International Journal of Research Studies in Education
2022 Volume 11 Number 9, 85-95

Solid Waste Management Act in Nueva Vizcaya: Setting lenses on implementation and community participation

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Received: 20 February 2022 **Revised**: 25 March 2022 **Accepted**: 8 April 2022
Available Online: 15 April 2022 **DOI**: 10.5861/ijrse.2022.816

ISSN: 2243-7703
Online ISSN: 2243-7711

OPEN ACCESS

Abstract

This study was undertaken in order to come up with an assessment of the levels of implementation of and community participation in the Republic Act 9003 or the Solid Waste Management (SWM) Act in the province of Nueva Vizcaya, Philippines, involving 76 local government officials and 76 community members. Results showed that the level of implementation of the provisions of Republic Act 9003 along with municipal profiling, segregation, and storage, composting, and waste management facilities, is very high, while in terms of the level of participation, the provisions of the Republic Act 9003 along with segregation, waste reduction, reusing, recycling, and disposal, is high. Further, there is a significant difference between the assessments of the implementers and community members on the level of implementation of Republic Act 9003 along with municipal profiling, segregation & storage of waste, composting, and waste management facilities. Results likewise showed that the generation of a large amount of waste is brought by increased population and increased economic activity. Despite the efforts exerted by local government units, lack of discipline and poor imposition of fines are factors that affect community participation. Finally, efforts done by the local government units to address solid waste management problems include zero-plastic policy, no-segregation-no-collection policy, supporting organic fertilizer production, and giving of awards and recognition. Meanwhile, community members practice the use of eco-bags and recycled plastic wares and containers for gardening purposes.

Keywords: community members, community participation, implementation, local government officials, Solid Waste Management Act

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1. Introduction

A World Bank Report discloses that the amount of solid waste we generate on earth will be twice as much by the year 2025. We are likely to go from 3.5 million tons to 6 million tons per day if the current trends continue. The numbers predict that trash production will keep increasing for the imaginable future. It predicts we will not hit peak garbage-global trash production at its highest and then level off until sometime after 2100. At that point, we will be producing 11 million tons of trash per day *(*https://www.rootwell.com*)*.

Solid waste is indeed considered a major global issue. The large amount of waste generated in the world can be attributed to the wastes generated from households, industrial units, manufacturing units, commercial establishments, landfills, hospitals, and medical clinics. Trashes collected from households often take the form of plastic bags and organic waste. Commercial establishments also pile up a lot of trash such as waste matter. Industrial units taking part in manufacturing produce toxic solid wastes, such as slag, through the industrial procedure of obtaining metals from their ores. Hospitals and clinics also produce wastes in the form of disposable syringes, used test tubes, plastic bags used for collecting blood, cotton swabs, and used bandages (Spelch, 2016).

Modernization and progress have their share of disadvantages and one of the main aspects of concern is the pollution they cause to the earth - be it land, air, or water. With the increase in the world population and the surging demand for food and other essentials, there has been a rise in the amount of waste being generated every day by each household. This waste is eventually thrown into municipal waste collection centers from where it is collected to be further thrown into the landfills and dumps. If at this stage the management and disposal are inappropriately done, they can cause serious problems to the surrounding environment. Wastes if not properly managed, especially excreta and other liquid and solid waste from households and the community, are a serious health hazard and lead to the spread of infectious diseases. Unattended waste lying around attracts flies, rats, and other creatures that spread diseases. Normally, it is the wet waste that decomposes and releases a bad odor. This leads to unhygienic conditions and thereby to a rise in health problems.

The Philippines is one of the several countries in the world which are confronted with problems with solid waste. According to Plaza (2017), Metro Manila is now home to more than 12 million people. As with other megacities in Asia, waste collection and disposal is a major environmental issue. Currently, about 35,000 tons of municipal solid waste are generated by the Philippines daily and more than 8,600 tons per day in Metro Manila alone. A sizable proportion of the refuse is openly burned, further worsening the quality of the city's already heavily polluted air. This problem is also observed in other areas. Daily garbage generated in Northern Baguio City increased by more than 20% from 2008 to 2013. Since the Irisan dumpsite trash-slide incident in 2011, Baguio has used landfill facilities in Pangasinan and Tarlac Provinces. In Cebu, the Inayawan landfill still operates years after it was supposed to have closed upon reaching 7 years of service.

