

RESEARCH ARTICLE

## Analysis on policy implementation and institutional integration of RA 9003 SWM indicators in educational institutions

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### Abstract

This study attempts to assess the extent of implementation and integration of solid waste management practices in public and private schools in General Santos City in terms of waste reuse, waste reduction, waste collection, waste recycling, waste treatment, final waste disposal, and IEC advocacy/campaign indicators. A modified questionnaire was given to the respondents which were composed of Senior High School students, Science teachers, and school administrators of one (1) private and public educational institution. The comparative result of implementation and integration between the public and private schools revealed that both schools implement and integrate the policy on solid waste management to a great extent with a composite mean of 3.55 and 3.42 respectively. *T-test* result on the extent of the implementation and integration of RA 9003 solid waste management between the two selected big schools in General Santos City showed no significant difference with a *t*-value of 1.03941 and the *p*-value of 0.319106 which is less than 0.05 ( $p < .05$ ). This justifies that the two public and private schools in General Santos City implement and integrate solid waste management to a great extent. It is imperative, therefore, for the educational institutions to continue prioritizing the programs and advocacies on solid waste management. The school administrators must also maintain high standards of integrating SWM in the learning process through campaigns, incentives, partnerships, organizational resources, and equity.

**Keywords:** solid waste management; reuse; reduction; collection; recycling; treatment, disposal; advocacy; budget

### Introduction

In recent decades, climate change, poverty, non-renewable resource depletion, and species extinction are just a few of the environmental threats that the globe has faced. With the accelerated pace of urbanization and industrialization, pollution has become one of the environmental threats to sustainability. Despite the given that a majority of regulations and initiatives are being implemented throughout the world to mitigate risk, the area of environmental sustainability is being confronted by global environmental concerns (Patwary, 2016).

The challenges related with municipal solid waste (MSW) management have grown alarmingly in developing nations in the past few decades. Population explosion and rise in economic activity in developing nations' metropolitan regions, along with a lack of training and expertise in current solid waste management methodologies and procedures, hamper efforts to enhance solid waste management services (Khan et al., 2021).

In the case of developing countries, though waste generation per capita is lesser than the developed nations, the capacity of the former is exponentially limited especially in terms of collection, processing, disposal, and recovery, which can be attributed to the geographic, sociocultural, industrial, and environmental factors of a certain country (Bundhoo, 2018; Mmereki et al., 2016). For instance, in Bangladesh, solid waste management has been one of the least investigated environmental challenges though recently, the government and other non-government private institutions have come in to pursue efforts to address the concern, it has been reported that solid waste has not been managed properly and it remained to be a daunting task for the said sectors due to the socioeconomic and technological setup of the country (Ahsan et al., 2014).

In the study conducted (Mmereki et al., 2016), despite the changing lifestyles, increasing manufacturing processes, and fast urbanization of the developing nations, they still fall short in adequate waste policy implementation. According to the conclusions of the comparative research, SW management in less developed countries is poorly established

and inefficient. This issue is exacerbated by lack of coordination among government and non-government stakeholders, institutional structural and mechanism concerns, and other uncoordinated initiatives. There are also reported increase in solid waste generation during pandemic, while, poor strategies in solid waste management in developing countries is also believed to aggravate CoViD-19 cases (Nzediegwu & Chang, 2020; Zand & Heir, 2020).

The Philippines, like other developing countries in Asia and the Pacific, is being confronted by more severe waste management constraints. It was reported that the country's solid waste management system is regarded as one of the most pressing environmental issues threatening the country's entire environmental justice (Atienza, 2011). Solid wastes, which include all superfluous waste generated by various institutions, households, and large industries, have been identified as a dilemma in fast-growing urban communities as a result of poor solid waste management (Ogbonna et al., 2007). In the case of municipal solid waste (MSW), moreover, the ASEAN Report in 2015 recorded that MSW has become a severe concern in recent years due to increased urbanization and industry, population growth, and improved lifestyles (ASEAN, 2015). In developing nations, the growing accumulation of solid wastes has amplified the effects of typhoons resulting in flash floods and blocking water flows (Al-Khatib et al., 2010). Indeed, waste pollution remains a pressing environmental challenge of this contemporary time that needs to be robustly dealt with.

