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Municipal solid waste management program implementation in the Philippines: Basis for an intervention program

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Abstract

The study scrutinized the implementation of the solid waste management program components and determines the gaps of implementation in Maddela, Quirino in the Philippines. From a survey of 483 respondents who are household and ESWM implementers, the study revealed that the extent of implementation of the solid waste management program in Maddela, Quirino, though it shifted from Partially Implemented (PI) to fully Implemented (FI) ESWM program implementation in the pass three (3) years were hindered by problematic issues of inadequate efforts to organize community-based ESWM programs, lack of financial and human resources to implement programs, and failure to strictly implement the basic policy of “No Segregation, No Collection”. The problems that limit the implementation have relation to the LGUs utilization of its budget or finances, and the capability of its personnel, and adequacy of equipment to implement the ESWM Components and Sub-components. Moreover, the hindrances could be overcome by heeding the proposed most important measures which were directed to enforcement or strict implementation of policy, provisions of ESWM facilities, organizing barangay-based ESWM implementing structures, and involving the private sector in recycling and materials recovery. The study recommends that the LGU can sustain or enhance its extent of implementation by strengthening its organization structure, capacitating its implementing unit, and providing adequate financial support to its implementing agencies. That in implementing the proposed measures will improve/intensify the extent of ESWM implementation in municipality of Maddela.

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Introduction

The problem of Solid Waste Management confronting the local government units (LGUs) in the Philippines are becoming more complex as population and local economies grow. LGUs need to continually review and map out short-term and long-term solutions to effectively deal with them (Coracero *et al.*, 2021). Solid waste disposal is proving to be a complex and controversial issue and the LGUs are faced with limited options to address it as the mandatory provision of the law already spell out what they have to do (Ripa *et al.*, 2017). Their biggest challenge is to come up with solid waste management and pollution control strategies that would reduce the wastes released to the environment. (*Solid Waste Management Mapping Out Options and Solutions At the Local Level; Service Delivery Impact: Resource Book for Local Government*)).

The implementation of R.A. 9003 or the Solid Waste Management Act of 2001 provided the necessary framework and institutional mechanisms for the proper treatment of waste and waste disposal (Bagolong, 2017). The law sets the appropriate guidelines for waste minimization and introduction of proper treatment measures (i.e. segregation, transport, collection, disposal, recycling procedures) enhanced through the promotion of national research and development programs. As provided in the law, together with the creation of the National Solid Waste Management Commission, is the creation of Local Government Solid Waste Management Plan which is strategically and geographically enforced in the local government units (LGUs) for the implementation of safe and sanitary management plans for solid waste treatment in the respective areas (Acosta *et al.*, 2012).

In a national setting, like other developing countries, wastes management has become a major problem in the Philippines (Atienza, 2011). Solid waste management is the one thing just about every city government provides for its residents. While service levels, environmental impacts and costs vary dramatically, solid waste management is arguably the most important municipal service and serves as a prerequisite for other municipal action.

The global impacts of solid waste are growing fast. Solid waste is a large source of methane, a powerful GHG that is particularly impactful in the short-term. The recycling industry, with more than two million informal waste pickers, is now a global business with international markets and extensive supply and transportation networks. Locally, uncollected solid waste contributes to flooding, air pollution, and public health impacts such as respiratory ailments, diarrhea and dengue fever. In lower income country cities solid waste management is usually a city's single largest budgetary item (Nasir *et al.*, 2018).

The LGU of Maddela have started implementing RA 9003 way back year 2004 where it prepared a 10-year ESWM Plan covering the planning the period 2005 to 2015 with the assistance of the ECO-GOVERNANCE NGO. The plan was submitted to the National Solid Waste Commission (NSWMC) but was not fully approved by the agency. However, the LGU implemented other provisions of the plan, in order to comply with the mandated by RA 9003, such as Waste Analysis and Characterization Study (WACS), closure of open dumpsite, initiated the establishment of Sanitary Landfill, construction of Material Recovery Facility, Segregation of waste and waste collection at the urban center- the first collection area of the LGU.

Why are problems on waste management continue to grow and persist? Are there mandates that are overlooked or not implemented in the local units? What are the issues and problems besetting the implementation of waste management? Is the LGU compliant with the mandate of RA 9003 and is diverting wastes from its final disposal? Or does the LGU in the right track of implementation? The preceding questions agitated the mind of the researcher, thus a study on the extent of implementation of ESWM in the municipality of Maddela, Province of Quirino.

