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# Solid Waste Management (SWM) through Effective Communication Policies

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Received February 27, 2022; Revised March 28, 2022; Accepted April 05, 2022

**Abstract** Poor solid waste management is among the major challenges in developing countries including the Philippines. Understanding community concerns and willingness towards involvement in solid waste management improvement initiatives are critical for informing interventions like local barangay communication initiatives. The study used a descriptive study to collect quantitative data from 1175 residents in five barangays located in downtown Calapan. A semi-structured questionnaire was used which determined collected waste materials and assessed the residents and officials as to their perception of solid waste management in terms of planning and control, waste management campaigns, waste collection; and waste disposal. Data were analyzed using descriptive statistics like frequency and mean. Findings revealed that the biggest proportion of waste materials collected in downtown Calapan was recyclable (31.73%), followed by non-biodegradable (23.87%) and lastly biodegradables (22.07%). Both residents and officials as respondents expressed very effective management in terms of planning and control, waste management campaigns, waste collection; and waste disposal. However, practices in waste disposal and separation were poor despite communication initiatives being in place to improve waste management, highlighting a need for authorities to engage residents of downtown to strictly adhere to SWM policies.

**Keywords:** communication policies, SWM. Semi-structured, initiatives, interventions

**Cite This Article:** Leonel C. Mendoza, Jermaine Ritzchelle D. Marquez, and Elvi C. Escarez, "Solid Waste Management (SWM) through Effective Communication Policies." *American Journal of Environmental Protection*, vol. 10, no. 1 (2022): 22-28. doi: 10.12691/env-10-1-3.

## 1. Introduction

Globally, solid waste management is one of the greatest environmental health challenges and continues to overwhelm local authorities and national governments as urban populations continue to rise and consumption patterns change. Cities generate about 1.3 billion tons of solid waste per year, a volume expected to rise to 2.2 billion tons by 2025, a more than double increase for developing countries [1]. Uganda, like many such countries, is facing rapid urbanization of 5.1% per annum. This has led to overcrowding and the development of slums that are inadequately provided with basic infrastructure and services characterized by poor solid waste management. This leads to numerous environmental and health risks including contamination of surface and groundwater, ecosystem degradation, and soil pollution as well as greenhouse gas emissions by anaerobic decomposition of waste. In many of these communities, poor management of solid waste contributes to flooding, air pollution, and spreading of diseases and health conditions such as respiratory ailments and diarrhea, giving rise to severe economic and social losses. The problems are particularly severe in slums in developing

countries where solid waste management systems are inadequate [2].

Municipal solid waste collection is currently one of the most critical lacking public services and its low coverage has caused a public outcry. Factors that affect solid waste management include inaccessibility, unaffordability where the service is expected to be paid for, and poor sanitation. The generation of solid waste is influenced by family size, education level, and income among other factors. The involvement of communities has a direct bearing on effective solid waste management and so do their awareness, attitudes, and practices. Participation is influenced by social pressures, environmental motivation, attitudes, and economic incentives [3].

Calapan is bounded to the north and northeast by the Calapan Bay, south and southeast by Naujan, and to the west by the Baco. The city lies at the quadrangle bounded by 13°12.6' and 13°27' north latitudes and 121°17' east longitudes. It is approximately 28 nautical miles (52 km; 32 mi) from the nearest point of Batangas, 45 kilometers (28 mi) south of Batangas City, and 130 kilometers (81 mi) south of Manila. The city has an area of 250.06 km<sup>2</sup> (96.55 sq mi) and is composed of 62 barangays of which 22 are classified as urban and 40, rural. The city also has jurisdiction over the Baco Islands and the two Silonay Islets on Calapan Bay. The overall land characteristic is a

wide plain with rivers, interspersed with wetlands at the seacoast periphery. The highest elevation is 187 m (614 ft) above sea level at Bulusan Hill, a 6-kilometer (3.7 mi) long landform east of the city, which interrupts the mostly flat terrain northeast of the Halcon-Baco Mountain Range.

The city's economy is dependent on agriculture and fishing. However, a growing industry in machinery and tourism has contributed well to the city's annual income making it one of the fastest-growing new cities in the country for the last 10 years [4]. Since 1998, the city has experienced rapid development. The establishment of a special development area, particularly an eco-zone for light industries located at the Urban Development Area (Lumangbayan and Guinobatan), has been promoted and now serves as a growth area that generates employment and spurs economic opportunities. Such industries focus on agro-industrial-based activities such as food processing, handicraft making, furniture making, and other related activities.

