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INFLUENCING FACTORS AFFECTING THE IMPLEMENTATION OF REPUBLIC ACT 9003(ECOLOGICAL SOLID WASTE MANAGEMENT ACT) IN THE PROVINCE OF LAGUNA

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ABSTRACT

This study aimed to determine the influencing factors affecting the implementation of Republic Act 9003 (Ecological Solid Waste Management Act of 2000) in the province of Laguna. It aimed to study the extent of influencing factors, the level of compliance, and the challenges encountered by LGUs in SWM implementation.

The results of the study revealed that the respondents regarded the influencing factors such as institutional, technical, legal, financial, external assistance, and public participation and awareness as very influential to SWM implementation. However, most of it does not significantly predict the level of implementation of RA 9003. Among the challenges experienced by the LGUs, financial or budget insufficiency was the only serious problem identified.

Based on the results of the study, the following are recommended to improve the level of compliance of LGUs with the provisions of RA 9003: the institutionalization of MENR Offices, capacitation of personnel assigned in the SWM section, allocation of sufficient budget for SWM programs and projects, strict enforcement of local ordinances, and conduct of intensive IEC to encourage the community to participate in solid waste management programs.

KEYWORDS: *solid waste management, influencing factors, RA 9003*

INTRODUCTION

Solid waste management (SWM) is a perennial problem that is being faced by all countries worldwide. This is due to the continuing increase in waste generation which is influenced by population growth, rapid urbanization, industrialization, and a booming economy. According to Teh (2022), the Philippines is the fourth-largest producer of waste in Southeast Asia. Several causes contribute to this, including the increased rate of trash generation in our country and the shortcomings in the collection, segregation, and recycling of waste in many local government units (LGU). As a result, various parties, including lawmakers and non-governmental organizations, have expressed the same views that the problem of waste management calls for immediate action (COA, 2023).

In 2001, the Republic Act 9003, or the Ecological Solid Waste Management Act was put into law which mandates the adoption of a systematic, comprehensive, and ecological solid waste management program in the country. After more than two decades, most LGUs have not yet complied with some of the provisions of RA 9003, particularly those relating to the submission and implementation of Ten-Year SWM Plans, the establishment of Materials Recovery facilities, and the closure of all open and controlled dumpsites (SEPO, 2017).

It has been noted that over time, the amount of solid waste generated has gradually increased rather than decreased. In this context, a research study was done to identify the influencing factors that have been preventing the country from effectively implementing solid waste management programs.

OBJECTIVES OF THE STUDY

1. Determine the extent of influencing factors affecting the SWM implementation in terms of institutional, technical, financial, legal, external support from NGAs and other sectors, and public awareness and participation.

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2. Determine the level of LGUs' implementation of the provisions of RA 9003 in terms of implementation of Ten-Year SWM Plan, operationalization of Materials Recovery Facilities, closure and rehabilitation of open and controlled dumpsites, and establishment/operation and/or disposal of/to Sanitary Landfill.
3. Determine if the influencing factors significantly predict the level of LGUs' implementation of the provisions of RA 9003.
4. Determine the challenges encountered by the respondents during the implementation of Ecological Solid Waste Management.

MATERIALS AND METHODS

This study employed a quantitative approach to analysis and a survey research methodology. Collecting and evaluating numerical data is the process of quantitative research which involves regulating or modifying an independent variable in order to ascertain the impact it has on a dependent variable (Bhandari, 2022). The opinions and perceptions of the respondents were gathered using a custom questionnaire using a 5-point Likert scale. Face-to-face interviews were done. In the event that a respondent was unavailable, a questionnaire was left at their workplace or sent via email. A deliberate sample was taken. The researcher employed regression analysis, mean calculations, frequencies, and percentages to analyze the data.

Population and Sampling Technique

The study was conducted in three (3) cities and twenty-four (24) municipalities in the province of Laguna wherein the respondents were composed of two (2) distinct groups: the LGUs and the DILG personnel involved in the solid waste management implementation. The total number of respondents was 162; 135 came from LGUs and 27 from the local DILG.

Survey questionnaires were used to meet the objectives of determining the level of influencing factors affecting SWM implementation in the province of Laguna.

Data Collection Procedure

Prior to the actual gathering procedure, the researcher sought permission from the heads of offices by submitting a letter request. Upon approval, the researcher personally interviewed the respondents. The purpose of this research was explained carefully to the respondents to attain the desired results and all data/information gathered will be used only for research. The data gathered were presented in tabular form, analyzed, and interpreted using appropriate statistical tools.

The study used a purposive sampling technique wherein the selected respondents were those involved in the planning and operational aspects of SWM implementation. They are proficient and well-informed about the field of study. In addition to knowledge and experience, what is important is the availability and willingness of the respondents to participate in the study (Dalugdog, 2021).

RESULTS AND DISCUSSION

Table 1. Frequency Distribution on the Socio-Demographic Profile of the Respondents

Demographic Profile	LGUs		DILG	
	f	%	f	%
Age (in years)				
21 - 30	18	13.3%	2	7.4%
31 - 40	21	15.6%	8	29.6%
41 - 50	32	23.7%	12	44.4%
51 - 60	38	28.1%	4	14.8%
61 and above	26	19.3%	1	3.7%
Gender				
Male	100	74.1%	9	33.3%
Female	35	25.9%	18	66.7%
Educational Status				
High School	8	5.9%	0	0.0%
College Undergraduate	12	8.9%	0	0.0%
College Graduate	90	66.7%	18	66.7%
Graduate Studies	25	18.5%	9	33.3%
Training Attended				
Yes	117	86.7%	26	96.3%
No	18	13.3%	1	3.7%
Number of Years Employed				