This study looked into the Ecological Solid Waste Management Plan (ESWMP) of the municipality of Maddela in the Province of Quirino and provided

assessment on its implementation in accordance to the mandate of R.A. 9003. The study scrutinized the implementation of the solid waste management program components and determine the gaps of implementation and in the end describe the opportunities that would enhance implementation in order to attain its sustainability. While the ESWM system is geared towards the establishment of a sustainable waste management, along the line of its elements and processes, there the pressing need to be closely examine the expanse of implementation area, as such in the whole municipality. It is at this point, where the extent of implementation was assessed in order to identify gaps and opportunities to discuss and provide solutions to issues and problems arising during the phase or period of implementation and in order to attain sustainable implementation.

Materials and methods

Research Design

This study is guided by a quantitative research design. Specifically, this study employed the descriptive method to carry out successfully the objectives stated in this dissertation. A survey was conducted by the researcher to gather pertinent data and were treated using descriptive and inferential statistics. According to Scheuren (2004), a survey is a general view, examination, or description of people's attitudes, impressions, opinions, expectations, beliefs, and behaviors on specific facts.

Locale of the study

It was conducted at the Municipality of Maddela which lies at the northeastern part of the province of Quirino. It is about 62 kilometers away from Santiago, Isabela and approximately 31 kilometers from the capital town of Quirino. It lies on the meridians of 16° 21' 35.52" N latitude and 121° 40' 57.18" E longitude.

Respondents and Sampling Procedures

Meanwhile, the main respondents in the gathering of data in the study are divided into two groups the Households and ESWM implementers. A total of 483 respondents were engaged providing information that

are needed in the study. The Households and implementers respondent were chosen from 26 barangays out of 32 barangays of the LGU. The data or information gathered were analyzed using the frequency method to describe the general extent of implementation. The information gathered from secondary data, were used to describe the status of implementation, and the existing capability and potentials of the LGU in implementing SWM programs.

Analysis of Data

The data or information gathered is analyzed using the frequency method to describe the general extent of implementation, and ranking tool to describe the preferred programs and intervention for Solid Waste Management implementation. The information gathered from secondary data, were used to describe the status of implementation, and the existing capability and potentials of the LGU in implementing SWM programs.

Results and discussion

As regards to the extent of implementation, Table 1 shows the Mean assessment of the two groups of respondents of the extent of implementation of the ESWM Program during the past three-year period (2016-2018) in all sampled Barangays in the Municipality of Maddela. The study data imply the respondents are aware on the extent of implementation of the solid waste management components (Waste Segregation and Storage, Waste Processing and Resource Recovery, Collection and Transport of Solid Waste, Disposal of Solid Waste, Prohibitions and Penalties). The respondents reported partially implemented in the past two years (2016 and 2017). However, respondents are articulate/have showed awareness that the ESWM programs were fully implemented in 2018. This is manifested in the annual program mean (APM) for both household and implementer respondents from 1.96 and 2.17 APM (Partially Implemented) for 2016 and 2017 respectively, to 2.54 APM (Fully Implemented) for 2018. The data imply that there is a progressing scale or extent of implementation in the past three years in each of the Component and corresponding Sub-component of ESWM Programs.

Table 1. Mean assessment of the two groups of respondents of the extent of implementation of the ESWM Program during the three-year (2016-2018) period in all Barangays in the Municipality of Maddela.

