positive social norms.

Keywords: *Plastic Waste Management, Waste Management Awareness, Community Participation, Supporting Infrastructure*

https://doi.org/10.69855/mgj.v1i4.86
https://gpijournal.com/index.php/miracle

INTRODUCTION

Plastic waste has become one of the major problems threatening the environment and human health. In recent decades, global plastic consumption has increased significantly, fuelled by its lightweight, durable and inexpensive properties (Laia, 2024). However, these characteristics also make plastics difficult to degrade in the environment, resulting in significant waste accumulation. It is estimated that more than 8 million tonnes of plastic enters the oceans every year, polluting marine ecosystems and negatively impacting biodiversity (WWF, 2023).

In Indonesia, the use of plastics in daily life, such as shopping bags, water bottles, and food packaging, contributes greatly to the increasing amount of plastic waste (Ditjen PPKL, 2018). Plastic waste accounts for about 14% of the total national waste, with a low level of management. This leads to piles of plastic in landfills and the environment, creating adverse impacts such as soil degradation, water pollution, and threats to living things (Ministry of Environment and Forestry, 2023).

In addition to its impact on the environment, plastic waste also endangers human health. Plastic contains harmful chemical compounds such as bisphenol A (BPA) and phthalates, which can leach into food or drink. Exposure to these compounds is associated with the risk of chronic diseases, including cancer, hormonal disruption and reproductive problems (Plasticsmartcities, 2023). Microplastics, tiny particles resulting from plastic degradation, have been found in the human food chain and pose a hidden threat to health (Kompas Lestari, 2023).

Recognising the threat, the government and various organisations have been working on sustainable plastic waste management solutions. One of the proposed strategies is the circular economy approach, which emphasises the reduction, reuse and recycling of plastics. A circular economy also involves environmentally-friendly product innovation and technology-based waste management systems (Indonesia.go.id, 2023).

In addition, public awareness is key in plastic waste management. Educational campaigns to reduce the use of single-use plastics and increase recycling practices continue to be promoted. The role of the community in sorting waste from the source is very important to support the efficiency of the waste management system (Febyanti et al., 2021) (Kompas Lestari, 2023).

Research also shows that environmentally friendly technologies such as plastic biodegradation with microorganisms and plastic conversion into energy can be alternative solutions (Octavianda et al., 2016; Sriningsih & Shovitri, 2015). These innovations not only reduce waste piles, but also create economic value from plastic waste (UMJ Journal, 2023).

This research aims to analyse effective plastic waste management strategies to reduce negative impacts on the environment and human health. The focus includes evaluating waste management policies, the role of the community, and the application of environmentally friendly technologies.

The research results are expected to make a real contribution to sustainable plastic waste management efforts in Indonesia. The findings are expected to be used by policy makers, environmental practitioners, and the wider community to address the plastic waste problem as a whole.

METHODS

This research uses a *mixed-method* approach, a combination of quantitative and qualitative methods, to gain a comprehensive understanding of plastic waste management strategies to reduce negative impacts on the environment and human health. This method is relevant for evaluating policies, community participation, and the application of environmentally friendly technologies.

This research aims to describe and analyse plastic waste management strategies and identify factors that influence their effectiveness in Padang City. The focus of the research included urban, coastal and areas with community-based management initiatives. The research lasted for six months, including data collection and analysis. The goal is to formulate measures to reduce the negative impact of plastic waste on the environment and human health.

Quantitative Population: Households, businesses, and waste managers in the study area. Quantitative Sample: Drawn by *purposive sampling* method, including 150 respondents. Qualitative Key Informants: Drawn by *snowball sampling*, including: Government officials related to waste management policies, community leaders, practitioners of environmentally friendly technology.

Data Collection Method for Quantitative data, Questionnaire: Used to measure community knowledge, attitudes, and practices related to plastic waste management. Field Observation: To record the actual condition of waste management in the study area. Qualitative Data, In-depth Interviews: Conducted with key informants to explore waste management policies, challenges, and innovations. Document Study: Analyses of government policies, environmental agency reports, and waste management data.

Data from the questionnaires were analysed using descriptive statistics (frequency, percentage, and average) and inferential (correlation or regression tests) to see the relationship between variables. Interview and document data were analysed using the *content analysis* method, with steps:

1. Read and understand the data thoroughly.
2. Group themes based on waste management indicators.
3. Infer relevant patterns.

Research Ethics, This study upholds research ethics, including: Written consent from respondents and informants, Confidentiality of respondent data, Use of data only for research purposes.