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Less than a year	14	10.4%	0	0.0%
At least 1 year but not less than 3 years	16	11.9%	1	3.7%
At least 3 years but not less than 5 years	12	8.9%	1	3.7%
At least 5 years but not less than 10 years	26	19.3%	4	14.8%
10 years or more	67	49.6%	21	77.8%
Rate of Involvement				
No involvement at all	3	2.2%	1	3.7%
Slightly involved	24	17.8%	6	22.2%
Moderately involved	38	28.1%	7	25.9%
Very involved	47	34.8%	8	29.6%
Extremely involved	23	17.0%	5	18.5%

Table 1 shows the socio-demographic profile of the respondents. This study was participated by the respondents from LGU and DILG. In terms of age, the majority of the DILG (81.4%) were young and middle adulthood, while the LGUs were 52.6 percent. In terms of late adulthood, 47.4 percent came from LGU, while DILG was 18.6 percent. In gender, the greatest number of participants in LGUs were males, which was 74.1 percent, while in DILG, were females corresponding to 66.7 percent. Both LGU and DILG respondents were college graduates with 66.7 percent, but 33.3 percent of the population from DILG pursuing their graduate studies relative to 18.5 percent of LGU. In years of employment, 77.8 percent were 10 years or more in service in DILG while only 49.6% for LGU. Also, 10.4% of the population in the LGU were employed for less than a year. In the rate of involvement, most DILG respondents were very involved in the implementation, which was 29.6 percent, like LGU but with 34.8 percent.

In the study conducted by Fagan et al. (2011), they analyzed different challenges and practices in the juvenile system in the United States in implementing a system program. They suggested that knowing demographic factors like age, gender, educational status, years of employment, and training needed to be considered in implementing different programs. This will help researchers identify barriers in planning and implementing programs or policies to meet the needs of different populations. In context, the researcher applies this suggestion to the solid waste management program implementation.

EXTENT OF INFLUENCING FACTORS AFFECTING SWM IMPLEMENTATION

Table 2. Extent of Institutional Factors Affecting the Solid Waste Management Implementation

Institutional Factors	LGU			DILG		
	Mean	SD	QI	Mean	SD	QI
1. Existence of a permanent C/MENR Office or an office that handles waste management matters	4.43	0.94	EI	4.37	1.15	EI
2. Sufficient number of permanent plantilla positions	3.90	1.07	VI	4.11	1.15	VI
3. Personnel's educational background and/or experiences are related to the job	4.16	0.96	VI	4.19	1.14	VI
4. Capacity building and mentoring such as training, and workshops for continuous knowledge enhancement	4.12	0.94	VI	4.33	1.04	EI
5. The personnel are well-informed of the programs and projects and the strategies towards the attainment of goals and objectives.	4.23	0.78	EI	4.22	1.05	EI
6. Presence of skilled personnel	4.13	0.97	VI	4.19	1.14	VI
7. Provision of rewards and incentives to personnel	3.56	0.99	VI	3.70	1.17	VI
8. Provision of rewards and incentives to personnel	3.56	0.99	VI	3.70	1.17	VI
Overall Mean	**4.07 Very Influential**			**4.16 Very Influential**		

Legend:4.20 - 5.00 Extremely Influential (EI) 3.40 - 4.19 Very Influential (VI) 2.60 - 3.39 Moderately Influential (MI) 1.80 - 2.59 Slightly Influential (SI) 1.00 - 1.79 Not at all Influential (NAI)

Table 2 shows both the employees from the LGU and the DILG believed that the existence of a permanent office that handles waste management matters is *extremely influential* to the implementation of SWM. On the part of the DILG employees, the provision of capacity building and other mentoring schemes was also *extremely influential*, but this was rated by the LGU

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employees as *very influential.* The extent of institutional factors based on the perceptions of both the DILG and LGU employees were *very influential* in terms of a sufficient number of plantilla positions, the personnel's experiences, the presence of skilled personnel, and the provision of rewards and incentives to personnel. The overall mean indicated that the institutional factors were *very influential* in the implementation of the SWM, according to the LGU employees *(M*=4.07) and the DILG employees *(M*=4.16).

It can be concluded from the data shown on the provision of capacity building and other mentoring schemes that LGUs require attention in their training and workshop needs comparable to DILG. This can be explained by the role of LGU in SWM implementation. As per RA 9003, the LGUs are mandated to implement the provisions of RA 9003 which was also cited in the Performance Audit Report (PAO-2023-1) of the Commission on Audit (2023). In the case of Zimbabwe, as enumerated in the study of Shabani & Jerie (2022), they explained that solid waste management effectiveness is fueled by an institution or organization that is responsible for its efficient system.

Table 3. Extent of Technical Factors Affecting the Solid Waste Management Implementation

Technical Factors	LGU			DILG		
	Mean	SD	QI	Mean	SD	QI
1. Presence of adequate infrastructure and facilities such as MRF, composting area, etc	4.30	0.88	EI	4.44	1.05	EI
2. Availability of equipment and machinery	4.16	0.93	VI	4.44	0.85	EI
3. Well-maintained vehicles to ensure smooth transport and disposal of collected solid waste	4.32	0.79	EI	4.44	0.85	EI
4. Well-maintained routes for smooth flow of hauling solid wastes	4.15	0.85	VI	4.33	0.78	EI
5. Provision of Lakbay-Aral to have hands-on experience with new technologies	3.62	0.98	VI	3.41	0.89	VI
6. Provision of communication equipment	3.64	0.98	VI	3.67	1.24	VI
7. Proper recording of wastes received, recycled, and disposed	4.10	0.96	VI	4.30	0.99	EI
Overall Mean	**4.04**			**4.15**		
	Very Influential			**Very Influential**		

Table 3 shows the extent of technical factors affecting the SWM implementation. Both employees from LGU and DILG believed that the presence of adequate infrastructure and facilities such as MRF, composting area, etc., also, well-maintained vehicles to ensure smooth transport and disposal of collected solid wastes were both *extremely influential*. The provision of lakbay-aral to have hands-on experience with new technologies and the provision of communication equipment were both interpreted by the LGU and DILG as *very influential.* On the part of LGU, the availability of equipment and machinery, well-maintained routes for smooth flow of hauling solid wastes, and proper recording of wastes received, recycled, and disposed of were only rated as *very influential*, while for DILG, those were *extremely influential.* Moreover, both DILG (4.15) and LGU (4.04) interpreted the extent of technical factors affecting solid waste management as *very influential*. The differences in the interpretation of both the LGU and DILG in three out of seven variables may be in the technicality of their implementation. However, the mean reflected a similar verbal interpretation *very influential*.