ESWM Component	Program Sub-Component	Year						Row Mean	Adjectival Value
		2016		2017		2018			
		Implementor	Household	Implementor	Household	Implementor	Household		
1. Waste Segregation and Storage (WSS)	1. Households practice segregate waste at-source	1.98	1.95	2.27	2.21	2.75	2.80	2.33	PI
	2. Households practice waste reduction	1.95	1.92	2.20	2.20	2.64	2.72	2.27	PI
	3. Wastes are segregated into Bio-degradable, Recyclable, Residual, Special Waste.	1.98	1.94	2.25	2.23	2.74	2.79	2.32	PI
	4 Households have four (4) waste receptacles for Bio-degradable, Recyclable, Residual, Special Waste.	1.96	1.90	2.24	2.19	2.73	2.77	2.31	PI
	5. Establishment have notified the workers, employees, and entities working of the requirement of segregation in their premises	2.02	2.06	2.25	2.22	2.67	2.67	2.32	PI
	Component Mean	1.98	1.95	2.24	2.21	2.70	2.75	2.31	PI
	Adjectival Value	PI	PI	PI	PI	FI	FI	PI	
2. Waste Processing and Resource Recovery (WPR)	1. The LGU have established MRF for final sorting and storage, recycling/composting	1.98	1.92	2.15	2.13	2.50	2.56	2.21	PI
	2. Presence of Barangay MRF for final sorting and storage, recycling/composting	1.96	1.77	2.15	2.03	2.49	2.53	2.18	PI
	3. Income generated from operation of MRF shall accrue to Solid Waste Management Fund	1.86	1.78	2.05	2.02	2.39	2.37	2.10	PI
	4. Renovation of MRF building.	1.85	1.84	2.01	2.04	2.24	2.35	2.05	PI
	5. The barangay have organized Solid wastes management committee.	2.09	2.08	2.24	2.22	2.59	2.69	2.31	PI
	Component Mean	1.95	1.88	2.12	2.09	2.44	2.50	2.17	PI
	Adjectival Value	PI	PI	PI	PI	FI	FI	PI	
3. Collection and Transport of Solid Waste (C&T)	1. The barangay will collect waste within the brgy.	1.92	1.85	2.19	2.09	2.60	2.49	2.22	PI
	2. The LGU will collection waste at the Business Central Districts	1.94	1.94	2.20	2.12	2.49	2.36	2.20	PI
	3. The LGU will provide collection assistance to barangays	1.85	1.92	2.12	2.13	2.49	2.41	2.15	PI
	4. the barangay implement “No Segregation, No Collection” Policy	1.90	1.94	2.14	2.12	2.41	2.53	2.16	PI
	5. Residual and Special Wastes are transported or brought directly to the Disposal Site (Sanitary Land Fill, etc.)	1.91	1.98	2.21	2.16	2.54	2.50	2.22	PI
	6. Wastes are brought out for collection during collection schedule/time only and violation of anti-littering provision of ordinance.	1.90	1.96	2.19	2.15	2.60	2.48	2.23	PI
	7. Setting out of waste not during collection time is a violation of anting littering ordinance	1.86	1.92	2.16	2.13	2.49	2.43	2.17	PI
	8. All wastes are brought out and stored in a properly sealed receptacles during collection time	1.90	1.88	2.15	2.10	2.54	2.48	2.19	PI
	9. Uncollected wastes are reported at the barangay collection team.	1.89	1.93	2.14	2.15	2.53	2.53	2.19	PI
	Component Mean	1.90	1.93	2.17	2.13	2.52	2.47	2.19	PI
	Adjectival Value	PI	PI	PI	PI	FI	FI	PI	

ESWM Component	Program Sub-Component	Year						Row Mean	Adjectival Value	
		2016		2017		2018				
		Implementor	Household	Implementor	Household	Implementor	Household			
4. Disposal of Solid Waste (DSW)	1. The LGU have closed its open/controlled dumped	1.95	1.93	2.14	2.12	2.41	2.45	2.17	PI	
	2. The LGU have and operating Sanitary Landfill.	2.08	2.19	2.24	2.35	2.58	2.55	2.31	PI	
	3. Disposal Facility have waste treatment facility (leachate tanks)	1.98	2.09	2.14	2.28	2.72	2.53	2.29	PI	
	4. Only residual wastes are disposed at SLF cell.	1.99	2.11	2.13	2.30	2.36	2.48	2.19	PI	
	5. No burning policy is implemented in the barangay	2.02	2.02	2.20	2.13	2.56	2.55	2.26	PI	
	Component Mean	2.00	2.07	2.17	2.24	2.53	2.51	2.24	PI	
	Adjectival Value	PI	PI	PI	PI	FI	FI	PI		
	5. Prohibitions and Penalties (PP)	1. Littering, throwing, dumping of waste matters in public places, such as, but not limited to roads, sidewalks, canals, esteros, or parks, and establishment.	1.99	2.10	2.18	2.21	2.53	2.59	2.25	PI
		2. Non-segregation of wastes	1.98	2.04	2.17	2.16	2.53	2.50	2.23	PI
		3. Scavenging or unauthorized collection in designated segregation containers or areas.	1.96	1.92	2.11	2.08	2.47	2.42	2.17	PI
4. Uncovered solid Waste		1.93	2.01	2.12	2.14	2.49	2.45	2.19	PI	
5. Solid waste shall be brought out during collection time only		1.99	1.96	2.23	2.09	2.59	2.44	2.25	PI	
6. Burning of wastes		1.96	2.10	2.13	2.23	2.58	2.53	2.24	PI	
7. Dumping, burying of wastes along bodies of water		1.99	2.12	2.17	2.22	2.52	2.48	2.24	PI	
Component Mean		1.97	2.02	2.15	2.15	2.53	2.46	2.22	PI	
Adjectival Value	PI	PI	PI	PI	FI	FI	PI			
Annual Program Mean	1.96		2.17		2.54		2.23			
Adjectival Value	Partially Implemented		Partially Implemented		Fully Implemented		Partially Implemented			

Note: Scale: 1-1.66- Not Implemented; 1.67-2.33- Partially Implemented; 2.34-3.00 Fully Implemented

The data in table 1 coincide or could have attribution with the respondents attendance to trainings, Seminars, Orientations on ESWM programs in the same year 2017 to 2018 and the duration of respondents trainings, seminars, orientation (Table 12). Moreover, the data were corroborated by respondents who attended trainings, seminars, orientations, that were conducted by the LGU agencies, and the much better budget distribution in 2017 and 2018.

