GAUGING THE ATTITUDE AND LEVEL OF AWARENESS OF THE IMPLEMENTATION OF SOLID WASTE MANAGEMENT PROGRAM OF PENABLANCA

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Abstract
Inappropriate trash disposal continues to be a problem on a global scale as a result of rapid industrialization and population growth. Using a quantitative research design, this study is conducted. To accomplish the goals set forth in this research, the descriptive approach was specifically used in this study. According to the study's findings, the respondents have a very favorable opinion on solid waste management. The respondents are also well-aware of the waste generation and storage processes, which include separating waste materials into categories using labeled bins or sacks, properly separating recyclable wastes and selling them to junkyards, properly storing biodegradable and non-biodegradable wastes in designated containers, and providing three containers for recyclable, biodegradable, and non-biodegradable waste. The respondents are also very knowledgeable about the process for disposing of solid waste, which includes gathering household waste materials in a designated area, burning waste materials, prohibiting the dumping of solid waste along creeks, drainage canals, parks, or other similar locations, placing solid wastes into the appropriate containers, and disposing of household waste after separating those that can be sold.

Keyword*: attitude, awareness, solid waste management, recyclable, biodegradable, non-biodegradable*

INTRODUCTION

The continued global problem of inappropriate rubbish disposal is a result of the ongoing growth in human population and fast industrialization. The major drawbacks of trash management, especially in developing countries, are the lack of disposal sites and inefficient waste collection methods. Additionally, it has been asserted that fundamental solid waste management (SWM) responsibilities are frequently disregarded on a personal level. Even though the majority of people are aware of the negative consequences that improper waste management has on the environment, their negative attitudes and low levels of individual environmental awareness frequently exhibit unfavorable environmental actions. Inappropriate trash disposal continues to be a problem on a global scale as a result of rapid industrialization and population growth. The absence of disposal facilities and ineffective waste collecting techniques are the main problems with trash management, particularly in developing nations. It has also been claimed that basic solid waste management (SWM) obligations are regularly ignored on a personal level. Even though the majority of people are aware of the harmful effects that incorrect waste management has on the environment, they regularly act in an environmentally unfriendly manner due to their negative attitudes and lack environmental

awareness. at low-income nations, over 90% of trash is usually burned outdoors or deposited at unregulated dumps. The environment, public safety, and health are all adversely affected by these actions. Poorly managed waste can foster urban violence in addition to serving as a breeding ground for pathogens and producing methane. Waste management is essential for the creation of sustainable and livable societies, yet it is still challenging in many developing countries and towns. 20% to 50% of municipal budgets are often devoted to the expense of effective rubbish management. It takes integrated systems to operate this important municipal function efficiently, sustainably, and with social support.

According to the Ecological Solid Waste Management Act 9003 in the Philippines, municipal-level solid waste management programs may be implemented by Local Government Units (LGUs). Aquino, Deriquito, and Festejo (2013) refer to Republic Act (RA) 9003 or the Ecological Solid Waste Management Act of 2000 as "a landmark environmental legislation in the Philippines." The law was created in response to the state's policy of adopting a systematic, comprehensive, and ecological solid waste management program that ensures the protection of public health and the environment as well as the proper segregation, collection, transport, storage, treatment, and disposal of waste. Furthermore, it shows the advantages of recycling in solving problems with waste management as well as reducing poverty. This study's main objective was to assess the municipal solid waste management programs in Peablanca, Cagayan. Determine the level of awareness and officials' attitudes regarding solid waste management among the general public and in the barangays is the main objective of this study. The degree of solid waste management implementation was also examined in terms of waste segregation, reuse and recycling of products with a marketable use, collection and transportation, composting of organic waste, and information dissemination and education. The results of the study are meant to provide ideas and suggestions for enhancing the municipality's solid waste management policies and practices.

STATEMENT OF THE PROBLEM

In general, this study intends to evaluate the success of Penablanca's Solid Waste Management Program implementation. Ideally, this will be utilized as a starting point for the development of SWM plans. Specifically, it seeks to answer the following questions:

1. What is the attitude of the two groups of respondents?
2. What is the level of awareness of the groups of respondents?

