

Analysis on the Effectiveness of Regulations on Waste Management and Sanitation of the Local Government Unit in Palayan City amidst the Pandemic: Problems and Recommendations

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Abstract

this study was entitled "Analysis on the Effectiveness of Regulations on Waste Management and Sanitation of the Local Government Unit in Palayan City amidst the Pandemic: Problems and Recommendations". It specifically investigated the practices of waste management and sanitation in the city, the waste management regulations, the problems encountered by the city government, the actions taken in intensifying the regulations, and the proposed recommendations for the improvement of waste management and sanitation in the city amidst pandemic. The descriptive-evaluative approach and absolute enumeration were used in this study's sampling procedure. This study presented that the city has a systematic approach in terms of waste management and sanitation. The findings presented that the city government has a strong commitment with regards to the improvement of waste management and sanitation in the area. However, various problems was presented in the study which suggests that some recommendations should be made as an output of this study.

Keywords: Waste Management, Problems, Regulations, Covid-19 Pandemic, Local Government Unit, Recommendations

INTRODUCTION

According to the Department of Health, there are still a lot of Covid-19 cases in the Philippines and no one knows when this pandemic ends. This has developed into the most difficult situation that everyone encounters. Whether wealthy or impoverished, young or old, or of any other financial status, this will be the most memorable situations for every individual and organization in the modern era. Unlike previous downturns, this pandemic is being spread by an invisible virus that is difficult to govern and control. The virus kills a lot of people and alters their way of living. The office of the President of the Philippines declared the lockdown last March 16, 2020 so basically this pandemic is in its two years and still present in the majority areas around the world.

Aside from the pandemic, one of the problems that every country has faced in the previous two years since the epidemic began is waste management in different institutions and household. Though the COVID-19 pandemic was reported to have reduced air pollution and environmental-related noise and improved biodiversity and tourist sites, however, the impact of stay-at-home and preventive measures on waste management is alarming. Failure to properly manage the waste generated from health facilities and households may escalate the spread of COVID-19 via secondary transmission.

According to a recent World Health Organization report, Tens of thousands of tonnes of excess medical waste generated as a result of the COVID-19 pandemic have put an enormous strain on health care and city government waste management systems throughout the world, endangering human and environmental health and highlighting the urgent need to enhance waste management procedures. The World Health Organization Global analysis of health care waste in the context of COVID-19: status, impacts, and recommendations is based on an estimate of 87,000 tonnes of personal protective equipment (PPE) procured between March 2020 and November 2021 and shipped to support countries' urgent COVID-19 response needs through a joint UN emergency initiative. The majority of this equipment is likely to be discarded. Today, 30 percent of healthcare institutions (60 percent in LDCs) are unprepared to handle existing waste loads, let alone the increased COVID-19 load. This may expose health professionals to needle stick injuries, burns, and harmful microbes, as

well as people living near poorly managed landfills and waste disposal facilities to polluted air from burning garbage, poor water quality, or disease-carrying bugs like mosquitoes, fleas, bed bugs, and flies.

The world is not only experiencing COVID-19 pandemic, but also suffers from the problem of an increasing amount of solid waste generated as a result of population growth, resulting in environmental degradation. Based on the "World Population Data Sheet,"(Motavilli et al. 2005) there will be a 46 percent increase in worldwide population to about 9 billion from 2005 to 2050. The persistent increase in the volume of solid waste generated per day is aggravated by rapid population growth. By 2025, the waste generation rate in Asia is expected to rise from around 760,000 tons per day to around 1.8 million tons per day. (IBRD/WB1999). The majority of these wastes are not appropriately collected or disposed illegally. This condition has created both environmental and health problems due to the inability of both local and national governments to implement proper waste management primarily because of scarce financial, irresponsible citizens, human and technical resources.

In this light, the researchers would like to analyze the effectiveness of regulations on waste management and sanitation of the Local Government Unit in Palayan City amidst pandemic. Specifically, it sought to answer the following:

1. How may the wastes of Palayan City amidst pandemic be describe in terms of :
 - 1.1 Municipal solid waste;
 - 1.2 Industrial waste;
 - 1.3 Agricultural waste; and
 - 1.4 Hazardous waste?
2. How effective are the measures taken by the city government of Palayan in waste disposal in :
 - 2.1 Barangays;
 - 2.2 Health Facilities;
 - 2.3 City government institutions;
 - 2.4 Private institutions; and
 - 2.5 Businesses.
3. How may the regulations on waste management and sanitation be assessed in terms of :
 - 3.1 Segregation;
 - 3.2 Collection;
 - 3.3 Transportation;
 - 3.4 Storage; and
 - 3.5 Disposal ?
4. What are the problems encountered by the city government of Palayan in solid waste management in the midst of COVID- 19 pandemic ?

5. What actions does the city government of Palayan do to intensify their regulations on proper waste disposal and sanitation amidst pandemic ?

Waste management and Sanitation

According to Jerry A. Nathanson (2020) solid-waste management, the collecting, treating, and disposing of solid material that is discarded because it has served its purpose or is no longer useful. Improper disposal of municipal solid waste can create unsanitary conditions, and these conditions in turn can lead to pollution of the environment and to outbreaks of vector-borne disease that is, diseases spread by rodents and insects. The tasks of solid-waste management present complex technical challenges. They also pose a wide variety of administrative, economic, and social problems that must be managed and solved.

In addition, Veasna, et al. (2006) Solid waste has become an increasing concern in many developing countries, especially in poor urban areas, due to the rapid rate of population growth, increased per capital consumption, the complexity of waste and inadequate infrastructure to manage waste

Covid 19 Pandemic and its Effect to the Waste Management and Sanitation

According to Ma et al. (2020) during the period of COVID-19, the medical waste disposal capacity is seriously inadequate. The main technical process of the municipal solid waste incineration system is the same as that of the medical waste incineration system. Under the conditions of optimizing the technological process, improving the supporting facilities, and controlling the co-processing ratio, the municipal solid waste incinerator (grate furnace) co-processing medical waste is feasible. Some suggested guidelines for emergency treatment of medical waste from COVID-19 have been provided by China. Due to the stockpiling of gloves, gowns, masks and other protective clothing and equipment, there appears to be a waste emergency due to the unusual production of waste from both households and health facilities

However, United Nations Environment Programme (UNEP) (2020a). Thus, there exists a challenge of managing unusual waste sustainably using available waste facilities while reducing air pollution, preventing secondary viral transmission and mitigating potential health risk Besides, there could be serious consequences for developing countries without standard waste management technologies and waste emergency policies to curb the pandemic.