The following information were gathered in the Environment Office related to the extent of implementation on the different Components and sub-components covered in the study:

1. In the case of Waste Segregation and Storage (WSS), the result of monitoring and evaluation (M&E)

conducted by the Municipal LGU for 2017 and 2018 have showed improvement of compliances of households in every barangay on Solid Waste Management (SWM) basic practices, such, segregation at-source, waste segregation into Biodegradable, Recyclable, Residual, and Special waste coupled with the presence of operational and functional four (4) receptacles for Bio-degradable, Recyclables, Residual, and Special wastes, practice of “No burning of Waste” policy, practice Tapat ko, Linis ko, backyard composting, and community involvement (see M & E Tools, Annex 2). The result of LGU M & E for 2017 and 2018 as shown below parallels the shift of the extent of implementation from partially implemented (PI) in 2017 to Fully Implemented (FI) in 2018. That households and barangays have increased compliance on ESWM Program.

Table 2. Comparative Percentage of Barangays Compliance Level by Year (M&E – 2017 - 2018).

Year	Low Compliance	Medium Compliance	High Compliance	Very High Compliance
	<50%	50% to 70.9%	71% to 85.9%	86% to 100%
2017	61%	27 %	6%	6%
2018	13%	47%	31%	9%
Increase (+) /decrease (-)	-9.84%	74.1%	417%	50%

Notes

Low Compliance

Less than 50 percent of the average points earned by the barangays of LGU in compliance with the set indicators on facilities and practices, and barangay organizational/institutional requirements.

Medium Compliance

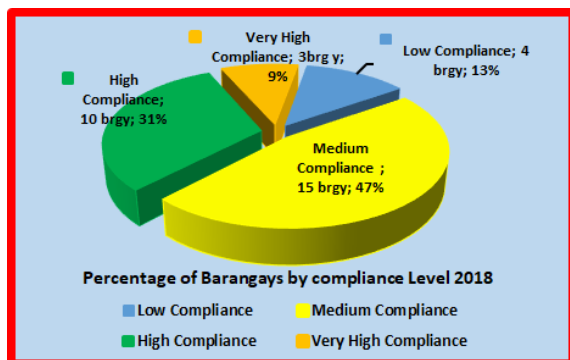
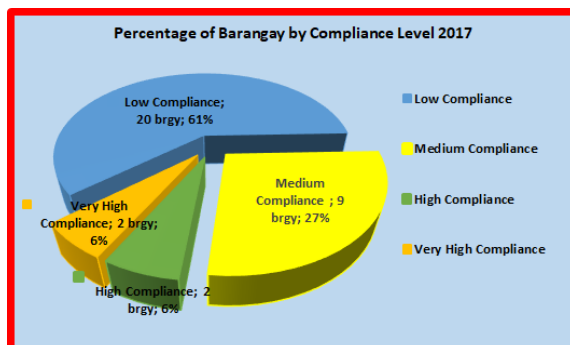
50 to 70.9 percent of the average points earned by the barangays of LGU in compliance with the set indicators on facilities and practices, and barangay organizational/ institutional requirements.

High Compliance

71 to 85 percent of the average points earned by the barangays of LGU in compliance with the set indicators on facilities and practices, and barangay organizational/institutional requirements.

Very High Compliance

86 to 100 percent of the average points earned by the barangays of LGU in compliance with the set indicators on facilities and practices, and barangay organizational/institutional requirements.



2. In the case of Waste Processing and Resource Recovery (WPRR), the LGU has a Central Materials Recovery Facility which was located at the Sanitary Landfill Site. Though it is operational since 2016, it is not operated as income generating facility of the LGU

since the materials recovered by waste pickers are sold by them to junk buyers.

Table 3. Number of Barangays with Materials Recovery Facility by Year.

	2016	2017	2018	2019
Number of Barangays with MRFs.	5	5	14	3
Cumulative Number of Barangays with MRFs	5	10	24	27
Percentage to Total Barangays	15.6	46.9	75	84

Source: MENRO report to Regional Office, EMB RO2; Inventory of Barangays with MRFs.

During the scope of the study, the LGU also has encouraged the barangays to establish their own material recovery facilities and to practice final sorting of segregated wastes that are collected from households institutions and establishment. The corollary to IEC programs of the LGU on the establishment of MRFs in every barangays (10 Year ESWM Plan IEC), are the apparent increase of barangays with Materials Recovery Facilities as shown in the table 3 which further indicate that the extent implementation from Partially Implemented (PI) to Fully Implemented (FI) in 2017 to 2018, and

the growing numbers of barangays with MRFs, as reported by the Local ENRO, have connection (See Annex 3. List of barangays with MRFs).

