DOI 10.5281/twist.10049652#366

TWIST, 2025, Vol. 20, Issue 1, pp. 160-165

TWIST

Journal homepage: www.twistjournal.net

# Ecological Solid Waste Management of Bulacan State University

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**Abstract**
This study is focused on the compliance of Bulacan State University-Bustos to the salient features of the Republic Act (RA) 9003 also known as the Ecological Solid Waste Management Act of 2000. It also develops guidelines to strengthen the implementation of the policy. This study utilized quantitative and qualitative research methods to interpret the school's program based on RA 9003. Results indicate that despite the efforts given by the Bulacan State University-Bustos to implement the Ecological Solid Waste Management Act of 2000 effectively and efficiently, proper waste disposal, awareness and high-impact projects were the main issues. It is suggested to craft and enforce guidelines for continuous education, stricter policy implementation, and widening of community partnership and income-generating projects.

**Keywords**
Solid waste management, Bulacan, Waste recycling, Philippines

## INTRODUCTION

The amount of solid waste produced each year has grown steadily with the increasing population and wealth of the people. As consumption of goods per person increases, so does the amount of solid waste generation per person. In addition, the use of disposable and non-returnable packaging materials made the disposal of plastic and aluminum overwhelming. These two factors increase solid waste generation faster than population growth (Kumar & Kalamdhad, 2019).

In the Philippines, over 21 million metric tons of garbage are produced by more than 100 million people each year. It has an average per capita generation of 0.5 kilograms. In 2020, the projected waste generation of the country has a total of 21,4265,676 metric tons of garbage. The National Capital Region (NCR) is the biggest producer of garbage, with an estimated population of over 12 million. Last year, Manila produced 3,466,469 metric tons of garbage (Mayuga, 2021). The World Bank expects that the solid waste produced by the country will rise by 165 percent to 77, 776 tons from 29, 315 tons per day. This increase is a consequence of a projected urban hike of 47.3 percent of the population by 2025. There is also a projection of doubling the municipal solid waste generation per capita to 0.9 kilograms per day from the current 0.5 kilograms (Senate of the Philippines, 2017).

To address the growing problem of solid waste, Republic Act Number 9003, or the Ecological Solid Waste Management Act of 2000, was enacted on January 26, 2000. This law provides the legal framework for the country's systematic, comprehensive, and ecological solid waste management, ensuring public health and environmental protection. It integrates the waste management method of Reduce, Reuse Recycle. It requires segregating solid waste into containers with labels including compostable, recyclable, and non-recyclable (https://www.officialgazette.gov.ph/).

The local government units (LGUs) in the country are initially responsible for the effective and efficient implementation of solid waste management (Castillo & Otoma, 2013). They are mandated by the law to prepare a 10-year solid waste management plan (National Waste Management Commission, NSWMC, 2010). Each plan must include an implementation schedule shown within five years after the law took effect. The goal is that "LGUs shall divert at least 25 percent of all solid waste from waste disposal facilities through reuse, recycling and composting activities, and other resource recovery activities. The waste diversion goals shall be increased every three years after that" (Mayuga, 2021).Despite the creation of the law and its implementation, there is still poor solid waste management in the country. Mayuga (2021) mentioned that in October 2020, based on the data collected from the Department of Environment and Natural Resources (DENR) approved 10-year-solid waste management plans, only 68 percent was the diversion target by the end of last year. She continued that there is only 1, 064, or 58.6 percent compliance. While there are also 521 plans, or

37 percent of the total, that are under evaluation, and 76 LGUs do not submit the plans. She also discussed that there are 11, 558 materials recovery facilities (MRFs) cater to 14, 483 barangays, far from the estimated 42,000 barangays for the whole country. For the LGU disposals in the sanitary landfills, there are 189 servicing 399 LGUs all over the Philippines. Premakumara, Canete & Nagaishi conducted another study (2013) entitled Policy Implementation of the Republic Act (RA) 9003 in the Philippines: A Case Study of Cebu City. The study found out that impacts of the RA 9003 can be "achieved if the LGU has the high level of political commitment, development of effective strategies in a collaborative manner, partnership building with other stakeholders, capacity development, adequate financing and incentives, and in the close monitoring and evaluation of performance.Through the years, the studies and research in solid waste management all over the country have focused on its status and the implementation of RA 9003 at local and national levels. Nevertheless, this study will focus on the ecological solid waste management of Bulacan State University,Bustos Campus, the programs being implemented, budget utilization, and the impacts of RA 9003. Results of the study would be vital for proposing measures for improving ecological solid waste management in Bulacan State University.