The study of World Health Organization (WHO) (2022) state that the COVID-19 waste challenge and increasing urgency to address sustainably reduce and manage health care waste. This can be through strong national policies and regulations, regular monitoring and reporting and increased accountability, behaviour change support and workforce development, and increased budgets and financing.

Local Governments Waste Regulation

According to Department of Environment and Natural Resources (DENR), (2019) Under RA 9003, LGU's are primarily responsible for the effective and efficient solid waste management, particularly garbage segregation and disposal. Every LGU is required to develop a 10-year Solid Waste Management Plan (SWMP), including the establishment of materials recovery facilities (MRF) and sanitary landfills.

As stated by the article of The Manila Times in 2012 , Palayan City, Nueva Ecija: The city government has signed a lease agreement with a waste-to-energy corporation to put up a sanitary landfill in a 20-hectare area in this provincial capital. The lease agreement was signed between Mayor Romeo Capinpin representing the city government of Palayan and Juanito Ho, chairman of the Ecosci Corporation, a firm based in Diliman, Quezon City. The agreement was signed last 2012. The project is proposed to be set up in Barangay Imelda Valley

which has been certified as an ideal site for a sanitary landfill in a joint survey conducted by the Department of Environment and Natural Resources, Ecosci and a resident geodetic engineer of the city government.

Under the agreement, the city government as the lessor will lease the facility to the lessee (Ecosci) for a 25-year period renewable for another 25 years at a cost of P700,000 per year. However, this could be increased to P1 million per year when the daily waste disposal has reached 73 trucks per day for 30 consecutive days. The agreement also stipulates that an expansion area of another 20 hectares will be provided for the landfill project. Capinpin said that the project, which will cost P30 million for its first phase, will absorb not only residual wastes produced by the city but the entire province as well. He said the project is in compliance with the provisions of Republic Act 9003 or the Ecological Solid Waste Management Act which calls for the closure of open and controlled dumpsites.

MATERIALS AND METHODS

Research Design

This study used mixed method research design. According to Creswell (2013), mixed method research is defined as the employment of quantitative and qualitative methodologies in conjunction to gain a greater understanding of research challenges than either way alone. It employs an Explanatory Sequential Design approach, in which quantitative data is collected and analyzed first, followed by qualitative data gathering and analysis, and finally interpretation (Creswell 2013), including survey and interview guide questionnaires.

It is a fact-finding investigation with a thorough and correct evaluation of the results. The percentage and frequency distribution tools, as well as the weighted mean, were employed to interpret the data in this study.

Study Locale

Palayan, officially the City of Palayan (Tagalog: Lungsod ng Palayan), is a 5th class component city and capital of the province of Nueva Ecija, Philippines. According to the 2020 census, it has a population of 45,383 people, making it as the most sparsely populated city in the Philippines. (Wikipedia, 2022).

Participant Selection

The respondents of this study were the selected 50 government officials in Palayan City, Nueva Ecija. The researchers considered the government officials to be their respondents to understand precisely the situation of waste management in the area. By choosing the mentioned respondents, the effectiveness of regulations on waste management and sanitation, problems, and recommendations that the city government encountered amidst COVID-19 was presented; they also have the ability to answer those survey questionnaires that researchers prepared because they are more knowledgeable in this aspect.

Data Collection

The findings of this study were conducted through a cautious face-to-face survey, which was undertaken in light of the current COVID-19 pandemic that the world is currently experiencing.

After the approval of the research topic entitled "Analysis on the Effectiveness of Regulations on Waste Management and Sanitation of the Local Government Unit in Palayan City amidst the Pandemic: Problems and Recommendations" the researcher proceeded to gathering of data and information from related researches, articles, and internet. The questionnaire was formulated through the gathered information and was checked by the research mentor. The reliability coefficient of the instrument has a good internal consistency. The validity of

the research instrument was established by presenting the developed research instrument for the comments of expert who together rated the instrument with 4.62 weighted mean with a verbal interpretation of “very good”.

Before the distribution, the researcher got approval from the city government of Palayan City, through the request letters signed by the researcher, by his adviser. After the distribution, the answered questionnaires were retrieved and the data were tallied for interpretation.

Data Analysis

The data gathered in the area was encoded, tallied, and evaluated. Statistical tools like percentage, frequency distribution, weighted mean, and thematic analysis. The data were interpreted using a 4-point Likert scale.

The researchers assessed the effectiveness of regulations on waste management and sanitation in Palayan City amidst the pandemic using a 4-point Likert scale. The aim of the researcher is to analyze the effectiveness of regulations on waste management and sanitation amidst Covid-19 pandemic, and have an assessment on the problems encountered which the researchers sought to provide recommendations that helps the city government for a basis in implementing new actions and regulations in the city that are being totally performed, performed, not performed, and not totally performed in the area.

RESULTS AND DISCUSSION

1. Waste Classifications

1.1 Municipal Waste

Table 3 shows the waste classification of the area in terms of municipal waste.

Table 3. Municipal Waste

Municipal Waste	Frequency	Percentage
Food Waste	31	36%
Paper	27	32%
Plastic	21	24%
Metal and Glass	7	8%
Others	0	0
Total	86	100%

The majority of the respondent’s generated municipal waste are coming from foods wherein the choice number 1 which is the food waste got the frequency of thirty one (31) and a percentage of 100% are the significant results under table 3.

This table shows the waste classification in terms of municipal waste. The area has a number of food, paper, and plastic wastes according to the majority of the respondents. Every human kind needs food to survive and everyone is aware that food needs to have a package or wrapper to keep it clean and for it to become presentable. Foods are also everywhere, it is the leading necessity that people purchase to satisfy their needs and wants as an individual. So, basically foods are actually part of everyone’s lives and foods after consuming includes wastes that needs to put in a proper place.

All around the world approximately 1.3 billion tons of food designated for human consumption is either lost and/or wasted (FAO, 2014a) Around a third of the world’s food is wasted at various steps of the supply chain (FAO, 2011). In Europe, the largest and increasing share is wasted at the consumer level (EPRS, 2014). The issue has gained considerable public attention in the past years, with a large number of initiatives developed by different stakeholders such as policy makers, retailers (e.g. France, Intermarché, 2014) and NGOs (e.g. Denmark, Stop spild af mad, 2014), and research projects that have and are exploring the issue (CONANX; FUSIONS).

1.2 Industrial Waste

Table 4 shows the waste classification of the area in terms of industrial waste.

Table 4. Industrial Waste

Industrial Waste	Frequency	Percentage
Packaging Materials	28	41%
Waste from food processing	18	26%
Oils	8	12%
Paints	6	9%
Woods	8	12%
Others	0	0
Total	68	100%

The table above shows that most of the respondents’ industrial wastes are from packaging materials, choice number 1 which is the packaging materials obtained a frequency of twenty eight (28) and a percentage of 41.