Table 4 below shows the extent of financial factors affecting SWM implementation. Among the variables rated, both groups of respondents differ only in the allocation of sufficient budget for the hiring of the contract of services, or for land procurement. In the view of LGU, it was very influential in contrast to the interpretation of DILG which was *extremely influential.* This rating led to a difference in the overall financial factors. The former rated it as *extremely influential* while the latter interpreted it as very influential. As such, DILG believed that the allocation of a sufficient budget for hiring contract services and SWM infrastructure is an extremely important variable in making the implementation of the SWM in terms of financial factors. In an article published by ADB (2014), it said that the quality and coverage of solid waste management (SWM) services are determined to a large extent by the amount of funding available for the collection, transport, disposal, and recycling of waste. Effective SWM requires funds to cover said operating activities including the payment of staff salaries. With the present situation on the ground, most LGUs do not have sufficient numbers of employees assigned to SWM services, hence the DILG respondents, being the overseer, have seen its importance in SWM implementation.

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Table 4. Extent of Financial Factors Affecting the Solid Waste Management Implementation

Financial Factors	LGU			DILG		
	Mean	SD	QI	Mean	SD	QI
1. Adequate financial support from the LGU's budget (NTA)	4.36	0.79	EI	4.52	0.80	EI
2. Establishment of a Local Solid Waste Management (SWM) Fund by RA 9003	4.31	0.82	EI	4.78	0.42	EI
3. Imposition of fines and penalties to violators as an additional source of funds	3.92	1.06	VI	4.07	1.07	VI
4. Imposition of service collection fees to stakeholders as an additional source of funds	3.74	1.03	VI	3.74	0.94	VI
5. Provision of other relevant resources from the LGU	3.83	0.89	VI	4.07	0.83	VI
Proper utilization of allocated funds for specific projects or program	4.20	0.80	EI	4.52	0.85	EI
6. Allocation of sufficient budget for the hiring of the contract of services to work on SWM services and land procurement for SWM infrastructure	4.19	0.82	VI	4.22	0.97	EI
Overall Mean	**4.08**			**4.28**		
	Very Influential			**Extremely Influential**		

Table 5. Extent of Legal Factors Affecting the Solid Waste Management Implementation

Legal Factors	LGU			DILG		
	Mean	SD	QI	Mean	SD	QI
1. Existence of comprehensive laws and local ordinances related to SWM	4.50	0.72	EI	4.63	0.63	EI
2. Existence of adequate regulations supporting the implementation of the laws and ordinances related to SWM	4.39	0.70	EI	4.56	0.70	EI
3. Strict enforcement of RA 9003 and local ordinances	4.37	0.77	EI	4.48	0.85	EI
convey local ordinances and regulations to the stakeholders	4.27	0.77	EI	4.30	0.91	EI
4. Arresting violators and issuance of citation tickets	3.79	1.07	VI	3.89	1.31	VI
5. Imposition of fines and penalties to violators	3.84	1.05	VI	4.00	1.27	VI
6. Updating of local policies and ordinances to cater to the present needs of the community	4.16	0.84	VI	4.37	1.01	EI
Overall Mean	**4.19**			**4.32**		
	Very Influential			**Extremely Influential**		

Table 5 shows that both DILG and LGU believed in terms of legal factors such as the existence of comprehensive laws and local ordinances related to SWM, the existence of adequate regulations supporting the implementation of the laws and ordinances related to SWM, strict enforcement of RA 9003 and local ordinances and convey local ordinances and regulations to the stakeholders were interpreted as *extremely influential*. While arresting violators and issuing citation tickets and imposition of fines and penalties on violators were interpreted as *very influential*. On the contrary, DILG perceived updating local policies and ordinances to cater to the present needs of the community as *extremely influential* differs from the interpretation of LGU as *very influential*. The overall mean score and verbal interpretation of the legal factors affecting solid waste management implementation differ. For LGU, the mean score was 4.19 and interpreted as *very influential*. Meanwhile, for DILG, it is 4.32 with the interpretation of *extremely influential*. This implied that legal factors in DILG were perceived to have an extra influence in terms of SWM implementation in comparison to LGU's very influential interpretation. These differences in their perceived extent can be explained by Republic Act 9003 otherwise known as the Ecological Solid Waste Management Act of 2000, in reference no. 1996-110 (1996) that DILG has a task of enjoining all parts of the country in adopting comprehensive solid waste management that was enacted by a legal basis. In summation, since DILG is the implementing body that tasked the LGU in implementing the program, DILG has a strong basis or understanding of the importance of SWM regarding legal it will contribute to the implementation.

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Table 6. Extent of External Support from EMB and other NGAs Affecting the Solid Waste Management Implementation

External Support Factors	LGU			DILG		
	Mean	SD	QI	Mean	SD	QI
1. Receiving external support from national government agencies through technical means such as monitoring and consultations	4.01	0.90	VI	4.26	0.94	EI
2. Availability of equipment and vehicles from private and government agencies	3.90	1.06	VI	3.96	1.16	VI
3. Secure assistance in the development of customized information and educational materials	3.76	1.00	VI	3.81	1.00	VI
4. Invite National Government Agencies to conduct training for concerned sectors and implementers for policy updating and skills enhancement	3.79	1.07	VI	4.26	0.98	EI
5. Coordination with neighboring LGUs on possible shared SWM facilities	3.78	1.15	VI	3.78	1.12	VI
6. Cooperation with private enterprises on the disposal of wastes thru Buy-back programs	3.84	1.02	VI	3.89	1.12	VI
7. Engagement in a waste-to-energy process through a Public-Private Partnership Scheme	3.64	1.16	VI	3.70	1.10	VI
Overall Mean	**3.82 Very Influential**			**3.95 Very Influential**		

