

THE THEORETICAL UNDERPINNINGS OF THE SOLID WASTE MANAGEMENT PRACTICES: A PROPOSED BLUEPRINT TOWARDS GOVERNMENT ACTION

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Abstract

This research paper theoretically underpins the solid waste management practices in the Pacific Area of Southern Leyte as basis for a proposed blueprint towards government action that will serve as an addendum of the existing programs in accordance with the mandate under R.A. 9003 for an enhanced and intensified initiative of the local government unit(s) to address waste problems in cooperation with other concerned stakeholders (private sectors and non-government organizations) of the society.

Keywords: Solid Waste Generation, Pacific Area of Southern Leyte, Proposed Waste Management Disposal

Introduction

Due to the rapid increase in the production and consumption processes, societies generate as well as reject solid materials regularly from various sectors – agricultural, commercial, domestic, industrial and institutional. The considerable volume of wastes thus generated and rejected is called solid wastes. In other words, solid wastes are the wastes arising from human and animal activities that are normally solid and are discarded as useless or unwanted. This inevitably places an enormous strain on natural resources and seriously undermines efficient and sustainable development. One of the ways to salvage the situation is through efficient management of solid wastes, and this is the focus of this study.

Generation of solid wastes is one of the functional elements of the solid waste management system. If this function could be minimized by educating the people on the proper segregation, collection, transport and disposal, this would greatly help in the minimization of waste generated.

Theoretical Background

According to Hiriya (2003) , the functional elements of Municipal Solid Waste are as follows: 1) Waste generation: Waste generation encompasses activities in which materials are identified as no longer being of value and are either thrown away or gathered together for disposal. 2) Waste handling and separation, storage and processing at the source: Waste handling and separation involves the activities associated with management of waste until they are placed in storage container for collection.

Handling also encompasses the movement of loaded containers to the point of collection. Separation of waste components is an important step in the handling and storage of solid waste at the source.3) Collection: The functional element of collection includes not only the gathering of solid waste and recyclable materials, but also the transport of these materials, after collection, to the location where the collection vehicle is emptied. This location may be a material processing facility, a transfer station or a landfill disposal site. 4) Separation and processing and transformation of solid wastes: The types of means and facilities that are now used for the recovery of waste materials that have been separated at the source include curbside collection, drop off and buy back centers.

The separation and processing of wastes that have been separated at the source and the separation of commingled wastes usually occur at a materials recovery facility, transfer stations, combustion facilities and disposal sites.5) Transfer and transport: This element involves two steps: 1) the transfer of wastes from the smaller collection vehicle to the larger transport equipment 2) the subsequent transport of the wastes, usually over long distances, to a processing or disposal site. 6) Disposal: Today the disposal of wastes by land filling or land spreading is the ultimate fate of all solid wastes, whether they are residential wastes collected and transported directly to a landfill site, residual materials from materials recovery facilities (MRFs), residue from the combustion of solid waste, compost or other substances from various solid waste processing facilities.

A modern sanitary land is not a dump; it is an engineered facility used for disposing of solid wastes on land without creating nuisances or hazards to public. http://en.wikipedia.org/wiki/Municipal_solid_waste" (January 23, 2009).