Calapan plays a major role in the Philippine economy as one of the major food suppliers in the country. The city is also a major exporter of rice supplying to Metro Manila and major parts of Luzon making it both an agriculturally progressive and urbanized city. The five major crops are rice, citrus, banana, rambutan, and lanzones. The top five industries in Calapan are trading, tourism, services, marine and aquatic, and food processing. Calapan serves as the province's industrial hub. It plays a pivotal role in the economic development of the province and its adjacent areas.

With this growing economy, problems with solid waste management become evident. The Calapan City Environment and Natural Resources Office (City ENRO) has strengthened its massive campaign on proper waste disposal and management to the residents of the city. City Environment and Natural Resources Officer appealed to all Barangay Captains of the 62 barangays to strengthen their programs on waste management in their respective area of jurisdiction. As stipulated in the Philippine Law and Jurisprudence Databank [5], barangay captains are tasked to regulate and penalize those who do not comply with the solid waste management system being implemented by the city government.

This paper was conducted to assess the effectiveness of the communication policies and initiatives of the Calapan City downtown barangays regarding solid waste management.

## 2. Objectives of the Study

Generally, this paper aimed to determine the effectiveness of the solid waste management of San Vicente Barangays namely North, South, West, and Central of Calapan City, Oriental Mindoro. These barangays were selected because of their location downtown of Calapan City.

Specifically, this study answered the following questions: (1) what are the collected waste materials in terms of non-biodegradability, biodegradability, and recyclability?; (2) how effective is the solid waste management of the five barangays as perceived by the residents in terms of planning and control, waste management campaign, waste

collection and waste disposal?; (3) how effective is the solid waste management of the five barangays as perceived by the barangay officials in terms of planning and control, waste management campaign, waste collection and waste disposal; and (4) what programs may be implemented to improve the solid waste management of the five barangays?

## 3. Materials and Methods

The study used the descriptive method of research; it is an appropriate choice when the research aim is to identify characteristics, frequencies, trends, and categories. It is useful when not much is known yet about the topic or problem. Before you can research why something happens, you need to understand how, when, and where it happens. Also, descriptive research is usually defined as a type of quantitative research, though qualitative research can also be used for descriptive purposes. The research design should be carefully developed to ensure that the results are valid and reliable.

This study was conducted in selected Barangays of Calapan City, Oriental Mindoro namely the San Vicente North, San Vicente South, San Vicente East, San Vicente West, San Vicente Central. According to the website Philippine Cities, Calapan is just a small village until before the establishment of the first Religious District in Baco. In the early years of the 18th century, Calapan City only has a strip of land stretching from Ilaya to Ibaba in a cross shape that is facing the church and was cut off by the river then later on many barrios were established. Calapan City is the 3rd class city and the capital of Oriental Mindoro, Philippines.

San Vicente North is one of the barangay in the Calapan City of Oriental Mindoro. According to the 2015 census, the barangay has 749 populations that represent 0.56 % of the total population of Calapan City. Also, the highest population age group is 5-9 with 87 individuals, and the lowest population age group are ranges to 70-74 and 75-79 with only 3 individuals.

San Vicente South is one of the barangay in the Calapan City of Oriental Mindoro. According to the census in 2015, the said barangay has 608 populations that represent 0.45 % of the total population of Calapan City. Also, the highest population age group is 15-19 with 69 individuals and the lowest population age group is under 1, 70-74, and 75-79 with only 7 individuals.

San Vicente East is one of the barangays in the Calapan City of Oriental Mindoro. According to the 2015 census, the barangay has 622 populations that represent 0.46 % of the total population of Calapan City. Also, the highest population age group is 15-19 with 73 individuals and the lowest population age group are ranges to 75-79 and 80 and above with only 8 individuals.

San Vicente West is one of the barangay in the Calapan City of Oriental Mindoro. According to the census in 2015, the said barangay has 608 populations that represent 0.45 % of the total population of Calapan City. Also, the highest population age group is 15-19 with 79 individuals and the lowest population age group is under 1 with 1 individual.