The table represents the waste classification in terms of industrial waste. The respondents has a majority of wastes from packaging materials. As mentioned in the interpretation in table 3 (Municipal waste), foods are already part of every individual’s life and foods has packaging materials that was included in the industrial waste. So, this circumstances proved the presented data which shows that due to the regular purchasing of foods, the level of wastes like packaging materials also increases.

According to Velez, (2015), The increasing demand for plastics used for food packaging has led to global environmental concerns where governments, companies and consumers have been encouraged to be more sustainable by using less packaging materials and recycling them more.

The increasing demand for packaging materials to meet the needs of the food industry and its consumers are leading us to an unsustainable way of living. The extraction of scarce natural resources and pollution from waste in our land and sea are the main environmental concerns over packaging. There has been an increasing preference for plastic materials used for packaging due to its lightweight properties and cheaper costs in comparison to other materials. The issue with the high dependence on plastics is that they are mainly created from non-renewable resources such as oil and gas (Lewis, et al, 2001) and that most are non-biodegradable, so inappropriate management of their disposal is causing serious health and environmental problems. On the other hand, it is important to highlight that the utilization of plastic and other materials for food packaging do not only

imply environmental costs; food packaging itself is an important tool for preserving food and in fact it contributes to the reduction of food waste (Alter, 1988)

1.3 Agricultural Waste

Table 5 shows the waste classification of the area in terms of agricultural waste.

Table 5. Agricultural Waste

Agricultural Waste	Frequency	Percentage
Livestock waste	7	35%
Agricultural crop residue	10	50%
Agro - industrial by-products	3	15%
Others	0	0
Total	20	100%

The table above presents that most of the respondent’s wastes in terms of agricultural are coming from agricultural crop residue which was the number 2 in the choices, it attained a frequency of ten (10) and a percentage of 50.

The table above shows the waste classification in terms of agricultural waste. The overall agricultural wastes from the data acquired, according to the results, were from agricultural crop residue. According to the respondents, this is due to the fact that Palayan City has a large number of farmers. Agricultural crop residues are wastes left on the fields after harvests that are used as fodder, landfill material, or burned in various locations. So, after every harvest, there is always crop residue in farms, and those wastes, according to the respondents, can help improve soil structure, increase organic matter content in the soil, reduce evaporation, and help fix carbon dioxide in the soil, which is why farmers choose to keep those wastes on their land rather than dispose of them for some soil benefits.

Crop residues are materials left on cultivated land after the crop has been harvested. Retention of crop residues after harvesting is considered to be an effective antierosion measure. Crop residues can improve soil structure, increase organic matter content in the soil, reduce evaporation, and help fix CO₂ in the soil. Good residue management practices on agricultural lands have many positive impacts on soil quality. Besides, crop residues can be used in biofuel production. Information on residue cover guides polices for promoting beneficial management practices and helps the estimation of soil carbon. (Science Direct, 2020)

1.4 Hazardous Waste

Table 6 shows the waste classification of the area in terms of hazardous waste.

Table 6. Hazardous Waste

Hazardous Waste	Frequency	Percentage
Chemicals	5	12%
Used medical equipment	27	66%
Batteries	2	5%

Gasoline	4	10%
Prescribed drugs	3	7%
Others	0	0
Total	41	100%

The respondents have the majority of used medical equipment which happens to be the number 2 in the choices. Used medical equipment got a frequency of twenty seven (27) and a percentage of 66.

The table above shows the waste classification in terms of hazardous waste. According to the results, used medical equipment became prevalent since the existence of COVID-19. According to the data, used medical equipment includes face mask, face shields, syringe, personal protective equipment, and gloves. Due to the present pandemic that the whole world is facing, the need and demand for the mentioned medical equipment became high which means that the wastes before the use of these products also increased.

World Health Organisation (WHO) and the US Centers for Disease Control and Prevention, the National Centers for Disease Control and local governments have announced various guidelines, including frequent handwashing, social distancing and quarantine (home, local and state quarantine), to reduce the spread and health risks associated with COVID-19. These institutions have also recommended medical personnel and the general population to use personal protective equipment (PPE) such as surgical or medical masks, non-medical face masks (including various forms of self-made or commercial masks of cloth, cotton or other textiles), face shields, aprons and gloves. More and more countries have recommended wearing masks when going out in public places. The press conference study of the Joint Prevention and Control Mechanism of the State Council of China found that approximately 468.9 tons of medical waste are generated every day in association with COVID-19. (*The State Council Information Office of the People’s Republic of China, Press Conference on Strengthening Comprehensive Treatment of Medical Waste and Environmental Protection, 2020* and Peng et al, 2020).

On the other hand, it was found in Indonesia (Jakarta) that the medical waste scale had reached 12,740 tons approximately 60 days after people were first infected by coronavirus in the area (Eria, 2020 and Mihai, 2020). Infectious waste is characterised as any material that is suspected to contain pathogens (bacteria, viruses, parasites or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts. It also comprises waste contaminated with blood, bodily fluids, tissues, organs and sharp objects from treatment and, therefore, also includes diagnosis, swabs, medical devices and so on (Yong et al, 2009 and WHO, 2017. Therefore, it is harmful to health. In particular, infectious waste generated by the COVID-19 outbreak has posed a major environmental and health concern in many countries (Saadat et al, 2020). In particular, inadequate solid waste management may increase the spread of coronavirus, especially in developing countries (Mol M.P.G., Caldas S., 2020).

2. Effectiveness of City Government Measures in waste disposal

2.1 Barangay

Table 7 shows the effectiveness of city government measures on waste management in barangays.

Table 7. Barangay

Barangay	W.M.	V.I	RANK	V.D.
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1. Established material recovery facilities (MRF)	3.72	Always	2	Totally performed in the Area
2. Provide vehicles to collect wastes	3.84	Always	1	Totally performed in the Area
3. Scheduled collection of wastes	3.7	Always	3	Totally performed in the Area
4. Monthly announcement on proper waste management	3.42	Always	4	Totally performed in the Area
5. Signage, poster, and stickers on source segregation and proper waste management	3.28	Always	6	Totally performed in the Area
6. Airing on radio station	3.36	Always	5	Totally performed in the Area
Barangay	3.55	Always		Totally performed in the Area

Based on the results, the question number 2 which is the provide vehicles to collect wastes was ranked number 1 with a weighted mean of 3.84, verbally interpreted as always, and verbally described as totally performed in the area.

According to the findings, every barangay has kolong-kolong vehicles that collect garbage. It is a vehicle that looks like a tricycle in the Philippines, however the kolong-kolong's sidecar does not have a roof and is open, making it accessible for things. The city government provided these vehicles, which were used to collect waste from respective barangays. The vehicle is going around its allocated area with barangay police officers to ensure that there is a systematic and organized collection of wastes.

