

DIMENSIONS OF COMMUNITY-LEVEL SOLID WASTE MANAGEMENT PRACTICES IN THE COASTAL AREAS OF DAVAO CITY, PHILIPPINES

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ABSTRACT

Solid wastes legibly seen on the ocean surface remained a universal issue elsewhere. Methods and efforts of ocean clean-ups were not commonly embodied in the annual budgetary allocation of many countries since this issue was a little less of their concern. In the Philippines, coastal communities, especially the slums of highly urbanized cities, became a direct contributor and a victim of this environmental hazard. This research focused on discovering the dimensions of a particular community's understanding and practices in solid waste disposal. Results showed that Personal knowledge, Penalties, Local Government Programs, and Specific Policies emerged as the four dimensions of the coastal communities in Davao City in terms of solid waste management practices. Considering these factors, the author highly recommended that personal knowledge about solid waste management be coupled with personal discipline since the first will be useless without the second. Penalties must be strictly imposed with the addition of community services (clean-up) on violators; Incentives for ordinary people/eyewitnesses of actual violations must be integrated into local legislation to promote community involvement and tighten the implementation of the local regulations; Specific policies and instructions must be disseminated intensively, at home, school, in the local communities and as well as on social platform to reach all reading public. Lastly, there has to be a further study of individuals focusing on the impact of self-discipline on the current solid waste management practices in Davao City.

Keywords: Coastal Communities, RA 9003, Solid Waste Management, Waste disposal

1. INTRODUCTION

Solid waste disposal was among communities' most difficult worldwide issues (Oliveira & Turra (2015); UNHABITAT, 2010). Solid waste disposal has become a severe problem, especially in poor urban areas in developing countries (The World Bank, 2022). In this connection, Sustainable Development Goal (SDG) 12.5 of the UN General Assembly's Sustainable Development Agenda affirmed the necessity of significantly reducing waste globally by 2030 (Kühnen et al., 2019). Despite efforts to treat garbage, improper solid waste disposal caused some waste to eventually end up in coastal communities (Garcés-Ordóñez et al., 2019). Coastal communities were estimated to contain 60–80% of land-based garbage (Faris & Hart, 1994; Schuyler et al., 2014). Consequently, the lack of successful waste disposal systems might cause indestructible damage to society's and the environment's health (Rezazadeh, 2014). This has become the rationale for the Republic Act (RA) 9003 policies, or the Ecological Solid Waste Management Act of 2000. As stated, the National Solid Waste Management Commission was established under the Office of the President to supervise the implementation of solid waste management plans and prescribed policies to achieve the objectives of this Act. Davao City, an urbanized community, already established its Ecological Solid Waste Management Board (ESWMB) through City Ordinance No 044-02 series of 2002 and barangay SWM committees. Respective Barangay ordinances have been passed to support barangay-level disposal of solid waste activities. However, solid waste disposal remains a significant issue in Davao City, where 47% of the households in the coastal areas contribute much of their waste, including human waste (City Government of Davao, 2018). According to the report, approximately 3,000 sacks of trash were collected in May 2018 by Bantay Dagat volunteers from the 32 coastal areas of Davao. It was alarming since health and sanitation would be at stake if these concerns were not addressed. Knowing these, the researcher acknowledged the necessity of addressing this knowledge gap by determining the factors or dimensions of solid waste management practices in the coastal communities of Davao City.

2. METHODOLOGY

The study utilized quantitative design, specifically the Exploratory Factor Analysis (EFA), which measured the underlying relationship between the researcher-made questionnaire items and the factors the questionnaire had measured. Further, EFA summarized the data so that relationships and patterns between the observed variables in the measuring tool were interpreted and understood (Sürücü, 2017). An online survey was used to collect the data from target respondents. Torrentira (2020) defined an online survey as utilizing online platforms such as Google Forms to distribute an instrument or questionnaire to the intended respondents. The self-made questionnaire used a 5-Likert Scale to interpret and measure the respondent's awareness of the subject matter. The participants were selected using

purposive sampling of 150 respondents. This sampling method enabled the researcher to select an intentional selection of individuals and sites to gain a deeper understanding of essential phenomena (Creswell, 2012).

3. RESULTS AND DISCUSSION:

The collected data was analyzed and interpreted, as shown in Table 1 (below). The KMO Measure of Sampling Adequacy and Bartlett's Test of Sphericity are displayed in the table below. The samples appeared to have strong correlations, suitable for variable analysis that matches the data, according to the KMO value of 0.933. The results of Bartlett's test of sphericity indicated that the data could be processed to factor in the community-level solid waste management practices in the coastal areas of Davao City. The value obtained was 3776.317, with a significance level below 0.001. Additionally, Bartlett's test of sphericity suggests rejecting the null hypothesis and concluding that there are factors that influence solid waste management practices at the community level.