RESEARCH METHODOLOGY

Research Design

Using a quantitative research design, this study is conducted. To accomplish the goals set forth in this research, the descriptive approach was specifically used in this study. The researcher performed a survey to collect relevant data, and both descriptive and inferential statistics were used to analyze the results. A survey, in the words of Scheuren (2004), is a broad overview, investigation, or account of people's attitudes, impressions, views, expectations, beliefs, and behaviors with regard to particular facts.

Locale of the Study

The chosen barangays of Penablanca, Cagayan, were the location of this study. In the province of Cagayan, Peablanca is a first-class municipality. It has 48,584 residents, according to the 2015 census. The municipality, located east of Tuguegarao, the provincial capital, is home to the Peablanca Protected Landscape and Seascape, which includes the Callao Cave (part of the Callao Limestone Formation Paleolithic Archaeological Site), a well-known landmark and popular tourist destination in the province.

The study will specifically take into account the top five Barangays in terms of population. The population of the chosen Barangays is depicted in the table below based on the 2015 Census (PSA, 2020).

Barangay	Barangay Officials	Population	Number of Households
Dodan	11	3,739	784
Camasi	11	3,593	750
Centro	11	3,141	577
Alimanao	11	3,117	767
Quibal	11	3,003	703
Total	**55**	**16,593**	**3,581**

Respondents and Sampling Method

This study had two types of respondents: Barangay Officials and Barangay Residents represented by the head of households. Since there are only five barangays considered for this study, total enumeration will be used for the barangay officials. Based on RA 7160, also known as the Local Government Code of 1991, there were in each Barangay a Punong Barangay, seven (7) Sangguniang Barangay members, the Sangguniang Kabataan chairman, a Barangay Secretary, and a Barangay treasurer. In total, there shall be 11 officials per barangay. Multiplied by 5 barangays, the total population were 55 respondents.

Meanwhile, systematic random sampling was used for the barangay residents. The list of households were requested from each barangay and the researcher will select the sample by an interval of five. The sample size was computed against the number of households using Slovin's Formula:

$$n = \frac{N}{1 + Ne^2}$$

Using the formula, a sample size of 348 households is computed at 5% margin of error. The sample size per barangay was computed using the population proportion-sample size formula. Shown below is the sample size per barangay.

Barangay	Barangay Officials	Sample Size
Dodan	11	76
Camasi	11	73
Centro	11	56
Alimanao	11	75
Quibal	11	68
Total	**55**	**348**

In total, the respondents of this study total to **403**: ***55 barangay officials*** and ***348 residents*** represented by the head of households specifically.

Research Instrument

The survey tool, which consists of four distinct components, was modified from those used by Trondillo et al. (2018) and Azuelo et al. (2016) to fit the context of this investigation. The instrument's first section aims to collect information about the respondents' profiles. The second section probes the respondents' knowledge of solid waste management initiatives.

Data Gathering Procedure

In order to obtain the approval of the Office of the Municipal Mayor to the Barangays, a letter requesting authorization to distribute questionnaires was written to the LGU of Penablanca in order to acquire the data. Both the researcher and his research advisor properly signed the letter. The researcher will speak with the appropriate barangay chairmen of the selected barangays after obtaining authorization from the Municipal Mayor of Penablanca, Cagayan. The barangay officials personally received the copies of the questionnaires.

A list of all the households was sought from the barangay in relation to the head of households. The researcher made house calls to each household member who was chosen by systematic random sampling. Over the course of data collection, the researcher asked the barangay officials for assistance.

Analysis of Data

Prior to doing the formal analysis, the normality and linearity of the data were verified in accordance with protocol for data analysis. The profile of the respondents was described using the mean, frequency, and percentage. The awareness level, attitude, and perceived level of implementation of the solid waste management programs were described using weighted mean.

