



---

## THE IMPLEMENTATION OF ECOLOGICAL SOLID WASTE MANAGEMENT

**MA. Eleanor Fernandez**, MBA, Faculty Member-Adviser, College of Business, Entrepreneurship and Accountancy, Cagayan State University, Andrews Campus, Tuguegarao City, Cagayan, Philippines

**Gerard Andy Pascual**, Student-Researcher, Bachelor of Science in Business Administration, Cagayan State University, Andrews Campus, Tuguegarao City, Cagayan, Philippines

**Alonica Mae Tagacay**, Student-Researcher, Bachelor of Science in Business Administration, Cagayan State University, Andrews Campus, Tuguegarao City, Cagayan, Philippines

**Rubenita Estonilo**, Student-Researcher, Bachelor of Science in Business Administration, Cagayan State University, Andrews Campus, Tuguegarao City, Cagayan, Philippines

**Diesa Minorca**, Student-Researcher, Bachelor of Science in Business Administration, Cagayan State University, Andrews Campus, Tuguegarao City, Cagayan, Philippines

---

**Abstract:** *Solid Waste Management places a big role on the preservation of life and nature. Segregation of solid waste is one of the factors that would help us in minimizing our wastes. This study answered the question, if there is significant relationship between the implementation of solid waste management and that of the respondents. Descriptive – quantitative research is the design that was used in conducting this study and used a survey method to gather information to the respondents pertaining to the implementation of ecological solid waste management as to segregation. A total of 50 respondents were identified, composed of the owners and staff of food stalls in Cagayan State University. The result of the study indicates that there are more females, stall owners and staffs usually segregates their waste as to biodegradable and non-biodegradable and put in a garbage bag which the garbage truck collects. According to the respondents, one of the major issues that affect Cagayan State University is the improper implementation of solid waste. Furthermore, findings showed that there was a significant relationship between the profile of respondents and the implementation of ecological solid waste management. Having clean and organized surroundings will help the people to avoid deceases and being knowledgeable in terms of segregation will lead us to have a better place and school to stay.*

**Keywords:** *Solid waste, management, ecological, respondents, staffs, bio-degradable, non-degradable, garbage collection*

---



## **STATEMENT OF THE PROBLEM**

This study was conducted to determine the awareness of the respondents on the implementation of ecological solid waste management. Specifically, it will answer the following questions:

1. What is profile of the respondents in terms of?
  - 1.1 Age
  - 1.2 Sex
  - 1.3 Number/s of Trainings/Seminars attended in Ecological Solid Waste Management
2. What are the solid waste management practices of food stalls as to segregation of solid waste?
3. What are the problems encountered by the owners and staff of the food stalls in the implementation of solid waste management?
4. What are the types of containers usually used in segregating the solid waste?
5. Where do owners and staff of food stalls usually put their segregated waste?
6. Is solid waste a major issue currently affecting the CSU community?
7. Do environmental issues here in CSU could be minimized if solid waste is managed properly?
8. In what state does the food stall in CSU regarding on solid waste segregation are in right now?
9. Is there a significant relationship between the implementation of solid waste management and the profile of the respondents?

## **HYPOTHESIS**

There is no significant relationship between the implementations of solid waste management and the profile of the respondents.

## **INTRODUCTION**

People around the globe are hoping for the betterment of this world. All of us wanted the cleanliness and orderliness of our environment where all the living things are dependent. Solid waste is one of the biggest problems in today's generation. It is a by-product of human activities. In our environment that ruins little by little because of improper disposal of solid wastes. Some people are unaware of the danger that might cause because of negligence in disposing our wastes.



Unhealthy disposal of solid wastes might cause environmental calamities such as flood, pollution and others. Moreover it pollutes the air, water and land resources and therefore threatens the well-being of the people, animals and plant species. As safe potable drinking water becomes widely scarce, environmental contaminations attributed to poor sanitation and improper disposal of solid wastes render water sources, unhealthy for people. This is because of the carelessness of the people of the human activities and also because of the fast-growing of our country, the Philippines. Our country is facing a problem regarding solid waste disposal that is why our government enacted Republic Act No. 9003 also known as “The Ecological Waste Management Act of 2000”.

Managing of solid wastes is a good start to help the environment and the people in our economy. Recycling is the key to success and to lessen the harmful effects to our environment. It is also one of the most important factors in the managing of solid waste in our environment. It also reduces the amount of solid wastes, so less space is needed for the disposal. Environmental knowledge and attitude of young people appears to be crucial as they will ultimately play an important role in providing solution to future environmental problems.