In response to this growing environmental concern, the Philippine government decreed the Republic Act 9003 or the Ecological Solid Waste Management Act of 2000, which sets out programs and initiatives apropos solid waste management from segregation to disposal and treatment. To achieve the best possible execution of the Act, several stakeholders in the educational institutions have been obliged to accept accountability and obligation for solid waste management. The Act also requires educational institutions to incorporate ecologically-sound solid waste management in educational systems articulated across all levels. In the case of state universities and colleges (SUCs), the Act obligated the higher institutions to aid local government units (LGUs) in the extended system by enhancing their effectiveness through competence development and complementing extension initiatives (Baula, 2010; Gequinto, 2017).

Furthermore, the Act states that the national government, in collaboration with all government educational institutions, should undertake continuing information, education, and communication campaigns on solid waste management, as well as intensify the incorporation of environmental issues in the school curricula across all levels. To encourage environmental awareness and action among citizens, the education workforce must place a special focus on waste management concepts such as segregation at source, reduction, recycling, re-use, and composting. (Bautista, 2019). There must be a concerted effort and collective

participation among the school administrators, teachers, staff, and students from the school and surrounding community to make the concept of waste management even more pronounced and establish their own solid waste management program.

Indisputably, schools play a crucial function in raising the level of awareness among actors and key players. As cited by Punongbayan et al., (2014), awareness, together with participation and involvement, is fundamental for all students to be active in the school's waste management program, resulting in successful and sustainable promotion of appropriate waste management practices. According to the study conducted by Matunog and Awa (2013), schools and universities placed second in the generation of biodegradable garbage and are the major manufacturer of recyclable materials, with the majority of wastes being connected to the instructional process.

This study attempts to assess the extent of implementation and integration of solid waste management indicators of a public and a private school in General Santos City especially in terms of waste reuse, reduction, collection, recycling, treatment, and disposal considering the components of engineering support; education and advocacy; enforcement and policy support; institutional mechanism; equity; and incentives. There are several studies conducted vis-à-vis the level of implementation among LGU's Solid Waste Management Plan, but only a few have dug into school-based SWM, particularly in the context of General Santos City.

In the light of the unveiled realities, this study would be integral in establishing baseline data that will be useful for policymakers and school administrators to look deeper into the problem and take necessary steps and actions to be reflected in their school innovation programs. General Santos City, a rapidly urbanized city in the southernmost region of the Philippines, is a hub for the generation of waste of growing amount and complexity. Considering that municipalities are struggling to keep up with the accelerated level of waste generation, it is imperative to delineate the role of schools and their extent of implementation and integration in solid waste management, hence this study is carried out.

## **Literature Review**

### *National Policies*

The legal landmark of waste management was established with the passage of RA 9003 to comprehensively provide management mechanisms for all sectors and institutions. Notably, the policies that defined the country's SWM system were dispersed among components. For instance, Presidential Decree No. 825 (PD No. 825), the country's first basic policy which focus is geared towards penalizing littering, requires all inhabitants and residents of the Philippines, educational institutions, and commercial and industrial entities to clean their immediate surroundings, including canals, highways,

and streets. The Department of Environment and Natural Resources (DENR) Administrative Order No. 1998- 49 and the Memorandum Circular (MC) No. 1988-39A creating the Presidential Task Force on Waste Management then followed to support waste management measures (Domingo & Manejar, 2021).

At the onset of the 21st century, the adoption of a comprehensive and systematic strategy for waste management with a significant emphasis on the ecological side was made possible. By the time, there is a strong push for common-but-differentiated responsibility (CBDR), hence, some initiatives were potentially aided by international commitments to climate change mitigation (Vanderheiden, 2020). The cascading of initiatives as part of the implementation efforts on waste management plus being supported by the Local Government Code, mandated the devolution of domestic solid waste segregation and collection to the barangay level, while special and hazardous wastes were delegated to municipal or city local government units (LGUs) (Domingo & Manejar, 2021).

Today, RA 9003 remains to be the most valid legislation that governs the solid waste management covering waste re-use, reduction, collection, recycling, treatment, and disposal.

#### *Waste Generation Status*

According to the ASEAN Report in 2015, municipal solid waste (MSW) has become a severe concern in recent years due to increased urbanization and industry, population growth, and improved lifestyles. According to the report, the majority of MSW is created by homes, but it also includes garbage from hotels, retail complexes/shops, schools, and institutions, as well as municipal services like street cleaning and recreational area upkeep. Indonesia generates the most municipal waste per year, followed by Thailand with 26,770,000 tons, Vietnam with 22,020,000 tons, the Philippines (14,660,000 tons), Malaysia (12,840,000 tons), and Myanmar (841,508 tons), while Lao PDR produces the least (77,380 tons) (UNEP, 2017).