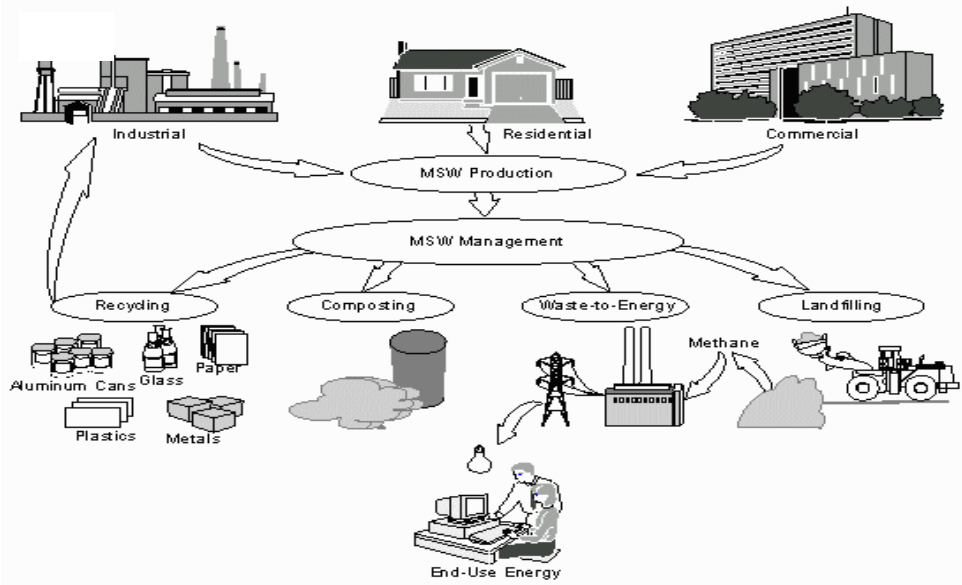
The municipal solid waste (MSW) industry has four components: recycling, composting, land filling, and combustion. The U.S. Environmental Protection Agency defines MSW to include durable goods, containers and packaging, food wastes, yard wastes, and miscellaneous inorganic wastes from residential, commercial, institutional, and industrial sources. It excludes industrial waste, agricultural waste, sewage sludge, and all categories of hazardous wastes, including batteries and medical wastes.

Another Solid Waste Management support worth mentioning is the Republic Act No. 9003, popularly known as “The Ecological Solid Waste Management Act of 2000”, an act providing for an ecological solid waste management program creating the necessary institutional mechanisms and incentives, declaring certain acts prohibited and providing penalties, appropriating funds therefore and for other purposes. This law requires all Local Government Units in the country to establish an ecological solid waste management program within their jurisdictions and provides the necessary institutional mechanisms to attain its objectives.

Municipal wastes, according to Kock (1999), is a never –ending stream that has to be treated continuously. Managing people’s solid wastes should be taught utilizing every available means of disseminating information.

Waste management requires managerial skills necessary in carrying out the problem. Komtz and Weihrich (1998) said that “managing is an art, know-how and doing things in the light of realities of a situation”.

Figure 7. Chief Components of Municipal Solid Waste Management



Source: Energy Information Administration, Office of Coal, Nuclear, Electric and Alternate Fuels (1996).

Statement of the Problem

This research paper theoretically underpins the solid waste management practices in the Pacific Area of Southern Leyte as basis for a proposed blueprint towards government action that will serve as an addendum of the existing programs in accordance with the mandate under R.A. 9003 for an enhanced and intensified initiative of the local government unit(s) to address waste problems in cooperation with other concerned

stakeholders (private sectors and non-government organizations) of the society.

Review of Related Studies and Literature

There are a number of concepts about waste management which vary in their usage between countries or regions. Some of the most general, widely-used concepts include: Waste hierarchy - The waste hierarchy refers to the "3 Rs" reduce, reuse and recycle, which classify waste management strategies according to their desirability in terms of waste minimization. The waste hierarchy remains the cornerstone of most waste minimization strategies. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of waste. http://www.waste_management.html. (March 23, 2009).

Extended producer responsibility - Extended Producer Responsibility (EPR) is a strategy designed to promote the integration of all costs associated with products throughout their life cycle (including end-of-life disposal costs) into the market price of the product. Extended producer responsibility is meant to impose accountability over the entire lifecycle of products and packaging introduced to the market. This means that firms which manufacture, import and/or sell products are required to be responsible for the products after their useful life as well as during manufacture.

Polluter pays principle - the Polluter Pays Principle is a principle where the polluting party pays for the impact caused to the environment. With respect to waste management, this generally refers to the requirement for a waste generator to pay for appropriate disposal of the waste, Paul 2006.

Education and awareness in the area of waste and waste management is increasingly important from a global perspective of resource management. The Talloires Declaration is a declaration for sustainability concerned about the unprecedented scale and speed of environmental pollution and degradation, and the depletion of natural resources. Local, regional, and global air pollution; accumulation and distribution of toxic wastes; destruction and depletion of forests, soil, and water; depletion of the ozone layer and emission of "green house" gases threaten the survival of humans and thousands of other living species, the integrity of the earth and its biodiversity, the security of nations, and the heritage of future generations. Several universities have implemented the Talloires Declaration by establishing environmental management and waste management programs, e.g. the waste management university project. University and vocational education are promoted by various organizations, e.g. WAMITAB and Chartered Institution of Wastes Management. Many supermarkets encourage customers to use their reverse vending machines to deposit used purchased

containers and receive a refund from the recycling fees, http://www.waste_management.html. May 26, 2009.