Household size, cultural patterns and personal attitudes are said to influence solid waste generation as well (Bandara *et al.*, 2007). Economists also compared the composition and quantity of wastes in terms of income level, household size and age structure of the household as these affect the quantity and composition of solid waste (Burnley *et al.*, 2007). Sujauddin *et al.* (2008) also showed that the quantity of waste generated by a country is proportional to its population and the mean living standards of the people is related to the income levels of the people hence individual household’s waste generation is correlated. Wilson *et al.* (2012) reported that income level and urbanization are highly correlated and as disposal incomes and living standards increase, consumption of goods and services correspondingly increases, as does the amount of waste generated.

In technical note, the term ‘solid waste’ is used to include all non-liquid wastes generated by human activity and a range of solid waste material resulting from the disaster, such as general domestic garbage such as food waste, ash and packaging materials; human faeces disposed of in garbage; emergency waste such as plastic water bottles and packaging from other emergency supplies; rubble resulting from the disaster; mud and slurry deposited by



the natural disaster; and fallen trees and rocks obstructing transport and communications. Other specialist wastes, such as medical waste from hospitals and toxic waste from industry, will also need to be dealt with urgently, but they are not covered by this technical note (World Health Organization, 2011).

Solid waste management is a major problem being faced by waste management authorities in development countries. It involves a huge expenditure and thus receives scant attention. It is not only a technical problem but it is also strongly influenced by political/legal, socio-cultural, environmental and economic factors as well as available resources. Moreover, these factors have interrelationships that are usually complex in the solid waste management system (Kum *et al.*, 2005). Hence integrated waste management and the waste hierarchy both inspire sustainable waste management and can reduce the environmental and health hazards associated with improper management of solid waste (Siddiqui *et al.*, 2012).

A typical solid waste management system in a developing country displays an array of problems, including low collection coverage and irregular collection services, crude open dumping and burning without air and water pollution control, the breeding of flies and vermin and the handling and control of informal waste picking or scavenging activities (Oguntoyinbo, 2012).

The Municipal Council enacted an ordinance establishing solid waste management also known as “Perkash Fashura Ordinance Na Isadanga.”The ordinance prohibits dumping of garbage anywhere other than those recognized and established garbage facilities; dumping of unclean and unsegregated waste at the redemption center/facility; discharging of human feces along the creeks and rivers; throwing of wastes in creeks, rivers, public places such as roads, sidewalks and establishments; and burning of garbage particularly non-biodegradable wastes. It also requires residents to practice segregation of wastes at source. Reusable solid wastes such as bottles, plastics, cellophanes and papers shall be brought to the barangay material recovery facility duly segregated or directly to the agent-buyers. Non-recyclable materials and special solid wastes will be brought to the material recovery facility, while hazardous wastes or chemicals will be disposed in coordination with concerned government agencies according to prescribed methods. The local government is responsible for collecting reusable, recyclable and non-biodegradable waste materials from the material



recovery facilities; and transporting them to the recycling centers and or to the municipal material recovery facility. Collection of segregated solid wastes is scheduled per barangay (Saley, 2012).

Poor sanitation and unsafe disposal of solid wastes threaten the well-being of humans living in poor, remote and marginalized communities across the globe, including First Nations (FN) communities in Canada (Owusu, 2010; Zagozewski et al., 2011). Improper disposal of municipal solid waste pollutes the air, water and land resources, and therefore threatens the wellbeing of people, animals and plant species, as well as water. As safe and potable drinking water becomes widely scarce, environmental contaminations attributed to poor sanitation and improper disposal of wastes render water sources unhealthy for people in many areas of both developing and developed countries across the world (Ritter et al., 2002; Reddy & Nandini, 2011; Haribhau, 2012).

Currently, landfilling is the only method used for solid waste disposal in Malaysia (Agamuthu & Fauziah, 2010; Latifah et al., 2009). The increasing amount of waste received by these landfill make it necessary to find other disposal option since constructing new landfills may be difficult due to the scarcity of land, increase of land price and demand for a better disposal system (Latifah et al., 2009).

The ineffective solution in solid waste management in Malaysia had encouraged the government to further improve the management system by approving the Solid Waste and Public Cleansing Management (SWPCM) Act that has been reviewed since 1997. The objective of SWPCM Act 2007 is to improve and ensure high-quality services in solid waste management. The implementation of the (SWPCM) Act will see the transfer of responsibility from Local Authorities to the federal government in managing solid waste in the country (Agamuthu et al., 2009; Latifah et al., 2009).

