

Local Government Unit -Academe Partnership in the Implementation of Solid Waste Management Program in the Philippines

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Abstract – *Educating the community through partnership of local government units and the academe is vital in maintaining an environment free from illness, diseases and wastes. The present study is conducted to investigate the implementation and impact of solid waste management program in one municipality in the Philippines. Employing the descriptive method of research utilizing the survey technique, the study involved two hundred eighty eight households and barangay officials. The study revealed that solid waste management program is moderately implemented. In addition, the result shows a moderate impact of solid waste management program to the community. Therefore, a firm reinforcement of ordinance and strong will of municipal leaders with academe partnership is needed for the implementation of a comprehensive solid waste management program.*

Keywords – *Impact, Implementation, Local Government Unit-Academe Partnership, Solid Waste Management*

INTRODUCTION

The Municipality of Santiago is a fourth class municipality in the province of Ilocos Sur with a population of less 20,000 based on the 2015 census. However, it is considered as one of the most visited place in the Ilocos Region because of its accessibility, good beaches and white sands.

The development of the place being a tourist destination has paved way to a fast urbanization of the place. This leads to the rising of hotels, resorts and other business establishment in the municipality.

Urbanization contributes to the exponential generation of solid waste. It is considered as one of the most pressing environmental concerns in most of the developing countries like the Philippines. The increasing trend of solid waste generation is caused by the increasing population [1] and urbanization [2]. The introduction of new materials and changing consumption patterns have contributed to the generation of more solid wastes scattered along streets, bodies of water, parks and markets.

The fast increase of population worsened the continuous escalation in the volume of solid waste generated per day. In Asia alone, it is experiencing very high population growth and urbanization. Asian countries will witness a large population increase,

which will have important implications for a variety of urban environmental issues, such as solid waste management [3].

The rapid population growth and modern economic activities, and these combined with absence of training in effective solid waste management practices hinders the efforts to improve the solid waste service.

In a study of Khajura et al [3], solid waste quantities are estimated to increase from 26, 15, 24, 57 and 91 million tons in 2001; 32, 24,33,77 and 112 million tons in 2010 and 39, 40, 44, 104 and 136 million tons in 2030 in countries like India, Nepal, Pakistan, Bangladesh and Sri Lanka. The per capita generation of solid waste in Asian cities also correlated between the ranges of 0.2 to 1.7 kg/day. This is based on the economic status and population density. Solid waste generation is depending on per capita generation increases with the level of income.

In the country, municipal solid waste (MSW) generated by Philippine cities will go up by 165 percent to 77,776 tons per day from 29,315 tons as a consequence of a projected 47.3-percent hike in urban population by 2025. It was estimated that the amount of municipal solid waste will rise from the current 1.3 billion tons a year to 2.2 billion tons a year by 2025.

Much of the increase will come from rapidly growing cities in developing countries [4]. The country ranked third as world's biggest dumper of plastic in the ocean [5] and highest in the Southeast Asia regarding trash collection rate [6].

Communities suffer from serious pollution problems. Several health problems and issues have been attributed to poor sanitation and improper disposal of wastes. Previous studies disclosed that the leading causes of morbidity are bronchitis, diarrhea, influenza, pneumonia, tuberculosis, malaria, and measles. The poor sanitary conditions could be due to improper waste disposal [7].

This very alarming issue has led to the enactment of the Philippine Ecological Waste Management Act of 2000 mandates Local Government Units to implement the provisions of the law by incorporating ecological waste management in their programs, projects and initiatives. This law ensures the proper segregation, collection, transport, storage, treatment and disposal of solid waste through the formulation and adoption of the best environmental practice in ecological waste management excluding incineration [8].

Republic Act 7160 [9] empowers Local Government Units to implement and enforce the provisions of law within their respective jurisdictions. The law also mandates that segregation and collection of solid waste shall be conducted at the barangay level while collection of non-recyclable materials and special wastes shall be the duty of the municipality or city.