San Vicente Central is one of the barangay in the Calapan City of Oriental Mindoro. According to the 2015 census, the barangay has 359 populations that represent

0.27 % of the total population of Calapan City. Also, the highest population age group is 15-19 with 39 individuals and the lowest population age group is ranges to 75-79 with only 4 individuals. The respondents of this study were the barangay officials of each barangay and residents of San Vicente.

## 4. Sampling Technique

**Table 1. Respondents' Population of the Study in the Barangay**

Barangay	Respondents		Total Sample
	Resident	Barangay Officials	
1. San Vicente South	231	10	241
2. San Vicente North	251	10	261
3. San Vicente West	231	10	241
4. San Vicente Central	179	10	189
5. San Vicente East	233	10	243

The sampling technique used in this study is proportional stratified random sampling. The study used the most common form of internal consistency reliability coefficient, Cronbach's alpha. Reliability analysis was done to identify the internal consistency of the instrument. The reliability of the scores from each subscale in the study was measured to check the internal consistency coefficient of the items. Based on the computed Cronbach's alpha of the variables presented in the table, the research instrument was found reliable and valid.

**Table 2. Reliability of Instrument as Perceived by the Respondents (Residents)**

Variables	Cronbach's Alpha
Planning and Control	0.85
Campaign in Waste Management	0.87
Waste Collection	0.82
Waste Disposal	0.87

**Table 3. Reliability of Instrument as Perceived by the Respondents (Barangay Officials)**

Variables	Cronbach's Alpha
Planning and Control	0.85
Campaign in Waste Management	0.87
Waste Collection	0.82
Waste Disposal	0.87

**Table 4. Scoring Rubric and Qualification of Data**

Scale	Range	Description
4	3.1-4	Very Effective
3	2.1-3	Effective
2	1.1-2	Slightly Effective
1	0-1	Not effective

The instruments that the researchers used were validated by the professors and instructors of MinSCAT Calapan City Campus to make sure that the instrument was appropriate to use and to test the reliability of the respondents. A letter of request to conduct the study was given to the five Barangay Captains of the chosen

Barangay of Calapan City where the study was conducted. The researchers personally administered the questionnaire to the barangay officials and resident respondents. The procedure for answering the questionnaire was discussed by the researchers. The questionnaire was retrieved after the barangay officials and residents answered the questionnaire. Moreover, the researchers then analyzed the gathered data. The effectiveness of solid waste management in each Division of Barangay of San Vicente Calapan City, Oriental Mindoro, was described using the scale below by the representative of each barangay.

## 5. Results and Discussion

**Table 5** shows the percentage and frequency of the three kinds of collected waste materials in the barangay San Vicente Central, East, West, South, and North in which respondents chose among the ten (10) most commonly collected materials that have been collected in their household. The collected materials were divided into three categories such as biodegradable like cartons, clothes, and fruits/vegetables. Non-biodegradable collected materials were plastic bags, Styrofoam, and disposable cups/plates while recyclable materials were metals, papers, tin cans, and plastic bottles.

As a result, presented in **Table 1**, the highest percentage of collected waste is recyclable materials, which is 31.73 with 476 frequency. Next to it is the Non-biodegradable materials that have 23.87 of their percentage with a frequency of 358. The least is the Biodegradable materials that have a result of 22.07 of its percentage with 331 of its frequency. This result means that Recyclable materials have the highest number of waste-generated materials in all of the five barangays.

According to the article page of the United States Environmental Protection Agency [6], MSW has recycled the highest amount of recyclable materials compared to biodegradable products such as paper and paperboards. Paper and paperboard products made up the largest percentage of all the materials in MSW, at 25 percent of total generation, next to it is the metals and plastic bottles. This article proves that recyclable materials are possibly be collected in such a high amount as stated in the result of five barangays.

**Table 5. Collected Waste Materials**

Category	Frequency	Percentage
1. Biodegradable	331	22.07
2. Non-biodegradable	358	23.87
3. Recyclable	476	31.73

It can be noted in **Table 6** that item number 1 has the highest mean score of 3.91 with a standard deviation of 0.29, which states, (*May pagpupulong ang barangay ukol sa mga basura*), described as very effective. On the other hand, Item number 8 has the lowest mean score of 3.64 with a standard deviation of 0.56 which states, (*Mabilis na nalilinis ang mga basura sa tuwing may mga kaganapan sa inyong barangay*), it is still described as very effective. The overall mean score was 3.79, described as very effective.