Seventeen (17) years after the passage of the Ecological Solid Waste Management Act, MSW collection and disposal is still a problem. The province of Nueva Vizcaya is one of the provinces in the country which is exerting efforts to address solid waste management problems as well as in managing its effects, particularly with that of global warming. However, there are still some municipalities in the province that are confronted with improper collection and disposal of waste. It has then encouraged the researcher to conduct a study on the implementation and compliance to the Republic Act 9003. The aim of the study included the identification of areas where problems on MSW are observed and also to surface the factors behind poor participation and implementation. The study is hopeful to provide possible interventions which can be undertaken to achieve the

optimum implementation and participation in the Republic Act 9003.

1.1 Statement of the Problem

This research is geared to come up with an account of the implementation of and participation in Republic Act 9003 (Solid Waste Management Act) in the 1st and 2nd class municipalities of Nueva Vizcaya. Specifically, this study sought to answer the following:

- What is the level of implementation of Republic Act 9003 in the selected municipalities in terms of municipal profiling, segregation and storage of waste, collection of waste, transport of waste, recycling program, composting, waste management facilities, and local government solid waste management?
- What is the level of community participation in Republic Act 9003 in the selected municipalities in terms of segregation, waste reduction, reusing, recycling, and disposal?
- Is there a significant difference between the assessments of the implementers and community members in the level of implementation of and level of community participation in Republic Act 9003?
- What are the factors affecting the implementation of and participation in Republic Act 9003?
- What measures can be undertaken to achieve the optimum level of implementation and compliance to Republic Act 9003?

1.2 Conceptual Framework of the Study

According to Yukalang, Clarke, and Ross (2018) municipal solid waste (MSW) is labeled as a serious problem, especially in developing countries that have inadequate infrastructure and landmass to process wastes in an appropriate way. Aside from these, some nations are confronted with other issues that lead to poor solid waste management. Rapid population growth accompanied by increased economic activity and consumer behavior results in an increase in solid waste generation. Municipal solid waste is a major concern for big cities in developing nations as well as to the local government units who are tasked to manage waste. Managing solid waste in urban and rural areas must be approached differently. Possible measures can include the following: formulation of appropriate policies and implementation plans; a waste separation system that may reduce the waste going to sanitary landfills, a collection service that encourages waste separation at source; and educating community members and Implementers. With the increase in production and consumption, societies generate and discard materials in different sectors such as agricultural, commercial, domestic, and industrial organizations. Solid wastes are materials coming from human and animal activities that are considered useless and must be disposed of. The generation of waste may bring harm to the environment and human health and it is therefore needed that people must be educated about proper solid waste management practices in terms of segregation, collection, transport and disposal (Baring et al., 2020; Lagbas, 2015).

The main input of the study is the provisions of the Republic Act 9003 which were evaluated in the level of how they are implemented and participated by community members. On the data gathering phase, document scanning was done to identify the provisions of the Republic Act 9003 which were included in the study as well as to assess if they correspond to the background and experience of the target respondents. Meanwhile, community profiling, ocular visits, and a series of observations were conducted to identify the areas where the study was confined as well as to obtain initial data. After which, the main data-gathering technique which was floating of the survey questionnaire was undertaken. Such a survey method is needed in order to systematically gather ratings among the respondents. It was also appropriate in the study considering the fact that data collection would be timely and inaccurate without employing such steps. Some of the respondents were interviewed in order to have additional data which were used to elucidate research findings and supplement data

discussion.

