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STRATEGIC ZERO WASTE MANAGEMENT PROGRAM OF BACOOR CAVITE, PHILIPPINES: BASIS FOR HEALTHY ENVIRONMENT CAMPAIGN

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Abstract:
The concept of zero waste advocates the "no waste" practice across societies, from individuals and households to enterprises and industries. There are prevailing issues and challenges in the current system of waste management in local government. Critics of the "plastic ban policy" assert that no significant change and impact was made from the time the local ordinance was implemented. However, interest groups have claimed that to confront the never-ending problem of waste is to strengthen the current policy through the adoption of zero waste management (ZWM). This system offers an alternative solution and remedy to the non-negotiable impacts of waste materials on the environment and public security. This study is designed to develop a proposal on waste management that will be utilized by the local government of Bacoor City, Cavite. It aims to evaluate the effectiveness of the waste management system as well as its problems and constraints in implementation. With the existing implementation of solid waste management, a strategic zero waste management system is offered to strengthen the government's effort in dealing with problems concerning waste. This strategic program covers key phases from the assessment of the current system to the implementation and post-evaluation of the project. Furthermore, a community relations approach was also introduced as an action plan in ZW management focusing on the promotion of sustainable development. Included in this study is the employment of 111 resident-

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homeowners of Bacoor City who were involved in the conduct of survey and interview through the use of structured questionnaire instruments. Findings of this qualitative-quantitative descriptive research show that issues of waste management centers on public awareness and information campaigns on the dynamics of the program and concerns on measures used in the restriction of plastic waste where institutionalized and standardized policies are needed. Furthermore, priority issues reveal that the local government needs to confront and address the different issues on waste management. Respondents have clearly observed that resources are key requirements if a ZW management is to be implemented. The availability of technology, equipment, and material flow is necessary to handle and manage if ever a ZW management is to be introduced in the city. On the other hand, the current system of waste management in Bacoor was observed as very effective. Its effectiveness is seen in the active community involvement and participation in waste management.

Keywords: zero waste management, strategic plan for waste management, and healthy environment

1. Introduction

Waste has been treated as a burden and social problem by individuals and communities. The increasing trend in consumerism, industrialization, and modernization results in the massive generation of waste materials. In a developing country like the Philippines, households, and establishments have been dependent on the landfill as the only and remaining disposal unit for all collected wastes. A number of attempts have been made to introduce mechanisms on how to eliminate if not minimize the impacts of waste on environmental pollution and degradation, (Ali, et al., 2021). With the availability of new systems and technologies in waste management, local governments are keen on developing approaches that will curb waste-related problems in communities. Zero waste (ZW) is one of the most debated topics in waste management among policymakers in the government and private sectors. From the lens of Zero Waste International Alliance (ZWIA), ZW is defined as "*designing and managing products and processes systematically to eliminate the waste and materials, conserve and recover all resources and not burn or bury them*". The practice of ZW is the prevention of waste using different sustainable designs and systems where wastes are recovered and not by managing wastes in landfills, (Singh, 2021, pp. 3040-3073). Looking at the different styles and strategies introduced by developed economies in the west like in the Nordic region, the ZW project strongly supports waste avoidance rather than treatment and disposal to open landfills. However, in previous projects implemented in some countries in Asia and the Pacific, there were issues seen regarding the feasibility of ZW management due to existing systems that are not responsive and supportive of the framework of waste management, (Salmenperä, et al., 2021).

Furthermore, the study is a conceptual examination of the current waste management system of Bacoor, a first-class city in the province of Cavite. It starts with the view that waste is not an "end-of-life" social problem but rather waste is a primary phase in the overall hierarchical processes of resource and consumption processes of man and his environment, (Shammi, Behal, & Tareq, 2021, pp. 4087-4093). It aims to shift the current waste management system of "Plastic Ban Policy" to zero waste by developing holistic and impactful systems and solutions to the problems of wastes. As a community problem that poses a serious threat to social security and safety, waste management requires technologies to solve and address its effects. Thus, a circular economic model is highly recognized to realize the main objective of ZW management through the use of industrial symbiosis, recycling, recycling, and up-cycling, as based on the acceptable notion of zero waste or no-waste, (de Souza, Bloemhof, & Borsato, 2021, pp. 235-248). There are loopholes and challenges in the current waste management program implemented by Bacoor local government despite its active implementation of waste management ordinances across all barangays. Thus, strategic management plans are necessary in order to materialize the zero waste goals in managing waste problems, (Yoo, & Yi, 2015, pp. 673-689). This strategic management framework is essential to local governments as a foundation for the effective planning and implementation of waste management programs through the employment of community support, legislative requirements and, "stakeholder ship" approaches, (Shittu, Williams, & Shaw, 2021, pp. 549-563).