According to Weebly, (2010), The respondents segregate their wastes into PET bottles, glass bottles, and other waste (mixed wastes). No respondents perform composting. It is worth noting, however, that burning of waste is not done by the respondents. The households rely on garbage collection by the government. Collection is done twice daily, except Sundays, and household members bring their garbage when the garbage truck arrives.

2.2 Health Facilities

Table 8 shows the effectiveness of city government measures on waste management in health facilities.

Table 8. Health Facilities

Health Facilities	W.M.	V.I	RANK	V.D.
1. Established material recovery facilities (MRF)	3.96	Always	2	Totally performed in the Area

2. Provide vehicles to collect wastes	3.88	Always	4	Totally performed in the Area
3. Scheduled collection of wastes	3.6	Always	5	Totally performed in the Area
4. Has sufficient garbage segregation cans	3.98	Always	1	Totally performed in the Area
5. Signage, poster, and stickers on source segregation and proper waste management	3.52	Always	6	Totally performed in the Area
6. Follows COVID -19 safety precautions	3.94	Always	3	Totally performed in the Area
Health Facilities	3.81	Always		Totally performed in the Area

Majority of the respondents believed that the question number 4 which is the sufficiency of garbage cans contributes greatly to the effectiveness of maintaining an organized waste management in health facilities which is why it ranked number 1. It obtained a weighted mean of 3.98, verbally interpreted as always and verbally described as totally performed in the area.

The data reveal that in order to maintain a safe environment during the COVID 19 pandemic, health facilities must have enough garbage segregation cans to prevent the transmission of different kinds of bacteria and viruses. In relation to the previous interpretation (Table 6. Hazardous waste), it was stated that the usage of various types of medical equipment meant to control the spread of the COVID 19 virus has increased which also increased the number of wastes coming from it considering these being a disposable items. As a result, the local government has effectively examined the status of health facilities and has come up with the idea of maintaining a sufficient garbage segregation cans in health facilities.

According to CleanItSupply, (2010), The area of medical waste requires special containment efforts. Safe disposal of potentially harmful medical waste and supplies must be done in line with current safety recommendations that include using safe disposal containers. This means that used syringes, blood bags, used paper products, and items like sanitary napkins should be placed in containers that are specially designed to hold medical waste products to avoid the spread of unnecessary organisms that is harmful in health.

2.3 City Government Institutions

Table 9 shows the effectiveness of city government measures on waste management in city government institutions.

Table 9. City Government Institutions

City Government Institutions	W.M.	V.I	RANK	V.D.
1. Government has material recovery facilities (MRF)	3.9	Always	4	Totally performed in the Area
2. Signage, poster, and stickers on source segregation and proper waste management	3.84	Always	5	Totally performed in the Area
3. Has sufficient garbage segregation cans	4	Always	1.33	Totally performed in the Area

4. Follows COVID -19 safety precautions	4	Always	1.33	Totally performed in the Area
5. Scheduled collection of wastes	4	Always	1.33	Totally performed in the Area
City Government Institutions	3.94	Always		Totally performed in the Area

Based on the table, the question number 3 (has sufficient garbage segregation cans), question number 4 (follows COVID-19 safety precautions), and question number 5 (scheduled collection of wastes) was all ranked number 1 with the same weighted mean of 4, verbal interpretation of always, and verbal description of totally performed in the area.

In addressing the question number 3, according to the results, just like in health facilities, city government institutions has also a sufficient garbage segregation cans to protect the working environment from viruses. The city government has also a continuous transaction and services with people that is why they maintain a clean environment not only for the workers but also for the sake of their everyday clients. With regards to question number 4, it was presented that city government institutions ensures that they always follow the COVID-19 safety precautions because this is a must for every kind of transactions. According to the respondents, in accordance with following the COVID-19 safety precautions, they set a limit for the number of their clients per day to avoid being crowded, they have also disinfectants like alcohol in their office, free face masks for those clients who does not bring one, properly disposal of their used medical equipment, and the government employees prohibits a personal contact to their everyday service transactions. Pertaining to the question number 5, the city government has a scheduled collection of wastes in compliance with the previous statement (question number 3).

Waste containers today have an important role in keeping a neighbourhood environmentally friendly – by keeping garbage locked in and collected by authorities, hence preventing environmental hazard and keeping your neighbourhood neat and tidy. When trash is securely stored in a proper waste containers, there is no possibility for bad scenarios to happen, like the spread of bacteria, virus, and germs. You may also rest assured that what is thrown away will stay away – until communal authorities collect it and remove it. (Green City, 2017).

According to Cirrincione et al, (2020), general organizational measures regarding the containment and management of the epidemiological emergency of COVID-19 have been imposed by the competent authorities for an adequate and proportionate management of the evolution of the epidemiological situation. The prevention and protection organizational measures therefore aim to minimize the probability of being exposed to SARS-CoV-2. For this purpose, measures must also be taken at work to avoid new infections or even the spread of the virus where it has already been present. Furthermore, environmental measures are aimed at reducing the risk of transmission of SARS-CoV-2 to individuals through contact with infected subjects, objects, equipment, or contaminated environmental surfaces. Protective devices must be used whenever there is potentially close

contact with a suspect case, especially when the potentially infected person does not wear a surgical mask that could reduce the spread of viruses in the environment. By adopting this specific prevention and protection measures recommended in the workplace, it will be possible to help overcome this COVID-19 pandemic.

Collection is the act of removing solid waste from the source or from a communal storage point. It is regarded as potentially the most expensive of the functional elements of SWM. RA 9003 requires segregated collection by the LGUs. Waste segregation and collection are to be conducted at the barangay level specifically for biodegradable and recyclable wastes while disposal and collection of non recyclable/residual and special wastes are the responsibility of the city or municipality. Waste collection techniques include 1) door-to door – where waste materials are collected in every house within a target area to recover recyclables to be sold to junkshops and biodegradables either for use as animal feeds or for composting and 2) block or communal – which utilizes MRFs in barangays that are within or near the targeted collection area. Solid waste collection in the country has environmental, social, economic and political implications (Environmental Management Bureau (EMB)).

2.4 Private Institutions

Table 10 shows the effectiveness of city government measures on waste management in private institutions.