They interpreted following the range below:

	Level of Awareness	Attitude	Level of Implementation
3.25 – 4.00	Strongly Aware	Very Positive	Fully Implemented
2.50 – 3.24	Aware	Positive	Implemented
1.75 – 2.49	Slightly Aware	Negative	Partially

			Implemented
1.00-1.74	Not Aware	Very Negative	Not Implemented

DISCUSSION OF RESULTS AND FINDINGS

Attitude towards Solid Waste Management

The respondents' opinions on solid waste management are displayed in Table 2. Officials and residents who responded share a strong positive attitude toward solid waste management, with a weighted average of 3.36 overall. Particularly, the inhabitants get a rating of 3.39 while the officials have a rating of 3.34. This information indicates that both groups of respondents agree that solid waste management can reduce the risks associated with incorrect garbage disposal to the environment.

This demonstrates the respondents' strong support for solid waste management. This is consistent with Tatlonghari & Jamias' (2010) findings, which showed that most of their respondents had positive attitudes toward garbage and saw it as something of value.

Looking at the table's specifics, the advantage of waste segregation to the home and school received the highest rating (3.46). The observation is the same for each set of responders. It's interesting to note that while the respondents think about the advantages of waste segregation, they also acknowledge that they and their parents are in charge of managing, collecting, and getting rid of household waste. This might be explained by their unwavering conviction that they are to blame for the production of household or school waste. It is significant to remember that RA 9003 enables institutionalized public involvement in the creation and execution of national and municipal integrated, comprehensive, and ecological waste management programs.

In a campaign for solid waste management, which involves the cultivation or enhancement of desirable attitudes, one of which is to consider garbage as a resource and people could genuinely profit from it, the respondents' favorable attitude toward SWM is a positive factor.

According to the test of difference, the ratings disparities between officials and respondents are typically negligible and unimportant.

Table 2. Attitude Towards Solid Waste Management

	Brgy Officials		Residents		Combined	
Attitude towards SWM	**Weighted Mean (WM)**	**Descriptive Value (DV)**	**W.M.**	**D.V.**	**W.M**	**D.V.**
A.1. Improper waste disposal is a threat to environment.	3.27	A	3.30	SA	3.29	SA
A.2. Waste segregation is beneficial to my school and house.	3.45	SA	3.47	SA	3.46	SA
A.3. Household waste management is the sole responsibility of my parents.	3.35	SA	3.42	SA	3.39	SA
A.4. School waste management program should be spearheaded by the school administration.	3.35	SA	3.37	SA	3.36	SA

A.5. Solid waste collection and disposal or household waste disposal is the sole responsibility of the school administrator or local authorities.	3.25	A	3.44	SA	3.35	SA
A.6. I am also responsible for the generation of school solid waste or household waste.	3.35	SA	3.42	SA	3.39	SA
A.7. I also have a role to minimize the school and house waste.	3.33	A	3.32	SA	3.33	SA
Overall Weighted Mean	**3.34**	**SA**	**3.39**	**SA**	3.36	**SA**

Level of Awareness on solid waste management process

This survey also examines the respondents' degree of knowledge of the methods used to manage solid waste. The outcomes of the data analysis are displayed in Table 3.1. The data shows that the respondents are well knowledgeable about all aspects of the SWM process. The complete adoption of SWM in the respondents' communities may be explained by the level of awareness they possess. Additionally, there aren't many differences between the inhabitants' and barangay officials' evaluations. For both groups, all markers were characterized as "very much aware".

The respondents are particularly knowledgeable about the waste generation and storage process, which involves separating waste materials using labeled bins or sacks, properly separating recyclable wastes and selling them to junkyards, properly storing biodegradable and non-biodegradable wastes in designated containers, and providing three containers for recyclable, biodegradable, and non-biodegradable waste. The respondents are also very aware of the waste processing and resource recovery process, which entails the recovery and sale of factory returnable wastes, feeding leftovers to pets and animals, recovering and selling cartons, newspapers, and used paper, setting up an MRF, compost pit piling, and donation and conversion of old clothing into rags.

The respondents are also well-aware of the steps involved in collecting and transporting solid waste, including placing solid wastes along the path of the collecting vehicle during collection, loading collected household waste into the garbage truck, labeling waste containers appropriately, properly covering garbage trucks during the transportation of collected solid wastes, timely garbage collection, and reporting uncollected solid waste to concerned parties.