With these laws, research revealed that LGUs have encountered difficulty in the implementation of the law [10]. Most barangays have problems on improper waste disposal which results to pollution of marine resources [2]. The cause of these issues is due to lack of enforcement of the law [11].

Though initiatives had been done to educate, inform and engage the community on the culture and practice of proper waste disposal, the issue on garbage collection and disposal has still become a problem that needs to be addressed and acted. So far, no study has been conducted to evaluate how cognizant and responsive is the implementation of the solid waste management program in the municipality.

The Ilocos Sur Polytechnic State College is one of the higher education institutions in the province. One of its campuses is situated in the municipality. It is considered as a partner agency of the LGU in the

empowerment of people and in transformation of the community.

With the partnership of the LGU and the academe, this study is undertaken to assess the implementation of the solid waste management program and how it impacts the community. The result of the study is significant for it would provide a baseline data for LGUs to strengthen and enhanced the solid waste management plan of the municipality. The municipality is declared as one of the tourist hubs in the province of Ilocos Sur making the place a rapidly urbanized municipality. Urbanization can be linked to an accelerated production of solid waste. Therefore, it is worth studying how RA 9003 is implemented in the municipality.

OBJECTIVES OF THE STUDY

The study assessed the implementation of the solid waste management program in terms of information dissemination; maintenance of cleanliness and sanitation; segregation, collection and transportation; resource recovery; disposal of solid waste; and Incentives for Individuals, Barangay, Commercial Establishment and LGU. It also determined the impact of the solid waste management program to the community in terms of cleanliness and health, increase of income and satisfaction of community.

FRAMEWORK OF THE STUDY

The present study is guided by the Reasoned Action Theory and the Theory of Planned Behavior. These theories aimed to explain how human action is influenced by attitudes and behaviour. Fishbein and Ajzen [12] believed that person's intention to act a behaviour is the main reason of whether or not a person perform that behaviour. The two theories presented give a framework that explains and predicts the behaviour of individual in their involvement to a certain activity, program or undertaking. It determines whether a certain action is voluntary or self-controlled.

This study hypothesized that if the community are well-informed on solid waste management program of the municipality, it favourably influences their attitude which is manifested in their actions on proper disposal of solid wastes.

MATERIALS AND METHODS

The present study employed the descriptive research design. The respondents are selected through purposive sampling involving a total of two hundred

eighty eight respondents from the twenty four barangays of Santiago. The study involved two hundred forty households and forty-eight barangay officials.

A researcher-made questionnaire duly validated by experts in solid waste management was used to gather the needed data in the study. It consisted of two parts, namely: implementation of the SWMP and the impact of SWP to the community. The study used a five-point likert scale as follows:

- A. Implementation of SWMP
 - Highly Implemented (HI) – 4.21-5.00
 - Implemented (I) – 3.41-4.20
 - Moderately Implemented (MI) – 2.61-3.40
 - Slightly Implemented (SI) – 1.81-2.60
 - Not Implemented (NI) – 1.00 – 1.80
- B. Impact of SWMP
 - Very High Impact (VHI) – 4.21-5.00
 - High Impact (HI) – 3.41-4.20
 - Moderate Impact (MI) – 2.61-3.40
 - Fair Impact (FI) – 1.81-2.60
 - No Impact (NI) – 1.00 – 1.80

Data collection started when the approved proposal was approved by the President of Ilocos Sur Polytechnic State College. Permission from the office of the Municipal Mayor of Santiago, Ilocos Sur was also sought. The survey questionnaires were personally distributed and retrieved with the help of trained data enumerators. The respondents were informed on the purpose of the study. Data gathered were treated with utmost confidentiality.

Data gathered were tallied and analysed using weighted mean. Published journals, articles and reports were reviewed to substantiate the result of the present study.