Thailand is the largest generator of hazardous or industrial waste among the four ASEAN nations, with roughly 3,500,000 tons of hazardous waste inventory each year, followed by the Philippines (2,000,000 tons/year), Malaysia (1,500,000 tons/year), and Singapore (500,000 tons/year). According to the UNU's Global E-waste Monitor 2014, Indonesia creates the most (745 metric kilotons per year), followed by Thailand (419 metric kilotons), Malaysia (232 metric kilotons), and the Philippines (127 metric kilotons), while Brunei Darussalem generates the least (Baldé et al., 2015).

In terms of Municipal Solid Waste (MSW), ASEAN produces 1.14 kg of Municipal Solid Garbage (MSW) per citizen every day, with Indonesia generating the most waste with 64 million tons/year. Thailand comes in second with 26.77 million tons/year, followed by Vietnam with 22 million

tons/year, the Philippines with 14.66 million tons/year, Malaysia with 12.84 million tons/year, Singapore with 7.5 million tons/year, Myanmar with 0.84 million tons/year, and Lao PDR with 0.07 million tons/year. Organic waste accounts for the bulk of MSW (around or more than 50%) in all ASEAN countries except Singapore, where organic waste accounts for just 10.5 percent of total MSW reported. The additional categories of rubbish (for example, plastic, paper, and metals) are also common in MSW landfills. Aside from MSW, rising waste sources in ASEAN countries include healthcare waste, e-waste, industrial waste, and building and demolition trash (UNEP, 2017).

#### *School-Based Solid Waste Management Program*

As the RA 9003 mandates the Department of Education (DepEd), the Technical Education and Skills Development Authority (TESDA), the Commission on Higher Education (CHED), and other concerned agencies to “incorporate ecological solid waste management in the school system at all levels”, these educational institutions have taken initiatives towards the implementation of school-based waste management. The said mandate for the educational institutions prompted the private organizations to take part in the solid waste management campaign bolstered by the National Solid Waste Management Commission (NSWMC) that put in place a holistic approach through the project called "Mainstreaming Ecological Solid Waste Management in the Philippine Educational." The project endeavored to enhance students' waste management capacity through an Ecological Solid Waste Management Training Program, which was implemented by the DENR as the lead agency. The Trainers' Training Program was developed for the students, staff, teachers, and the school management to develop their own solid waste management program, thus promote green practices (DENR, 2018).

For example, as part of their commitment to support the reduction of plastic waste, Procter & Gamble Philippines, in collaboration with World Vision Development Foundation Inc., has successfully implemented the school-based Pag-asa sa Basura initiative. Aside from promoting the necessity of efficient solid waste management, the initiative seeks to enable plastic recovery and recycling. Rehabilitation of the schools' materials recovery facilities (MRF) was done and training the teachers and students on waste segregation, upcycling, and the circular economy was conducted (Manila Lifestyle Standard, 2020).

#### **Research Methods**

This study employed a quantitative research design through a survey method to attain the objectives of the study. An availability or convenience sampling technique –a type of nonprobability or non-random sampling in which the target population fits the particular practical requirements or

criteria, was used to easily and conveniently conduct the survey (Etikan et al., 2016). The respondents of the study were purposely selected based on the following criteria: a.) practicing solid waste management; b.) big school with one thousand population or more; c.) located in the city, and d.) willing to take part in the study. A modified questionnaire from (Gequinto, 2017) was given to SHS students, Science

teachers, and administrators of each school yielding a total of 150 respondents per school. The survey questionnaire was divided into seven (7) sections namely: waste reuse, waste reduction, waste collection, waste recycling, waste treatment, waste disposal, and SWM advocacy. It utilized a five-point Likert scale interpreted as:

Description	Weighted Range
Implemented and integrated to a very great extent (VGE)	4.20-5.00
Implemented and integrated to a great extent (GE)	3.40-4.19
Implemented and integrated to a moderate extent (ME)	2.60-3.39
Implemented and integrated to a small extent (SE)	1.80-2.59
Not implemented and integrated at all (N)	1.00-1.79

Data were tallied and statistically analyzed using a weighted mean. A dependent-means *t*-test or paired *t*-test was used to determine the significant difference in the extent of solid waste management implementation and integration between the two selected big schools in General Santos City. It

determines if the mean difference between paired/matched observations differs from zero or the dependent samples *t*-test process determines if there is a statistically significant difference between the means of the two variables (Gerald, 2018). The formula of the dependent-means *t*-test is given by:

$$t = \frac{\sum d}{\sqrt{\frac{n(\sum d^2) - (\sum d)^2}{n-1}}}$$

Where  $\sum d$  is the sum of the differences.