3. With regard to the ESWM Component Collection and Transport of Wastes, the household and implementer respondents reported Partially Implemented (PI) from 2016 to 2017, but Fully Implemented (FI) in 2018. The report on the nine (9) sub-components means that the municipal and barangays have implemented the following:

- a. “No segregation, No collection” of Wastes in the barangays;
- b. The barangays will collect their wastes;
- c. The barangays are aware that setting out of waste not during the collection schedule is a violation of Solid Wastes Ordinance;
- d. The LGU is providing assistance to barangays in their collection activities, and residual and special shall wastes are transported to the disposal site;
- e. The LGU is collecting waste in the public market;

f. Uncollected wastes are reported to the collection team.

As regards to barangay compliance on Waste implementation, there are 27 or about 84.4 percent of the total barangays of the LGU that have established collection system or scheme. The barangays are responsible in the collection of recyclables and bio-degradable materials/waste. The Municipal Ten (10) Year SWM Plan 2016 – 2025 (7.2.7 Segregated Collection of Residuals, Plan for Increasing Collection Coverage), stipulated the target of eleven (11) barangays that will be organized to have a collection system from 2016 to 2025. However, the present implementing unit (MENRO) have already organized 27 or 84.4 percent of barangays collection system/scheme and the LGU have surpassed the target as shown in the fig. below. The trend in the data suggest a relation between the adjectival value of the extent implementation and the actual programs implemented, such as provision of facilities, enforcement of policies and mandates, by the LGU and barangays.

Table 4. Number of barangays with Collection System, by year.

	2016	2017	2018
Number of Barangays that have Established Collection System	3	10	14
Cumulative Number of Barangays	3	13	27
Cumulative Percentage of barangays	9%	41%	84.4%

Source: MENRO Annual Reports; Ten (10) Year SWM Plan 2016 – 2025.

4. As regards to Disposal of Solid Wastes, the household and implementer respondents reports Partially (PI) Implemented, from 2016 to 2017, and Fully Implemented (FI) in 2018. This means that the respondents have familiarity or complete awareness about the presence and status of facilities, such as operational Sanitary Landfill, waste treatment facilities in the SLF, closed controlled dump, and the disposal of only residual wastes at SLF. Moreover, the implementation of “No burning of Wastes” policy was finally reported as fully implemented (FI) in the barangays.

Anent to the Disposal of Solid Wastes component and sub-component, the LGU have closed its open/controlled dump way back 2013 and had operated its sanitary landfill in 2014 with waste treatment facilities (Ten (10) - Year SWM Plan 2016 –

2025). The LGU is accepting only residual wastes to be disposed to the SLF. However, the perceived extent of implementation could be linked to the result of the continuing Information, Education, Communication (IEC) campaign by the LGU and barangays.

5. As regards to the Prohibitions and Penalties (P&P) components of ESWM implementation, the household and implementer respondents are very articulate in reporting Partially Implemented (PI) in 2016 to 2017 but Fully Implemented (FI) in 2018. This means that the prohibited acts of RA 9003 and the Municipal ESWM Ordinance were implemented in the LGU. Corroboratively, the MENRO conducted trainings for ESWM Auxiliary Enforcers which was participated by barangay officials and barangay tanods, and MENRO staff and were deputized by the Local Chief Executive through a deputation order.

On the other hand, the MENRO have recorded apprehension of violators, Issue Notices of Violation, and settlement of fines and penalties in connection with the Prohibitions and Penalties of the Municipal ESWM Ordinance.

The fig. below show the status of implementation of the Prohibitions and Penalties component of ESWM program implemented by MENRO. The data supports the respondent assessment on the extent of implementation of ESWM program as LGU have carried out its enforcement mechanism. The apprehensions were executed by trained and deputized Auxiliary Enforcers, and the Notices of Violations were issued by Regular Enforcers of the MENRO.

The observed violations of Municipal ESWM Ordinance were reported by barangay official, private individual, and basura patrollers in the LGU.

Nature of Enforcement	Number of Violation by Year		Remark
	2017	2018	
Apprehension (Issued Citation Tickets)	54	23	Violation of Mun. ESWM Ordinance
Notices of Violations Issued	8	14	Violation of Mun. ESWM Ordinance

Source: MENRO 2017, 2018 Annual Accomplishment Reports

As regards to the extent of implementation of ESWM components and sub-components by year and group of respondents. The following table showed the trend

or shift of the extent of the implementation of every ESWM sub-component by year, and by respondents. The extent of implementation as expressed in adjectival value of partially implementation (PI) in 2016 to 2017 had shifted to Full Implementation (FI) in 2018. The respondents were aware that the implementation of solid waste management are partially implemented from 2016 to 2017 but were articulate that a full implementation were on-going in 2018. The data trend imply a progressing extent of implementation and are common to all the ESWM components and Sub-Components from 2016 to 2018 for both Household and Implementer Respondents.