RESULTS AND DISCUSSION

Table 1 presents the extent of implementation of solid waste management program in terms of information dissemination. It can be noted from Table 1 that in general information dissemination is implemented to a moderate extent a supported by the computed mean of 3.05. This implies that dissemination of the SWMP to the community should be intensified. Among the information dissemination activities, the municipal government conducts seminars and orientation to various groups, establishments and barangays on solid waste management obtained the highest mean of 3.76 while

radio plugs and mini movies are aired in local radio and TV networks ranked the least with 2.03. The use of flyers and posters on solid waste management are distributed and posted strategically in various barangays is moderately implemented with a computed mean of 3.36.

Table 1. Extent of Implementation of Solid Waste Management Program in Terms of Information Dissemination

Information Dissemination	WM	DR
1. The Municipal Government conducts seminars and orientation programs to various groups, establishments and barangays on solid waste management.	3.76	I
2. Flyers and posters on solid waste management are distributed and posted strategically in various barangays.	3.36	MI
3. Radio plugs and mini movies are aired in local radio and TV networks.	2.03	SI
Composite Mean	3.05	MI

This means that people in the barangays were reached out and informed on the provisions and activities on solid waste management through seminars and orientations. However, the results suggest that educating the community on SWMP still needs to be strengthened through posting of flyers in bulletins and talks on SWMP during general assemblies. Awareness and issues of generating solid waste must be fostered to the most basic unit of the community through enlightenment campaigns and education [7], [11]. Lau [13] confirmed that inefficient implementation of solid waste management is due to lack of regulation. In addition, most of the households in the country lack awareness on waste management activities.

In addition, the result means that radio plugs and mini movies aired in radio and local televisions are seldom used. Lack of awareness among the people has been a common issue in most of the municipalities of the country. Limited resources to produce and disseminate IEC materials hindered the dissemination of SWPM [14]. The implementation of the policy needs more information dissemination in the barangays. Radio and television dissemination must be intensified for these media are most accessible in reaching the people [15].

Table 2 reflects the extent of implementation of the solid waste management program in terms of maintenance of cleanliness and sanitation. In the overall, the result shows that maintenance of

cleanliness and sanitation is implemented as supported by the mean of 3.72. This means that respondents observed activities on the maintenance of cleanliness and sanitation are sustained.

Table 2. Extent of Implementation of Solid Waste Management Program in Terms of Maintenance of Cleanliness and Sanitation

Maintenance of Cleanliness and Sanitation	WM	DR
1. Covered and properly labelled trash cans are installed in public places.	3.68	I
2. Regular inspection on cleanliness and sanitation is conducted by the municipal government.	3.75	I
3. There is enough and properly marked public comfort rooms in public places.	3.72	I
Composite Mean	3.72	I

It can be noted that all the items were rated implemented. The highest mean is on regular inspection on cleanliness and sanitation is conducted by the municipal government with 3.75 followed by there is enough and properly marked public comfort rooms in public places with 3.72. The lowest mean is on covered and properly labelled trash cans are installed in public places with a mean of 3.68.

The findings indicate that cleanliness and sanitation of comfort rooms is consistently monitored by concern employees and authorities. Furthermore, it also shows that respondents observed trash cans and bins being installed in public places properly labelled and covered which are utilized to store solid waste before collection is done.

Table 3 shows the extent of implementation of solid waste management program in terms of segregation, collection and transportation.

Table 3. Extent of Implementation of Solid Waste Management Program in Terms of Segregation, Collection and Transportation

Segregation, collection and transportation of Solid Wastes.	WM	DR
1. Solid wastes are segregated at source.	3.37	MI
2. Garbage is properly packed and stored until collection.	3.57	I
3. Solid waste management trucks/ vehicles collect segregated solid waste as scheduled.	3.29	MI
Composite Mean	3.41	I

In general, the result shows that segregation, collection and transportation of solid waste is implemented with a mean of 3.41. The highest mean is garbage is properly packed and stored until collection with 3.57. This means that the community practice proper packing and storing of solid waste to avoid foul odor coming from the wastes attracting insects and disease-causing organisms. Solid wastes endangers humanity, pollutes the environment, and damages communities when improperly stored and uncollected [16].