### Results and Discussion

The solid waste management practices in public and private schools were assessed to observe the implementation and integration of RA 9003 as schools are contributory to a lamp collection of solid waste materials in city areas (Gequinto, 2017).

Based on the result, the public school community has high regard for waste disposal management as the school community obtained a *composite mean* of **3.55** described as **implemented to a great extent (GE)**. Specifically, results

showed that the school community puts much emphasis on IEC Campaign/Advocacy ( $\bar{x}$ = **3.99**), waste collection ( $\bar{x}$ = **3.98**), waste disposal ( $\bar{x}$ = **3.45**), waste treatment ( $\bar{x}$ = **3.43**), and waste recycling ( $\bar{x}$ = **3.41**) which are all described as **implemented and integrated to a great extent (GE)**. However, the school needs to put extra effort into waste reduction and re-use activities which both garnered the lowest mean of  $\bar{x}$ = **3.39** and  $\bar{x}$ = **3.20** respectively and were described as **implemented and integrated to a moderate extent (ME)** as shown in Table 1.

**Table 1.** Mean on the extent of the implementation and integration of solid waste management in a public school

Indicators	$\bar{x}$	Description
A. Re-use	3.20	Implemented and integrated to a moderate extent
B. Waste reduction	3.39	Implemented and integrated to a moderate extent
C. Waste collection	3.98	Implemented and integrated to a great extent
D. Waste recycling	3.41	Implemented and integrated to a great extent
E. Waste treatment	3.43	Implemented and integrated to a great extent
F. Waste disposal	3.45	Implemented and integrated to a great extent
G. IEC Campaign/Advocacy	3.99	Implemented and integrated to a great extent
<b>Composite Mean</b>	<b>3.55</b>	<b>Implemented and integrated to a great extent</b>

Results on the implementation and integration of solid waste management in a private school showed that the school community has **implemented and integrated the policy to a great extent** ( $\bar{x}$ = **3.42**). Explicitly, the school has put much

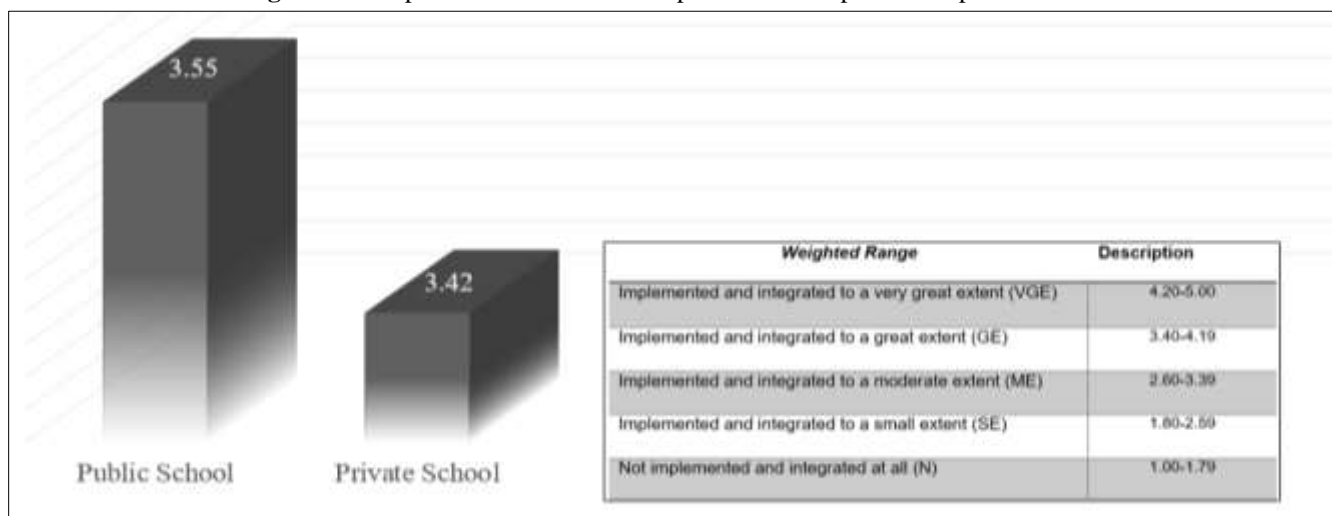
effort into implementing the policy through the IEC Campaign/Advocacy and waste collection with a mean of **3.58**, and waste treatment ( $\bar{x}$ = **3.43**), described as **implemented to a great extent**. Conversely, results also