1.1 Background of the Study

For the past years, Bacoor became a significant contributor to the development of the province of Cavite. It is one of the fastest-growing cities in the country with a number of investments and economic opportunities continuing to rise and operate in the city, (Rizal, 2021, pp. 1-40). Moreover, there is also an increasing influx of people from other provinces in the city making it an option for the congested communities in Metro Manila. In a 2015 survey conducted by the Philippine Statistics Authority (PSA), Bacoor is the most populated city in Cavite with 600, 609 persons. Generally, Cavitenos are described as economically productive with 67.3 percent of the population ages 15-64 working across industries and sectors while the province's old age was at 3.98 percent and 28.8 percent were of child dependency age. The city's household population is 599, 326 while 8,811 for the number of households and with an average size of 4.0 as reported by the state agency, (Adedoyin, et al., 2021).

Furthermore, with the complexities of life in a first-class city like Bacoor, there are unnoticeable factors brought by this development that pose challenges. Expectations are high for a city that has fast-paced growth where social services from the government are evident results of the phenomenon, (Alaedini, et al., 2021, pp. 619-642). These services come from various factors such as the need to generate employment for economic empowerment, accessible healthcare for a healthy and dignified body and self, a clean environment for a balanced and sustainable ecology, and social privileges to be enjoyed

by the elderly and the majority. Bacoor local government is known as an innovative city in designing and providing programs for its residents. Its full and effective use of resources in confronting the downside effects of urbanization and congestion such as pollution is evident in how responsive the local government is, (Purnomo, 2021, pp. 240-244).

Similarly, the city waste management practice is recognized as one of the most effective policies in the country in which its initiative is a collaboration of the community and city government. In fact, the City of Bacoor was recognized by the Department of Environment and Natural Resources' Environmental Management Bureau (DENR-EMB) for being an active partner in the protection of fragile natural resources through the implementation of RA 9003, the Ecological Solid Waste Management Act of 2000, and for its sustainable practices using Best Environmental Technology and Best Environmental Practices, (Wang, et al., 2021, pp. 20-29). In 2018, Barangay Panapaan 5 was likewise recognized for its active involvement in the search for the cleanest and greenest barangays and for initiating programs and activities promoting sustainable development and environment conservation. However, there are still concerns about a more efficient and community-responsive practice of waste management in some barangays. The motive of the RA 9003 could be hailed as a landmark policy of the national government in dealing with household, industrial, and community wastes, (Chand, et al., 2021). A move by the government on acting on the serious effects and costs of waste materials that are major causes of ecological imbalance and its direct threats to public security. But, despite all these programs and efforts of the government, wastes remain a challenge to the authority and community. Improper disposal, wrong method of segregation, and ineffective recycling practice are still observed in areas where there is a lack of strict implementation of guidelines and understanding of the concept of the law, (Torkashvand, et al., 2021, pp. 173-179).

2. Objectives of the Study

This study focuses on the assessment of the zero-waste management program of Local Government Unit specifically Bacoor City, Cavite which aims to attain the following research goals:

- To be able to evaluate the effectiveness of the current waste management program of the local government
- To be able to determine the key issues and challenges of the current waste management program.
- To be able to identify the readiness of LGUs in the proposed implementation of zero waste management as an alternative program to plastic waste.
- To be able to develop a program that will strengthen LGUs capacity in implementing a more effective waste management program with the proactive participation of the community

- To be able to propose a comprehensive approach in monitoring and evaluating performance of zero waste management programs.
- To be able to establish a replicable framework using the study as an effective entry point in socio-political organizational change.

2.1 Significance of the Study

Due to the rising threats of waste materials to the lives of the people and ecosystem, various civil society groups have called the attention of key government agencies to act on the issue. This study is deemed important to all concerned institutions, groups, and sectors in society. Ethical practices in waste management call for a more involved public however, to realize such a goal, it is necessary for the government to be the frontline in the implementation of various programs that have concerns with waste-related issues. This research offers not only additional insights into the current system of waste management but a more efficient and impactful program that will guide LGUs and other concerned government agencies. Likewise, this study is an attempt in proposing a new system from solid waste to zero waste management in the community.

3. Research Design

To ensure the completion of the objectives of the study, the quantitative descriptive design was used upon conducting the research. This method involves interpreting the data collected from the criteria used in the instrument on the factors and items that are important in the assessment of the zero waste management programs in local governments. Included in the application of this method is the use of previous works and literature in order to provide sufficient quantitative evidence which shall be beneficial to the study, (Morgenstern, et al., 2021, pp. 1-14).

3.1 Population of the Study

The research employed 111 respondents who took part in the conduct of this study specifically in the data collection phase where questionnaires were distributed among these participants. They were selected through snowball technique or referral from the Office of the Homeowners Association (OHA), an organization recognized by the local government, specifically the barangay council. Also, the convenience sampling technique was utilized by the researchers based on the availability of the respondents during the actual conduct of the survey among members of the said organization, (Ghosh, & Ng, 2021).