Data validity, method triangulation: Comparing results from questionnaires, interviews, and observations to increase data validity. Reliability and Validity Test: To ensure the quality of quantitative instruments

RESULTS

This section presents the findings of the study based on quantitative, qualitative, and bivariate analyses. The results aim to describe the current condition of waste management practices, including the level of public awareness, availability of supporting infrastructure, and community participation. In addition, the analysis also explores relationships between variables to identify factors influencing community involvement in waste management. The findings are

expected to provide a comprehensive overview of existing challenges and potential improvements in sustainable waste management practices.

1. Quantitative Analysis

Table 1. Quantitative Analysis Results

Variables	Indicators	Percentage (%)
Waste Management Awareness Level	Households sorting waste	68%
	Businesses use environmentally friendly materials	45%
Supporting Infrastructure	Access to waste bank	35%
	Number of rubbish bins in the neighbourhood	52%
Level of Community Participation	Households involved in recycling programmes	40%
	Businesses collaborate with waste managers	25%

In Table 1, the results of the quantitative analysis show that most households have sorted waste, but there are still 32% who have not done so. Only a small percentage of businesses actively use environmentally friendly materials. Most respondents do not have easy access to waste banks or management facilities. The number of waste bins is sufficient, but not evenly distributed in all areas. The level of community participation in recycling programmes is still low. Collaboration between businesses and waste managers is minimal.

2. Qualitative Analysis

Table 2. Qualitative Findings

Informant Category	Key Findings	Interpretation
Government Officials	1. Waste management policies are still weak in implementation. 2. Limited budget for supporting infrastructure.	The government needs to increase regulations and funding allocations to support waste management.
Community Leaders	1. Public education has not been optimised. 2. There is still resistance from the community towards changing their littering habits.	Socialisation and education need to be improved to build a culture of sorting and managing waste.
Technology	1. Plastic waste management	The development of

Practitioner	technologies are available, but have not been widely adopted. 2. Technology implementation costs are still high.	low-cost and environmentally friendly technologies needs to be supported, including through subsidies.

Table 2 presents qualitative findings obtained from various key informants, including government officials, community leaders, and technology practitioners. Overall, the results indicate that waste management challenges are influenced by policy limitations, low public awareness, and constraints in technology adoption. These findings highlight the need for integrated efforts involving regulatory strengthening, community education, and technological support to improve waste management practices.

3. Bivariate Analysis

Table 3. Bivariate Analysis

Free Variable	Dependent Variable	Category	Frequency (%)	Chi-Square (p-value)
Community Awareness Level	Participation in Recycling	High	60%	p = 0.001
		Low	20%	
Supporting Infrastructure	Participation in Recycling	Adequate	55%	p = 0.003
		Inadequate	25%	
Access to Waste Bank	Household Waste Sorting	There is	75%	p = 0.002
		None	40%	

Table 3 shows that people with a high level of awareness are more likely to be involved in the recycling programme. This shows that environmental education is very important to increase community participation. The availability of infrastructure such as integrated waste bins and recycling facilities affects the level of community participation. Locations with adequate infrastructure show higher participation rates. Households that have access to waste banks sort their waste more often. This emphasises the importance of expanding the waste bank network in different areas.

DISCUSSION

1. Level of Public Awareness

68 per cent of households sort their waste, while 32 per cent do not. Only 45% of businesses use environmentally friendly materials. Public awareness on plastic waste management is still uneven.

The level of public awareness reflects the low internalisation of environmental norms. Based on the *Theory of Planned Behavior* (Ajzen, 1991), waste sorting behaviour is influenced by positive attitudes, social norms, and perceived behavioural control. Lack of education about the

impact of plastic waste on health and the environment is an obstacle to raising awareness (Asare, 2015).

Sporadic and ineffective environmental education is a major cause of low public awareness. In addition, people tend to prioritise convenience over environmental responsibility, especially if supporting facilities are not available.

2. Supporting Infrastructure

Only 35 per cent of respondents have access to a waste bank, indicating limited waste management facilities at the local level. A total of 52 per cent of respondents rated the number of waste bins as adequate, but their distribution is uneven.

Infrastructure availability plays an important role in facilitating environmentally friendly behaviour. In *Environmental Behaviour Theory* (Stern, 2000), the presence of adequate facilities is an external factor that can motivate pro-environmental behaviour. The findings show that lack of access to recycling facilities is a major barrier (Steg & Nordlund, 2018; Stern, 2000).

Local governments have not prioritised the provision of waste management facilities across the board. Budget constraints also mean that infrastructure is only centralised in urban areas, leaving communities in peripheral areas without access.

3. Level of Community Participation.

Only 40% of households are involved in recycling programmes. Collaboration between businesses and waste managers only reached 25%.