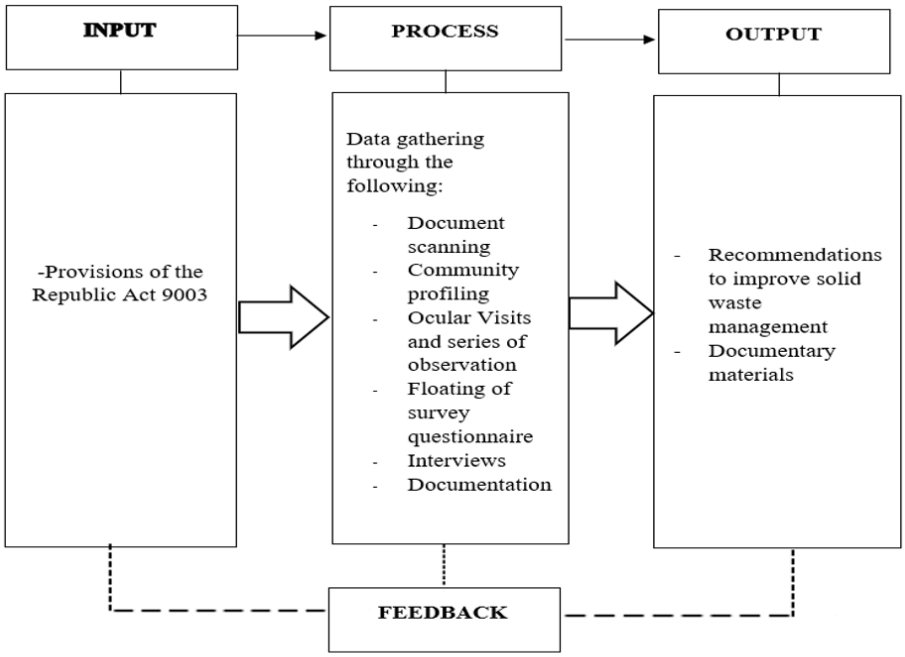

Figure 1. Research Paradigm

An important output that the study sought to provide was an environmental plan which can strategically address solid waste management problems. After gathering and analyzing data, documentary materials were provided in order for the readers to have an in-depth glimpse and understanding of the findings of the study.

2. Methodology

The mixed descriptive research design was employed in this study. Specific approaches were used to attain the research objectives like the evaluative, and comparative methods. This study was conducted in the province of Nueva Vizcaya. Specifically, the locale of the study included six municipalities of the province namely Bagabag, Solano and Bayombong in the north; Bambang, Dupax del Sur, and Aritao in the southern part. Bayombong which is the capital town and educational center of the province, as well as Solano and Bambang which are the commercial and agricultural centers, is classified as a first-class municipality. The remaining three are booming second-class municipalities.

The respondents of the study were implementers and the community members within the 1st class and 2nd class municipalities in Nueva Vizcaya. In selecting the implementer respondents, the purposive sampling technique was utilized. Seventy-six (76) respondents were equally allocated among the six included municipalities taking 12 or 13 local government official respondents from each municipality. On the other hand, the 76 community member respondents were selected using the multi-stage sampling technique. This figure surpasses the required minimum number of respondents for descriptive-correlational research which is 30 (Cudia & Tallungan, 2015) as supported by the Central Limit Theorem. Further, the protection of the privacy of research participants as well as an adequate level of confidentiality of the research data was ensured.

The majority of the local government official respondents are college graduates, have been in the service for 4 to 6 years and most of them are SWM enforcers, while the majority of the respondents are females, from the first-class municipalities and obtained information on Republic Act 9003 through television, radio, and social media. Most of them are 30 to 39 years old from Bambang, college graduates, have a monthly income of Php10,000 or below, and have a length of residency of 30 years or above.

The processes conducted by the researcher were collection and review of materials pertaining to solid waste

management, development of the survey questionnaire and interview guide, identification and ocular visits to the covered municipalities, identification of the prospective research respondents, asking permission from stakeholders to conduct the survey, scheduling the conduct of questionnaire and interview, briefing the respondents about the study, administering of research questionnaire, personal interviews, and documentation.

The data gathering tools used were a survey questionnaire and an interview guide. The survey questionnaire was the primary data gathering instrument. The first part was a profile sheet which was used to profile the respondents. The second part was the assessment sheet wherein the provisions of the Republic Act 9003 were rated as to the extent to how they are implemented and participated. To establish the internal consistency of the questionnaire used in this study, Cronbach Alpha was analyzed. The index was computed to be 0.855 which corresponds to the qualitative description of an acceptable level of internal consistency, hence the level of reliability of the questionnaire is acceptable. The interview guide was composed of thematically arranged guide questions that were asked to the respondents as a way of generating additional data. Questions were made open-ended so that responses were freely expressed.