Table 1. KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.933
Bartlett's Test of Sphericity	Approx. Chi-Square	3776.317
	df	435
	Sig.	.000

The graph of the Eigenvalues against all the components and the graph's detailed depiction of the total variance explained was shown in Figure 1 (Scree plot). Based on each component's relative relevance, the relative fit of each was determined, and the Eigenvalues' gradual trailing was displayed. The graph was beneficial in figuring out how many components must be kept. The flattening of the curve is the point of interest. As reflected, the curve became flatter as it approached component number 8, which was also the starting point for the Eigenvalue less than 1. A dimension was removed since the objects were less than the minimum. As a result, only four factors were considered as remained determinants.

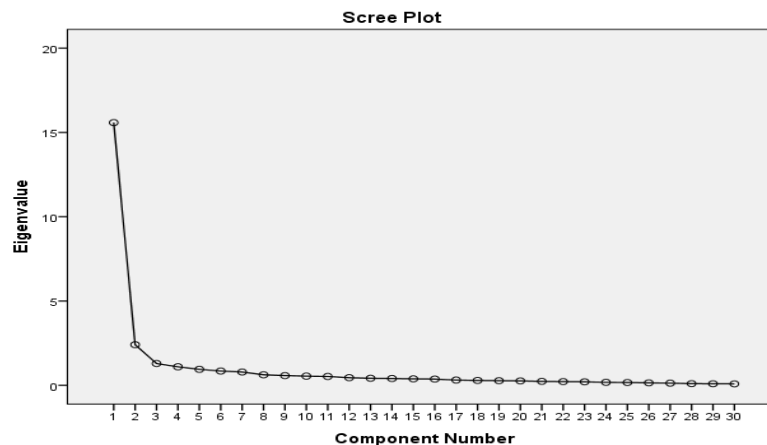


Figure 1.

Table 2. Rotated component matrix with grouped attributes of "Personal Knowledge".

FACTOR	ATTRIBUTES	LOADINGS
	20 Polluted Ocean affects the marine life.	0.840
	19 Garbage thrown along the creeks in coastal communities pollutes the ocean.	0.839
	21 Littering, throwing, dumping of waste matters in public places, (roads, sidewalks, canals, esteros or parks, and establishment) are prohibited.	0.822
	23 Open burning of solid waste containing hazardous components are prohibited.	0.793
	18 Littering, throwing, dumping of waste improperly may block the drainage causing flood.	0.767
	28 Recycling can reduce the amount of solid waste for disposal at the sanitary	0.758

Personal Knowledge	land fill.	
	27 Bringing personal eco-bag for grocery greatly helps to reduce solid waste in the community.	0.727
	26 Dirty surroundings impede economic growth.	0.695
	24 Residual waste from open burning of solid waste in coastal communities can reach the ocean during heavy rains.	0.682
	07 Garbage sack/bag that are loosely tied can be scattered by the wind/stray animals causing more trouble for the garbage collector.	0.682
	11 Different types of solid waste must be segregated for re-use, recycling and composting.	0.674
	13 Agricultural and garden waste are waste materials that can be processed for composting.	0.673
	14 Materials such as but not limited to glass, paper, plastic and metal are recyclable.	0.670
	12 Biodegradable materials can be self-managed at home or at any designated common service facility in the community.	0.645
	29 Garbage collection of trucks has specific date and time only.	0.548

The first Dimensions of Community-Level Solid Waste Management Practices in the Coastal Areas of Davao City was attributed to a high level of Personal Knowledge with the greatest number of attributes (50%) and the highest loading score (0.84) in the rotated matrix as shown in Table 2. The level of awareness and understanding among community members regarding solid waste management practices was reflected in this aspect. The study found varying levels of awareness in this area. It highlighted the significance of educational campaigns and outreach programs conducted at the barangay level to improve personal knowledge and encourage sustainable waste management behaviors. It is noted that residents knew the proper ways of handling solid waste and the damage it brought to the ocean once it was mishandled. Moreover, the degree of awareness significantly impacted how much SWM Practices were implemented (Lalamonan & Comighud, 2020).

Table 3. Rotated component matrix with grouped attributes of “Fines and Penalties”.

FACTOR	ATTRIBUTES	LOADINGS
Fines and Penalties	25 Penalty of open burning solid waste ranges from P300.00 – P1,000.00, or imprisonment within 1-15 days, or both.	0.833
	22 Punishment of littering, throwing, dumping of waste matters in public places upon convection ranges from P300.00 – P1,000.00, or render community service, or both.	0.719
	15 Guidelines on proper waste disposal are explained in RA 9003.	0.690
	16 Every barangay shall have MRF (Material Recovery Facility) that receives mixed waste for final sorting, segregating, recycling, and composting.	0.601

Table 3. represents the second dimension, the "Penalty," with four strong attributes and the second-highest loading score (0.833) in the rotated matrix.