Table 10. Private Institutions

Private Institutions	W.M.	V.I	RANK	V.D.
1. Has sufficient garbage segregation cans	4	Always	1.5	Totally performed in the Area
2. Follows COVID -19 safety precautions	4	Always	1.5	Totally performed in the Area
3. Scheduled collection of wastes	3.84	Always	3	Totally performed in the Area
4. Signage, poster, and stickers on source segregation and proper waste management	3.68	Always	4	Totally performed in the Area
Private Institutions	3.88	Always		Totally performed in the Area

According to the results, question number 1 which is the has sufficient garbage segregation and question number 2 which is the follows COVID-19 safety precautions both lead the ranking with a weighted mean of 4, verbal interpretation of always and verbal description of totally performed in the area.

Majority of the respondents cited that their institution has a sufficient garbage segregation cans wherein it serves as their way to maintain as clean environment for the workers and clients. According to them, cleanliness is essential in their field because they are mostly concerned with their employees and clients as this pandemic occurs. They also believed that having a clean environment contributes in building their institution’s image to the public. With regards to the question number 2, basically all kinds of organization are working to follow these established safety precautions for the sake of everyone.

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According to Cirrincione et al, (2020), general organizational measures regarding the containment and management of the epidemiological emergency of COVID-19 have been imposed by the competent authorities for an adequate and proportionate management of the evolution of the epidemiological situation. The prevention and protection organizational measures therefore aim to minimize the probability of being exposed to SARS-CoV-2. For this purpose, measures must also be taken at work to avoid new infections or even the spread of the virus where it has already been present. Furthermore, environmental measures are aimed at reducing the risk of transmission of SARS-CoV-2 to individuals through contact with infected subjects, objects, equipment, or contaminated environmental surfaces. Protective devices must be used whenever there is potentially close contact with a suspect case, especially when the potentially infected person does not wear a surgical mask that could reduce the spread of viruses in the environment. By adopting this specific prevention and protection measures recommended in the workplace, it will be possible to help overcome this COVID-19 pandemic.

2.5 Businesses

Table 11 shows the effectiveness of city government measures on waste management in businesses.

Table 11. Businesses

Businesses	W.M.	V.I	RANK	V.D.
1. Has sufficient garbage segregation cans	3.84	Always	3	Totally performed in the Area
2. Follows COVID -19 safety precautions	4	Always	1	Totally performed in the Area
3. Scheduled collection of wastes	3.9	Always	2	Totally performed in the Area
4. Signage, poster, and stickers on source segregation and proper waste management	3.74	Always	4	Totally performed in the Area
Businesses	3.87	Always		Totally performed in the Area

The table above shows that the question number 2 which is the follows COVID-19 safety precautions ranked number 1 with a weighted mean of 4, verbally interpreted as always, and verbally described as totally performed in the area.

According to the respondents, they are extremely ordered to follow the COVID-19 safety precautions in their operations during the pandemic. In accordance with following, they experienced various kinds of changes like the limitation in their work activities, social distancing, wearing of personal protective equipment, limitation of clients per day, etc. According to them, the government allowed their business to operate as long as they are following the safety precautions that was implemented by the government.

Measures for protecting workers from exposure to and infection with SARS-CoV-2, the virus that causes Coronavirus Disease 2019 (COVID-19), depends on exposure risk. That risk varies based on the type of work

being performed, the potential for interaction (prolonged or otherwise) with people, and contamination of the work environment. Employers should adopt infection prevention and control strategies based on a thorough workplace hazard assessment, using appropriate combinations of engineering and administrative controls, safe work practices, and personal protective equipment (PPE) to prevent worker exposures (United States Department of Labor, 2020).

According to Cirrincione et al, (2020), general organizational measures regarding the containment and management of the epidemiological emergency of COVID-19 have been imposed by the competent authorities for an adequate and proportionate management of the evolution of the epidemiological situation. The prevention and protection organizational measures therefore aim to minimize the probability of being exposed to SARS-CoV-2. For this purpose, measures must also be taken at work to avoid new infections or even the spread of the virus where it has already been present. Furthermore, environmental measures are aimed at reducing the risk of transmission of SARS-CoV-2 to individuals through contact with infected subjects, objects, equipment, or contaminated environmental surfaces. Protective devices must be used whenever there is potentially close contact with a suspect case, especially when the potentially infected person does not wear a surgical mask that could reduce the spread of viruses in the environment. By adopting this specific prevention and protection measures recommended in the workplace, it will be possible to help overcome this COVID-19 pandemic.

3. Assessment on City Waste Management Regulations

3.1 Segregation

Table 12 shows the assessment on city waste regulation in terms of segregation.

Table 12. Segregation

Segregation	W.M.	V.I	RANK	V.D.
1. Keeps the different kinds of wastes separately in a closed container can	3.98	Always	1	Totally performed in the Area
2. Can be able to acquire compost fertilizers from biodegradable wastes	3.68	Always	4	Totally performed in the Area
3. Cautious handling on infectious wastes	3.88	Always	2	Totally performed in the Area
4. Can use recyclable materials from non-biodegradable wastes	3.82	Always	3	Totally performed in the Area
Segregation	3.84	Always		Totally performed in the Area

The table above shows that the question number 1 which is the keeps the different kinds of wastes separately in a closed container can was ranked number 1 with a weighted mean of 3.98, verbal interpretation of always, and verbal description of totally performed in the area.

According to the findings, respondents always keep their trash separated in closed container cans so that the wastes can be appropriately disposed of. There are many different sorts of garbage, such as biodegradable, non-biodegradable, recyclable, contagious, and so on. By classifying and properly separating trash, collectors will be able to determine where those wastes will be disposed of, as well as recognize wastes that are still usable, such as the recyclables, which they can recycle for a variety of purposes. Separation of wastes is also

vital, according to the majority, because it prevents the spread of unwanted smells as well as numerous viruses or germs from wastes that can cause health problems.

Segregation at source is critical to its recycling and disposal. Lack of segregation, collection and transportation of unsegregated mixed waste to the landfills has an impact on the environment. When we segregate waste, it reduces the amount of waste that reaches landfills, thereby taking up less space. Pollution of air and water can be considerably reduced when hazardous waste is separated and treated separately. It is essential that waste is put in separate bins so that it can be appropriately dealt with (Squarespace, 2010).

3.2 Collection

Table 13 shows the assessment on city waste regulation in terms of collection.