Table 6 shows the extent of external support from EMB and other NGAs affecting SWM implementation. The DILG and LGU both perceived the majority of the external support as *very influential*. However, two of the variables got different interpretations. These were external support through technical means such as monitoring and consultations and inviting National Government Agencies to conduct training for concerned sectors and implementers. The former interpreted those as extremely influential while very influential only for the LGU respondents. These differences in perceived extent can be attributed to the fact that the DILG, being a national government agency have a strong fold of interest in the conduct of training and skills enhancement because they are the implementors and assessors of the program. In summary, the extent of external support affecting solid waste management implementation was interpreted as *very influential* for both LGU (3.82) and DILG (3.95). This result is congruent with the study of Yukalang (2017), which was conducted in highly urbanized areas in Thailand. Yukalang used SWOT analysis and found out that external support from the government is important as it can provide opportunities for the improvement of the program.

Table 7 shows the respondents from the LGU and DILG have similar perceptions of the extent of public awareness affecting solid waste management implementation. Both have an overall mean score of 3.82 with the verbal interpretation being *very influential*. However, they differ on the three (3) variables such as encouraging public participation through community meetings, etc; cooperation between and among the LGUs, private sectors, NGOs, and people's organizations; and conducting consultations with concerned agencies and stakeholders. The LGU rated those as *very influential* while *extremely influential* for DILG. With this, DILG in comparison with LGU posed a perspective on a range of items regarding the importance of public awareness as it affects the implementation of SWM. This result was proven by the lens of the study of Camarillo and Bellotindos (2021) conducted in Cebu City, Philippines. By using the Slovin formula, the authors identified 1,523 respondents from 30 barangays and determined respondents' compliance with SWM policies and guidelines. The study recommended that higher participation of the public should be encouraged to effectively see the progress in SWM. It is the same as what the respondents perceived regarding public awareness and participation.

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Table 7. Extent of Public Awareness and Participation Affecting the Solid Waste Management Implementation

Public Awareness and Participation	LGU			DILG		
	Mean	SD	QI	Mean	SD	QI
1. Encourage public participation through community meetings, radio broadcasts, and through community websites, etc	4.14	0.97	VI	4.33	1.00	EI
2. Provision of rewards and incentives to individuals and communities who are actively involved in Solid Waste Management activities	3.76	1.00	VI	3.96	1.09	VI
3. Launching of collaborative activities like the "Palit Basura Program" targeting different sectors such as schools, commercial establishments, subdivisions, etc	3.79	1.04	VI	3.93	1.11	VI
4. Provision of technical assistance and training for commercial establishments and industries due to limited environmental management programs	3.73	0.96	VI	3.96	1.09	VI
5. Cooperation between and among the LGUs, private sectors, NGOs, and people's organization	4.08	0.95	VI	4.26	0.98	EI
6. Conduct consultations with concerned agencies and stakeholders in case of new programs or projects before implementation	4.00	0.88	VI	4.30	0.87	EI
7. Focusing on social work sentences such as community clean-up rather than the imposition of fines may enhance public awareness and participation	4.10	0.84	VI	3.96	1.16	VI
Overall Mean	**3.82 Very Influential**			**3.82 Very Influential**		

Table 8. Level of LGU's Implementation of the Provisions of RA 9003 as to the Implementation of Ten-Year SWM Plan

Indicators	LGU			DILG		
	Mean	SD	QI	Mean	SD	QI
1. Implementing waste segregation at the source	3.76	1.03	UI	3.89	0.97	UI
2. Implementing segregated collection of wastes.	3.76	1.00	UI	3.85	1.03	UI
3. The service collection area coverage increased as the Plan is being implemented.	4.00	0.81	UI	4.30	0.82	FI
4. Has functional MRFs, composting facilities, and/or other technologies that improve waste management.	3.67	1.07	UI	3.96	1.02	UI
5. No open dumpsite and currently disposing of wastes to a sanitary landfill.	4.21	1.16	FI	4.30	1.38	FI
6. Developed or established linkages for marketing composts, recyclables, and processed materials out of wastes	3.35	1.17	SI	3.41	1.25	UI
7. Established collection scheme and storage for special household hazardous wastes.	3.21	1.27	SI	3.56	1.42	UI
8. Strictly enforcing the local ordinances related to SWM.	3.89	0.93	UI	3.81	1.04	UI
9. Regularly conduct IEC and other information campaigns related to SWM.	3.82	0.97	UI	4.07	1.04	UI
Overall Mean	**3.74 Usually Implemented**			**3.91 Usually Implemented**		

Legend: 4.20 - 5.00 Fully Implemented (FI) 3.40 - 4.19 Usually Implemented (UI) 2.60 - 3.39 Slightly Implemented (SI) 1.80 - 2.59 Rarely Implemented (RI) 1.00 - 1.79 Not Implemented (NI)