However, the result further shows that segregation of solid waste at source is moderately implemented with a mean of 3.37. This indicates that segregation of solid waste at source is not fully practiced and implemented. Due to lack of segregation facilities and long distance of waste containers from homes lead to dumping of waste along streets and other open area. These lead to air, water and land pollution. Solid waste management is highly unprofessional and unscientific because of the improper collection, treatment and disposal of solid waste [17].

The lowest mean is seen on solid waste management trucks/ vehicles collect segregated solid waste as scheduled with a mean of 3.29. This means that transportation of solid waste is not fully implemented based on plan and schedule. Practices have been adopted, though at a very slow pace and with limited coverage due to lack of government support, in various communities [7]. Limited number of garbage vehicles [11] and lack of financial resources are common issues faced by local government units to strengthen the collection and transportation of solid waste to dump sites.

Table 4. Extent of Implementation of Solid Waste Management Program in Terms of Resource Recovery

Resource Recovery	WM	DR
1. Biodegradable solid wastes are processed into organic fertilizer.	3.18	MI
2. Selling of recyclable materials is observed.	3.68	I
3. Bottles, plastics and papers are re-used.	3.40	MI
Composite Mean	3.42	I

Table 4 presents the extent of implementation of solid waste management in terms of resource recovery. In the overall, solid waste management is implemented in terms of resource recovery as backed up by the computed mean of 3.42. This means that activities on processing, recycling and reusing of solid waste are carried out in the communities. Intensified

recovery efforts are done as a sound economic activity of households [18].

The selling of recyclable materials is observed ranked first with a mean of 3.68 described as implemented. The lowest is on biodegradable solid wastes are processed into organic fertilizer with a mean of 3.18 described as moderately implemented. It can be noted further that reused of bottles, plastics and papers is moderately implemented with a mean of 3.40.

The results suggest that the households do not fully practice recycling of solid waste into valuable and useful products to save energy and reduce the amount of generated wastes. Various campaigns has been conducted by the government to promote recycling programs however it received low response from the public[19]. Community people welcome the idea of demonstrating composting but they lack knowledge to compost [11]. Thus, it requires proper and continuous demonstration and education of waste recycling and composting of biodegradable solid waste.

Table 5. Extent of Implementation of Solid Waste Management Program in Terms of Disposal

Disposal of Solid Wastes	WM	DR
1. Segregated solid wastes are properly disposed at the Santiago Solid Waste Management Center.	3.45	I
2. Prohibition of littering, dumping, throwing of waste matters in public places and bodies of water is properly implemented.	3.31	MI
Composite Mean	3.38	MI

Table 5 reflects the extent of implementation of solid waste management in terms of disposal. It can be noted that disposal of solid waste is moderately implemented as seen from the computed mean of 3.38. The respondents assessed that segregated solid waste are properly disposed at the SWMC with 3.45 described as implemented. The respondents agree that segregated solid wastes are deposited in dump sites to avoid emission of hazardous constituents into the air and bodies of water. About 90% of MSW is disposed unscientifically in open dumps and landfills, creating problems to public health and the environment [20].

On the other hand, the respondents assessed that prohibition of littering, dumping, throwing of waste matters in public places and bodies of water is moderately implemented with 3.31. This indicates that respondents observed dumping of solid waste along streets and bodies of water creating unacceptable odor

in the environment. This requires intensification of enforcing barangay and municipal ordinances prohibiting dumping, littering and dumping of waste in public places and in bodies of water. Parallel with the study of Abdulla et al [11], poor disposal were observed due to lack of enforcement and lack of awareness and knowledge on disposal of solid wastes.