This result means that in the five barangays, proper and continues updates and meetings are important. Meetings about the proper handling waste in each barangay were discussed and maintain every week or month depending on their schedule while the lowest rank was also experienced by many not just in San Vicente Barangays but as well to other barangays everywhere.

According to Lenkiewicz [7], lack of waste management system has a direct impact on residents particularly children. So it is important to conduct community meetings about the proper regulation of waste in the community to eliminate toxic emissions that cause lung diseases and to accumulate waste that encourages mosquitos to breed, resulting in the spread of cholera, dengue fever, and other infectious diseases.

**Table 6. Solid Waste Management as Perceived by the Barangay Residents in Terms of Planning and Control**

Items	Mean	Description
1. May pagpupulong ang Barangay ukol sa mga basura	3.91	Very Effective
2. May namumuno ukol sa tamang pagtatapon ng basura.	3.87	Very Effective
3. May sapat na pinagtatapunan ng basura sa barangay.	3.80	Very Effective
4. May sapat na bilang ng taong nangongolekta ng basura.	3.88	Very Effective
5. Alam ng publiko na may batas ukol sa tamang pagtatapon ng basura.	3.81	Very Effective
6. May mga paghahanda na ginagawa sa pag lilinis ng basura sa turing may kaganapan sa barangay.	3.73	Very Effective
7. May mga nakalaan na basurahan sa turing may kaganapan sa barangay.	3.67	Very Effective
8. Mabilis na nalilinis ang mga basura sa turing may kaganapan sa inyong lugar.	3.64	Very Effective
<b>OVERALL MEAN</b>	<b>3.79</b>	<b>Very Effective</b>

In Table 7, Item number 2 which states, (*May mga Patakaran at Regulasyon ukol sa pamamahala ng basura*), obtained the highest mean score of 3.71 with a standard deviation of 0.5, described as very effective. On the other hand, Item number 8 (rank 8) which states, (*Pagmumulta ukol sa maling pagtatapon ng basura*), obtained the lowest mean score of 3.23 with a standard deviation of 0.83 despite of its rank, it is still described as very effective. The overall mean score was 3.58, described as very effective.

Based on the result of this table, it is really required in each barangay to have specific rules and regulations regarding waste management since it is important to resident's health and environment. In spite of those rules implemented by each barangay, it's sad to say that fewer residents are following to it which resulted as low rank in represented in the table.

Planning the waste management and recycling for all of the rubbish is an enormous task which involves both logistical planning and scientific knowledge and understanding in order to balance the impact on the environment and the cost effectiveness of the process. Therefore, it is really important to discuss and have some rules and regulations regarding this since it plays an extreme important role in the global cleanliness and sustainability drive, with people's health and the conservation of resources.

**Table 7. Solid Waste Management a Perceived by the Barangay Residents in Terms of Management Campaigns**

Items	Mean	Description
1. Ipinatutupad ng barangay ang Tapat ko, Linis ko.	3.68	Very Effective
2. May mga patakaran o regulasyon ukol sa pamamahala ng basura	3.71	Very Effective
3. May pagtutulungan ukol sa paglilinis at pamamahala ng basura.	3.65	Very Effective
4. Pagsusuperbisa ng barangay ukol sa pagkolekta ng basura.	3.61	Very Effective
5. Pagpapaalala ukol sa tamang tapunan ng basura	3.59	Very Effective
6. Patuloy na pagpapaalam o pagpapaalala ukol sa tamang pamamahala sa basura.	3.63	Very Effective
7. Mayroong ginagawang pananaway ukol sa maling pamamahala at pagtatapon ng basura.	3.50	Very Effective
Pagmumulta ukol sa maling pagtatapon ng basura.	3.23	Very Effective
<b>OVERALL MEAN</b>	<b>3.58</b>	<b>Very Effective</b>

It was shown in Table 8, Item number 3 which states, (*Nasa oras ang pangungolekta ng basura*), obtained the highest mean score of 3.68 with a standard deviation of 0.51, described as very effective. On the other hand, Item number 8 which states, (*Hindi nahuhuli sa paglalagay ng basura sa basurahan*), obtained the lowest mean score of 3.45 with a standard deviation of 0.7 despite of its rank, it is still described as very effective. The overall mean score was 3.60, described as very effective.