Based on studies made by the National Solid Waste Management Commission Secretariat based at the Environmental Management Bureau (EMB), it is estimated that the per capita waste production daily is 0.5 kg. This means that for every person living in the metropolis, he or she generates half a kilo of waste a day. With an estimated population of 10.5 million, total waste generated in Metro Manila alone could run up to 5,250 metric tons per day. Or, 162,750 metric tons per month. Or, 1.95 million metric tons per year.

The salient features of R.A. No. 9003: a. Creation of the National Solid Waste Management Commission (NSWMC), the National Ecology Center (NEC) and the Solid Waste Management Board in every province, city and municipality in the country. The NSWMC shall be responsible in the formulation of the National Solid Waste Management Framework and other policies on solid waste, in overseeing the implementation of solid waste management plans and the management of the solid waste management fund. The NEC, on the other hand, shall be responsible for consulting, information, training and networking services relative to the implementation of R. A. No. 9003.

The Solid Waste Management Board of provinces, cities and municipalities shall be responsible for the development of their respective solid waste management plans. b. Formulation of the National Solid Waste Management Framework; 10-year solid management plans by local government units consistent with the National Solid Waste Management Framework; c. Mandatory segregation of solid waste to be conducted primarily at the source such as household, institutional, industrial, commercial and agricultural sources; d. Setting of minimum requirements to ensure systematic collection and transport of wastes and the proper protection of the health of garbage collectors; e. Establishment of reclamation programs and buy-back centers for recyclable and toxic materials; f. Promotion of eco-labeling in local products and services; g. Prohibition on non-environmentally acceptable products and packaging; h. Establishment of Materials Recovery Facility in every barangay or cluster of barangays; i. Prohibition against the use of open dumps; j. Setting of guidelines/criteria for the establishment of controlled dumps and sanitary landfills; k. Provision of rewards, incentives both fiscal and non-fiscal, financial assistance, grants and the like to encourage LGUs and the general public to undertake effective solid waste management; and l. Promotion of research on solid waste management and environmental education in the formal and non-formal sectors.

There are many ways to do it. A highly recommended formula is to

adopt the 3Rs of Ecological Waste Management: REDUCE, REUSE, AND RECYCLE. In addition to that, let us refrain from doing what have been prohibited under the law, to include but are not limited to the following:

- a. *Littering, throwing, dumping of waste materials in public places like roads, sidewalks, canals, esteros, parks and establishments;*
- b. *Open burning of solid waste;*
- c. *Allowing the collection of non-segregated or unsorted waste;*
- d. *Squatting in open dumps and landfills;*
- e. *Open dumping or burying of biodegradable and non-biodegradable materials in flood-prone areas;*
- f. *Unauthorized removal of recyclable material intended for collection by authorized persons;*
- g. *Mixing of source-separated recyclable material with other solid waste in any vehicle, box, container or receptacle used in solid waste collection or disposal;*
- h. *Manufacture, distribution or use of non-environmentally acceptable packaging materials;*
- i. *Establishment or operation of open dumps; and*
- j. *Importation of consumer products packaged in non-environmentally acceptable materials.*

www.emb.gov.ph (March 25, 2009).

Related Studies

In the study of Ambait (2004), she assessed the domestic solid waste management as to their level of awareness and extent of compliance under R.A. No. 2003, as how solid waste management implemented in segregation, collection transfer and transport and disposal towards technology intervention in the province of Eastern Samar.

Pineda (2002), she enumerated the type of storage depository prior to disposals including plastic bags, garbage bin, empty drums, sacks and plastic containers with lids from households, from the schools, from commercial establishments and from industries.

Demecillo (2004), focused on the sources of garbage as the assessment of solid waste management in Daanbantayan, Cebu.

