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EFFECTIVITY AND SUSTAINABILITY OF WASTE MANAGEMENT IN KALUMSING, SAN EMILIO, ILOCOS SUR

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ABSTRACT

This study aimed to measure the effectivity and sustainability of waste management in Kalumsing San Emilio Ilocos Sur and its effect to the sanitation of the community, life, and natural resources. It sought to know the factors that affect the waste management of the barangay. The significance of this study lies in its ability to inform and provide understanding to individuals of waste management and its effect on the community. It provides deeper understanding of solid waste management and its benefits to the community. The Local Government Unit of San Emilio, Ilocos Sur initiated a meeting to identify and address solid waste management issues, from updating Solid Waste Management (SWM) plan to strengthening the implementation of waste segregation policy. It is one of the strategies of the local government unit to address the problem of waste management. Barangay Kalumsing joined the launching of Nationwide Community-Based Clean-up Drive on September 16, 2023. This activity aims to maintain and provide a healthy and safe environment and prevent the spread of diseases through proper solid waste management. This study aims to measure the effectivity and sustainability of waste management in Kalumsing, San Emilio, Ilocos Sur and its effect to the sanitation of the community, life, and natural resources. It sought to know the factor that affects the waste management of the barangay. The waste management in Barangay Kalumsing is moderately effective and moderately sustained, meaning there are still strategies or actions of the barangay that needs to be improved such as: the waste segregation, the collection of garbage per household, and the dumping of waste far from the community.

KeyWords: *Waste Management, Sustainability, strategies*

INTRODUCTION

   One of the aspects to attain a clean and green surrounding is to maintain the solid waste management. Waste management plays a vital role in reducing risks that pollution and other illness or diseases that affects human, animal, and environmental health. According to Keven Gaitu, et.al. 2019. Healthcare Waste Management (HCWM) is a vital issue to the environment, law enforcement agency, and the general public. It is one of the biggest challenges of the present-day times since it has a direct impact of the citizens, animals and the environment.

   Waste management is a global challenge, as population continuous to grow the harder waste management can be implemented as it affects the natural sources that human depends for living especially in the urban areas of a certain country. It can also affect climate change, production of materials form raw materials, and safety in the life zone area.

   Solid waste management (SWM) continues to dominate a major societal and governance challenge, especially in urban areas overwhelmed by the high rate of population growth and garbage generation. The role of SWM in achieving sustainable development is emphasized in several international development agendas, charters, and visions. For example, sustainable SWM can help meet several United Nations' Sustainable Development Goals (SDG), such as ensuring clean water and sanitation, creating sustainable cities and inclusive communities, mitigating climate change, protecting life on land, and demonstrating sustainable consumption and production patterns (Ismaila Rimi Abubakar, et.al., 2022).

The Local Government Unit of San Emilio, Ilocos Sur initiated a meeting to identify and address solid waste management issues, from updating SWM plan to strengthening the implementation of waste segregation policy. It is one of the strategies of the Local Government Unit to address the problem of waste management.

Barangay Kalumsing joined the launching of Nationwide Community-Based Clean-up Drive on September 16, 2023. This activity aims to maintain and provide a healthy and safe environment and prevent the spread of diseases through proper solid waste management. An action conducted by the barangay together with the PNP, RIC, barangay officials and other volunteer participants from the barangay

wherein they clean drainage, sidewalks, streets and stablish MRF to segregate waste that are collected. The barangay also launched the ordinance number 3, series of 2021, Ordinansa a Mangimandar ti Panakaigalot dagiti Aso, in partnership with the RIC, Barangay Officials, and Barangay Tanod where the residence of the barangay should to tie their dogs to prevent their wastes be scattered and reduce the damages that the roaming dogs might cause inside the barangay.

This study aimed to measure the effectivity and sustainability of waste management in Kalumsing San Emilio Ilocos Sur and its effect to the sanitation of the community, life, and natural resources. It seeks to know the factors that affects the waste management of the barangay.