The penalties aspect evaluated the efficiency of enforcement measures in controlling waste management practices. Even though penalties have been imposed for violating the current law, some individuals still tend to deviate from it due to insufficient enforcement.

However, residents' perception of the penalty directly influences their waste segregation practices (Hao, M & Xu, S 2022). In the Philippines, penalties imposed in violation of proper solid waste disposal have begun since 1975, when the presidential decree (PD 825) took effect.

Twenty-five years later, the decree has evolved into a new law with more defined penal provisions on fines and penalties in Chapter VI, section 49 of Philippine Republic Act 9003.

Table 4. Rotated component matrix with grouped attributes of “Local Government Programs.”

FACTOR	ATTRIBUTES	LOADINGS
Local Government Programs	2 Local officials have conducted orientations about the environmental impact of solid waste disposal.	0.813
	1 The Local Government has allocated resources to improve waste management in coastal areas.	0.784
	4 Local authorities implement strict waste disposal regulations in the community.	0.618
	3 Local officials provide programs/ workshops to promote recycling practices.	0.616
	5 Penalties or fines for individuals or businesses caught illegally dumping waste are being implemented.	0.559

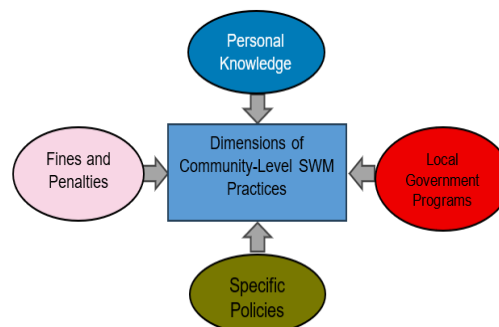
The Local Government programs represented the third dimension, with five attributes having the third highest score (0.813) in the rotated matrix, as shown in Table 4. It showed that local government programs with five attributes have strongly influenced the Community-Level Solid Waste Management Practices in the area. It showed further that Davao City Ecological Solid Waste Management Board (DCESWMB) programs have been fully disseminated, conducted, and provided to its localities as mandated in its Executive Order (EO) No. 53, Series of 2022. This dimension assessed the impact of local government initiatives on promoting sustainable waste management practices. However, the existing site conditions along brackish waters and coastal communities revealed lapses in local government efforts. This implied the necessity for policy reforms, greater funding for infrastructure and logistics, and improved collaboration between government agencies and coastal communities to enhance waste management services.

Table 5 Rotated component matrix with grouped attributes of “Specific Policies”.

FACTOR	ATTRIBUTES	LOADINGS
Specific Policies	6 The Barangay/purok has specific designated areas for waste collection in the community.	0.736
	8 Waste collection is executed regularly according to the scheduled day and time.	0.586
	9 The local government provide labels to identify which container is for bio-degradable, non-biodegradable and recyclables.	0.575

Specific policies constituted the fourth and last dimension of the study, with three attributes having a loading value of 0.736, as shown in Table 5. This dimension analyzed the influence of particular policies and regulations on waste management approaches in coastal regions. The investigation uncovered that these specific policies, particularly printed information, have offered valuable guidance to coastal communities. It was observed that specific policies mandated in the different barangays in Davao City, especially the coastal areas, initiated instructions about strict waste management through the City Environment and Natural Resources Office (CENRO), ASU, and Barangay and Cultural Communities Affairs Division (BCCAD) (LGU Davao City, 2024). As stated in Philippine Republic Act 9003, it was in the LGU or any Barangay Committee to implement and issue special policies regarding waste management.

Dimension diagram



As shown in the dimension diagram, four factors, namely, Personal Knowledge, Fines and Penalties, Local Government Programs, and Specific Policies, have emerged to be the dimensions of the Community-Level Solid Waste Management Practices in the Coastal Areas of Davao City.

4. CONCLUSION

Based on the findings, the researchers concluded that there are four (4) Dimensions of Community-Level Solid Waste Management Practices in the Coastal Areas of Davao City, namely Personal knowledge, Penalties, Local Government Programs, and Specific Policies. The study's findings offer valuable insights into the strengths and weaknesses of solid waste management practices at the community level in the coastal areas of Davao City. Policymakers, local authorities, and community stakeholders can utilize these findings to develop focused interventions for enhancing waste management systems. These interventions may involve implementing extensive educational and outreach campaigns, strengthening enforcement measures, improving government programs, and revising policies to align with sustainability objectives. Therefore, these measures are crucial in addressing environmental pollution, safeguarding coastal ecosystems, and fostering the welfare of communities in Davao City and its surrounding areas.

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