Therefore, the following are the questions that this research aims to answer:

1. What are the programs of the Bulacan State University, Bustos Campus In the implementation of ecological solid waste management?
2. How do the Bulacan State University, Bustos Campus utilize the budget for implementing ecological solid waste management?
3. What are the impacts of implementing ecological solid waste management in Bulacan State University, Bustos Campus?
4. What measures can be proposed to improve the implementation of ecological solid waste management in Bulacan State University, Bustos Campus?

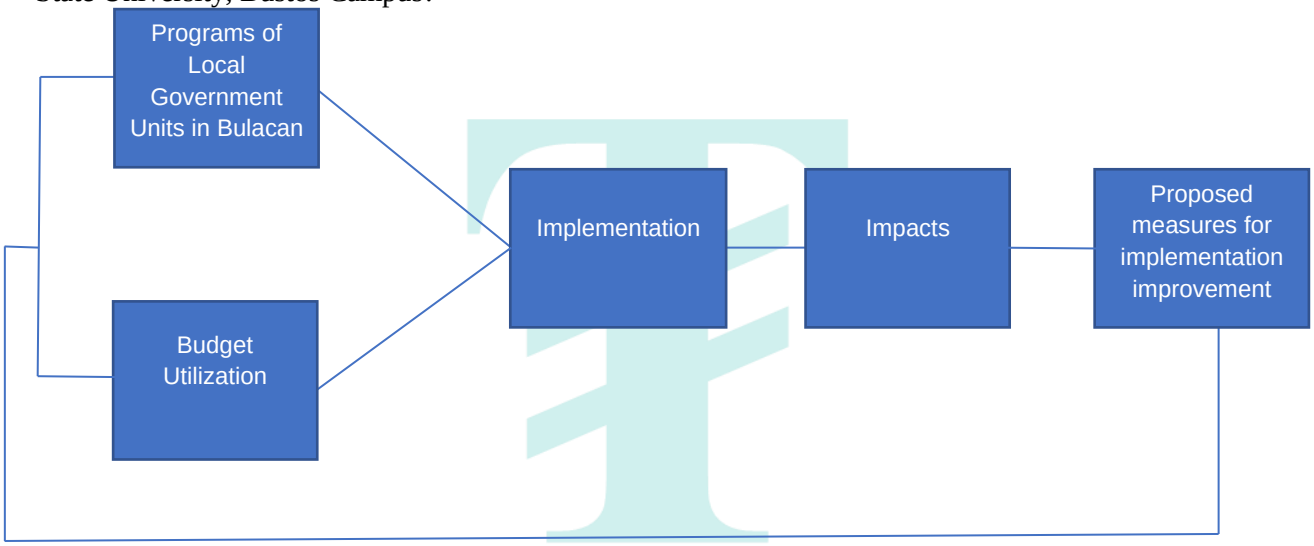


**Fig. 1** Model of the study showing Programs of Bulacan State University,Bustos Campus Budget Utilization, Implementation, Impacts, and Proposed measures for implementation improvement

Bulacan State University, Bustos Campus are considered to have programs to implement ecological solid waste management. For the programs to be implemented, budget allocation is needed. This implementation is considered to bring impacts. The impacts of the implementation may or may not rationalize the achievement of sustainability and some areas of excellence in public administration and governance. All of this may provide measures for further improving the implementation of ecological solid waste management in Bulacan State University, Bustos Campus.

## METHOD

### Participants

The respondents involved in this study were the administration, faculty, staff and students in the Bulacan State University, Bustos Campus. Data will be gathered through interviews and pertinent documents covering the programs, budget utilization, and impacts of ESWM.

### Data collection and analysis

Analysis of the issue will be delimited to the following: (1) the programs of the Bulacan State University, Bustos Campus in the implementation of ecological solid waste management; (2) the Bulacan State University, Bustos Campus utilization of the budget in implementing ecological solid waste management; (3) the impacts of implementing ecological solid waste management in Bulacan State University, Bustos Campus ; and (4) the measures that can be proposed to improve the implementation of ecological solid waste management in Bulacan State University, Bustos Campus .The best practices of State University, Bustos Campus as it generates non-numerical data.In this qualitative method of research, the researchers specifically used the phenomenological study design. According to Neubauer and others (2019), phenomenology is a form of qualitative research that focuses on the study of an individual's lived experiences within the

world. Phenomenological research uses Thematic Analysis (TA) with six phases (Cresswell 2013): 1) familiarization with the data; 2) coding; 3) searching for themes; 4) reviewing themes; 5) defining and naming themes; and 6) writing up.

## RESULTS

### Waste Management Policies and Measures

School-based solid waste management practices in Bulacan State University, Bustos Campus are measures to observe and ensure proper waste disposal because the largest fraction of waste is generated from paper and other school related materials and from cafeterias. Hence institutions like state universities have to model responsible solid waste management in terms of waste reuse, waste reduction, waste recycling, waste collection ,waste treatment, and final waste disposal through programs implemented by the campus.