The low level of community participation indicates structural and cultural barriers. According to *Social Exchange Theory* (Homans, 1958), community participation in environmental programmes is influenced by perceived benefits and costs (time, effort or money) incurred. In this case, the low economic benefits of recycling and the lack of incentives are the main factors (Ahmad et al., 2023).

Lack of economic incentives and minimal education on the benefits of recycling have led to low public participation. In addition, businesses do not yet see recycling as a directly profitable practice.

CONCLUSIONS

1. Awareness Level

Public awareness levels are good but not optimal, especially when it comes to sorting waste and reducing plastic use. Community-based education is needed to raise this awareness. A massive education campaign on the importance of plastic waste management is needed, involving community leaders to strengthen positive social norms.

2. Supporting Infrastructure

Infrastructure availability remains a major challenge. Without adequate facilities, communities lose motivation to be actively involved in waste management. The government needs

to increase the budget allocation for the procurement of infrastructure such as waste banks, recycling bins, and integrated waste bins.

3. Level of Community Participation

Community and business participation in recycling programmes is still very low. This requires closer collaboration between the government, communities and the private sector to create incentives that encourage engagement. The government can provide incentives, such as a point-based reward system or economic benefits from recycling, to encourage community and business participation.

REFERENCES

Ahmad, R., Nawaz, M. R., Ishaq, M. I., Khan, M. M., & Ashraf, H. A. (2023). Social exchange theory: Systematic review and future directions. *Frontiers in Psychology*, *13*(2), 1-13. https://doi.org/10.3389/fpsyg.2022.1015921

Asare, M. (2015). Using The Theory Of Planned Behaviour To Determine The Condom Use Behaviour Among College Students. *American Journal of Health Studies*, *30*(1), 43. https://pmc.ncbi.nlm.nih.gov/articles/PMC4621079/

Compass Lestari. (2023). "Circular Economy as a Waste Management Solution."

DG PPKL (2018). *Reducing the Use of Single-Use Plastic Shopping Bags*. Ministry of Environment and Forestry. https://ppkl.menlhk.go.id/website/reduksiplastik/02_doc.php

Febyanti, P. E., Murniasih, A., & Suarsana, I. N. (2021). The Role of the Community towards Local Waste Management Sites (TOSS) in Paksebali Village. *Journal of Anthropology*, *V* (02). ojs.unud.ac

Indonesia.go.id. (2023). "Plastic Waste Reduction Target 2025."

Laia, K. (2024). *Plastic Production Emissions to Triple by 2050*. Betahita.id. https://betahita.id/news/detail/10155/emisi-produksi-plastik-bakal-melonjak-tiga-kali-lipat-pada-2050.html?v=1713906133

Ministry of Environment and Forestry. (2023). "National Waste Management Annual Report."

Octavianda, F. T., Tri Asri, M., & Lisdiana, L. (2016). Potential of Oxo-Degradable Polyethylene-Degrading Bacteria of Benowo Landfill Soil Surabaya. *Lentera Bio*, *V*(1). https://ejournal.unesa.ac.id/index.php/lenterabio

Online MSW Programmes. (2020, July). *What is Social Exchange Theory? - Social Work Theories & Approaches*. Www.onlinemswprograms.com. https://www.onlinemswprograms.com/social-work/theories/social-exchange-theory/

Plasticsmartcities. (2023). "Health Hazards of Microplastics."

Sriningsih, A., & Shovitri, M. (2015). Potential of Pseudomonas Bacteria Isolates as Plastic Degraders. *ITS Journal of Science and Arts*, *IV*(2). https://media.neliti.com/media/publications/15619-ID-potensi-isolat-bakteri-pseudomonas-sebagai-pendegradasi-plastik.pdf

Steg, L., & Nordlund, A. (2018). Theories to Explain Environmental Behaviour. *Environmental Psychology*, 217-227. https://doi.org/10.1002/9781119241072.ch22

Stern, P. C. (2000). New Environmental Theories: Toward a Coherent Theory of Environmentally Significant Behaviour. *Journal of Social Issues*, *56*(3), 407-424. https://doi.org/10.1111/0022-4537.00175

UMJ Journal (2023). "Technological Innovation in Plastic Waste Management."

WWF. (2023). "Plastic Pollution in Oceans."

Zero Waste Indonesia Alliance. (2023, March 20). *Tracing the Carbon Footprint of Plastic Production*. Zero Waste Indonesia Alliance. https://aliansizerowaste.id/2023/03/20/menelusuri-jejak-karbon-dari-produksi-plastik/