Table 6. Extent of Implementation of Solid Waste Management Program in Terms of Incentives

Incentives for Individual, Barangays, Commercial Establishment and LGU	WM	DR
1. Private organization and entities including NGO's that have undertaken outstanding and innovative projects, technologies, processes and techniques or activities in re-use and reduction of wastes properly recognized and rewarded.	2.25	SI
2. A competition on cleanest institution is annually conducted.	2.50	SI
Composite Mean	2.38	SI

Table 6 presents the extent of implementation of solid waste management in terms of incentives. The result shows that provision of incentives is slightly implemented with a computed mean of 2.38. This means that provision of incentives to motivate the community to participate in the implementation of ecological solid waste management is limited and implemented to some extent only.

It is noticeable that lack of recognition provided by the local government unit is not evident as seen from the computed mean of 2.25 described as slightly implemented. This requires mechanism of providing recognition to private organizations, household, commercial establishments and individual with outstanding contributions in the attainment of the objectives and implementation of the RA 9003. The national mandate can be achieved if the LGUs have the high degree of political commitment, planning and development of effective local strategies in a collaborative manner to meet with local conditions, partnership building with other stakeholders, capacity development, adequate financing and incentives [21].

Table 7 shows the summary on the implementation of solid waste management program. The overall mean of 3.23 shows that SWMP is moderately implemented. Three of the indicators were implemented such as maintenance of cleanliness and sanitation (3.72), segregation, collection and transportation of solid waste (3.41) and resource

recovery (3.42). The provision of incentives obtained the lowest mean of 2.38.

Table 7. Summary on the Extent of Implementation of Solid Waste Management Program

Indicators	WM	DR
1. Information Dissemination	3.05	MI
2. Maintenance of Cleanliness and Sanitation	3.72	I
3. Segregation, Collection, Transportation of Solid Wastes	3.41	I
4. Resources Recovery	3.42	I
5. Disposal of Solid Wastes	3.38	MI
6. Incentives for Individuals, Barangay, Commercial Establishment and LGU	2.38	SI
Overall	3.23	MI

The results suggest that activities and plans in SWMP be reviewed with more emphasis on educating the community on solid waste management to increase awareness and solicit greater involvement and participation of the people. Mechanisms on giving awards and incentives may be included for better implementation of SWMP.

Table 8. Impact of Solid Waste Management Program in terms of Cleanliness and Health

Cleanliness and health is improved through....	WM	DR
1. There are reduced air pollutants produced by incineration or open burning of solid wastes.	2.59	MI
2. Absence of fly-infested solid wastes.	3.50	HI
3. There is safer water to drink and use.	3.89	HI
Composite Mean	3.23	MI

Table 8 shows that impact of SWMP in terms of improvement of cleanliness and health. It can be noted that the impact of SWMP in terms of improved cleanliness and health is moderate with a computed mean of 3.23. Two of the items were assessed to have a high impact. These include the absence of fly infested solid waste with 3.50 and there is a safer water to drink and use with 3.89. The lowest mean rating is on reduced air pollutants produced by incineration or open burning of solid wastes with a mean of 2.59.

The results indicate that there are still available water resources which are safe to drink and use and no fly-infested solid wastes. However, it can be noted that open burning is still observed and practiced causing an increased air pollutants. Many people are

aware of the health consequence of poor solid waste disposal. Poor management of solid waste can have a negative impact on resident's health [11]. Households need to be educated about the effects of improper waste disposal on their health [23].

Table 9 reflects the impact of solid waste management in terms of increase of income. In general, there is moderate impact of solid waste management in terms of increase of income with a mean of 2.99. This explains that respondents observed that people gained from recovered and recycled solid waste. It has provided additional income to augment the basic needs of the family.