Qualified respondents were able to meet the following criteria: male or female, residents, and homeowners of Bacoor City. The researcher provided a person with expertise in translating the English text of the questionnaire to the local dialect or Tagalog during the actual answering of the test instrument.

Table 1: Demographic Profile of Respondents

Age	**60-65**	**66-70**	**71-75**	**76-80**
	32	41	26	12
Gender	**Male**		**Female**	
	47		64	
Highest Educational Attainment	**Elementary**	**High School**	**College**	**Graduate Studies**
	5	26	68	12

The data above shows the demographic profile of respondents specifically their age, sex, and educational attainment. These 111 respondents were asked to write some personal data in the questionnaire during the conduct of the survey. On the age component, 29% or 32 is in the age range of 60-65, 37% or 41 under 66-70, 24% or 26 belong to the age bracket of 71-72, and 10% or 12 respondents belong to the age range of 76-80, (Abas, et al., 2021, May).

For the sex profile, 47 or 42% are male respondents while 64 or 58% are female. On the other hand, for the respondent's highest educational attainment, 5% are elementary graduates, 23% attained high school diplomas, 68% are college graduates, and 11% are graduate studies degree holders, (Sultana, 2021, pp. 349-366).

3.2 Data Collection

Before proceeding to the data collection, the instruments used were subjected to face and content validation which determines the validity of the tool. After the approval from the validators, the researcher initiated a pilot testing of the questionnaire before distributing it to the respondents, (Oduro-Appiah, et al., 2021, pp. 735-746).

Similarly, those who qualified as respondents received a physical or hard copy of the questionnaire which includes a letter prepared for the OHA and an informed consent letter to the respondents. Moreover, an interview with selected participants of this study was conducted by the researchers. A Focus Group Discussion (FGD) was facilitated right after the survey questionnaire was collected from the respondents. Questions asked were focused on community participation and their observation on how the local government manages and implements its programs on waste management in the city, (Oduro-Appiah, et al., 2020, pp. 115-143).

4. Result and Discussion

This part of the study presents statistical analysis and interpretation of data gathered through surveys and interviews.

Table 1: Issues of Waste Management Program

Indicators	**WM**	**I**	**R**
1. Importance of public awareness and education on waste management.	4.85	SA	1.5
2. Proper education and information campaigns on environmental protection.	4.78	SA	3
3. Importance of innovative practices on waste management.	4.67	SA	4
4. Effective rules and guidelines on responsible shopping and consumption practices.	4.22	A	8.5
5. No proper institutional set-up for solid waste management service.	3. 45	A	12
6. Poor cooperation of government agencies (DENR, CENRO, LGU, Barangay).	3.52	A	11
7. Importance of responsible household waste management.	4.85	SA	1.5
8. Restriction on plastic use and other harmful materials.	4.26	A	7
9. High garbage collection fee for domestic and industrial wastes.	4.33	A	5
10. High landfill tax and a ban on waste to landfill.	4.22	A	8.5
11. Standardized waste management policy for domestic, institutional, commercial, and trade waste.	4.32	A	6
12. Existence of waste pickers or scavengers on site.	3.86	A	10
Average Weighted Mean	**3.99**	**A**	
Standard Deviation	**0.419**		

Community groups, households, and the private sector are concerned about various issues of the waste management program of the local government. Based on the table presented, there is an average 3.99 weighted mean which was agreed by the 111 respondents who took part in this study. The top most issues on waste management are the "importance of public awareness and education" and "poor cooperation of government agencies" which were strongly agreed by respondents and marked with a 4.85 mean. Both subscales were ranked first which shows that public awareness initiatives and information campaigns on waste management are important approaches for effective program implementation. Likewise, respondents described the local government as having poor cooperation with other agencies such as CENRO, DILG, and barangay. Following the list is item number 2 or "proper education and information campaign on environmental protection" with a mean of 4. 78 and was strongly agreed by respondents. Such a component in waste management requires a proper campaign strategy that promotes appropriate practices in waste management such as recycling and segregating waste materials. Next is the subscale "importance of innovative practices on waste management" which was also strongly agreed upon and rated with a 4.67 mean. Innovative practices in waste management involve new systems and ways how to enhance the program in minimizing waste produced by industries and households. Another issue that was agreed upon is the concern on "high garbage collection fee for domestic and industrial wastes" with a mean of 4.33. Respondents perceived that LGU-accredited garbage collectors charged high amount of fees to the community. Sixth in order is the issue of "standardized waste management policy for domestic, institutional, commercial and trade waste". Respondents agreed that the availability of standardized waste management policy remains an issue of the local government. They described the current policy as inconsistent and in contradiction with the guidelines set out by the government on waste management. Another challenge of the city government on waste

management is the issue of "restriction on plastic use and other harmful materials". This subscale with a mean of 4.26 and was agreed that there are restriction concerns on the continuous use of plastic waste and harmful materials in households and business establishments, (Sebastian, & Louis, 2021).