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Table 8 shows that both LGU and DILG believed that in terms of implementation of the provisions of RA 9003 as to the implementation of an improved Ten-year SWM plan the following indicators were rated as *usually implemented*; Implementing waste segregation at source, Implementing segregated collection of wastes, functional MRFs, composting facilities and/or other technologies that improves waste management, Strictly enforcing the local ordinances related to SWM and lastly, Regularly conducting IEC and other information campaign related to SWM. While the indicator, no open dumpsite and currently disposing wastes to a sanitary landfill, was interpreted as *fully implemented*. LGU also implied regarding developed or established linkages for marketing of composts, recyclables, and processed materials out of wastes and Established collection scheme and storage for special household hazardous wastes as s*lightly implemented* while for DILG it is *usually implemented.* On the contrary, LGU perceived that the service collection area coverage increased as the Plan is being implemented is *usually implemented* while for DILG it is *fully implemented*. To conclude, the data showed some slight differences in terms of the level of implementation. Although, there are some by which DILG and LGU have the same level of implementation and observation. As such five (5) indicators were interpreted as *usually implemented*, and one (1) as *fully implemented.* While there are two (2) same results indicators for LGU as *slightly implemented, and usually implemented as per DILG*. Also, the LGU-rated indicator #3 is *usually implemented* while *fully implemented* for the DILG. Since the DILG is mostly basing their responses on the reports submitted by the LGUs, it was observed that their responses are more positive in comparison to LGU in terms of indicator #3 which is the service collection area coverage increased as the Plan is being implemented. Despite that, both LGU and DILG, with an overall mean score of 3.74 and 3.91, respectively, interpreted the level of implementation of the provisions of RA 9003 as to implementation of a Ten-year SWM Plan as *usually implemented.*

Table 9. Level of LGUs' Implementation of the Provisions of RA 9003 as to the Operationalization of Materials Recovery Facilities

Indicators	LGU			DILG		
	Mean	SD	QI	Mean	SD	QI
1. All barangays have established MRF	3.79	1.13	UI	3.89	1.01	UI
2. All barangay MRFs are operational	3.57	1.08	UI	3.63	0.97	UI
The personnel assigned to the MRF has a logbook for recording daily waste acceptance, recovery, and disposal	3.58	1.16	UI	3.59	1.19	UI
4. The MRF does not receive mixed wastes	3.41	1.15	UI	3.48	1.12	UI
5. The MRF has sufficient storage area for segregated wastes	3.50	1.15	UI	3.56	1.09	UI
The MRF has basic equipment such as a shredder, composter, weighing scale, etc.	3.39	1.20	UI	3.56	1.25	UI
7. Adopted measures for odor and vermin control in the MRF	3.21	1.24	SI	3.56	1.19	UI
8. The working staff is trained in MRF operation	3.48	1.18	UI	3.56	1.19	UI
The working staff are provided with appropriate personal protective gears	3.44	1.18	UI	3.59	1.22	UI
). The LGU has established linkages on the sale/disposal of products out of waste	3.44	1.22	UI	3.48	1.19	UI
Overall Mean	**3.48**			**3.59**		
	Usually Implemented			**Usually Implemented**		

Table 9 shows that relative to the operationalization of materials recovery facilities, both LGU and DILG interpreted almost all indicators as *usually implemented* with an overall mean score of 3.48 and 3.59, respectively. The difference in interpretation was on the adoption of measures for odor and vermin control in the MRF. The LGU has a mean score of 3.21 while the DILG got 3.56 with verbal interpretation of *slightly implemented* and *usually implemented*, respectively. This variation in the response can be attributed to the actual implementation on-site and the time of monitoring by DILG. Based on experience during field monitoring, there were times when the LGUs were compliant and sometimes were not. There were many factors affecting LGUs' compliances such as the availability of supplies, the presence of MRF workers, and the type of weather on a particular date, to name a few. In summation, both the DILG and LGU reflected the actual situation in most of the MRFs in Laguna.

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Table 10. Level of LGUs' Implementation of the Provisions of RA 9003 as to the Closure and Rehabilitation of Open and Controlled Dumpsites

Indicators	LGU			DILG		
	Mean	SD	QI	Mean	SD	QI
1. The dumpsite is completely closed and rehabilitated.	4.30	1.11	FI	4.59	0.89	FI
2. There is no ongoing activity at the closed dumpsite.	4.10	1.25	UI	4.59	0.80	FI
3. The waste is graded, compacted, and covered with soil.	4.13	1.16	UI	4.37	1.11	FI
4. Gas vents were installed at the closed dumpsite.	3.39	1.56	UI	3.85	1.46	UI
5. Constructed a leachate pond.	3.38	1.53	UI	3.89	1.42	UI
6. The leachate pond is properly maintained.	3.22	1.42	SI	3.81	1.49	UI
7. The closed dumpsite has a perimeter fence to prevent unauthorized entry.	3.87	1.37	UI	4.26	1.13	FI
8. A signage that the dumpsite is CLOSED is installed at the entrance of the facility.	3.87	1.40	UI	4.33	0.96	FI
9. No waste pickers were operating at the closed dumpsite.	4.02	1.30	UI	4.41	0.89	FI
Overall Mean	**3.81 Usually Implemented**			**4.23 Fully Implemented**		

Based on Table 10, both the LGU and DILG perceived the same level of interpretation as *fully implemented* in the first indicator which was the dumpsite is completely closed and rehabilitated. However, both groups of respondents have different interpretations of most of the indicators. As per LGU, the following items were interpreted as *usually implemented*; no ongoing activity at the closed dumpsite; waste is graded, compacted, and covered with soil; the closed dumpsite has a perimeter fence to prevent unauthorized entry; signage that the dumpsite is CLOSED is installed at the entrance of the facility and lastly, no waste pickers were operating at the closed dumpsite in contrast to the response of the DILG which was *fully implemented*. *Slightly implemented* was given as an interpretation by the LGU on the indicator "the leachate pond is properly maintained" while for DILG it was *usually implemented*. This result is congruent with the news published in the freeman last 2017 by Gallarde. It reported that SWM laws were violated in Negros Oriental by LGU with penalties ranging from 500,000 pesos to 2.5 million pesos due to the backsliding of the open dump site despite the presence of a leachate pond. This report implied that the leachate pond was not properly maintained. Overall, LGU's mean score was 3.81 and interpreted as *usually implemented* while 4.23 for the DILG and interpreted as *fully implemented*. With this result, the difference in the responses revealed that some of the respondents from the LGU such as the ABC President or the Sangguniang Bayan representative may not be aware of the actual status of their closed dumpsite, or the report submitted by the LGU to the DILG was outdated.