The significance of this study lies in its ability to inform and provide understanding to individual of waste management and its effect to the community. It provides deeper understanding of solid waste management and its benefits to the community.

Statement of the Problem

This study aims to investigate the effectivity and sustainability of waste management in Kalumsing, San Emilio, Ilocos Sur.

Specifically, it sought to answer the following questions:
1. What is the level of effectivity of Solid Waste Management in Kalumsing, San Emilio, Ilocos Sur.
2. What is the level of sustainability of Solid Waste Management in Kalumsing, San Emilio. Ilocos Sur.

Scope and Delimitation of the Study

This study aimed to determine the effectivity of solid waste management in Kalumsing, San Emilio, Ilocos Sur. There are 50 respondents utilized in this study. The researchers used 10 items questionnaire in gathering the data. The respondents are inhabitants of Barangay Kalumsing. The sample was determined through random sampling.

Random sampling is a part of the sampling technique in which each sample has an equal probability of being chosen. A sample chosen randomly is meant to be an unbiased representation of the total population. (m.economictimes.com).

The researchers used 10 items questionnaire in gathering the data.

The study was conducted in Barangay Kalumsing which is geographically located at municipality of San Emilio, province of Ilocos Sur.

Conceptual Framework

This study is guided with the framework or design as it shown below.

Independent Variable   **Dependent Variable**

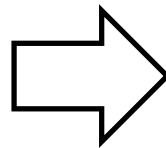| Solid waste materials in barangay Kalumsing | → | Effectivity and sustainability of solid waste management in Kalumsing, San Emilio, Ilocos Sur. |

Figure 1

The paradigm shows the dependent and independent variable conceptual framework. The dependent variable consists of the problem while the independent variable consists of the effectivity of solid waste management in Kalumsing, San Emilio, Ilocos Sur.

The arrow signifies that the independent variable directly affects the dependent variable.

Review of the Related Literature

The researchers read and reviewed related articles, previous studies, journals that are related to the study.

Innovative, resource-efficient solutions and effective waste management systems capture value in business and contribute to sustainability. However, due to scattered waste management responsibilities in the vehicle industry and the orientation of operations management and lean tools, which mostly focus on lead-time and labour-time improvements, the requirement of a collaborative method to include material waste efficiency in operational development is identified (Martin Kurdve, et al. 2015)

Solid waste management (SWM) is an integral part of an environmental management system. SWM approaches have been modified into a more practical and effective option to establish sustainability based on the "reduce", "reuse", and "recycle" (3R) principles. This review provides an overview of a wide range of existing SWM strategies with the following key objectives: (i) to comprehensively describe current technologies, strategic innovations, and monitoring tools, (ii) to provide an overview of prevailing waste management scenarios across different countries, (iii) to identify the roles of life cycle assessment (LCA) and other modeling tools in SWM, and (iv) to showcase feasible approaches for sustainable recycling and utilization of solid wastes. The current review finds that

geographical positions and economic status of nations are important to dictate waste characteristics. A number of economic and LCA models have been described to facilitate future workers vis-à-vis organizations for the selection of appropriate waste management algorithms and for the evaluation of their eventual performance (Subhasish Das, et al. 2019).

The circular economy (CE) is considered a key economic model to meet the challenge of sustainable development. Strenous efforts are focused on the transformation of waste into resources that can be reintroduced into the economic system through proper management. In this ways, the linear and waste-producing value chain problems are solved, making them circular, and more sustainable solutions are proposed in those already benefiting from circular processes, so that waste generation and waste are reduced on the one hand, and on the other, the non-efficient consumption of resources decreases. In the face of this current tide, there is another option that proposes a certain nuance, based on the premise that, although circular systems promote sustainability, it does not mean that they are in themselves sustainable, give that, in the first place, the effects of CE on sustainable development are not fully known and, on the other hand, the CE model includes the flow of materials, with only scant consideration of the flow of non-material resources (water, soil and energy) (Carmen and Ana, 2021).