Bernaldez (2000), garbage problem in Cagayan de Oro City, the residents recorded experience flooding caused by overflow of canals clogged by garbage. They apply burning, recycling and composting of wastes generated in households.

Uy (1998) explained that the problem of the solid waste management has become more complex today than the thirty years ago. The increasing problem was attributed to the urbanization of goods by commercial and industrial establishments which are worsened by the unmindful attitude

among the populace.

Data Presentation

This section presents analyses and interprets the data in tabular and textual form.

Profile of the respective municipalities in the Pacific area of Southern Leyte.

Municipality	No. of Barangays	Population (2000)	Households (2000)
Anahawan	14	7,209	1,514
Hinunangan	40	25,016	5,438
Hinundayan	17	11,113	2,510
St. Bernard	30	23,089	4,746
San Juan	18	13,510	2,789
Silago	15	10,486	2,286

Table 1. Profile of the municipalities in the Pacific area of Southern Leyte
 ❖ based on the National Statistic Office

Table 1 presents the sources and types of biodegradable and non-biodegradable wastes of the respective municipalities. This data secured through the aid of the DILG Officer in the province of Southern Leyte. Based on the monthly reports submitted by the department head.

This presentation accounts to more or less fifty percent of the total solid waste generated. Solid wastes coming from the domestic areas covered the residential houses, street corners, vacant lots and open fields, and playgrounds or parks. Commercial areas based on public markets, private enterprise, lumberyards, and recreational centers. And for agricultural areas based on rice fields, dry leaves and animal wastes.

Solid wastes coming from the residential areas were estimated based on the records and confirmed upon the perception of the respondents that a household was producing approximately one half to one kilo of waste per day. Based on the reports submitted the waste generated upon collection was the inner barangay of the municipality the term was poblacion, it is along the center barangays of the municipalities. The outer barangay introduced backyard composting.

Table 1-1. Sources and Estimated Volume of Solid Waste in Domestic, Commercial and Agricultural Areas in the Municipality of Saint Bernard

Major sources of wastes	Biodegradable*	Non-Biodegradable*
A. Domestic Areas	(tons)	(tons)
❖ Residential Houses	0.36	0.45
❖ Street Corners	0.21	0.24
❖ Vacant lots and open fields	0.56	0.42

❖	<i>Playground and parks</i>	0.47	0.50
	Sub-total	1.60	1.61
	B. Commercial Areas		
❖	<i>Public Market</i>	0.64	0.23
❖	<i>Private Enterprise</i>	0.49	0.53
❖	<i>Lumberyard</i>	0.30	0.32
❖	<i>Groceries</i>	0.50	0.42
❖	<i>Hospitals/clinics</i>	0.23	0.25
❖	<i>Schools</i>	0.25	0.42
❖	<i>Churches</i>	0.23	0.45
❖	<i>Recreational centers, etc.</i>	0.24	0.23
	Sub-total	2.88	2.85
	C. Agricultural Areas		
❖	<i>Rice fields</i>	0.25	0.45
❖	<i>Dry leaves and trashes of crops</i>	0.34	0.24
❖	<i>Animal wastes and others</i>	0.03	0.0
	Sub-total	0.62	0.69

* A monthly report on garbage collection, based on municipal records

Table 1-2. Sources and Estimated Volume of Solid Waste in Domestic, Commercial and Agricultural Areas in the Municipality of San Juan

<i>Major sources of wastes</i>	<i>Biodegradable*</i>	<i>Non-Biodegradable*</i>
A. Domestic Areas	(tons)	(tons)
❖ <i>Residential Houses</i>	0.22	0.38
❖ <i>Street Corners</i>	0.28	0.05
❖ <i>Vacant lots and open fields</i>	0.01	0.01
❖ <i>Playground and parks</i>	0.02	0.01
	Sub-total	0.53
B. Commercial Areas		
❖ <i>Public Market</i>	0.04	0.27
❖ <i>Private Enterprise</i>	0.03	0.02
❖ <i>Lumberyard</i>	0.01	0.01
❖ <i>Groceries</i>	0.02	0.01
❖ <i>Hospitals/clinics</i>	0.01	0.01
❖ <i>Schools</i>	0.02	0.04
❖ <i>Churches</i>	0.02	0.01
❖ <i>Recreational centers, etc.</i>	0.01	0.01
	Sub-total	0.16
C. Agricultural Areas		
❖ <i>Rice fields</i>	0.01	0.01
❖ <i>Dry leaves and trashes of crops</i>	0.01	0.01
❖ <i>Animal wastes and others</i>	0.01	0.00
	Sub-total	0.03