Furthermore, subscales 4 and 10, or "effective rules and guidelines on responsible shopping and consumption practices" and "high landfill tax and a ban on waste to landfill" were both agreed by the respondents as part of the issues of the government in waste management. With a mean of 4.22, these two items which were found to be issues concerning how rules and guidelines are implemented on responsible use and segregation of plastic as part of consumers' shopping and consumption practices. Ranked 10th among the 12 subscales is the "existence of waste pickers or scavengers on-site" with a mean of 3.86 and was agreed by respondents as an issue on the local governments' waste management program. The availability of waste and garbage pickers was described by respondents as a problem due to the inconsistent garbage collection schedule of waste pickers and collection trucks in some barangays. The "poor cooperation of government agencies" was also agreed upon and found by respondents as an issue of the community and the local government. This item which focuses on the coordination of key government agencies such as CENRO, EMB, DENR, DILG, and the barangay council was found to be a major cause of the waste management program. Item number 5 with the lowest mean and agreed by respondents as an issue in waste management is the "no proper institutional set-up for solid waste management service". This subscale shows the ineffective coordination and cooperation of concerned government agencies in implementing solid waste management programs in the City of Bacoor, (Browning, Beymer-Farris, & Seay, 2021).

Issues of waste management in Bacoor City are focused on various concerns not just only among households, product consumers, and commercial establishments but even the local government. Respondents have expressed personal observations during the conduct of the interview that public awareness and information campaign initiatives are necessary for responsible household and industrial waste management practices. Restriction on plastic waste and stricter use of plastic is perceived as effective measures to curb the issue. Furthermore, respondents stressed the need for institutional and standardized waste management for all where waste materials are properly collected, recycled, and managed by key agencies and entities in the community through the efforts of the government, (Hirpe, & Yeom, 2021).

Table 2: Effectiveness of Waste Management Program

Indicators	**WM**	**I**	**R**
1. Training on correct practice of recycling	3.98	VE	4
2. Recruitment and training of solid-zero waste management staff	3.86	VE	6.5
3. Individual (household) bins system (recycling)	4.78	EE	1
4. Door-to-door garbage collection	3.88	VE	5
5. Community recycling centers and stations	3.86	VE	6.5
6. Availability of equipment for recycling	3.82	VE	8

7. Strict monitoring of concerned agencies on waste management program violators	4.04	VE	2.5
8. Active participation of community and households in the recycling of garbage for income generation	4.04	VE	2.5
Average Weighted Mean	**4.03**	**VE**	
Standard Deviation	**0.313**		

From the data gathered through the survey and field interview, the table presented shows the effectiveness of the waste management program of Bacoor City. There is an average weighted mean of 4.03 rated as "very effective" on the effectiveness level of the program implemented by the city government from household practices to garbage collection. Subscale 3 or "individual (household) bins system (recycling)" was rated as "very effective" with a mean of 4.78. This indicates the availability of garbage bins among households and establishments as part of compliance with the local government's policy on solid waste management. This was followed by "strict monitoring of concerned agencies on waste management program violators" and "active participation of community and households in the recycling of garbage for income generation" with both having a mean of 4.04 and being described as "very effective". Monitoring procedures of key agencies was observed by respondents as very effective especially on apprehending individuals who are violating waste management policies of the local government. On the other hand, recycling of waste materials like plastic was rated as very effective because of the economic and employment opportunities it offers to the local community, (Yang, & Chen, 2021).

On the other hand, the "training on correct practice of recycling" component was rated also as "very effective" with a mean of 3.98. This implies LGUs training program provided to local residents and establishment owners on the importance of proper segregation, recycling, and management of wastes. This training program involves the procedure, rules and guidelines set out by the local government which includes solid waste management. Fifth in rank is the "door-to-door garbage collection" of local government with a mean of 3.88 and rated as "very effective". This pertains to the systematic collection of garbage trucks and recognized waste collectors of the city government. Households are required to have a garbage bin where household wastes are deposited and collected during a scheduled collection in the community and barangay. Component numbers 2 and 5 or "community recycling centres and stations" and "recruitment and training of solid-zero waste management staff" were described by respondents as "very effective" with a mean of 3.88 which implies the availability of recycling facilities like centres and stations in most barangays and villages. These centres are situated in areas where waste materials that could be recycled are deposited and collected by LGU-recognized waste collectors and garbage trucks. On the manpower part of the waste management program, the city government of Bacoor provides relevant training to its employees on various matters concerning solid and zero waste management. Last in rank is the subscale "availability of equipment for recycling" with a mean of 3.82 and rated as "very effective" by the respondents. This implies the

program's availability of equipment used in the recycling of waste materials, mostly plastic wastes, (Richter, et al., 2021).