With a particular focus on the household waste management through community participation in waste bank activity problems. Waste especially solid waste is a problem that will continue to exist. Waste is generated by human's effort to fulfil their needs of life. Solid waste that continues to accumulate in the environment will cause negative impact which can interfere with human life itself. One of the examples is the outbreak of a disease that lowers the level of public health. The negative impact will affect our environment, social, and economy aspect. Until now, public awareness of the importance of processing waste is still very low. This is due to several factors such as economic conditions, education, and social attitudes of the society itself. Nowadays, every country in this world tries to do solid waste management because it's effect to humanity. One of the efforts to assist in the case of solid waste management is by the existence of waste bank. Waste bank is expected to be a sustainable solution to overcome the existing waste problems in the society. Society can get several benefits from waste bank because not only reduce the existing solid waste but also can improve the economic quality of the society with the payment system. The payment system is to exchange waste from society with some payments. The factors that affect the sustainability of waste banks are awareness, knowledge, equipment, support, and infrastructure (Lina, et al., 2018).

Management of solid wastes in the Philippines has long been a responsibility pf the Local Government Units in the country since the enactment of Republic Act 9003 also known as the Ecological Solid Waste Management Act of 2002. In support to the local government of Batangas City, lessen the harmful effects to the environment and health of the people and find solutions to problems encountered in its implementation (Paz & Mabelle, 2013).

Various municipal solid waste management (MSWM) innovations have emerged in developing countries in face of the challenges posed by increasing waste generation and poor MSWM practice. The Life Cycle Sustainability Analysis (LCSA) framework and the United Nations (UN) sustainable development goals (SDGs) facilitated the methodology development. The result of applying the methodology to the case of waste bank (WB) in Bandung City shows that WB potentially impact in the resource recovery phase and the smallest impact in the collection and final disposal phase. All negative impacts could arise in the economic dimension. Surprisingly, WB as a national strategy to achieve 3Rs would not effectively solve Bandung City's landfill problem. Almost all SDGs would benefit from the decision making in MSWM by (1) comparing available innovations to find the optional solution, (2) identify the hot spots and taking measures to combat the negative impacts, (3) providing the basis for monitoring the implementation process and the ex-post-performance assessment (Jing, et al., 2018).

Operational Definition of Terms
The researchers used terms in this study defined the meaning and defined operationally.
The following terms defined according to their operational functions.

Waste Management. Schemes to manage and dispose of wastes.

Waste. Everything that no longer has a use or purpose and needs to be disposed of.

Effectivity. Quality of being able to bring out an effect.

Sustainability. The ability to maintain or support a process continuously over time.

Variable. A quantity that may be changed according to the problem.

Independent Variable. A variable that stands alone and isn't changed by the other variables you are trying to measure.

Dependent Variable. A variable that depends on other variables.

Hypothesis. A supposition or proposed explanation made on the basis of limited evidence.

Null Hypothesis. There is no effectivity and sustainability of waste management in Kalumsing, San Emilio, Ilocos Sur.

Alternative Hypothesis. There is effectivity and sustainability of waste management in Kalumsing, San Emilio, Ilocos Sur.

Hypothesis
Null Hypothesis (Ho)
1. The programs under Solid Waste management in Kalumsing, San Emilio, Ilocos Sur is ineffective.
2. The programs under Solid Waste management in Kalumsing, San Emilio, Ilocos Sur is Unsustainable.
3. **Alternative Hypothesis (Ha).** The programs and activities of solid waste effective and existing.

Assumptions of the Study.
The study was premised on the following assumptions.
1. Effectivity and Sustainability of Waste Management in Kalumsing,

San Emilio, Ilocos Sur.
2. The respondents will answer the questions efficiently and honestly.
3. The researchers will conduct the whole process of the study in very good condition.