Table 13. Collection

Collection	W.M.	V.I	RANK	V.D.
1. Every Barangay has vehicles to collect wastes	4	Always	1	Totally performed in the Area
2. Door-to-door collections	3.82	Always	3	Totally performed in the Area
3. Waste containers placed near the road	3.68	Always	5	Totally performed in the Area
4. Household members collect their own solid waste in containers and carry it to a composting, recycling or disposal site or secondary storage.	3.8	Always	4	Totally performed in the Area
5. A representative of several households collects their waste and takes it to a composting, recycling or disposal site.	2.16	Often	8	Performed in the Area
6. There is a weekly scheduled collection of wastes	3.94	Always	2	Totally performed in the Area
7. Small amounts of chemical or pharmaceutical waste may be collected together with infectious waste.	3.62	Always	6.5	Totally performed in the Area
8. Large quantities of chemical waste packed in chemical resistant containers and sent to specialized treatment facilities	3.62	Always	6.5	Totally performed in the Area
Collection	3.58	Always		Totally performed in the Area

Based on the results, question number 1 which is the every barangay has vehicles to collect wastes lead the ranking with a weighted mean of 4, verbally interpreted as always, and verbally described as totally performed in the area.

The finding shows that the city government provided a vehicle to every barangay that is incharge for the collection of wastes. According to the respondents, particularly the barangay captains, the vehicle they are using is the *kolong-kolong*. In the Philippines, it is a vehicle that looks like a tricycle, but the *kolong-kolong*'s sidecar does not have a roof and it is open which makes it accessible for things. Majority stated that the collection of

wastes was scheduled every Thursday of the week and it is going around their barangay, the people are putting their garbage beside the street for the preparation of collection. The collection of wastes in barangays was managed by the barangay tanod who are in duty during the schedule of the collection of wastes to have a systematic operation during the collection of wastes.

According to Weebly, (2010), The respondents segregate their wastes into PET bottles, glass bottles, and other waste (mixed wastes). No respondents perform composting. It is worth noting, however, that burning of waste is not done by the respondents. The households rely on garbage collection by the government. Collection is done twice daily, except Sundays, and household members bring their garbage when the garbage truck arrives.

According to G. Laporte, R. Musmanno and F. Vocaturo, 2010, the collection vehicles servicing residential areas move along the streets to collect the garbage accumulated by each house.

The study of Mofid-Nakhaee and F. Barzinpour, 2019 also added that, in some developed economies, solid wastes are collected separately for recycling. In that situation, solid wastes can be transported by various vehicles or by one vehicle with multiple compartments.

3.3 Transportation

Table 14 shows the assessment on city waste regulation in terms of transportation.

Table 14. Transportation

Transportation	W.M.	V.I	RANK	V.D.
1. There is a vehicle that collects wastes	4	Always	1	Totally performed in the Area
2. Transported by trucks over public highways	3.92	Always	2	Totally performed in the Area
Transportation	3.96	Always		Totally performed in the Area

The table above shows that the question number 1 which is the there is a vehicle that collects wastes was ranked number 1 with a weighted mean of 4, verbal interpretation of always, and verbal description of totally performed in the area.

In connection with the previous interpretation (Table 13. Collection), the wastes of the areas included in this study was collected using the vehicles that their government used. However, some of the respondents, particularly those who live beside highways stated that their wastes beside the road was collected by trucks that collects wastes and directly transporting it to the dump site. This means that the city government of Palayan ensures a proper transportation of their collected wastes.

The respondents segregate their wastes into PET bottles, glass bottles, and other waste (mixed wastes). No respondents perform composting. It is worth noting, however, that burning of waste is not done by the respondents. The households rely on garbage collection by the government. Collection is done twice daily, except Sundays, and household members bring their garbage when the garbage truck arrives (Weebly, 2010).

The collection vehicles servicing residential areas move along the streets to collect the garbage accumulated by each house (G. Laporte, R. Musmanno and F. Vocaturo, 2010)

According to the study of Mofid-Nakhaee and F. Barzinpour, 2019, in some developed economies, solid wastes are collected separately for recycling. In that situation, solid wastes can be transported by various vehicles or by one vehicle with multiple compartments.

3.4 Storage

Table 15 shows the assessment on city waste regulation in terms of storage.

Table 15. Storage

Storage	W.M.	V.I	RANK	V.D.
1. The wastes are stored separately according to their types	4	Always	1.5	Totally performed in the Area
2. The storage area have an impermeable, hard-standing floor with good drainage; it is easy to clean and disinfect.	3.9	Always	4	Totally performed in the Area
3. Has a water supply for cleaning	3.88	Always	5	Totally performed in the Area
4. Has an easy access for waste-collection vehicles	3.96	Always	3	Totally performed in the Area
5. The storage area is away from fresh food stores or food preparation areas	4	Always	1.5	Totally performed in the Area
Storage	3.95	Always		Totally performed in the Area

The table shows that the question number 1 which is the, the wastes are stored separately according to their types and question number 5 which is the, the storage area is away from fresh food stores or food preparation areas both ranked number 1 with the same weighted mean of 4, verbal interpretation of always, and verbal description of totally performed in the area.

The results indicates that the wastes are placed and separated according to their types for it to be organized and to classify easily when the wastes are set to transfer in the materials recovery facility (MRF) or in the dump site. According to the respondents, the wastes are also separated accordingly to know the things that can be recycle, to avoid the combination of wastes that produced an unnecessary smell and viruses or bacteria, and to know where to put the wastes according to their classification. In terms of question number 5, the respondents, particularly the barangay captains ensured that the waste storage in their barangay is away from the stores that prepares and sells fresh food, when someone in their barangay started a food business they were told to locate their business away from the waste storage for the sake of their business' image and for the customers.

Segregation at source is critical to its recycling and disposal. Lack of segregation, collection and transportation of unsegregated mixed waste to the landfills has an impact on the environment. When we segregate waste, it reduces the amount of waste that reaches landfills, thereby taking up less space. Pollution of air and water can be considerably reduced when hazardous waste is separated and treated separately. It is essential that waste is put in separate bins so that it can be appropriately dealt with (Squarespace, 2010).

Wastes storage should locate farm waste storage areas away from food handling, input storage and livestock housing areas to prevent cross-contamination and avoid attracting pests. They should make sure farm waste storage areas and containers are adequate for the amount of waste generated between disposal times. The barangay police officials shall also clean farm waste storage areas often enough to avoid creating conditions that can cause cross-contamination or attract pests. Where possible, use containers with lids for the storage of farm waste until removal (British Columbia).

3.5 Disposal

Table 16 shows the assessment on city waste regulation in terms of disposal.

Table 16. Disposal

Disposal	W.M.	V.I	RANK	V.D.
1. Applying 3R (Reduce, Reuse, Recycle)	3.82	Always	3	Totally performed in the Area
2. Composting	3.72	Always	4	Totally performed in the Area
3. Burning	1.28	Sometimes	5	Not performed in the Area
4. Digging up of wastes	3.88	Always	2	Totally performed in the Area
5. Collected by the government in charge of wastes	4	Always	1	Totally performed in the Area
Disposal	3.34	Always		Totally performed in the Area

The table above shows that the question number 5 which is the, collected by the government in charge of wastes lead the ranking with a weighted mean of 4, verbally interpreted as always, and verbally described as totally performed in the area.