To be able to maintain a habit, it is important that the community is aware on the correct schedule of collecting the garbage. It is for their own sake to prepare their trashes inside their households especially those of biodegradable waste that might cause bad odors if not eliminated as soon as possible. Since not all of the residents are doing this appropriately, some of them are still putting the garbage on the wrong schedule and often throw their waste on the site. Another bad thing is that those people are not being punished immediately as the low rank represents.

This was supported by Saylor [8] stating that schedule is imperative to getting work done well-organized manner. When people are working or throwing their garbage under a deadline, a work schedule is a valuable structure that ensures the deadline will be met. Through deadline or schedule, the residents will exercise a habit of throwing their waste on time.

**Table 8. Solid Waste Management as Perceived by the Barangay Residents in Terms of Waste Collection**

Items	Mean	Description
1. Pagsusuri sa mga lugar na pinagtatapunan ng basura.	3.58	Very Effective
2. May laging nangongolekta ng basura.	3.63	Very Effective
3. Nasa oras ang pangungolekta ng basura.	3.68	Very Effective
4. May tamang lugar ng tapunan ng basura sa barangay.	3.66	Very Effective
5. May sapat na basurahan sa loob ng barangay.	3.61	Very Effective
6. Mabilis na nakolekta ang basura sa mga tapunan.	3.60	Very Effective
7. Nasa ayos ang mga basura sa oras ng pangongolekta.	3.57	Very Effective
8. Hindi nahuhuli sa paglalagay ng basura sa basurahan.	3.45	Very Effective
<b>OVERALL MEAN</b>	<b>3.60</b>	<b>Very Effective</b>

In **Table 9**, Item number 1 which states, (*May mga palatandaan ang mga tapunan ng basura*), obtained the highest mean score of 3.62 with a standard deviation of 0.6, and described as very effective. On the other hand, Item number 7 which states, (*Napaparusahan ang mga taong nag kakalat ng basura*), obtained the lowest mean score of 2.99 with a standard deviation of 0.85 described as effective. The overall mean score was 3.45, described as very effective.

Proper signage of waste disposal is important when a community is conducting waste management. This is needed for the community to be aware on the right places of where to put their garbage and for easy collection by each barangay members.

According to Bell [9], it is important to have proper signages to avoid confusions and contaminations of waste materials.

**Table 9. Solid Waste Management as Perceived by the Barangay Residents in Terms of Waste Disposal**

Items	Mean	Description
1. May palatandaan ang mga tapunan ng basura.	3.62	Very Effective
2. May ginagawang pagsisiyasat sa mga lugar na pinagtatapanan ng basura.	3.47	Very Effective
3. Pagtatalaga ng lugar na tapunan ng basura ng mga opisyal ng barangay.	3.56	Very Effective
4. May hiwalay na tapunan ng ibat ibang klase ng basura.	3.54	Very Effective
5. Pagpapatupad ng striktong pagtatapon ng basura.	3.57	Very Effective
6. May babala ukol sa maling pagtatapon ng basura.	3.40	Very Effective
7. Napaparusahan ang mga taong nagkakalat ng basura.	2.99	Very Effective
8. Hindi nanganganalat ang mga basura sa basurahan.	3.46	Very Effective
OVERALL MEAN	3.45	Very Effective

**Table 10. Solid Waste Management as Perceived by the Barangay Officials in Terms of Planning and Control**

Items	Mean	Description
1. May ginagawang pagpupulong ukol sa mga basura.	3.96	Very Effective
2. Napapamunuan ang tamang pagtatapon ng basura.	3.86	Very Effective
3. May nakatakdang tapunang ng basura.	3.96	Very Effective
3. Sapat ang bilang ng tauhan ng barangay sa pagkolekta ng basura.	3.96	Very Effective
Alam ng barangay na may batas ukol sa tamang pagtatapon ng basura	3.96	Very Effective
May paghahanda ang barangay na paglilinis sa tuwing may kaganapan sa lugar.	3.94	Very Effective
Paglalaan ng barangay ng basurahan tuwing may kaganapan.	3.94	Very Effective
Mabilis na nalilinis ang nasasakupan ng barangay	3.90	Very Effective
OVERALL MEAN	3.94	Very Effective

In **Table 10**, Item number 1,3,4 and 5 obtain which obtained the highest same mean score of 3.96 with a standard deviation of 0.2, described as very effective. On the other hand, Item number 2 which states, (*Napapamunuan ang tamang pagtatapon ng basura*), obtained the lowest mean score of 3.86 with a standard deviation of 0.35 despite it is still described as very effective. The overall mean score was 3.94, described as very effective. The importance of Planning and Control is a big factor in solid waste management as it helps the

barangay official to fully manage the waste disposal of their barangay as increases waste generation.