Indeed, respondents found the current system of waste management in Bacoor as very effective. Generally, the effectiveness of the program is seen in the active community involvement and participation in waste management. Individual and household recycling and proper disposal of garbage were described as very effective. Recycling centers and garbage collection were found to be very effective as well where households have shown a willingness to the government's program on waste management, (Honma, & Hu, 2021).

Table 3: Priority Issues of Waste Management Program

Indicators	**WM**	**I**	**R**
1. Availability of technology in waste management	3.80	HP	2
2. Effectiveness of solid waste management and plastic ban policy	3.78	HP	3
3. Environment-friendly treatment technology and facility	3.66	HP	4
4. Availability of material flow, funding and personnel	3.62	HP	5
5. Priority on performance monitoring and evaluation	3.60	HP	6
6. Priority of composting	3.54	HP	7
7. Priority of waste-to-energy technology	3.84	HP	1
8. Priority of landfill	3.32	HP	8
Average Weighted Mean	**3.65**	**HP**	
Standard Deviation	**0.168**		

The table above presents 8 priority issues of the solid waste management program of Bacoor City. Data shows that there is an average mean of 3.67 and all subscales were described as "high priority" by respondents. Issues under this scale include the availability of technology, landfill, personnel, and budget as well as the system of treatment and composting. Rated as the number 1 priority concern is "priority of waste-to-energy technology" or subscale 7 with a mean of 3.84. This pertains to the need of providing a facility that handles wastes and converted them to energy as an alternative source to the limited power supply in the metropolis area of Mega Manila. Second in rank is "availability of technology in waste management" with a mean of 3.80 which shows the effectiveness of waste management could be derived from the availability and readiness of necessary technology to handle the program of the local government. The next subscale is the "effectiveness of solid waste management and plastic ban policy" which was perceived by respondents as a high priority that the city government of Bacoor must be given attention. This issue involves a stricter and consistent implementation of the current local ordinance on plastic-ban in the entire city. Fourth in rank with a mean of 3.66 is the need for the issue of "environment-friendly treatment technology and facility" to be addressed by concerned parties, (Chen, et al., 2021, pp. 1-15).

Moreover, treatment facilities to be established should meet environmental standards and compliances of the city government and as much as possible, environment-friendly equipment should be built in the community. Furthermore, subscale number 4, or "availability of material flow, funding, and personnel" was ranked

sixth and was perceived by respondents as a priority issue on the proposed solid and zero waste management programs as necessary. Resources such as adequate funds, trained personnel, and systems of the program on waste management are described as priorities for the successful management and implementation of the project. Likewise, item 6 or "priority of composting" with a mean of 3.54 was perceived by respondents as an important requirement in the solid and zero waste management in the community. This indicates the need for composting as a basic practice in the proper and environmental management of waste materials. Finally, item "priority of landfill" with a mean of 3.32 was ranked last among 8 subscales that were all rated as "high priority". Respondents perceived the importance of the landfill that will be utilized by residents and the government of Bacoor City only. The availability of landfill for all waste materials collected within the city should be utilized and used by households and establishments that are living and operating in Bacoor thus, resulting in a well-managed waste management program, (Zhang, et al., 2021).

Lastly, the 8 priority issues reveal that the local government needs to confront and address the different issues on waste management. Respondents have clearly observed that resources are key requirements if a ZW management is to be implemented. The availability of technology, equipment, and material flow is necessary to handle and manage if ever a ZW management is to be introduced in the city. Likewise, composting and the conversion of waste to energy were also observed to be a high priority in the government's effort on waste management. Included in the list of priorities as perceived by the respondents is the need to execute a performance and evaluation system that will assess the impacts of the said system, (Saja, Zimar, & Junaideen, 2021).