The results indicates that the wastes in the city was collected by the government in charge of the wastes, or just like the previous interpretations, it was mentioned that there is a vehicle that is going around the area that collects wastes. According to the respondents, they are just waiting for the schedule and the vehicle to collect their wastes because the city has also rules and regulations regarding wastes like the basics of putting wastes in a proper place, prohibition of burning wastes, and others.

Municipalities are responsible for organizing the management of waste generated in dwellings and by the municipality’s administrative and service functions. Municipalities are also responsible for arranging the recovery and treatment of hazardous waste generated in dwellings. The recovery and treatment of hazardous waste from agriculture and forestry is also the responsibility of municipalities, unless excessive quantities are involved. In addition, municipalities are in charge of providing information and advice on the waste management services for which they are responsible. In practice, many municipalities have assigned most of their waste management duties to regional companies, which usually purchase the services by putting them out

to tender among private waste management enterprises (Environment.fi, 2019).

4. Problems encountered by the city government of Palayan in waste management and sanitation amidst COVID-19 Pandemic

Table 17 shows the problems encountered by the city government in waste management amidst COVID -19 Pandemic.

Table 17. Problems Encountered

Problems encountered by the city government of Palayan in waste management and sanitation amidst COVID-19 Pandemic	Frequency	Percentage	Rank
Handling infectious waste	12	24%	2
Limit in direct exposure	3	6%	4
Disinfection of protective equipment	9	18%	3
Failure in managing generated waste	26	52%	1
TOTAL	50	100%	

The table above shows that majority of the respondents are dealing with the problem of failure in managing generated waste. The statement was ranked number 1 which obtained a frequency of 26 and a percentage of 52.

According to the respondents, the major problem is the increasing quantity of uncollected wastes due to the citizens who throws their garbage everywhere without considering the environment and those who are assigned to pick out their scattered wastes. Some of the respondents, particularly those areas or barangay with a wide land coverage stated that, vacant and grassy lots tend to earn a lot of wastes because people are throwing their wastes in these kind of areas given that it is unoccupied. Failure in managing generated wastes also results from insufficient vehicle sizes according to the respondents. It is estimated that in one *kolong-kolong*, approximately it can only carry 15 - 20 sacks of wastes so, the vehicle does not have a choice but to go back to the wastes storage to put the collected wastes and head back to the household areas and collect wastes again. However, other citizens who are able to go in storage together with their wastes are going by themselves specially if they have already a lot of wastes to be disposed, but only a few of them are doing this kind of action which will be better if majority of them are being responsible with their wastes for the waste management to avoid various kinds of problems.

Most developing countries face the problem of efficient waste management due to increase in waste generation rates, high collection and also financial resources. In the past the garbage pick-up was leftover to the driver. Because of the urbanization of the cities, an importance of an efficient collection came into existence. Different methods were formulated that focused on various route parameters (Jorapur 2016).

In some populated cities, waste was generally dumped randomly and littered on the streets. In such cities, the residential waste collection stations are extremely smelly that often affects the hygiene and affects the

modern society. The environment is facing a huge risk due to unsustainable waste disposal. The present scenario of dumping the waste in an improper manner has become a sensitive, environmental issue which concerns about environmental issues in today’s world. Domestic, industrial and other wastes that are causing environmental pollution have become prime problems for mankind (Jorapur 2016).

Municipal solid waste (MSW) collection has become a major challenge for clean city management and social sustainable development in developing economies. A new variant of the collection vehicle routing problem (CVRP) is addressed with the characteristics of full loads and multiple trips of the collection vehicles, and multiple demands of the garbage facilities, which is called the collection vehicle routing problem of the garbage facilities (CVRPGF) in this study. (Zhang et al, 2018),

5.Actions of the City Government to intensify the regulations on waste management and sanitation amidst pandemic

Table 18. shows the actions of the city government in intensifying the regulations regarding the waste management amidst pandemic.

Table 18. Actions taken to intensify the regulations

Actions of the City Government to intensify the regulations on waste management and sanitation amidst pandemic	Frequency	Percentage
<p style="text-align: center;">Barangay</p> <p>Penalty to those who caught throwing garbage everywhere</p>	46	92%
<p style="text-align: center;">Health Facilities</p> <p>Providing a sufficient secured cans for every kind of wastes</p>	47	94%
<p style="text-align: center;">City Government Institutions</p> <p>Monthly meeting with every barangay captains with the DILG and LGU about the condition of their area in terms of waste disposal</p>	50	100%
<p style="text-align: center;">Private Institutions</p> <p>Regular update with the private institutions regarding on how they dispose their wastes properly</p>	45	90%
<p style="text-align: center;">Businesses</p> <p>Communicating with business owners regularly about the proper waste disposal</p>	44	88%

Based on the results that can be seen above, the action of city government institution got a frequency of 50 and a percentage of 100. It was followed by the actions made by health facilities with a frequency of 47 and a percentage of 94. The actions made by the barangay followed the ranking with a frequency of 46 and a percentage of 92. Private institution’s action towards intensifying waste regulations followed the ranking with a

frequency of 45 and a percentage of 90. Last among the ranking was the actions made by the businesses which obtained a frequency of 44 and a percentage of 88.

City Government Institution

According to the results, the city government are performing a monthly meeting with every barangay captains with the DILG and LGU about the condition of their area in terms of waste disposal to have an assessment on the situation regarding wastes. Through carrying out this kind of meeting, the city government will be able to know the problems encountered by the respondents in terms of waste management. Through the data presented by the respondents, particularly the barangay captains, the government official in charge of waste management will be able to come up for the best solution regarding the problem in which they can carry out or implement in their rules and regulations regarding waste management.

Communities in the Philippines that were once riddled with trash are being recognized for their revolutionary zero waste models. By implementing a combination of effective policy advocacy, powerful grassroots organizing, and meaningful community education on ecological waste management, these communities decreased their waste in landfills, generated more jobs, and enhanced community safety. In this year's celebration of the Zero Waste Month, these communities were the esteemed destinations of international delegates wanting to learn about innovative models (Global Alliance for Incinerator Alternatives (GAIA), 2020)

Pressing issues affecting the barangays were discussed during the recently held meeting at the Palayan City Hall hosted by Mayor Rianne Cuevas. The city government according to Mayor Cuevas would work closely with the barangays to address problems about illegal parking, waste management, and public safety. She enjoined the barangay captains to take a proactive stance in solving these problems by strictly enforcing the existing local and national laws in their respective barangays (Palayan City Government, 2018).