Chapter II
METHODOLOGY
Research Design

The researchers utilized the descriptive type of research. Descriptive research is used interchangeably with the phrase descriptive study. The descriptive research definition is research that describes the characteristics of a population. The descriptive study definition is the study of the data that is used to examine the relationships among variables. (study.com).

Research Procedure

After the researchers are divided into group, they think of various problems and come up with their research title and proposed to the research teacher. Afterwards, the researchers selected the best-defended title among those proposed research titles. After the selection of title, the researchers read articles and various research output with regarding their chosen title, and after that they crafted a letter of approval to the school head teacher, to the adviser, and letter to the barangay captain.

Upon approval of the communication letters, the researchers begin to do the chapter 1 of their research paper. Afterwards, before the researchers do the chapter 2 of their research the group leader started to create the questionnaire that will be utilized in this study. Creating of questions for this study took a longer time because the researchers need to revise the format of their questions and waited for the barangay secretary to ask some information that will be used to create a set of questionnaires. After that, the questionnaires are validated by the adviser and the research teacher validated the questionnaires and after, the researchers started to float the questionnaires.

During the conduct of this study, there are some aspects that hinders the researchers to conduct the study such as: some of the personnel that will assist, guide and source of information are unavailable. However, the researchers rescheduled the survey where the respondents are available and where the weather condition is good.

Research Instrument

The set of questions utilized in this study serves as the main tool in gathering the data needed in this study. There are two sets of questionnaire contains the level of effectivity of Solid Waste Management in Kalumsing, San Emilio, Ilocos Sur, and the level of sustainability of Solid Waste Management in Kalumsing, San Emilio. Ilocos Sur.

Population and Sample

In this study, the researchers used random sampling method in selecting their respondents. There are 50 respondents utilized in this study and they are all inhabitants of Barangay Kalumsing which is geographically located at Municipality of San Emilio, Province of Ilocos Sur.

Random Sampling is a part of the sampling technique in which each sample has an equal probability of being cho   ple chosen randomly is meant to be an unbiased representation of the total population (m.economictimes.com).

Statistical Treatment of Data

These different statistical tools used in this study are as follows:

Mean(x). This was used to determine the level of effectivity and sustainability of waste management in Kalumsing, San Emilio, Ilocos Sur with a scale of (5) highly effective and highly sustained, (4) effective and sustained, (3) moderately effective and sustained, (2) Either effective or ineffective and poorly sustained, (1) ineffective and unsustained.

Z-test(z). This was used in hypothesis testing.

Standard Deviation(σ). This was used to measure the variability of the data set.

Chapter III
PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

This chapter presents the analysis and interpretation of the data gathered through the questionnaire to find out the effectivity and sustainability of waste management in Kalumsing, San Emilio, Ilocos Sur.

Interpretation of Data

This chapter presents the analysis and interpretation of the data gathered through survey questionnaire to find out the effectivity and sustainability of waste management in Kalumsing, San Emilio, Ilocos Sur.

Problem 1. What is the level of effectivity of Solid Waste Management in Kalumsing, San Emilio, Ilocos Sur.

Table 1.

QUESTION NUMBER	RATING SCALE					OVERALL	
	Highly Effective	Effective	Moderately Effective	Either Effective Or Ineffective	Ineffective	WD	SD
	5	4	3	2	1		
1	16	21	9	1	2	3.96	0.97
2	10	34	4	2	0	4.04	0.66
3	2	14	17	12	5	2.92	1.03
4	4	14	15	9	6	3.04	1.14
5	0	2	2	3	29	1.27	0.72
OVERALL WEIGHTED MEAN						3.04	0.18

*Legend: 4.21-5.00   Highly Effective
        3.41-4.20   Effective
        2.61-3.40   Moderately Effective
        1.81-2.60   Either Effective or Ineffective
        1.00-1.80   Ineffective

The completed weighted mean of the level of effectivity of waste management in Kalumsing, San Emilio, Ilocos Sur and the descriptive equivalent is moderately effective.