The respondents were asked about the operation of a sanitary landfill in their municipalities and cities. Their responses with the item "*No sanitary landfill but disposing the waste to an accredited sanitary landfill*" is presented in Table 11A as a frequency distribution. This item does not apply to the city of San Pablo, and the municipalities of Kalayaan, Mabitac, and Paete. These LGUs were operating their sanitary landfills, hence the respondents from these LGUs did not provide their rating for this item. A total of 115 responded to this item on the part of the LGUs and 23 on the part of DILG, representing 2 cities and 21 municipalities.

Table 11A. Frequency Distribution on the Non-existence of Sanitary Landfills but Disposing Waste to an Accredited Sanitary Landfill

Agency	Fully Implemented		Usually Implemented		Slightly Implemented		Rarely Implemented		Not Implemented	
	f	%	f	%	f	%	F	%	f	%
LGU	89	77.4%	12	10.4%	9	7.8%	3	2.6%	2	1.7%
DILG	17	73.9%	4	17.4%	1	4.3%	1	4.3%	0	0.0%

As shown in Table 11A, out of one hundred fifteen (115) respondents from the LGU, 77.4% answered for *fully implemented*, followed by 10.4% (*usually implemented)*, 7.8% (*slightly implemented)*, 2.6% *(rarely implemented)*, and 1.7 % for *not implemented*. In contrast, DILG has 73.9% *fully implemented*, 17.4% *usually implemented*, 4.3 % *slightly implemented*, 4.3% *rarely implemented* and 0% *not implemented.* Though the respondents answered differently, they were aware that their respective localities were disposing of

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solid wastes to a third-party service provider, which was a privately operated sanitary landfill. These private sanitary landfills were in San Pedro City, Calamba City, and Santa Cruz, Laguna.

Table 11B. Level of LGUs' Implementation of the Provisions of RA 9003 as to the Establishment/operation and/or Disposal of/to Sanitary Landfill

If the LGU is operating a sanitary landfill, ...	LGU			DILG		
	Mean	SD	QI	Mean	SD	QI
1. The site has a perimeter fence to prevent unauthorized entry into the area.	4.75	0.55	FI	4.50	1.00	FI
2. Installed signages in appropriate places within the landfill.	4.75	0.55	FI	4.50	1.00	FI
3. The landfill is not accepting mixed wastes.	4.15	1.31	UI	4.50	1.00	FI
4. Practicing daily soil covering of wastes	4.05	1.28	UI	4.50	1.00	FI
5. With installed gas vents	4.15	1.31	UI	4.50	1.00	FI
6. With leachate collection pipes and a leachate pond	4.35	1.09	FI	4.50	1.00	FI
7. Storm drainage canals are constructed.	4.55	0.89	FI	4.50	1.00	FI
8. Practice of open burning is prohibited	4.65	0.67	FI	4.50	1.00	FI
9. Waste pickers, if any, are organized by the LGU.	4.10	1.48	UI	4.50	1.00	FI
Overall Mean	**4.39 Fully Implemented**			**4.50 Fully Implemented**		

The disagreement of the respondents with the item "*No sanitary landfill but disposing the waste to an accredited sanitary landfill*" as presented in Table 11A lead to subsequent items in the case the LGUs are operating a sanitary landfill. Table 11B presents the indicators for the proper establishment/operation of a sanitary landfill.

As per the DILG, all indicators are interpreted as *fully implemented*. In despite of that LGU interpreted some indicators as *usually implemented* such as the landfill not accepting mixed wastes, practicing daily soil covering of wastes, with installed gas vents, and waste pickers, if any, are organized by the LGU, the rest are believed by both LGU and DILG as fully implemented. With this, both respondents interpreted their level of LGU's Implementation of the Provisions of RA 9003 as to the establishment/operation and/or disposal of/to Sanitary Landfill as *fully implemented* with overall means for LGU (4.39) and DILG (4.50).

Regression of Influencing Factors on the Level of LGUs' 'Implementation of the Provisions of RA 9003

Table 13A. Regression Analysis of Influencing Factors on the Level of LGUs' Implementation of the Approved Ten-Year Solid Waste Management Plan

Factors	beta	t-value	p-value	Analysis
Institutional	-0.158	-1.137	.257	Not significant
Technical	0.082	0.482	.631	Not significant
Financial	0.067	0.384	.702	Not significant
Legal	0.060	0.363	.717	Not significant
External Support	0.054	0.398	.691	Not significant
Public Awareness and Participation	0.225	1.527	.129	Not significant

Intercept = 2.432 *Adjusted R-Square = 0.0644* *F-value = 2.539* *Sig.* = 0.023

Regression results in Table 13A showed that none of the influencing factors as institutional, technical, financial, legal, external support, and public awareness and participation significantly predict the level of implementation of the Ten-Year SWM plan. The beta coefficients were too small, and the p-values were all greater than the threshold of 0.05. This means that the Ten-Year SWM plan is implemented by strictly enforcing the contents of the plan regarding waste collection, segregation, information campaign, and establishing linkages for marketing composts, recyclables, and processed materials out of waste. While implementing the plan, the influencing factors were not taken into consideration although usually implemented but not accounted for by the respondents. This implied that the factors mentioned are not primary drivers or variables in assessing the success or failure of the program. A more detailed

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study that will reflect the actual situation on the ground should be conducted.

Table 13B. Regression Analysis of Influencing Factors on the Level of LGUs' Establishment and Operationalization of Materials Recovery Facility

Factors	beta	t-value	p-value	Analysis
Institutional	-0.084	-0.504	.615	Not significant
Technical	0.274	1.353	.178	Not significant
Legal	0.084	0.425	.672	Not significant
External Support	0.096	0.592	.555	Not significant
Public Awareness and Participation	0.156	0.892	.374	Not significant

Intercept = 1.627 Adjusted R-Square = 0.0827 F-value = 3.014 Sig. = 0.009

Regression results in Table 13B showed that none of the influencing factors as institutional technical, financial, legal, external support, and public awareness and participation significantly predict the level of LGU's establishment and operationalization of materials recovery facility. The beta coefficients were too small, and the p-values were all greater than the threshold of 0.05.