* A monthly report on garbage collection, based on municipal records

Table 1-3. Sources and Estimated Volume of Solid Waste in Domestic, Commercial and Agricultural Areas in the Municipality of Anahawan

<i>Major sources of wastes</i>	<i>Biodegradable*</i>	<i>Non-Biodegradable*</i>
<i>A. Domestic Areas</i>	(tons)	(tons)
❖ <i>Residential Houses</i>	0.20	0.31
❖ <i>Street Corners</i>	0.15	0.05
❖ <i>Vacant lots and open fields</i>	0.01	0.01
❖ <i>Playground and parks</i>	0.01	0.01
<i>Sub-total</i>	0.37	0.38
<i>B. Commercial Areas</i>		
❖ <i>Public Market</i>	0.05	0.24
❖ <i>Private Enterprise</i>	0.02	0.02
❖ <i>Lumberyard</i>	0.01	0.01
❖ <i>Groceries</i>	0.02	0.02
❖ <i>Hospitals/clinics</i>	0.50	0.42
❖ <i>Schools</i>	0.01	0.01
❖ <i>Churches</i>	0.01	0.01
❖ <i>Recreational centers, etc.</i>	0.03	0.03
<i>Sub-total</i>	0.65	0.76
<i>C. Agricultural Areas</i>		
❖ <i>Rice fields</i>	0.02	0.01
❖ <i>Dry leaves and trashes of crops</i>	0.01	0.01
❖ <i>Animal wastes and others</i>	0.01	0.00
<i>Sub-total</i>	0.04	0.02

* A monthly report on garbage collection, based on municipal records

Table 1-4. Sources and Estimated Volume of Solid Waste in Domestic, Commercial and Agricultural Areas in the Municipality of Hinundayan

<i>Major sources of wastes</i>	<i>Biodegradable*</i>	<i>Non-Biodegradable*</i>
<i>A. Domestic Areas</i>	(tons)	(tons)
❖ <i>Residential Houses</i>	0.35	0.42
❖ <i>Street Corners</i>	0.23	0.04
❖ <i>Vacant lots and open fields</i>	0.03	0.02
❖ <i>Playground and parks</i>	0.02	0.01
<i>Sub-total</i>	0.63	0.49
<i>B. Commercial Areas</i>		
❖ <i>Public Market</i>	0.34	0.27
❖ <i>Private Enterprise</i>	0.24	0.26
❖ <i>Lumberyard</i>	0.01	0.01
❖ <i>Groceries</i>	0.01	0.01
❖ <i>Hospitals/clinics</i>	0.01	0.01
❖ <i>Schools</i>	0.02	0.03
❖ <i>Churches</i>	0.02	0.01
❖ <i>Recreational centers, etc.</i>	0.02	0.01

Sub-total	0.67	0.70
C. Agricultural Areas		
❖ Rice fields	0.05	0.02
❖ Dry leaves and trashes of crops	0.01	0.01
❖ Animal wastes and others	0.01	0.00
Sub-total	0.07	0.03

* A monthly report on garbage collection, based on municipal records

Table 1-5. Sources and Estimated Volume of Solid Waste in Domestic, Commercial and Agricultural Areas in the Municipality of Hinunangan

Major sources of wastes	Biodegradable*	Non-Biodegradable*
A. Domestic Areas	(tons)	(tons)
❖ Residential Houses	0.38	0.65
❖ Street Corners	0.74	0.32
❖ Vacant lots and open fields	0.31	0.24
❖ Playground and parks	0.10	0.14
Sub-total	1.53	1.35
B. Commercial Areas		
❖ Public Market	0.15	0.78
❖ Private Enterprise	0.24	0.75
❖ Lumberyard	0.35	0.45
❖ Groceries	0.21	0.32
❖ Hospitals/clinics	0.41	0.23
❖ Schools	0.12	0.27
❖ Churches	0.34	0.16
❖ Recreational centers, etc.	0.45	0.68
Sub-total	2.27	3.64
C. Agricultural Areas		
❖ Rice fields	0.27	0.45
❖ Dry leaves and trashes of crops	0.32	0.23
❖ Animal wastes and others	0.24	0.00
Sub-total	0.83	0.68