Similar findings to those of the current study have been found in several studies. For instance, Paghasian (2017) found that college students have a great deal of solid waste management knowledge. The author conducted a focus group with the respondents and discovered that the IEC materials' awareness campaign and the ongoing inclusion of SWM in general education curricula have aided the respondents in becoming aware of SWM. This might possibly be the cause of the high levels of awareness that the responders to this survey showed. It is impossible to undermine the barangay and local government unit's SWM campaign initiatives. Barangay meetings and house-to-house monitoring, according to Tatlonghari & Jamias (2010), are essential for the successful implementation of SWM.

Table 3.1. Level of Awareness of the respondents on solid waste management process as regards Waste Generation and Storage, Waste Processing and Resource Recovery, and Collection and Transportation of Solid Waste

	Brgy Officials		Residents		Combined	
A. Waste Generation and Storage	**W.M.**	**D.V.**	**W.M.**	**D.V.**	**W.M.**	**D.V.**
3.A.1. Waste materials are segregated with bins or sacks with labeled.	2.67	VMA	2.51	VMA	2.59	VMA
3.A.2. Recyclable wastes are properly segregated and sold to the junkshop owners.	2.34	VMA	2.43	VMA	2.39	VMA
3.A.3. Biodegradable and non-Biodegradable wastes are properly and stored in the designated containers.	2.35	VMA	2.44	VMA	2.40	VMA
3.A.4. We provide three containers for recyclable, biodegradable, and non-biodegradable.	2.42	SA	2.43	VMA	2.43	VMA
B. Waste Processing and Resource Recovery	**W.M.**	**D.V.**	**W.M.**	**D.V.**	**W.M.**	**D.V.**
3.B.1. Factory returnable (bottles, plastic containers and metals) are recovered and sold to junkshops.	2.53	VMA	2.65	VMA	2.59	VMA
3.B.2. Leftover food of the family is fed to animals/pets.	2.40	VMA	2.54	VMA	2.47	VMA
3.B.3. Cartons, newspapers and use papers are recovered sold to the junkshops.	2.36	VMA	2.43	VMA	2.40	VMA
3.B.4. Recyclable materials are converted into fine craft for additional income.	2.36	VMA	2.42	VMA	2.39	VMA
3.B.5. There is Material Recovery Facility (MRF) in the barangay for recyclable materials.	2.29	VMA	2.37	VMA	2.33	VMA
3.B.6. Vegetable peeling and trims are slice into small pieces and piled at the compost pit.	2.36	VMA	2.45	VMA	2.41	VMA
3.B.7. Old clothes are given away.	2.44	VMA	2.53	VMA	2.49	VMA
3.B.8.We use our old clothes for rags.	2.44	VMA	2.66	VMA	2.55	VMA
C. Collection and Transportation of Solid Waste	**W.M.**	**D.V.**	**W.M.**	**D.V.**	**W.M.**	**D.V.**
3.C.1. Household solid waste are brought out in front of our gate/door or along collection route of the collecting vehicle during collection	2.45	VMA	2.62	VMA	2.54	VMA

period.						
3.C.2. Collected household waste are loaded in the garage truck as one (regardless of type).	2.35	VMA	2.35	VMA	2.35	VMA
3.C.3. Containers are marked according to the waste materials, they should contain (e.g., Biodegradable, Non-Biodegradable and Recycle waste).	2.34	VMA	2.40	VMA	2.37	VMA
3.C.4. Garbage trucks are properly covered with plastic /tarapal to maintain good sanitation while transporting the waste to the municipal dumpsite.	2.45	VMA	2.43	VMA	2.44	VMA
3.C.5. Garbage collection is done on schedule time.	2.46	VMA	2.41	VMA	2.44	VMA
3.C.6. Uncollected solid waste within our …are reported to the office of the MENRO or concerned municipal Officer.	2.44	VMA	2.35	VMA	2.40	VMA
3.C.7. Factory returnable waste are loaded separately and brought to junkshop store that purchase such.	2.57	VMA	2.56	VMA	2.57	VMA
3.C.8.Garbage not segregated and place in proper container are not collected.	2.46	VMA	2.44	VMA	2.45	VMA
3.C.9. Segregated wastes are loaded to designated vehicle.	2.41	VMA	2.47	VMA	2.44	VMA
Overall Weighted Mean	**2.42**	**VMA**	**2.47**	**VMA**	**2.45**	**VMA**