Table 9. Impact of Solid Waste Management Program in terms of Increase of Income

Increase of Income	WM	DR
1. There is an increased income by selling/ recycled/ recovered materials to junk collectors or shops.	3.30	MI
2. Reuse of leftovers to feed animals.	3.52	HI
3. Recycling of used materials.	2.15	MI
Composite Mean	2.99	MI

It can be noted that reuse of leftovers to feed animals assessed the highest with 3.52 described as high impact. This means that households were to save and reduce budget for feeds utilizing leftovers to feed their animals. Food scraps for animals can save farmers and company's money. It is often cheaper to feed animals food scraps rather than having them hauled to a landfill[23].

The lowest mean is evident on recycling of used materials with a mean of 2.15 described as moderate impact. This indicates that respondents seldom recycle used materials and sell it for additional income. Recovered materials are sold to junk collectors and shops instead. Furthermore, the result explains that people do not so much profit from selling bottles, papers and plastics.

Table 10. Impact of Solid Waste Management Program in terms of Satisfaction of Community

Satisfaction of Community Members	WM	DR
1. Solid waste management program is effectively implemented.	3.51	HI
2. There are cleaner and more beautiful surroundings in public places.	3.66	HI
3. There are responsible and disciplined community members.	3.35	MI
Composite Mean	3.60	HI

Table 10 shows the impact of solid waste management in terms of satisfaction to the community. The overall computed mean is 3.60 described as high impact. This means that the respondents agree and satisfied with the implementation of RA 9003 in the municipality.

The highest mean is seen in there are cleaner and more beautiful surroundings in public places with 3.66 followed by solid waste management program is effectively implemented with a mean of 3.51 both with a descriptive rating of high impact. This means that the respondents observed that the implementation the law and the activities undertaken create a better place to live in. The people feel more comfortable and safe as a result of the implementation of RA 9003.

The lowest is there are responsible and disciplined community members with a mean of 3.35 described as moderate impact. This means that the implementation of the law and ordinances on solid waste management develops people as law abiding citizen and community members.

Table 11. Summary on the Impact of Solid Waste Management Program

Impact	WM	DR
1. Cleanliness and health	3.23	MI
2. Increase of Income	2.99	MI
3. Satisfaction of Community Members	3.60	HI
Overall Mean	3.27	MI

Table 11 reflects the summary on the impact of solid waste management program. In the overall, it be noted that solid waste management has a moderate impact as backed up by the computed overall mean of 3.27. This means that respondents agree a negligible effect and influence of RA 9003 in the environment, health and economic conditions of the people in the community. The result requires a more intensified implementation of the law, keeping them informed and greater participation of the people in the barangay.

CONCLUSION AND RECOMMENDATION

The present study presents the current conditions and situations of solid waste management, which will be very much significant for future planning, interventions and effective strategies to implement it.

The implementation of RA 9003 known as the Ecological Solid Waste Management Act of 2001 is a mandate of the Local Government Unit. In accordance with this mandate, municipal and barangay officials

enforced the law. Though there exist a comprehensive solid waste management plan and program in Santiago, Ilocos Sur, several areas have been identified needing improvement.

Solid Waste Management Program is moderately implemented which leads to a moderate impact of the program to the community. Public awareness and intensified education of the people on resource recovery, segregation, and disposal shall be given utmost attention by concern authorities. The local government unit may tap educational institutions like higher education institutions and the Department of Education to amplify awareness of people on solid waste management. Enforcement of the law is needed to lessen the volume of scattered, littered and dumped wastes in streets, parks and bodies of water.

Recycling and composting shall be practiced to reduce the quantity of solid waste disposed in the dump site. This activity would convert solid waste into valuable materials to make cash out of trash. Collaboration with NGOs, SUCs, TESDA and private companies may be undertaken to train households on recycling of recovered materials composting of biodegradable waste. Partnership with business establishment may also be done to market recycled materials to bring about additional income and finances to the family. The recommended strategies would bring about improvement in the implementation of RA 9003 and will in the future increase income and prevent health hazards other environmental impacts. Further studies shall be conducted specifically on waste characterization to determine the kinds and volume of waste generated in the municipality. This would serve as basis for future planning and determination of appropriate technologies that would sustain solid waste management.

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