* A monthly report on garbage collection, based on municipal records

Table 1-6. Sources and Estimated Volume of Solid Waste in Domestic, Commercial and Agricultural Areas in the Municipality of Silago

Major sources of wastes	Biodegradable*	Non-Biodegradable*
A. Domestic Areas	(tons)	(tons)
❖ Residential Houses	0.25	0.40
❖ Street Corners	0.32	0.07
❖ Vacant lots and open fields	0.02	0.01
❖ Playground and parks	0.05	0.01
Sub-total	0.64	0.49
B. Commercial Areas		

❖	<i>Public Market</i>	0.07		0.64	
❖	<i>Private Enterprise</i>	0.03		0.02	
❖	<i>Lumberyard</i>	0.01		0.01	
❖	<i>Groceries</i>	0.03		0.02	
❖	<i>Hospitals/clinics</i>	0.01		0.01	
❖	<i>Schools</i>	0.01		0.03	
❖	<i>Churches</i>	0.02		0.01	
❖	<i>Recreational centers, etc.</i>	0.03		0.03	
	<i>Sub-total</i>	0.21		0.77	
	<i>C. Agricultural Areas</i>				
❖	<i>Rice fields</i>	0.02		0.01	
❖	<i>Dry leaves and trashes of crops</i>	0.01		0.01	
❖	<i>Animal wastes and others</i>	0.01		0.00	
	<i>Sub-total</i>	0.04		0.02	

** A monthly report on garbage collection, based on municipal records*

Conclusion

Based on the theory anchored from Hiriyá (2003), the functional elements of Municipal Solid Waste was important. The local government units in the Pacific Area of Southern Leyte have to come up with more information campaign and proper practices in solid waste disposal system.

As per concluded, the proposed blueprint of government action is, hereby, recommended to be adopted by the local government units in the Pacific Area of Southern Leyte in aid of government policies regarding solid waste management programs in the Philippines. It is further shown below.

Proposed Blueprint Towards Government Action

Rationale

Much had been written about the worsening problem of solid waste even more were fora, seminars and conferences conducted to discuss ways of solving the problem. For how long would it take us to attain a zero waste economy, no one knows. But, one thing is sure - time is running out and WE need to act NOW!

Why WE?

The answer is simple, but at the same time, mind-boggling. That explains why WE need to act. As part of the problem, because we produce garbage ourselves, we can also be part of the solution by reducing our contribution to the waste problem.

Why NOW?

Because at the rate we are producing waste, we will soon find ourselves buried in our own trash. Or, shall we say, we will soon be having more of our human-made mountains of garbage amidst us?

Perhaps the most important reason why we have to act now on the worsening solid waste problem is their impact on human health. Health is a

basic human right. We all deserve to live in a cleaner environment. We all desire for a healthy family... a healthy neighborhood... a healthy nation. And, the only way to satisfy these desires is to do away with garbage that breeds flies, roaches, rodents and harmful bacteria that can spread diseases in our homes and in our communities.

While there were already efforts in the past to address the problem head-on, the passage of Republic Act (R.A.) No. 9003, otherwise known as the “Ecological Solid Waste Management Act of 2000”, marked the turning point in the national development agenda for improved solid waste management and resource conservation.

Objectives

Based on the findings the following objectives were considered:

- To provide information to the community the proper segregation and disposal of waste.
- To provide courses of action on how to promote a pollution free environment by properly handling solid wastes.
- To educate the residents on the proper methods of managing waste coming from different sources.
- To prepare a plan on how to segregate wastes coming from different sources.

Recommendations

1. Households must practice minimization of waste through recycling of the garbage.
2. There is a need to intensify sanctions such for example the collection of fines for anti-littering and or related problems to waste management disposal and other acts therein.
3. The local government in cooperation with the private sectors and non-government organizations should conduct elaborate information campaign on proper solid waste management.

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