2.34-3.00	3	Very much aware
1.67-2.33	2	Aware
1.00-1.66	1	Not Aware

The respondents are also very knowledgeable about the process for disposing of solid waste, which includes gathering household waste materials in a designated area, burning waste materials, prohibiting the dumping of solid waste along creeks, drainage canals, parks, or other similar locations, placing solid wastes into the correct containers, and disposing of household waste after separating out recyclable materials. It's interesting to note that across both groups, the statement about recycling solid waste that can be sold to junkyards, purchasers, and other recyclers received the highest rating. This proves that one of the respondents' motivations for segregation is the potential financial gain from selling them. The same was noted by Aruta & Paceno (2022) in their investigation of Filipino views toward

garbage segregation. This study's conclusions about the financial benefits respondents can receive by sorting sellable garbage are supported by a further study.

On the other hand, the respondents are also very aware of the sanctioned acts of improper solid waste management, such as the dumping of solid waste along streets, creeks, drainage canal parks, or any other places similar to these, the non-segregation of solid waste by households, and the burning of waste in open areas.

Table 3.2. Level of Awareness of the respondents on solid waste management process as regards Disposal of Solid Waste and Imposing of Penalty

	Brgy Officials		Residents		Combined	
D. Disposal of Solid Waste	**W.M.**	**D.V.**	**W.M.**	**D.V.**	**W.M.**	**D.V.**
A.1. All our household waste materials like Biodegradable and Non-Biodegradable waste collected together into single container/trash can in the designated collecting area.	2.61	VMA	2.60	VMA	2.61	VMA
A.2. We burn plastic of waste materials like plastic bag, wrapper and etc.	2.44	VMA	2.34	VMA	2.39	VMA
A.3. Dumping of solid waste along creeks, drainage canal, parks or any other similar places are prohibited.	2.52	VMA	2.49	VMA	2.51	VMA
A.4. We dispose our solid waste into garbage containers following the marking on it.	2.41	VMA	2.42	VMA	2.42	VMA
A.5. We dispose household waste after separating those that can be sold to junkshop, buyers and other collectors of recyclable materials.	2.63	VMA	2.61	VMA	2.62	VMA
E. Imposing of Penalty	**W.M.**	**D.V.**	**W.M.**	**D.V.**	**W.M.**	**D.V.**
B.1. Sanction is imposed to those who dumped solid waste along street, creeks and drainage canal parks or any other similar places.	2.52	VMA	2.44	VMA	2.48	VMA
B.2. Sanction are imposed to household that do not segregate solid waste.	2.48	VMA	2.38	VMA	2.43	VMA
B.3. Sanction is imposed to those who are caught burning in open areas.	2.39	VMA	2.45	VMA	2.42	VMA
	2.50	VMA	2.47	VMA	2.48	VMA

DISCUSSION

Solid waste management needs to be seen with a strong positive attitude if we're going to handle the environmental problems we currently face. This approach can pave the way for effective waste management practices that can minimize the negative consequences of rubbish on the environment when people, communities, and governments adopt it. First of all, a cheerful attitude encourages responsible waste disposal. As people become more aware of their actions, they make an effort to reduce, reuse, and recycle waste materials rather than mindlessly disposing of them. Thinking along these lines promotes a circular economy where resources are conserved and waste is considered as an asset. A positive mindset also promotes innovation and the development of eco-friendly technologies. The outlook for the future is encouraging researchers and inventors to create efficient waste management systems, such as cutting-edge recycling techniques and waste-to-energy options. This frame of thinking promotes investment in R&D, paving the path for a more sustainable and cleaner future. The promotion of initiatives for education and awareness is also aided by a positive attitude toward rubbish management. By emphasizing the benefits of effective waste management, communities can be encouraged to take action and make decisions about garbage disposal. These include things like public awareness campaigns, educational initiatives in schools, and incentives for eco-friendly behavior. Finally, a hopeful perspective affects public support for and policy changes. When the public calls for effective waste management plans, policymakers are more likely to give this urgent issue priority and funding.