As regards extent of implementation in each barangay for the past three (3) years 2016, 2017, and 2018, the fig. 15 showed that there is only one barangay or four (4) percent of the sampled barangays whose respondents reported that ESWM Programs are Not Implemented (NI) in 2016, 2017, and 2018. There are 12 percent of the sampled barangays reported that ESWM programs are Not Implemented (NI) in 2016 and 2017 but Partially Implemented (PI) in 2018; Eight (8) percent reported Not Implemented (NI) in 2016 but Fully Implemented (FI) in 2018; 16 percent of the sampled barangays reported Partially Implemented (PI) in 2016, 2017, and 2018; 32 percent reported Partially Implemented (PI) in 2016, 2017 but Fully Implemented (FI) in 2018; and 28 percent of the sampled barangays reported Fully Implemented (FI) in 2016 up to 2018.

Table 5. Extent of Implementation of ESWM Components and Sub-components by year and Group of Respondents (Households and Respondents).

ESWM Component	Sub-component	2016		2017		2018	
		HHs	Imp	HHs	Imp	HHs	Imp
1. Waste Segregation and Storage (WSS)	1. Households practice segregate waste at-source	PI	PI	PI	PI	FI	FI
	2. Households practice waste reduction	PI	PI	PI	PI	FI	FI
	3. Wastes are segregated into Bio-degradable, Recyclable, Residual, Special Waste.	PI	PI	PI	PI	FI	FI
	4 Households have four (4) waste receptacles for Bio-degradable, Recyclable, Residual, Special Waste.	PI	PI	PI	PI	FI	FI
	5. Establishment have notified the workers, employees, and entities working of the requirement of segregation in their premises	PI	PI	PI	PI	FI	FI
Adjectival Value		PI	PI	PI	PI	FI	FI

ESWM Component	Sub-component	2016		2017		2018	
		HHs	Imp	HHs	Imp	HHs	Imp
2. Waste Processing and Resource Recovery (WPRR)	1. The LGU have established MRF for final sorting and storage, recycling/composting	PI	PI	PI	PI	FI	FI
	2. Presence of Barangay MRF for final sorting and storage, recycling/composting	PI	PI	PI	PI	FI	FI
	3. Income generated from operation of MRF shall accrue to Solid Waste Management Fund	PI	PI	PI	PI	FI	FI
	4. Renovation of MRF building.	PI	PI	PI	PI	FI	FI
	5. The barangay have organized Solid wastes management committee.	PI	PI	PI	PI	FI	FI
Adjectival Value		PI	PI	PI	PI	FI	FI
3. Collection and Transport of Solid Waste (C&T)	1. The barangay will collect waste within the brgy.	PI	PI	PI	PI	FI	FI
	2. The LGU will collection waste at the Business Central Districts	PI	PI	PI	PI	FI	FI
	3. The LGU will provide collection assistance to barangays	PI	PI	PI	PI	FI	FI
	4. the barangay implement “No Segregation, No Collection” Policy	PI	PI	PI	PI	FI	FI
	5. Residual and Special Wastes are transported or brought directly to the Disposal Site (Sanitary Land Fill, etc.)	PI	PI	PI	PI	FI	FI
	6. Wastes are brought out for collection during collection schedule/time only and violation of anti-littering provision of ordinance.	PI	PI	PI	PI	FI	FI
	7. Setting out of waste not during collection time is a violation of anting littering ordinance	PI	PI	PI	PI	FI	FI
	8. All wastes are brought out and stored in a properly sealed receptacles during collection time	PI	PI	PI	PI	FI	FI
	9. Uncollected wastes are reported at the barangay collection team.	PI	PI	PI	PI	FI	FI
Adjectival Value		PI	PI	PI	PI	FI	FI
4. Disposal of Solid Waste (DSW)	1. The LGU have closed its open/controlled dumped	PI	PI	PI	PI	FI	FI
	2. The LGU have and operating Sanitary Landfill.	PI	PI	PI	PI	FI	FI
	3. Disposal Facility have waste treatment facility (leachate tanks)	PI	PI	PI	PI	FI	FI
	4. Only residual wastes are disposed at SLF cell.	PI	PI	PI	PI	FI	FI
	5. No burning policy is implemented in the barangay	PI	PI	PI	PI	FI	FI
Adjectival Value		PI	PI	PI	PI	FI	FI
5. Prohibitions and Penalties (PP)	1. Littering, throwing, dumping of waste matters in public places, such as, but not limited to roads, sidewalks, canals, esteros, or parks, and establishment.	PI	PI	PI	PI	FI	FI
	2. Non-segregation of wastes	PI	PI	PI	PI	FI	FI
	3. Scavenging or unauthorized collection in designated segregation containers or areas.	PI	PI	PI	PI	FI	FI
	4. Uncovered solid Waste	PI	PI	PI	PI	FI	FI
	5. Solid waste shall be brought out during collection time only	PI	PI	PI	PI	FI	FI
	6. Burning of wastes	PI	PI	PI	PI	FI	FI
	7. Dumping, burying of wastes along bodies of water	PI	PI	PI	PI	FI	FI
Adjectival Value		PI	PI	PI	PI	FI	FI

On the other hand, 68 percent of the sampled barangays have reported Fully Implemented (FI) in 2018, 28 percent reported Partially Implemented (PI), and 4 percent Not Implemented (NI) in 2018.