Planning the waste management and recycling for all of the rubbish is an enormous task. This involves both logistical planning and scientific knowledge and understanding to balance the impact on the environment and the cost-effectiveness of the process.

In **Table 11**, Item number 1 which states, (*Pagpapatupad ng Tapat ko Linis ko*), obtained the highest same mean score of 3.96 with a standard deviation of 0.2, described as very effective. On the other hand, Item number 3,6,8 which obtained the same lowest mean score of 3.86 with a standard deviation of 0.0.35, is still described as very effective. The overall mean score was 3.90, described as very effective.

The importance of the Campaign in Waste Management is to make sure the improvement of waste management of the barangays as waste generated by the people increase dramatically every day. Like the '*Tapat ko Linis ko*' Ordinance that has been implemented by the Philippines to improve the waste management of not just the barangay but also the household living in the barangay.

The current initiative of *Tapat ko Linis ko* is to call for every Filipino to be responsible for managing their solid waste to prevent disaster properly.

**Table 11. Solid Waste Management as Perceived by the Barangay Officials in Terms of Waste Management Campaigns**

Items	Mean	Description
1. Ipinatutupad ng barangay ang Tapat ko, Linis ko.	3.96	Very Effective
2. May mga patakaran o regulasyon ukol sa pamamahala ng basura	3.92	Very Effective
3. Pagsusuperbisa ng barangay ukol sa pagkolekta ng basura.	3.86	Very Effective
4. Pagpapaalala ukol sa tamang tapunan ng basura	3.90	Very Effective
5. Patuloy na pagpapaalam o pagpapaalala ukol sa tamang pamamahala sa basura.	3.92	Very Effective
6. Pagsaway sa mga residenteng mali ang pamamahala sa kanilang basura	3.86	Very Effective
7. Pagbibigay multa sa mga pasaway na ngatatanpon ng basura kung saan-saan.	3.92	Very Effective
8. Pagmumulta ukol sa maling pagtatapon ng basura.	3.86	Very Effective
OVERALL MEAN	3.90	Very Effective

In **Table 12**, Item number 2 which states, (*Pagtatakdang araw na dapat itapon ang basura*), obtained the highest same mean score of 3.92 with a standard deviation of 0.27, described as very effective. On the other hand, Item number 5,7 (rank 5) which states, (*Mabilis na pangonglekta ng basura ng barangay*) obtained the same lowest mean score of 3.82 with a standard deviation of 0.39, is still described as very effective. The overall mean score was 3.86, described as very effective.

To practice the habit of maintaining the cleanliness of the surroundings, the waste management collector of every barangay must have their scheduled date of garbage collection to minimize the waste especially those of biodegradable waste that might cause bad odors and to remind every household when their garbage is ready to be collected.

The collection of waste is a highly visible and important municipal service that involves large expenditures. Waste collection problems are, however, one of the most difficult

operational problems to solve. This paper describes the optimization of vehicle routes and schedules for collecting municipal solid waste in Eastern Finland.

**Table 12. Solid Waste Management as Perceived by the Barangay Officials in Terms of Waste Collection**

ITEMS	Mean	Description
1. Pagsusuri sa mga lugar na pinagtatapunan ng basura.	3.84	Very Effective
2. Pagtatakda ng araw na dapat itapon ang basura.	3.92	Very Effective
3. Pagtatakda ng oras na dapat itapon ang basura.	3.84	Very Effective
4. Paglalagay ng tamang signs ng mga tapunan ng basura.	3.84	Very Effective
5. May sapat na basurahan sa loob ng barangay.	3.82	Very Effective
6. Mabilis na nakokolekta ang basura sa mga tapunan.	3.90	Very Effective
7. Nasa ayos ang mga basura sa oras ng pangongolekta.	3.82	Very Effective
8. Hindi nahuhuli sa paglalagay ng basura sa basurahan.	3.88	Very Effective
OVERALL MEAN	3.86	Very Effective