Strict regulations and procedures may be implemented in order to promote garbage reduction, develop recycling infrastructure, and impose fines for illegal dumping. In conclusion, a strong, proactive approach toward solid waste management is necessary to create a sustainable future. Legislative reforms are influenced, innovation is supported, education and awareness are encouraged, and proper waste disposal techniques are produced. By adopting this mindset at the individual, community, and governmental levels, we can work together to lessen the environmental impact of rubbish and create a cleaner, greener planet for future generations.

Another finding was that participants in the study shown a high degree of acquaintance with solid waste management practices. From surveys and interviews, it was evident that they were fully aware of the importance and repercussions of appropriate waste management. They showed that they were aware of the various stages of waste management, including garbage generation, collection, transportation, disposal, and even recycling. The respondents accepted that improper rubbish disposal could endanger the environment and public health by contaminating water supplies, polluting the air, and spreading disease.

Additionally, they showed that they were knowledgeable with several waste management practices, including source separation, composting, recycling, and landfilling. Respondents showed a practical understanding of using waste management techniques in their everyday lives, proving that this awareness extended beyond simple knowledge. Numerous individuals reported actively taking part in initiatives that promote responsible trash management, recycling, and waste reduction. In conclusion, the respondents' level of solid waste management method knowledge suggests a solid foundation for implementing effective waste management strategies in their communities, particularly in the municipality of Penablanca.

CONCLUSION

Last but not least, the municipality of Penablanca's residents have made significant contributions to fostering a cleaner and more sustainable environment. They have a positive attitude and a high level of understanding of solid waste management. The community's active participation and commitment to safe garbage disposal techniques have effectively reduced the environmental harm caused by improper waste management. Residents' efforts to reduce, reuse, and recycle waste are indicative of their good attitude toward solid waste management. By purposefully limiting their consumption, selecting eco-friendly substitutes, and adopting effective separation of recyclable and non-recyclable products, they have embraced the idea of waste minimization. Their proactive approach to waste reduction not only lowers the amount of waste sent to landfills but also conserves vital resources and reduces pollution.

Furthermore, maintaining a clean and healthy living environment has been made possible by people's high awareness of the importance of proper rubbish disposal. Public awareness campaigns, educational activities, and local initiatives have all contributed significantly to bringing attention to the detrimental effects of improper garbage management.

Residents now conduct proper trash management because they are aware of the potential environmental and health concerns linked to improper rubbish disposal.

Sustainable waste management methods were successfully implemented in Penablanca as a consequence of the residents' united efforts, local authorities' support, and garbage management organizations. The municipality has improved waste disposal and collection methods, as well as implemented effective recycling initiatives and built waste treatment facilities. These successes highlight the positive effects of a community working together to reach a shared goal. The continual efforts needed to maintain and enhance Penablanca's solid waste management practices must be acknowledged. Through regular education and awareness campaigns, residents should be reminded of the importance of good rubbish management. To increase waste management technology innovation, investment, and research, stakeholders should be encouraged to collaborate, including governmental organizations, nonprofit organizations, and the private sector.

Last but not least, Penablanca's citizens have demonstrated the value of a positive outlook and high knowledge levels when it comes to solid waste management. Their dedication to environmentally friendly practices sets an example for other neighborhoods, highlighting the beneficial effects that individual acts may have on the environment. Penablanca's continued support of appropriate waste management could act as a role model for other communities, helping to create a cleaner, healthier, and more sustainable future for everybody.

RECOMMENDATIONS

Some suggestions for future research and the practical implications of the present findings are outlined below:

1. In order to sustain the impressive implementation of SWM in the Municipality of Penablanca, the following should be given attention:

1.1. The LGU to provide more SWM facilities to all barangays such as, Material Recovery Facilities and Waste Sorting and Storage Facilities, and Equipment.

1.2. Continue to functionalize Barangay Solid Waste Management Boards (MSWMB), Municipal and barangay Information, Education, Communication (IEC), Monitoring and Evaluation (M&E) as these are seen to be influential to the implementation of SWM.

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