5. Project Framework

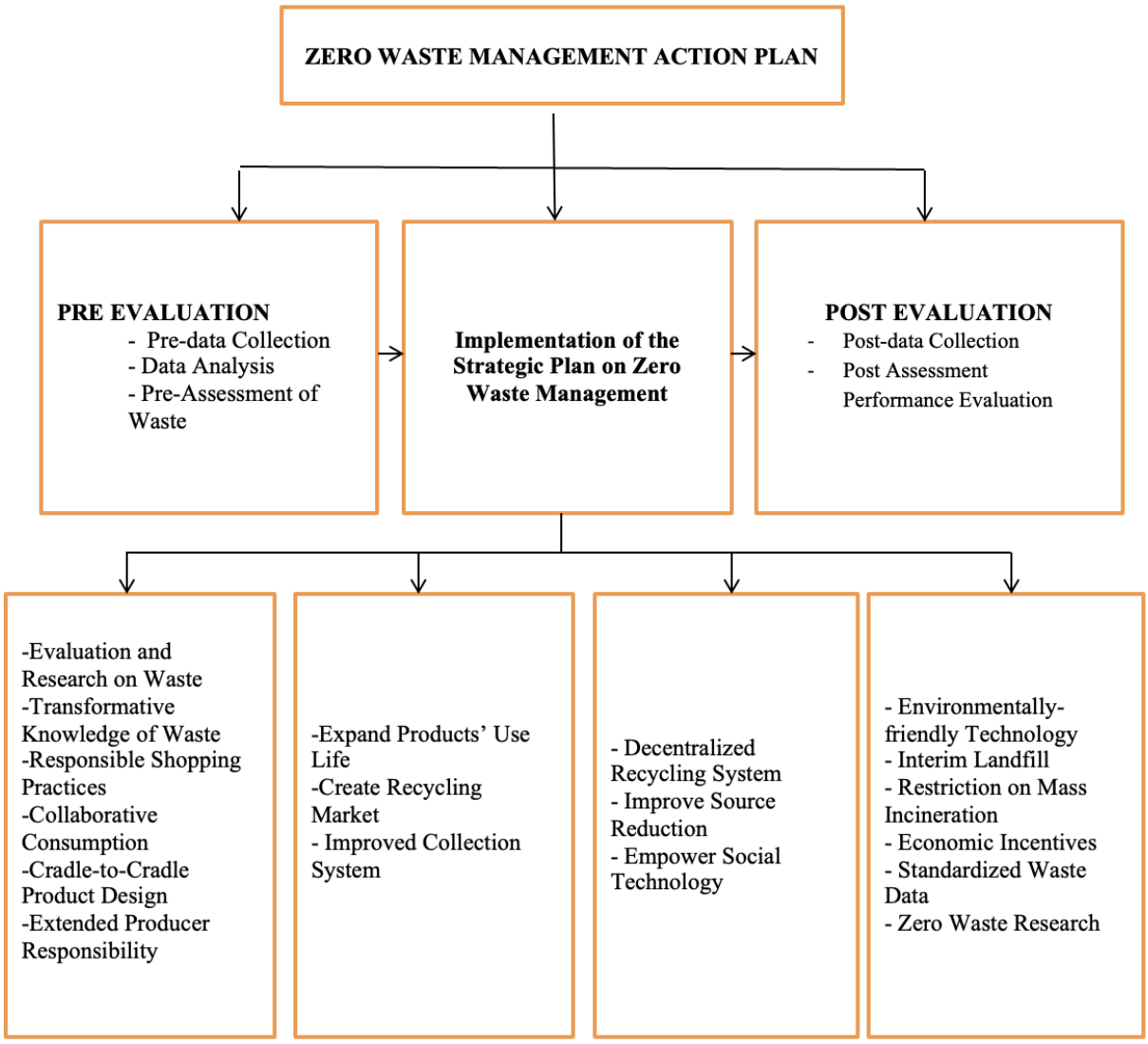
This study introduces two (2) approaches that could be used by the local government of Bacoor City. The first policy framework is Strategic Zero Waste Management which is composed of three major phases: pre-evaluation, implementation stage, and post-evaluation. The second framework that could be used is the Sustainable Development in Solid Waste Management Through Community Relations which offers insights into the importance of community involvement as a strategy for dealing with issues and problems on wastes.

A. Strategic Zero Waste Management Framework

This proposed strategic framework which was drawn from the lens of Uz Zaman (2017) of the SA Research Centre for Sustainable Design and Behavior at the University of South Australia will be adapted in the implementation of ZW management program in Bacoor City and will concentrate on three key phases namely: pre-evaluation, strategic implementation of the project, and post-evaluation. Under pre-evaluation, a study will be undertaken to determine the current waste management system used by the local government which includes actions on data collection, analysis, and assessing the waste

produced and generated in the entire city. This will be followed by the implementation of the actual system that will be utilized as an alternative to the current program used. Parts of stage number 1 on the ZW management strategic approach are evaluation and research on waste, transformative knowledge of waste, responsible shopping practices, collaborative consumption, cradle-to-cradle product design, and extended producer responsibility. On the other hand, the second stage of the implementation phase involves actions such as the expansion of products' use life, the creation of a recycling market, and the improvement of the collection system. The third stage of the implementation phase is focused on strategies like decentralized recycling systems, improve source reduction, and empowering social technology. Lastly, the implementation of ZW management plan includes key actions on environmentally friendly technology, interim landfill, restriction on mass incineration, economic incentives, standardized waste data, and zero waste research.

Figure 1: Strategic Framework for Zero Waste Management by Zaman (2017)



For the project's sustainability, this ZW management system will utilize post-evaluation strategies which require post-data collection, post assessment and performance evaluation.