The statistical tools used were frequency and percentage, weighted means, and T-test. All inferences were made using the 0.05 level of significance. On the other hand, written observations of the researcher and interview responses were summarized and focal points were deduced and presented in narrative form. The coding technique was used to systematically categorize the interview responses wherein statements implying the same ideas were combined.

3. Results and Discussion

3.1 Level of Implementation of Republic Act 9003

As shown in Table 1, the level of implementation of Republic Act 9003 in the setting is described with an overall computed mean of 3.51 or very high. This is attributed to the assessment made for each of the indicators of implementation. Along with the provisions under municipal profiling, the mean is 3.60 or very high, which implies that estimating the population of each barangay within the municipality and a projection for 10-period time is implemented to a high extent.

Table 1

Level of Implementation of Republic Act 9003

Indicator	Mean	Level
Municipal Profiling	3.60	Very High
Segregation and Storage of Wastes	3.66	Very High
Collection of Wastes	3.42	High
Transport of Waste	3.42	High
Recycling Program	3.30	High
Composting	3.59	Very High
Waste Management Facilities	3.52	Very High
Local Government Solid Waste Management	3.55	Very High
Mean	3.51	Very High

In terms of segregation and storage of wastes, the mean is 3.66, or a very high level of implementation, e.g. there is a separate container for each type of waste, solid waste container depending on its use is properly marked or identified for on-site-collection as “compostable”, “recyclable”, “non-recyclable” or “special waste” or any classification as may be determined by the commission. Along with the collection of wastes, the mean is 3.42, or high level of implementation, e.g. collection of waste is done in a manner that prevents damage to the container and spillage or scattering of waste within the collection vicinity, while in terms of transport of waste, the mean is 3.42 or high, e.g. vehicles are designed to consider road size, condition and capacity to ensure the safe and efficient collection and transport of solid waste.

In terms of the recycling program, the mean is 3.30 or high, e.g. building and/ or land layout and equipment is designed to accommodate efficient and safe materials processing, movement, and storage, while along with composting, the mean is 3.59 or very high, e.g. inventory of markets for composts, and following guidelines for compost quality. As to extent of implementation of Republic Act 9003 in terms of waste management facilities, the computed mean is 3.64, or very high, e.g. following criteria for operating a sanitary landfill, while in terms of local government solid waste management, the mean is 3.55 or very high, e.g. following guidelines for identification of common solid waste management.

3.2 Level of Community Participation in Republic Act 9003

As shown in Table 2, the level of community participation in Republic Act 9003 in the setting is described with an overall computed mean of 3.15 or high. This is attributed to the assessment made for each of the indicators of participation. Along with the provisions under segregation, the mean is 3.45 or high, which implies that residents separate recyclable materials from non-recyclable materials to a high extent, but the least extent is ascribed by the practice of segregating non-harmful materials from toxic and hazardous wastes.

Table 2

Level of Community Participation in Republic Act 9003

Indicator	Mean	Level
Segregation	3.45	High
Waste Reduction	3.30	High
Reusing	3.25	High
Recycling	2.50	High
Disposal	3.21	High
Mean	3.15	High

In terms of waste reduction, the mean is 3.30 or high, e.g. residents only buy things that are really needed, and things or materials that are just needed occasionally are borrowed, shared, or rented, while in terms of reusing, the mean is 3.25 or high, e.g. residents reuse grocery bags when buying goods. Along with recycling, the mean is 2.50, the least rated among indicators, but still categorized as high, e.g. residents generate additional income from waste materials, while in terms of disposal, the mean is 3.21 or high, e.g. residents bring biodegradable wastes to the garbage collection area. Significant Difference in the Assessments of the Implementers and Community Members on the Levels of Implementation of and Participation in Republic Act 9003. The difference between the assessments of both respondents, the implementers and community members, on the extent of implementation of Republic Act 9003, was analyzed to yield an answer to this research question. The result of the analysis is shown in Table 3.

The comparison of paired means yielded p-values of 0.021, 0.010, 0.000, and 0.000 correspondingly, which are all lower than the level of significance of 0.05. This means that the null hypothesis along this area is rejected. Therefore, there is a significant difference in the assessment of the implementers and community members, on the extent of implementation of Republic Act 9003 along with municipal profiling, segregation and storage of waste, composting, waste management facilities. On the other hand, there is no significant difference in the assessment of the implementers and community members, on the extent of implementation of Republic Act 9003 along with the collection of waste, transport of waste, recycling program, local government solid waste management.