Problem 2. What is the level of sustainability of Solid Waste Management in Kalumsing, San Emilio, Ilocos Sur.

Table 2.

QUESTION NUMBER	RATING SCALE					OVERALL	
	Highly SUS-TAINED	SUS-TAINED	Moder-ately SUS-TAINED	POORLY SUS-TAINED	UN SUS-TAINED	WD	SD
	5	4	3	2	1		
1	13	27	9	0	9	4.08	0.66
2	3	14	21	3	4	3.27	1.02
3	25	19	4	0	0	4.4	0.66
4	5	25	9	1	9	3.32	.25
5	3	2	1	5	36	1.55	1.12
OVERALL WEIGHTED MEAN						3.32	0.94

*Legend: 4.21-5.00   Highly Sustained
       3.41-4.20   Sustained
       2.61-3.41   Moderately Sustained
       1.81-2.60   Poorly Sustained
       1.00-1.80   Unsustained

The completed weighted mean of the level of sustainability of waste management in Kalumsing, San Emilio, Ilocos Sur is 3.32 and the descriptive equivalent is moderately sustained.

Chapter IV
SUMMARY, FINDINGS, CONCLUSION, AND RECOMMENDATION

Summary

The Local Government Unit of San Emilio, Ilocos Sur initiated a meeting to identify and address solid waste management issues, from updating SWM plan to strengthening the implementation of waste segregation policy. It is one of the strategy of the local government unit to address the problem of waste management. Barangay Kalumsing joined the launching of Nationwide Community-Based Clean-up Drive on September 16, 2023. This activity aims to maintain and provide a healthy and safe environment and prevent the spread of diseases through proper solid waste management.

This study aims to measure the effectivity and sustainability of waste management in Kalumsing, San Emilio, Ilocos Sur and its effect to the sanitation of the community, life, and natural resources.

Findings

Based on the analysis of the data gathered, the findings are the following:

The completed weighted mean of the level effectivity of waste management in Kalumsing, San Emilio, Ilocos Sur is 3.04 and the descriptive equivalent is moderately effective, and the computed weighted mean of sustainability of waste management in Kalumsing, San Emilio, Ilocos Sur is 3.32 and the descriptive equivalent is moderately sustained.

On the first set of the questionnaire, the total of the respondents using garbage cans or bags in their house is 3.96 meaning using of trash bags or cans is effective, while the total of observation of cleanliness around the community is 4.04, meaning it is effective or cleanliness around the community is observed, and for the total of waste segregation is 2.92 meaning waste segregation is moderately effective, for question number 4 the total of properly waste disposal is 3.04 meaning proper waste disposal around Kalumsing is moderately effective and the total of collecting garbage regularly is 1.27 meaning there is no garbage collector per household in Kalumsing or ineffective.

For the second set of questionnaire, the result of clean and green program is 4.08 meaning the clean and green program initiated in the barangay is sustained and, the result of functioning MRF is 3.27 meaning it is moderately sustained, and, the result for bayanihan is 4.4, meaning it is sustained, and for the result of information education campaign is 3.32, meaning it is moderately sustained, and for the result of dumping of garbage far from the community is 1.55, meaning it is unsustained.

Conclusion

The following conclusions are derived from the preceding result of the study.

The waste management in Barangay Kalumsing is moderately effective and moderately sustained, meaning there are still strategies or actions of the barangay that needs to be improved such as: the waste segregation, the collection of garbage per household, and the dumping of waste far from the community.

Recommendations

Based on the conclusions, the researchers came up with the following recommendations.

1. It might be better if the individual will make their own composed pit to dump the biodegradable waste and the barangay will distribute trash bins around the community.
2. The garbages around the community might be more properly disposed if there is a collector of garbage regularly.
3. If there is no dump site of the barangay, waste per household might be better if it will be buried in a piece of their land in their land far from the community.

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