In terms of location, the barangay respondents who reported Fully Implemented (FI) from 2016 to 2018 were represented by urban center and urbanizing barangays, namely: Poblacion Sur, Poblacion Norte,

Lusod, Dumabato Sur, Diduyon, Cabaruan, Buenavista. Moreover, the data imply that these barangays were e the early adopter of the ESWM program that were implemented as signified by Fully Implemented (FI) in 2016 up to 2018. The data imply that the ESWM implementation gradually progressed from 2016 to 2018 and creeps through from the urban barangays to the urbanizing barangays and spread further to the different rural barangays.

Table 6. Barangay Assessment Mean and Adjectival Value or Extent of Implementation of the household respondents of each Sample Barangay by year (2016, 2017, 2018), and Percentage.

Barangay	2016		2017		2018		%
	Brgy Mean	Adjectival Value	Brgy Mean	Adjectival Value	Brgy Mean	Adjectival Value	
1. San Salvador	1.28	Not Implemented	1.28	Not Implemented	1.43	Not Implemented	4%
2. Ysmael	1.27	Not Implemented	1.27	Not Implemented	2.18	Partially Implemented	
3. Abbag	1.45	Not Implemented	1.45	Not Implemented	2.31	Partially Implemented	12%
4. Pedlisan	1.37	Not Implemented	1.37	Not Implemented	1.77	Partially Implemented	
5. Villa Agullana	1.33	Not Implemented	1.33	Not Implemented	1.59	Fully Implemented	8%
6. Sto Tomas	1.40	Not Implemented	1.40	Not Implemented	2.34	Fully Implemented	
7. Divisoria Nrte	2.16	Partially Implemented	2.16	Partially Implemented	2.23	Partially Implemented	
8. Divisoria Sur	1.95	Partially Implemented	1.95	Partially Implemented	2.27	Partially Implemented	16%
9. Manglad	2.19	Partially Implemented	2.19	Partially Implemented	2.32	Partially Implemented	
10. San Berbabe	2.09	Partially Implemented	2.09	Partially Implemented	2.33	Partially Implemented	
11. Cofcaville	2.00	Partially Implemented	2.00	Partially Implemented	2.67	Fully Implemented	
12. Dipintin	2.11	Partially Implemented	2.11	Partially Implemented	2.53	Fully Implemented	
13. Dumabato Nrte	1.91	Partially Implemented	1.91	Partially Implemented	2.35	Fully Implemented	
14. Villa Norte	2.07	Partially Implemented	2.07	Partially Implemented	2.79	Fully Implemented	32%
15. Villa Sur	1.93	Partially Implemented	1.93	Partially Implemented	2.57	Fully Implemented	
16. Sta Maria	2.13	Partially Implemented	2.13	Partially Implemented	2.44	Fully Implemented	
17. San Pedro	2.01	Partially Implemented	2.01	Partially Implemented	2.49	Fully Implemented	
18. Sto Nino	1.96	Partially Implemented	1.96	Partially Implemented	2.52	Fully Implemented	
19. Buenavista	2.70	Fully Implemented	2.70	Fully Implemented	2.72	Fully Implemented	
20. Cabaruan	2.70	Fully Implemented	2.70	Fully Implemented	2.85	Fully Implemented	
21. Diduyon	2.35	Fully Implemented	2.35	Fully Implemented	2.64	Fully Implemented	
22. Dumabato Sur	2.79	Fully Implemented	2.79	Fully Implemented	2.97	Fully Implemented	28%
23. Lusod	2.54	Fully Implemented	2.54	Fully Implemented	2.76	Fully Implemented	
24. Poblacion Norte	2.60	Fully Implemented	2.60	Fully Implemented	2.80	Fully Implemented	
25. Poblacion Sur	2.35	Fully Implemented	2.35	Fully Implemented	2.71	Fully Implemented	

As regards to the extent of ESWM implementation from household and implementer respondents, the following table 7 and table 8 show that the components of the ESWM programs, as reported both by the Household and Implementer Respondents in each sampled barangay, are Partially Implemented (PI) from 2016 to 2017, and shifted to Fully Implemented (FI) in 2018. The data imply that ESWM implementation has took off in the past years

and started gaining momentum which may be propelled by the sustainable funding/proper utilization of fund, continuing conducted trainings, seminars, and orientations by the LGU.