B. Sustainable Development in Solid Waste Management Through Community Relations Framework

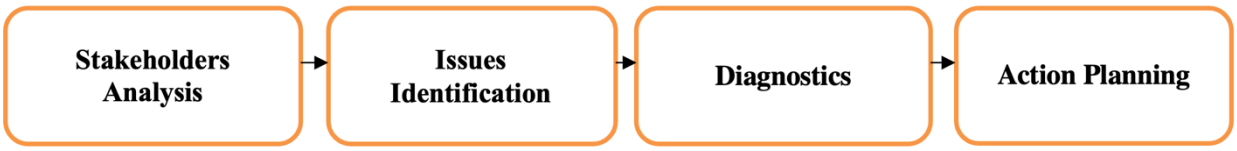


Figure 2: Sustainable Development in Solid Waste Management Through Community Relations Framework by Martinez (2018)

As a proposed solution, there is a need, first and foremost, to reduce the waste generation in each locality through the successful holistic implementation of a solid waste management program. By segregating waste according to type, biodegradable and recyclable wastes can be set aside for composting and diversion of recyclables, respectively. To achieve a paradigm shift in terms of the public's attitude towards and worldview of waste disposal in general Moving Towards Sustainable Development through Proper Solid Waste Management," was fostered, an idea that solid waste management is the entry point for sustainable and long-term economic growth. This theory on waste management for sustainable development with the involvement of the community covers four (4) phases. First is the stakeholder's analysis which shows the key participants and actors involved in the policy-making and implementation. This is followed by issues identification which is drawn from the responses of the participants involved. The third phase is setting the diagnostics based on issues identified by the stakeholders and lastly, is the development of action planning.

6. Stakeholder Analysis

Key stakeholders involve public sector representatives from municipal officials, municipal employees, barangay officials, public school teachers**,** local businesses like canteen owners, cafeteria managers, and garbage collectors**.** Other participants include officers of the *Pantawid Pamilyang Pilipino Program* (4Ps), youth organizations, residents and private organizations.

A. Issues Identification

Some are common issues in the solid waste management program of the local government.

1) Lack of cooperation and coordination between the Municipal and Barangay officials in implementing an effective solid waste management program.

2) The political risks involved in the strict implementation of solid waste management practices.
3) Very little private sector participation, i.e., the ratio between the LGU officials and private sector representatives during the seminar was almost 2:1.
4) Other issues – garbage collection schedule, the municipal garbage trucks not collecting from all households, a boarding house whose waste has been left uncollected for several weeks, customers of canteen operators who need help in educating their buyers or consumers, among others.

B. Diagnostics Based on the Issues Identified

a) **Lack of cooperation and coordination between the Municipal and Barangay officials.** A major cause for this situation is miscommunication or lack of communication between the Municipal and barangay officials. Open minds are encouraged among participants and actors to resolve the problem and to seriously undertake a successful waste segregation program in the Municipality. It is important to highlight this concern because, some officials may have already been equipped with the "content" or knowledge of what the law says, the sheer failure to implement the same was precisely part of the "process" that is hoped to train these leaders in this community relations approach.
b) **The political risks involved in the strict implementation of solid waste management practices and very few private sector participants.** Another issue is the mistaken notion of a weakened political base as a result of strictly implementing waste segregation among the constituents. The idea of compelling them to segregate at-source is tantamount to breaking bad habits that may result in reaping enemies in the process before tangible benefits can actually be felt. This perception is especially prevalent among barangay officials. Minimizing the political risks in the community, volunteers from the private sector, particularly those from the grassroot and marginalized are pre-organized like the senior citizens, solo parents, out-of-school-youths, barangay health workers, and persons with disabilities and trained to become the Ecoguardians. Stakeholders from the private sector, especially from the grassroot areas, are said to be more effective disseminators of proper solid waste management practices and ideas as they have no political careers to consider in the community
c) **Other issues –** garbage collection schedule, municipal garbage trucks that do not collect from all households, a boarding house whose waste has been left uncollected for several weeks, and some business establishments, like canteen operators who need help in educating their buyers or consumers.

C. Action Planning

1) Deployment of the trained leaders to the different households for the conduct of an IEC should be immediate and consistent before enthusiasm wanes. For this purpose, the municipal government should prioritize this in its programs and

ensure its sustainability by reaching out to the barangay officials more often, coming up with a performance evaluation program per barangay, and tapping more members of the private sector as a parallel political base.

2) Tap schools and universities in the territory to ensure that solid waste management practices are being observed by the students, teachers, and school administration. The goal is to make solid waste management/environmental protection a moral value and to include the same in the curricula, not only in theory but more so in practice.
3) Distribute educational pamphlets and hold fiestas and other celebrations with themes that are consistent with environmental protection, especially solid waste management.
4) Empower the community by organizing the private sector and training them as Eco guardians. This move may even prove an effective tool in achieving a paradigm shift among the electorate when they are able to discern better which candidates have the public's interests at heart. In other words, it will pave the way to producing a more enlightened electorate.
5) Maximize media exposure to solid waste management practices.
6) To help minimize waste generation, designate a composting facility in different zones throughout the municipality. As reported recently, the EMB has allowed the Municipality to utilize an area within its old open dumpsite as a composting facility and this is a huge step toward our goal of waste reduction.
7) Inspection of all materials recovery facilities in barangays and assessment of the feasibility of already utilizing the same. For barangay MRF's, the design should be simple and user-friendly for the constituents. There is no need to allocate a huge budget for barangay MRF's.
8) Designate a main MRF per zone or area throughout the municipality, which may also serve as a transfer or pickup station where further segregation may be held prior to collection and final disposal at sanitary landfill facilities.