Table 3

Analysis of the assessments of implementers and community members on the level of implementation

Indicators	LGO Mean	CM Mean	Mean Difference	*p*-value	Interpretation
Municipal Profiling	3.75	3.45	0.30	0.021	Significant
Segregation and Storage of Waste	3.88	3.44	0.44	0.010	Significant
Collection of Waste	3.44	3.40	0.04	0.635	Not Significant

Transport of Waste	3.46	3.38	0.08	0.356	Not Significant
Recycling Program	3.35	3.25	0.10	0.120	Not Significant
Composting	3.92	3.26	0.66	0.000	Significant
Waste Management Facilities	3.79	3.25	0.54	0.000	Significant
Local Government Solid Waste Management	3.49	3.47	0.02	0.789	Not Significant

LGO=Implementers; CM=Community Members

This result may be substantiated by the contention of Castillo (2013) that from the point of view of the local community, solid waste management is a pressing issue that calls for immediate attention. The intense movements to boost economic growth by developing countries just like the Philippines have resulted in heightened manufacturing, distribution, and use of different products and as an offshoot, a great number of wastes are generated that contributed to the degradation of the environment and even worsened climate change. Based on records, wastes generated by the community members in the country, particularly in urbanized areas heightened due to rapid industrialization accompanied population growth. The daily waste generated in the Philippines is approximately 35,580 tons. It is said that each person generates 0.5kg and 0.3kg in the urban and rural areas respectively.

The difference between the assessments of both respondents, the implementers and community members, on the level of participation in Republic Act 9003, was analyzed to yield an answer to this research question. The result of the analysis is shown in Table 4. The comparison of paired means yielded *p*-values of 0.018, 0.020, and 0.000 correspondingly, which are all lower than the level of significance of 0.05. This means that the null hypothesis along this area is rejected.

Table 4

Analysis of the assessments of implementers and community members on the level of participation

Indicators	LGO Mean	CM Mean	Mean Difference	*p*-value	Interpretation
Segregation	3.66	3.24	0.42	0.018	Significant
Waste Reduction	3.28	3.32	0.04	0.635	Not Significant
Reusing	3.14	3.46	0.32	0.020	Significant
Recycling	2.48	2.52	0.04	0.635	Not Significant
Disposal	2.93	3.57	0.64	0.000	Significant

LGO=Implementers; CM=Community Members

Therefore, there is a significant difference in the assessment of the implementers and community members, on the level of participation of Republic Act 9003 along with segregation, reusing, and disposal. On the contrary, there is no significant difference in the assessment of the implementers and community members, on the level of participation of Republic Act 9003 along with waste reduction and recycling.

3.3 Factors Affecting Implementation of and Participation on Republic Act 9003

Factors Affecting Implementation - The first factor considered by the implementers which adversely affects their level of implementation is the population of their respective municipalities. Being first-class and second-class municipalities in the province, it is given that they are the ones who have a greater population thus huge amount of generated waste follows. Being the seat of not only several households, but the influx of migrants in their places is also brought by the presence of big educational institutions, livelihood and job opportunities, and the emergence of several business establishments. During the ocular visits of the researcher, it was noticed that large amounts of waste are generated and accumulated in front of business establishments especially those that are under the food industry.

The second factor is the inadequate number of trucks that are used for waste collection and transfer. In one municipality, an interviewed local government official stated that the waste collection truck is mainly used in the key barangays of their municipality which causes delays in the waste collection in other areas. Wastes from remote areas are often accumulated which leads residents to dump their wastes on vacant lots while some practice open-pit burning although it is prohibited. Another factor is the inadequate number of Implementers who

implement the Republic Act 9003. In one first-class municipality, their Municipal Environment and Natural Resources Office has less than ten employees which makes it difficult to implement all provisions of the Republic Act 9003. In addition, the said office is just newly created. and there was no turnover of documents from the past administration. With this, there is no concrete basis on how to assess how the implementation has been for the past years as well as to surface possible interventions which can be applied at present.