revealed that the school community has **implemented to a moderate extent** its wastes disposal ( $\bar{x}= 3.37$ ), reduction ( $\bar{x}= 3.31$ ), re-use ( $\bar{x}= 3.28$ ), and waste recycling ( $\bar{x}= 3.39$ ).

**Table 2.** Mean on the extent of the implementation and integration of solid waste management in private school

Indicators	$\bar{x}$	Description
A. Re-use	3.28	Implemented and integrated to a moderate extent
B. Waste reduction	3.31	Implemented and integrated to a moderate extent
C. Waste collection	3.58	Implemented and integrated to a great extent
D. Waste recycling	3.39	Implemented and integrated to a moderate extent
E. Waste treatment	3.43	Implemented and integrated to a great extent
F. Waste disposal	3.37	Implemented and integrated to a moderate extent
G. IEC Campaign/Advocacy	3.58	Implemented and integrated to a great extent
<b>Composite Mean</b>	<b>3.42</b>	<b>Implemented and integrated to a great extent</b>

**Figure 1.** Comparative result of the composite mean of public and private school



According to Baula (2010), by virtue of RA 9003, all educational institutions in the public and private and other concerned government educational agencies are vigorously integrating ecological solid waste management in school systems at all levels. This means that the school administrations continue to update and strengthen their waste management curricula. There is also active participation and collaboration among the school workforce including the administrators, teaching and non-teaching staff, and students

to consider in their planning and implementation of the nearby community waste management actions.

Data obtained from the survey were then subjected to statistical analysis using a paired t-test to determine whether the responses showed significant differences from each other. Table 3 shows the t-test result of the extent of implementation and integration of Solid Waste Management between two (2) selected big schools in General Santos City.

**Table 3.** t Test on the extent of the implementation and integration of Solid Waste Management between the two selected big schools in General Santos City

source	df	SS	MS	T-Value	P-Value
treatment	6	0.57	0.1166	1.03941	0.319106
error	6	0.09	0.0454		
total	12	0.66			

With a *t*-value of 1.03941, the *t*-test result on the extent of the implementation and integration of Solid Waste Management between the two selected big schools in General Santos City showed no significant difference as the *p*-value of 0.319106 is less than 0.05 at 0.05% level of significance ( $p < .05$ ). This further testifies that the two (2) big public and private schools in General Santos City implements and integrates Solid Waste Management to a great extent.

The results supported the findings of the study conducted by Lalamonan & Comighud (2020) that the solid waste management practices of students and school administration especially in terms of segregation, reduction, reuse, recycling, collection, treatment, disposal, and advocacy were excellent. It signifies that both instructors and students displayed a high level of understanding of Solid Waste Management (SWM) ideas and methods, as educational practitioners continue to raise public awareness. It was also reported that both instructors and students had a high level of SWM implementation due to effective instruction and increased community engagement (Molina & Catan, 2021).

## Conclusion

The result of the study reveals that schools (both public and private) implement the provision set forth in RA 9003 for educational institution and integrate the concept of solid waste management in their curricula. The role of schools in the implementation and integration of Solid Waste Management is evidently stated in RA 9003, thus, educational institutions must put much effort into educating the learners on proper Solid Waste Management Advocacy.

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Sustainable waste management practices should be given much priority by creating a platform on which everyone can share knowledge and learn together vis-à-vis proper waste management.

Undoubtedly, an effective SWM is most likely to prosper if facilities are at the forefront of an institution. In this sense, the government should consider private sector participation as a means of enhancing efficiency and mobilizing private investment and thus expanding the resources available for urban infrastructure and equipment. Partnership with the LGU should always be considered to maintain and leverage SWM activities. Also, the administrators must always engage students with SWM advocacies/campaigns to strengthen the level of awareness of the school community.

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