This means that the implementation of the provisions of RA 9003 about the Operationalization of Materials Recovery Facilities such as the non-acceptance of mixed waste, presence of trained personnel, and basic equipment necessary for the operation and maintenance of the MRF are not regarded as important factors for effective implementation. Relative to the influencing factors such as institutional, financial, legal, external support, and public awareness and participation, the result of this study showed that these factors have no bearing on the assessment of the success or failure of the program. A study involving those involved in the actual operationalization of the MRF such as the equipment operators, the garbage collectors, and the secondary sorters must be conducted to reflect the actual situation and the challenges encountered on site.

Table 13C Regression Analysis of Influencing Factors on the Level of LGUs' Closure of Open and Controlled Dumpsite

Factors	beta	t-value	p-value	Analysis
Institutional	0.042	0.221	,825	Not significant
Technical	0.020	0.086	.932	Not significant
Financial	0.508	2.128	.035	***Significant***
Legal	0.357	1.576	.117	Not significant
External Support	-0.211	-1.136	.258	Not significant
Public Awareness and Participation	0.599	2.978	.003	***Significant***

Intercept = 2.580 Adjusted R-Square = 0.0723 F-value = 2.740 Sig. = .015

Influencing factors such as financial, and public awareness and participation showed *significant* influence on the LGU's implementation of closure and open and controlled dumpsite. The beta coefficient of 0.508 indicates that for every standard deviation unit increase in the financial factor, there is a corresponding increase in the implementation of closure and open and controlled dumpsite. The t-value of 2.128 is significant at the .035 probability level. Also, the beta coefficient of 0.599 indicates that for every standard deviation unit increase in public awareness and participation factor, there is a corresponding increase in the implementation of closure and open and controlled dumpsites. The t-value of 2.978 is significant at the .003 probability level. The adjusted R-squared value indicates that 7.23% of the variation in the implementation of closure and open and controlled dumpsite was explained by the financial factor and public awareness and participation. The F-value of 2.740 is significant at the .015 probability level.

This means that the closure and rehabilitation of open and controlled dumpsites are affected by financial factors, and public awareness and participation. Depending on the situation, a certain LGU's program on closure and rehabilitation can be a failure or a success. Some municipalities like Sta. Cruz, Cavinti, Pagsanjan, and Luisiana succeeded in their rehabilitation programs because of the support of their local chief executives. Sufficient budget and manpower were allotted for the purpose. Said municipalities also conducted training, meetings, and posted posters and billboards containing SWM matters. They launched several programs to encourage the public to implement proper waste management.

However, the influencing factors such as institutional, technical, legal, and external support did not significantly predict the

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LGU's implementation of the closure of open and controlled dumpsite. This means that the personnel's experiences, training, and skills as well as the presence of heavy equipment and enforcement of local ordinances did not affect or contribute to the effectiveness of the program. This implied that the program on closure and rehabilitation of dumpsites can be successfully undertaken if the LGUs have allocated sufficient budget to finance the activities incorporated in the rehabilitation program. Likewise, the awareness and participation of the citizenry on proper waste management help because the volume of waste that supposedly goes to the dumpsite is greatly reduced, thus in turn resulting in a high percentage of waste recycling and recovery.

Table 13D. Regression Analysis of Influencing Factors on the Level of LGU's Establishment/ Operation of SLF or Disposal to Accredited Landfill

Factors	beta	t-value	p-value	Analysis
Institutional	0.608	1.631	.127	Not significant
Technical	-0.338	-0.656	.523	Not significant
Financial	-0.791	-1.596	.134	Not significant
Legal	1.124	2.250	.042	***Significant***
External Support	1.513	2.382	.033	***Significant***
Public Awareness and Participation	1.209	2.018	.065	***Significant***

Intercept = 2.829 Adjusted R-Square = 0.1219 F-value =3.439 Sig. = .012

Influencing factors such as legal, external support and public awareness and participation showed *significant* influence on the level of LGU's establishment/ operation of SLF or disposal to accredited sanitary landfill. The beta coefficient of 1.124 indicates that for every standard deviation unit increase in the legal factor, there is a corresponding increase in the LGU's level of establishment/operation of SLF or disposal to an accredited landfill. The t-value of 2.250 is significant at the .042 probability level. Also, the beta coefficient of 1. 513 indicates that for every standard deviation unit increase in external support factor, there is a corresponding increase in the LGU's level of establishment/operation of SLF or disposal to an accredited landfill. The t-value of 2.382 is significant at the .033 probability level. Moreover, the beta coefficient of 1.209 indicates that for every standard deviation unit increase in public awareness and participation, there is a corresponding increase in the LGU's level of establishment/operation of SLF or disposal to an accredited landfill. The t value of 2.018 is significant at the .065 probability level. The adjusted R-squared value indicates that 1.219% of the variation in the implementation of closure and open and controlled dumpsite was explained by the legal, external, and public awareness and participation factors. The F-value of 3.439 is significant at the .012 probability level.

This means that factors such as legal, external, and public awareness contribute to the successful implementation of the program. These three (3) factors are interlinked with each other. Awareness of the people on the existence of local ordinances on waste management and strict enforcement of these ordinances by the local authorities coupled with the support or assistance from national agencies such as the provision of training will make any program a success. The operation of the sanitary landfill does not only involve dumping and covering waste at the disposal area. It starts with the collection of waste from households. Strictly enforce waste segregation at the source, with the households actively participating, the volume of waste that will go to the landfill will be reduced. The assistance from the national government through technical means and cooperation with the private sector such as the establishment of a Waste-to-Energy program through the Public-Private Partnership scheme or the Build Better More program of the current administration is a big leap. This will result in a longer lifespan of the landfill and less pollution to the environment. Mendoza et. al., (2022), in their study, recommended that officials involved in project implementation should conduct an annual meeting and information campaign on the proper handling of solid waste to ensure the success of implementation.