Factors Affecting Community Participation **-** Based on the interviews, the main reason which affects community participation is the lack of discipline among people. An interviewed respondent stated that there is no collaboration among residents. Though the majority of the respondents follow proper solid waste management, there are still community members who are not compliant. The respondents also added that although their local government unit disseminates information on the Republic Act 9003 through posted materials, provisions of waste containers on streets, and constant reminders, penalties are not fully imposed. During the ocular visit, the researcher noticed that proper waste segregation is not followed in some municipalities wherein biodegradable and non-biodegradable wastes especially dried leaves, vegetable, and fruit peelings and leftover food are combined on same containers. This then leads to the infestation of insects and rodents. This was seen on waste containers that are placed on the streets. It has also been observed that wastes particularly food wrappers are disposed of on creeks and canals. According to one respondent, it is done not only by some residents but also by-passers.

3.4 Measures Conducted to Address Solid Waste Management Problems

Implementers **-** To lessen the huge amount of plastic waste, some municipalities implemented their zero-plastic policy wherein plastics and drinking straws previously used on soft drinks and other beverages are already prohibited. This was implemented in both small and large business establishments like supermarkets and restaurants. Plastics that are only allowed to be used are bio-degradable ones and single plastic should only be used on purchased goods. However, concerns addressed by community members are the spillage of moisture and residue of purchased products from the wet market, poor plastic and paper bag quality, and high amount of eco-bags. In one municipality, there is a strict no-segregation-no-collection policy. Waste collectors will first inspect the contents of the waste containers to ensure that wastes are segregated according to their kind before placing them on the garbage trucks. It has then encouraged community members to comply with the standard waste segregation guidelines. Meanwhile, one municipality supports organic fertilizer production in its upland barangays. Lastly, rewards and recognition are given to barangays who highly comply with the provisions of the Republic Act 9003 and an example of which is the Makakalikasan Award.

Community Members **-** A notable practice observed among the community members is the use of eco-bags when going to public markets and grocery stores. According to an interviewed resident, the use of eco-bag is a practical way of lessening plastic waste for such material can be washed and be re-used many times. In terms of recycling, most of the interviewed respondents stated that they use destroyed plastic wares and used plastic bottles as plant pots.

4. Conclusions

Based on the major findings of the study, the following conclusions were drawn:

- The level of implementation of the provisions of Republic Act 9003 along with municipal profiling, segregation and storage, composting, and waste management facilities is very high while along with the collection of wastes, transport of wastes, recycling program, and local government solid waste management, high.
- The level of community participation in the provisions of Republic Act 9003 along with segregation, waste reduction, reusing, recycling, and disposal is high.

- There is a significant difference between the assessments of the implementers and community members on the extent of implementation of Republic Act 9003 along with municipal profiling, segregation & storage of waste, composting, and waste management facilities, and on the level of participation in the Republic Act 9003 along with segregation, reusing, and disposal.

- The generation of a large amount of waste is brought by increased population and increased economic activity. In some municipalities, lack of garbage trucks and irregular collection leads to the accumulation of waste and the reason why open-pit burning is practiced by some residents. In addition, a newly created MENRO office and lack of employees and documents hinder the optimum level of implementation. Despite the efforts exerted by local government units, lack of discipline and poor imposition of fines are factors that affect community participation.

- Efforts done by the local government units to address solid waste management problems include zero-plastic policy, no-segregation-no-collection policy, supporting organic fertilizer production, and giving of awards and recognition. Meanwhile, community members practice the use of eco-bags and recycle plastic wares and plastics for gardening purposes.

4.1 Recommendations

Based on the findings of the study, the following are recommended:

To the Implementers. The following may be undertaken:

- Higher funds may be allocated for the provision of garbage trucks to ensure regular collection and transport of wastes.

- Additional employees/personnel may be hired and they should undergo a series of training and seminars.

- There may be a collaboration between concerned offices and they may come up with more strategic ways how to fully implement the Republic Act 9003. However, overlapping functions may be avoided.

- Documents from the past administrations pertaining to how the Republic Act 9003 was implemented as well as problems and issues encountered may be reviewed to surface interventions that can be applied at present and in the future.

- If possible, waste collection may be done daily.

- The type and amount of waste generated by each barangay may be determined to come up with a more strategic collection scheme.

- Potential sites which can be converted as landfills may be identified so that they can be prepared ahead of time.

- Evaluations and research may be conducted to come up with additional strategies.