In Table 13, Item number 3,4,5 which obtained the highest same mean score of 3.86 with a standard deviation of 0.35, described as very effective. On the other hand, Item number 8 which states, (*Napaparusahan ang mga kabbarangay na may alagang hayop na nagkakalat ng basura*), obtained the same lowest mean score of 3.82 with a standard deviation of 0.39 despite its rank, it is still described as very effective. The overall mean score was 3.68, described as very effective.

Waste disposal is very important to keep your surroundings clean. Waste should be sorted into recyclable, reusable, and disposable materials to ensure that it ends up in the right place. Not only it is unpleasing to the eye but also it can cause a lot of damage to the environment and the health of human beings.

According to Runcie [10], an audit on the use of clinical waste bins and its implications, a multicenter quality improvement project on the use of clinical waste bins and aims to raise awareness of the importance of sorting waste. It also makes recommendations for hospital clinical and management staff to improve compliance.

**Table 13. Solid Waste Management as Perceived by the Barangay Officials in Terms of Waste Disposal**

ITEMS	Mean	Description
1. Pagpapaalala sa mga kabbarangay ng tamang pagtatapon ng basura.	3.84	Very Effective
2. Paginspeksyon sa lugar na tapunan ng basura.	3.82	Very Effective
3. Pagtatalaga ng lugar na tapunan ng basura ng mga opisyal ng barangay.	3.86	Very Effective
4. Paglalagay ng hiwa-hiwalay na tapunan ng ibat ibang klase ng basura.	3.86	Very Effective
5. Pagpapatupad ng striktong pagtatapon ng basura.	3.86	Very Effective
6. Paglalagay ng opisyal ng barangay ng mga babala ukol sa maling pagtatapon ng basura.	3.84	Very Effective
7. Pinaparusahan ng barangay ang mga taong mali ang pagtatapon ng basura	3.74	Very Effective
8. Napaparusahan ang mga kabbarangay na may alagang hayop na nagkakalat ng basura	3.68	Very Effective
OVERALL MEAN	3.81	Very Effective

## 6. Conclusion and Recommendation

Based on the findings, the following conclusions were made: (1) there are three categories of solid waste materials collected in five different barangays in San Vicente. Those were the biodegradable, non-biodegradable and the recyclable materials; (2) the residents in each barangay in San Vicente were updated in each meeting and planning of waste management system held by the barangay officials all of the officials in each barangay are knowledgeable of the proper handling of waste management and are conducting regular meetings and planning to the effectiveness of their community; (3) the residents were aware of the following rules regarding waste management in their barangays also each barangay has enough men of waste collector and are working consistently in their agreed schedule of collecting waste; (4) the residents were informed of the collecting schedule of their waste and it must be followed based on the day of their schedule in each barangay street while barangay officials are strict on implementing schedule of throwing waste, the right site for disposal and the proper signs that the community easily understand such as big tarpaulins and boards; (5) The residents were knowledgeable of the proper signs to where they can throw their waste and the barangay officials provided large tarpaulin where residents can read a big sign "TAPUNAN NG BASURA" also the barangay officials were strictly implementing the "Tapat ko, Linis Ko" program in their community for a much easier work for barangay sweepers.

The following recommendations were deduced: (1) the barangay officials should conduct an annual seminar about the "Proper waste handling of Waste Materials" in the barangay to help the people to properly manage their waste; (2) the barangay officials should conduct a monthly clean up drive to dispose and clean the waste that can be a habitat for insects that can cause diseases. (3) the barangay officials should implement an Additional waste disposal area in the barangay every time that an event is occurring; (4) the barangay officials should have an Additional no littering signages and warnings in establishments, schools, and other institutions for more cooperation of the resident and visitors; (5) the barangay officials should conduct a monthly recognition for the most resident who cleaned handled their waste properly; (6) the residents should help the manpower during an event in the barangay to clean the waste generated by the event; (7) the residents should have a big penalty for not complying the rules and regulations regarding waste control in the community; and (8) parallel study should be made to have more relative information about the topic.

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