### Utilization of the Budget in Implementing Ecological Solid Waste Management

The main contributors in the LGU budgets for financing their ESWM activities and services come from the national transfers and the own-source revenues. For the national transfer, the internal revenue allotment (IRA) is the most important because it is fixed at a certain percentage such as 40%, and by law, 20% of this should be allotted to developmental activities. On the other hand, LGUs are heavily dependent on the IRA. This dependence is prevalent among municipalities with low tax bases and cannot generate sufficient own-source revenue.

### Impacts of implementing ecological solid waste management

It is considered favorable to look at solid waste management at institutional level because of the different composition of institutions, and mostly because the different state universities currently manage their waste themselves to a great extent. Due to the integration of activities, institutions can easily manage their own solid waste management systems within the large municipal solid waste management system framework. With such systems in place in institutions, management of waste and waste recycling can more easily and effectively be incorporated.The findings on institutional solid waste management in Bulacan State University, Bustos Campus points out particular features that can be addressed to improve the campus solid waste management and contribute to the improvement of municipal solid waste management in the Municipality of Bustos, Bulacan.It advances the idea that solid waste management at Bulacan State University, Bustos Campus can be improved through efforts focused on individual sources with emphasis on waste minimization rather than provision for disposal.

**Table 1** Sources and Types of waste from Bulacan State University, Bustos Campus Premises

| Source | Types of Waste |
|---|---|
| Chapel | Paper, plastic, cans, food leftovers, nylon, vegetal food wraps |
| Students' hostels | Paper, food remnants, food preparation wastes, plastic, textile |
| Cafeterias | Food leftover, bones, vegetal matter, ash, tins, bottles, paper, plastic and sand |
| Academic areas and offices | Paper, plastic, electronic waste |

In general, the study found that the majority of undergraduate students from Bulacan State University,Bustos Campus had satisfactory knowledge and attitude;, less than half had satisfactory practice level on several items on material recycling and participation in environmental programs in the premises of the school. At the time of the survey students were somehow aware of the importance as to proper solid wastes management and recycling and they also exhibited a good attitude towards these matters. Abdullah and Tuna (2014) also surveyed students from secondary schools, universities, and colleges in Nigeria. The study revealed an unsatisfactory knowledge level on environmental issues among student-respondents, but they showed good perception ratings. The students were, at least, conscious but they could not "explain on why" environmental problems continue to exist in their community (Abdullah and Tuna, 2014).

## DISCUSSION

The responsibility of State University in the implementation of SWM is clearly stipulated in RA 9003. In compliance to this mandate, State University along with the officials, faculty members, staff, and studentry have implemented SWM. Indeed, the Bustos Campus practiced solid waste management to a great extent in terms of waste reuse, reduction, collection, recycling, treatment and disposal, there are still rooms for improvement. Practices for waste recycling and treatment need more careful planning from the administration and local student council to convert waste to resources or make cash out of trash particularly in the recycling process. Thus, it is recommended that for recycling to be effective, functional and marketable MRF should be put up in the university to attract recycling entrepreneurs. It would be better also if a recycling campaign once a week would be initiated by the Local Student Council for the studentry to take part,and live the recycling advocacy campaign. Hence, waste treatment could also be invented by students through their undergraduate research guided by their research professor.. It could be a treatment facility for special wastes like ink cartridges, paint, thinner, whiteboard markers, and others would really lessen and convert this waste into resources. This would be a cost-effective measure for the university.

Similarly, Rahmaddin et al. (2015) studied the KAP regarding waste management in communities near Martaputra River Bank in Indonesia. Another study has explored the village KAP on solid waste management in Sta. Rosa City in Laguna Province, the Philippines. Results showed high awareness and favorable attitudes on waste-related issues and topics, among the surveyed members of the communities. Interestingly, the respondents also engaged in favorable practices on waste segregation (Tatlonghari and Jamias, 2010). It revealed that the students' knowledge and attitude were positively correlated with their level of practice. The practice of the students to minimize the use of materials was highly associated with satisfactory knowledge and attitude ratings.An improved solid waste management system can easily be adopted in the school curriculum and as well practiced. Since the higher educational institutions in itself are composed of learned individuals, the adoption of best practices would be a lot easier and practicable. Through an intensive awareness program conducted by the university in terms of proper solid waste management, the community can be sensitized and educated on the best practices to adopt so as to ensure that everyone is carried along in issues concerning Solid waste management. It can be integrated through mass media programs. The university authority should also provide training for its faculty and staff as well as the studentry on various waste management programs so that they can become custodians of the environment. Once the good waste management practices are institutionalized, it will definitely trickle down to the society.

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