- In order to disseminate thorough information on proper solid waste management, public lectures and house-to-house visits may be undertaken.

- There may be local ordinances geared towards solid waste management of business establishments considering the fact that they are major sources of waste.

- The no-segregation no collection policy may be strengthened to encourage segregation at the point of source.

- There may be a market for organic fertilizers to encourage community members to practice composting.
- Backyard gardening using recyclable materials such as plastic containers may be encouraged.
- Imposing fines for violators may be strengthened.

To the Department of Education. They may incorporate additional lectures on Republic Act 9003 on health subjects, particularly on environmental health. Aside from teaching students proper waste disposal, a possible intervention is requiring students to use recyclable materials on their art projects and portfolios in other subjects.

To the Non-Government Organizations. Environmentalists may conduct forums that aim to instill environmental awareness. This can be done through partnerships with local government units.

To the Future Researchers. Studies on best practices on solid waste management may be made so that other local government units will have an idea of what practices can be possibly applied in their respective locales. Future researchers may also include third and fourth-class municipalities in their studies.

5. References

Ali, N. E., & Sion, H. C. (2014). *Solid waste management in Asian Countries: A review of solid waste minimization (3'r) towards low carbon*. Retrieved from http://iopscience.iop.org/article/10.1088/1755-1315/18/1/012152

Baring, R., del Castillo, F., & Guanzon, M. (2020). Climate change and service learning in light of "laudato si": reviewing educators' perceptions. *The International Journal of Climate Change: Impacts and Responses, 12*(1), 1-12. https://doi.org/10.18848/1835-7156/CGP/v12i01/1-12

Castillo, A. L. (2013). *Status of solid waste management in the Philippines*. Retrieved from https://www.jstage.jst.go.jp> pdf>-char

Ebreo, B. J. (2018). *Vizcaya capitol eyes as model for solid waste management.* Retrieved from https://www.google.com/amp/s/pia.gov.ph/news/articles/1010050.amp#ampshare=https://pia.gov.ph/news/articles/1010050

Gequinto, A. (2017). Solid waste management practices of selected state universities in CALABARZON, Philippines. *Asia Pacific Journal of Multidisciplinary Research, 5*(1), 1-8.

Mondal, P. (n. d.). *Solid waste management: Types, sources, effects and methods of solid waste management*. Retrieved from http://www.yourarticlelibrary.com/waste-management/solid-waste-management-types-sources-effects-and-methods-of-solid-waste-management/9949

NDCP Policy Brief. (2013). Retrieved from https://www.ndcp.edu.ph/uploads/publications

Pagsahian, M. (2017). *Awareness and practices on solid waste management among college students in Mindanao state University Maigo School of Arts and Trades.* Retrieved from https://www.atlantis-press.com>icet-17

People produce vastly more waste more than our planet can sustain. Retrieved from https://synovapower.com/a-global-problem

Pervez, A. (2013). *Impact of solid waste on health and the environment.* Retrieved from https://www.researchgate.net/publication/306150450_Impact_of_Solid_Waste_on_Health_and_The_Environment

Premakumara, D. G. (2014). *Policy Implementation of the Republic Act (RA) No.9003 in the Philippines: A Case Study of Cebu city*. Retrieved from https://www.ncbi.nlm.nih.gov/m/pubmed/24280621

Reyes, P. (2013). *Greening of the solid waste management act in Batangas City.* Retrieved from https://research.Lpubatangas.edu.ph/2014/04

Sridhar, K. S. (2015). Solid waste management in Asia Pacific. What explains its coverage. *Public Works Management and Policy, 21*(1). https://doi.org/10.1177/1087724X15570642

Tantuco, V. (2018). *Why can't the Philippines solve its trash problem?* Retrieved from https://www.google.com/amp/s/amp.rappler.com/newsbreak/in-depth/200292-reason-philippines-cannot-solve-trash-problem#ampshare

Vivar, P. C. (2015). Village-level solid waste management in Lahug, Cebu City, Philippines. *Countryside Development Research Journal, 4*(1).

Yukalang, N., Clarke. B., & Ross. K. (2018). Solid waste management solutions for a rapidly urbanizing area in Thailand: Recommendations based on stakeholder input. *International Journal of Environmental Research and Public Health, 15*(7), 1302.