The duration of trainings attended by households and implementers, and the functional implementing structure of the LGU consisting the supplied personnel and equipment and facilities.

Table 7. Mean assessment of the total Household Respondents in the sampled barangays of the Extent of Implementation of the ESWM Program during the 2016, 2017, 2018 period in the Municipality of Maddela.

Component Mean and Adjectival Value by Year	ESWM Program Component					Overall Barangay Mean	Adjectival Value
	Waste Segregation and Storage	Waste Processing And Resource Recovery	Collection and Transport of Waste	Disposal of Waste	Prohibitions and Penalties		
2016 Component Mean	1.92	1.83	1.76	1.85	1.88	1.85	PI
2016 Adjectival Value	Partially Implemented	Partially Implemented	Partially Implemented	Partially Implemented	Partially Implemented	Partially Implemented	
2017 Component Mean	2.15	1.98	1.97	2.00	2.03	2.02	PI
2017 Adjectival Value	Partially Implemented	Partially Implemented	Partially Implemented	Partially Implemented	Partially Implemented	Partially Implemented	
2018 Component Mean	2.63	2.35	2.35	2.40	2.39	2.42	FI
2018 Adjectival Value	Fully Implemented	Fully Implemented	Fully Implemented	Fully Implemented	Fully Implemented	Fully Implemented	

Table 8. Mean assessment of the total Implementer Respondents in the sampled barangays of the Extent of Implementation of the ESWM Program during the 2016, 2017, 2018 period in the Municipality of Maddela.

Component Mean and Adjectival Value by Year	ESWM Program Component					Overall Barangay Mean	Adjectival Value
	Waste Segregation and Storage	Waste Processing And Resource Recovery	Collection and Transport of Waste	Disposal of Waste	Prohibitions and Penalties		
2016 Component Mean	1.97	1.89	1.97	2.08	2.06	1.99	PI
2016 Adj Value	Partially Implemented	Partially Implemented	Partially Implemented	Partially Implemented	Partially Implemented	Partially Implemented	
2017 Component Mean	2.21	2.09	2.15	2.23	2.17	2.17	PI
2017 Adj Value	Partially Implemented	Partially Implemented	Partially Implemented	Partially Implemented	Partially Implemented	Partially Implemented	
2018 Component Mean	2.75	2.49	2.51	2.51	2.45	2.54	FI
2018 Adj Value	Fully Implemented	Fully Implemented	Fully Implemented	Fully Implemented	Fully Implemented	Fully Implemented	

Conclusion and recommendations

The LGU record showed that the implementation of ESWM Programs started way back 2004 and it covered the two (2) Urban barangays, the Public Market, and one urbanizing barangay. The implementing guide for implementation was the Ten (10)-Year ESWM Plan (2005-2014) formulated in 2004. On the other hand, the scope in this study covered the year of implementation 2016, 2017, 2018 and the implementing guide was the Ten (10)-Year ESWM Plan (2015-2025) and the Municipal Ordinance 2006-07. The ESWM components and corresponding sub-components were assessed as to the extent of implementation using the adjectival scale of Not Implemented (NI), Partially Implemented (PI), and Fully Implemented (FI). The result showed that most of the sampled barangays reported (awareness and experience) Partially Implemented (PI) to Fully Implemented (FI) ESWM programs in year 2017 and 2018. The shift of implementation scale indicates progressing extent of implementation of ESWM Components, and Sub-components from 2016 to 2018. There are Four (4) percent of the sample barangays reported Not Implemented (NI) for the components of ESWM programs covered in the study.

Hence, the extent of implementation though it shifted from Partially Implemented (PI) to fully Implemented (FI) ESWM program implementation in the pass three (3) years were hindered by problematic issues of inadequate efforts to organize community-based ESWM programs, lack of financial and human

resources to implement programs, and failure to strictly implement the basic policy of “NO SEGREGATION, NO COLLECTION”. The problems that limit the implementation have relation to the LGUs utilization of its budget or finances, and the capability of its personnel, and adequacy of equipment to implement the ESWM Components and Sub-components. Moreover, the hindrances could be overcome by heeding the proposed most important measures which were directed to enforcement or strict implementation of policy, provisions of ESWM facilities, organizing barangay-based ESWM implementing structures, and involving the private sector in recycling and materials recovery.. The LGU can sustain or enhance its extent of implementation by strengthening its organization structure, capacitating its implementing unit, and providing adequate financial support to its implementing agencies. That in implementing the proposed measures will improve/intensify the extent of ESWM implementation in municipality of Maddela.

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