However, the influencing factors such as institutional, technical, and financial did not significantly predict the LGU's establishment/operation of SLF or disposal to an accredited landfill. This explained the support such as financial and technical know-how encompasses the program operation to the institutional practices.

Challenges encountered by the LGU in the Implementation of Ecological Solid Waste Management

In Table 14, the challenges encountered by the LGUs were presented. These were rated according to the seriousness of the problem ranging from "not at all a problem to very serious."

In this study, challenges are listed and rated by the respondents that enable them to effectively perceive the program implementation. Respondents interpreted 11 out of 13 problems they encountered as moderate such as the Absence of C/MENR Office (majority of the staff are concurrent or designated only) (3.30), Insufficient number of personnel (3.37), Insufficient knowledge and

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skills of SWM staff (3.13), Lack of trained personnel especially on the operation of SWM equipment (3.13), Lack of land for the construction of

Table 14. Challenges Encountered by the LGU in the Implementation of Ecological Solid Waste Management

Challenges	Mean	SD	Qualitative Interpretation
1. Absence of C/MENR Office (majority of the staff are concurrent or designated only)	3.30	1.41	Moderate
2. Insufficient number of personnel	3.37	1.24	Moderate
3. Insufficient knowledge and skills of SWM staff	3.13	1.19	Moderate
4. Lack of trained personnel especially in the operation of SWM equipment	3.13	1.16	Moderate
5. Insufficient funding allotted for solid waste management programs and projects	3.43	1.16	Serious
6. Lack of land for the construction of SWM facilities	3.30	1.35	Moderate
7. Lack of collection vehicle	3.02	1.32	Moderate
8. Lack of equipment	3.24	1.22	Moderate
9. Weak enforcement of local ordinances	3.21	1.14	Moderate
10. Unwillingness to pay for the SWM services	2.96	1.17	Moderate
11. Solid waste management is not a priority by the Local Chief Executive	2.24	1.37	Minor
12. Poor public cooperation	3.34	1.25	Moderate
13. Low level of awareness of the community on SWM	3.07	1.19	Moderate
Overall Mean		***3.13***	***Moderate***

Legend: 4.20 - 5.00 Very Serious (VS) 3.40 - 4.19 Serious (S) 2.60 - 3.39 Moderate (Mo) 1.80 - 2.59 Minor (Mr) 1.00 - 1.79 Not at all a problem (NaP)

SWM facilities (3.30), Lack of collection vehicle (3.02), Lack of equipment (3.24), Weak enforcement of local ordinances (3.21), Unwillingness to pay for the SWM services (2.96), Poor public cooperation (3.34), and lastly, Low level of awareness of the community on SWM(3.07). Moreover, solid waste management is not a priority by the Local Chief Executive with a mean score of 2.24 is interpreted as a minor problem while insufficient funding allotted for solid waste management programs and projects with a mean score of 3.43 interpreted as a serious problem. As such, some of the respondents added "allocation of sufficient funding for the establishment of SLF", "financial assistance from the national government for the establishment of WTE", "budget for the procurement of equipment", "funding coming from the national agency", and "lack of funds to develop SLF and equipment" are just some of few additions that strengthened the budget as a strong factor that influences the success of program implementation. Before this, a study by Malik et. al., (2022) of Khonozai Town, Baluchistan, Pakistan on the household level implied the willingness of respondents to pay and contribute to the improvement of solid waste management because of government LGUs agencies ignoring and not putting importance to solid waste management. The article of the Asian Development Bank (2014) titled "Solid Waste Management in the Pacific Financial Arrangements enumerated other financial sources that could be explored by LGUs to finance SWM activities such as intergovernmental transfers or subsidies, external development assistance, local taxes, user charges, and environmental fees.

CONCLUSION AND RECOMMENDATION

Based on the findings of the study, it can be concluded that most of the respondents are in the prime of life, college graduates, and highly involved in SWM implementation. The short-term of office of the elected local officials is one reason for the frequent reshuffling and/or turnover of LGU employees thus affecting the sustainability of SWM program operations.

Both the LGU and DILG respondents regarded the influencing factors as important in SWM implementation. However, as to the level of implementation, variations in some responses were noted. This implied that the DILG respondents have different views compared with the LGUs being the overseer and the implementer, respectively. Further, significant differences were observed when the respondents were grouped according to socio-demographic profiles such as age, gender, educational status, and training attended. Hence, it can be said that the success of the implementation of SWM programs depends largely on the capacity of the implementers in terms of education and training. The higher the educational level and the more training attended related to SWM, the higher rate of success for

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implementation.

On the other hand, the influencing factors have no bearing on the assessment of success or failure pertaining to the implementation of the 10-Year SWM Plan and MRF operation. Other factors need to be considered to combat existing problems in both aspects. For the closure and rehabilitation of dumpsites, and operation and/or disposal to sanitary landfill, legal, external support, and public awareness and participation significantly influence its implementation. Awareness of the people on the existing ordinances coupled with strict enforcement and external support from national agencies and other sectors would make any program a success.

The local governments faced many challenges in SWM implementation, but the results of this study revealed that insufficient funding was the only serious problem perceived by the respondents. If the budget is carefully planned and a large percentage is allocated to SWM programs and projects, a greater chance of success will be expected.

In order to effectively and efficiently implement the provisions of RA 9003, the local governments should focus on the allocation of sufficient budget for SWM programs, strictly enforce national laws and local ordinances, conduct intensive IEC targeting all sectors of the community, and capacitate its employees through training on the dynamics of solid waste management. Other recommendations that need utmost consideration by the current administration are the mandatory creation of the Municipal Environment and Natural Resources Office in every municipality and the establishment of a sanitary landfill or Waste-to-Energy Facility hosted by the provincial government in collaboration with the national agencies. Further, the assignment of a Special Court in every LGU that will handle SWM-related cases may also be considered.

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