D. Project Management

Objective	Major Activities	Expected Result and success indicators	Unit or Specific Individual responsible	Time Frame	Obstacle/ Constraints	Preventive or Contingency Action
To be able to evaluate the effectiveness of the current waste management program of the local government To be able to determine the key issues and challenges of the current waste management program.	Pre-Evaluation Creation of a Technical Working Group (TWG) that will present on the study conducted regarding the effectiveness of the current waste management program of the local government. Conduct interview, survey and data evaluation on how the government and households in Bacoor comply and respond to the ordinance.	Determining which part of local ordinance has issues and concern from the households' practices, business establishment compliance, and implementation of the policy by key government agencies.	Local Government Unit of Bacoor (CENRO) Environmental Management Bureau (EMB) Homeowners Associations (all villages and subdivisions) Barangay Councils	Last quarter of 2019 (November to December)	Limited resources (budget and manpower) and support from key agencies and organizations Time constraint due to the availability and cooperation of respondents in the study Instrument validation	Coordination with the local government and barangay council as well as homeowners association
To be able to identify the readiness of LGUs in the proposed implementation of zero waste management as an alternative program to the plastic waste.	Evaluation and assessment of the LGUs capability and capacity of introducing a ZW management program in the city. Designing of programs based on best practices observed among cities and communities that have implemented ZW.	There is a need to redirect and shift the current plastic-ban policy to ZW system. Incorporating the designed program/project to the priorities of the city government	Local Government Unit of Bacoor (Planning and Development, CENRO, Finance) EMB Homeowners Associations (all villages and subdivisions) Barangay Councils	January 2020	Possible problem: Lack of participation and cooperation of key agencies and organization (Brgy .Councils, homeowners) Budget availability	Seek support from LGU and if possible, national government or international institutions (ADB, USAID)
To be able to develop and propose a holistic zero waste management system that will strengthen LGUs capacity in implementing a more effective program with the proactive participation of the community Post Evaluation	Developing of a project feasibility study and submit the proposal package to the funding agency. Creation of a team that will provide trainings and necessary interventions on how to strengthen LGU and the community as part of the project implementation	Successful integration of ZW management system to the priority projects of the local government Highly organized, systematic and impactful ZW management.	LGU EMB Other interest groups (stakeholders)	February 2020 onwards	Project sustainability due to budget and sufficiency of funds	Seeking support from multilateral funding agencies that have interests on this kind of project.

7. Ethical Considerations

Ethical guidelines in this study were observed by the researchers. From the initial and selection phase up to the final writing phase, ethical considerations were strictly followed. Securing necessary permits to hold surveys and interviews from respondents underwent proper procedure through the assistance of the barangay council, homeowners associations, and the local government of Bacoor City. Likewise, data collected were treated with utmost confidentiality as this will be used for this study only and this was discussed with the respondents. During the conduct of the survey in an uncontrolled environment, respondents were given orientation on the nature, purpose, and objectives of the study as well as their roles. They were not forced to answer the survey questionnaire and coaching was not provided during the actual answering of the said instrument.

8. Participating in Tripartite Agencies

- Ayuyang under its corporate name, **Buong Bayan Magkaisa** (BBM), Volunteerism for Peace and Poverty Alleviation, Incorporated, was organized in December 2010 under SEC # CN 201029628. The BBM hopes to initiate holistic approaches to political education across the Philippine archipelago. It has been operating since then to cater to the needs of politicians with advocacies similar to the organization. This study was conceptualized under the BBM vision, mission, and goals with the approval of the Board of Directors.
- **Office of Senior Citizens Association** - Bacoor chapter in coordination with the office of the Honorable Strike Revilla and Mayor Lanie Revilla ensured the participation of the resident-respondents in providing a defensible and reliable pre-test of the questionnaires. The conduct of the survey was initiated by the authors, Atty. Irineo F. Martinez, Jr., Ph.D. Chief of Staff of Senator Ronald Dela Rosa and Professor Rex Llonora, faculty of the Philippine National Police Academy and a freelance researcher in their personal capacities.
- **Dalta-Jonelta Foundation, Inc**. provided technical research and a venue for regular meetings of the researchers. It will also be involved in providing medical assistance as entry points in the contiguous or target communities.

Conflict of Interest Statement
The authors declare no conflict of interest.

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