Health Facilities

Based on the results, the city government are always providing a sufficient secured cans for every kind of wastes in health facilities to separate different kind of wastes that can be harmful in health. According to the city government, they are ensuring the safety of everyone specially those front liners in health facilities during COVID 19 pandemic simply by providing sufficient secured cans that can help in the disposal of their used medical equipment. Through this action made by the city government to health facilities, the contamination and the spread of different kind of virus and bacteria will be prevented which lessens the problems in health facilities as well as the city government.

According to PlayPower, 2020, before you start positioning your trash cans inside and outside your establishment, you must have enough to do so. Just like placement, the number of trash cans can have a significant impact on how much litter is around your area. With more trash cans, you can expect less litter since people can't make excuses that they didn't see any receptacles nearby. Keep America Beautiful conducted a study regarding the disposal behaviour of nearly 10,000 people from 10 different states in 130 different locations. They found all but two locations had litter present, despite the fact that 118 out of the 130 sites — 91% — had at least one trash can. Although litter behaviour relies heavily on individual, contextual demands, such as having plenty of trash cans readily available for public disposal, do play a role. Since the availability of trash receptacles has a positive effect on littering, consider stocking up on commercial garbage cans for your public park, recreational area, church or other places of worship, school or business to increase your efforts and stop litter from piling up.

Barangay

The results indicated that the city government are implementing a regulation about the penalty to those who caught throwing garbage everywhere. According to them, they are forced to implement this regulation

despite the tough life situation of majority of the people in order for the society to follow from the implemented action. According to the interviewed barangay captains, the money collected from those who are caught were served as a fund in barangay that was used in buying cleaning materials, gasoline for the *kolong-kolong*, snacks for those who are duty in the collection of wastes, etc.

PRESIDENTIAL DECREE NO. 825, November 7, 1975. PROVIDING PENALTY FOR IMPROPER DISPOSAL OF GARBAGE AND OTHER FORMS OF UNCLEANLINESS AND FOR OTHER PURPOSES. SECTION 2. Any person, who shall litter or throw garbage, filth, or other waste matters in public places, such as roads, canals, esteros or parks, shall suffer an imprisonment of not less than 5 days nor more than one year or a fine of not less than P 100 nor more than P 2,000.00 or both such fine and imprisonment at the discretion of the Court or tribunal, without prejudice to the imposition of a higher penalty under any other law or decree. If the violator is a corporation, firm, or other corporate entities, the maximum penalty shall be imposed upon the president, manager, director or persons responsible for its operation, (Philippine Environmental Laws - Chan Robles Law Library).

Private Institutions

The findings shows that the least that the city government can do is to have a regular update with the private institutions regarding on how they dispose their wastes properly. According to the city government, they were not experiencing issues in private institutions regarding waste management because the institutions stated that they maintain a clean and safe environment for the employees and clients everyday. During the collection of data, the researchers also observed the cleanliness in the area which proves the statement of the city government officials.

Communication plays a pivotal role in ensuring compliance with the rules and successful implementation of planned strategies, (Climate and Clean Air Coalition, 2017).

Effective communication between waste management organizations and citizens is essential to the efficient operation of waste management services. Citizens need to know what services are available to them, and the schedule and requirements of that service, in order for those services to be efficiently used. Citizens are also more likely to undertake waste sorting and recycling activities if they know what happens to waste that is sent for recycling, and the associated environmental benefits. Best practices for awareness-raising campaigns need to, ensure continuity, consistency, complementarity and clarity of all communications with well-defined aims and objectives; create clear messages appropriate to, and directed at, well-defined target audiences; and, ensure efficient delivery through the integration of activities and clear lines of responsibility, (European Commission).

The awareness campaigns for citizens can be delivered directly by the waste management organization, by professional agencies on their behalf, or by partner organizations (including stakeholders in other sectors). A whole range of communication channels can be used, which can include advertising, public relations, direct marketing, community engagement, online engagement, social media and product labeling. The improvement of the uptake of the waste management services results in better economic performance as well, (European Commission).

Businesses

According to the results, the city government is communicating with business owners regularly about the proper waste disposal. Just like in private institutions, businesses in Palayan City are maintaining a clean environment for the sake of workers and customers. According to the city government officials, they are not experiencing a major problem in businesses because the owners are easy to talk when it comes to waste management. The least the city government can do is to ensure that they collect the gathered wastes in businesses.

Communication plays a pivotal role in ensuring compliance with the rules and successful implementation of planned strategies, (Climate and Clean Air Coalition, 2017).

Effective communication between waste management organizations and citizens is essential to the efficient operation of waste management services. Citizens need to know what services are available to them, and the schedule and requirements of that service, in order for those services to be efficiently used. Citizens are also more likely to undertake waste sorting and recycling activities if they know what happens to waste that is sent for recycling, and the associated environmental benefits. Best practices for awareness-raising campaigns need to, ensure continuity, consistency, complementarity and clarity of all communications with well-defined aims and objectives; create clear messages appropriate to, and directed at, well-defined target audiences; and, ensure efficient delivery through the integration of activities and clear lines of responsibility, (European Commission).

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CONCLUSION AND RECOMMENDATIONS

With the data given from the discussions, it can be concluded that the majority of the respondent accumulates wastes like papers, packaging materials, agricultural crop residue, and used medical equipment.

With regards to the assessment on the effectiveness of city government measures in waste disposal, they provide vehicles to collect wastes in every, they provide sufficient garbage segregation cans and, the different institutions and establishment follows COVID -19 safety precautions to ensure the safety and the proper waste disposal and sanitation amidst pandemic. The respondents also keeps the different kinds of wastes separately in a closed container can in which it will be collected by the vehicles provided by the city government to collect wastes. The collected wastes are stored separately according to their types and the storage area is away from fresh food stores or food preparation areas. The wastes in the storage in every barangay was collected by the truck of the government in charge of wastes (e.g., MRF, ENRO, LGU) and transport it to the dump sites.

The major problem encountered by the respondents was the failure in managing generated waste. Since the presence of the problems in terms of managing wastes were evident, the actions of the city government to intensify the regulations on waste management and sanitation amidst pandemic was made.

With the above conclusion, the researcher recommends that, the city government should implement a rigorous policy and regulation regarding waste management where everyone is obliged to follow

It is also recommended that, city government should provide the needs of the barangay and waste collectors to systematically collect all of the generated wastes.

The city government should promote the exercising measure of 3R (Reduce, Reuse, Recycle) to lessen the wastes accumulated by the society.

The government of Palayan City should keep on carrying workshops and awareness programs regarding waste management and sanitation.

Lastly, it is recommended for this study to be done in a larger scale to cover more areas beyond Palayan City with more variables and dimensions other than this research's variables. Such study should adopt more experimental methodologies.

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