Major changes in solid waste management in Malaysia will be in terms of management funds, the payment mode, the waste separation system, improved enforcement and improvement in 3Rs (reduce, reuse and recycle) system (Agamuthu et al., 2009). Other area which is notable in the new Act is the strict punishment including RM10,000 (EURO 1980) to RM 100,000 (EURO 19,802) of fine and a jail sentence of up to five years for those found guilty of illegal dumping, storage and treatment (Latifah et al., 2009).

This study aimed for the improvement of our university that it must be clean, and well-organized we should implement or practice how to segregate and dispose our garbage at



the designated place for us to have a good environment and to avoid diseases that caused by improper disposal. It is important to have knowledge with the segregation of wastes; our lives will change since we will have a better environment.

## STATISTICAL TOOLS

This study utilized the descriptive statistics like mean, measure of central tendency, frequency counts and percentages. Statistical tools which were used to analyze the respondents' profile and other information on ecological practices specifically solid waste management. Regression was used to test if there is a significant relationship between the implementation of solid waste management and the profile of the respondents.

## RESULTS AND DISCUSSIONS

**Table 1 Frequency and Distribution of respondents in terms of Sex**

Profile	Frequency	Percent
Male	15	30.0
Female	35	70.0
<b>Total</b>	<b>50</b>	<b>100.0</b>

The table above shows the frequency distribution of respondents in terms of their sex, that out of 50 respondents, 35 were female and 15 were male. Majority of the respondents are female with 70% and male with 30%. Most of the stall owners and staff are female because that kind of work is more applicable to women because they are more approachable and accommodating.

**Table 2 Frequency and Distribution of respondents in terms of age**

Profile	Frequency	Percent
22-32	24	48.0
33-43	19	38.0
44-54	5	10.0
55-65	2	4.0
<b>Total</b>	<b>50</b>	<b>100.0</b>

Table 2 shows the frequency and distribution of respondents in terms of age, age range 22-32 years old with a mean age of 26.74 got the highest frequency with 48%, and the age whose range is 55-65 got the lowest frequency with 4%. It tells us that most of the owners and staff of food stalls have an age range 22-32 which implies that majority of the respondents are still strong, vibrant and energetic in doing that kind of work.



**Table 3 Frequency and Distribution of respondents in terms of Number/s of Seminars/Trainings attended in Ecological Solid Waste Management**

Number of Seminars Attended	Frequency	Percent
0	46	92.0
2	2	4.0
3	1	2.0
4	1	2.0
Total	50	100.0

Table 3 shows the frequency and distribution of respondents in terms of number/s of seminars/trainings attended in Ecological Solid Waste Management that most of the owners and staff of food stalls have not attended any seminars/ trainings. It implies that most of them spend more time in working than attending seminars regarding solid waste management.

**Table 4 Practices of Food Stall as to Segregation**

Segregation Practices	Frequency	Rank
Segregation of biodegradable from non-biodegradable wastes	37	1 <sup>st</sup>
Selling of bottles, plastics, and cans to junkshops	16	3 <sup>rd</sup>
Feeding left over foods to pets	11	4 <sup>th</sup>
4R's (reuse, reduce, recycle and restore)	17	2 <sup>nd</sup>

Table 4 shows the practices of food stalls as to segregation, the staff and owners usually segregates non-biodegradable and biodegradable solid wastes which have a frequency of 37. This means that they are fully aware of the R.A. 9003. The second is the 4R's which can be done if they are finished segregating the biodegradable and non-biodegradable solid waste, and segregate the waste that can be reused, reduced, recycled and restored. Least is feeding left-over food to pets which have a frequency of 11, this shows that owners and staff prefer not to bring home left over because it will be burdensome for them when they will travel.

**Table 5 Problems encountered by the owners and staff in the implementation of solid waste management**

Problems encountered	Frequency	Rank
Inefficient collection of garbage	36	1 <sup>st</sup>
Non operation of a good disposal facility	14	2 <sup>nd</sup>
Public Indifference (Public don't care)	13	3 <sup>rd</sup>
Others	0	4 <sup>th</sup>



Table 5 shows the problems encountered by the owners and staff in the implementation of solid waste management that the inefficient collection of garbage is the worst problem of staff and owners of food stalls in CSU which have a frequency of 36. Followed by non – operation of good disposal facility which have a frequency of 14. Least is the “public indifference” which have a frequency of 13. It tells us that the worst problem of owners and staff in segregating wastes was inefficient collection of garbage because the garbage collector rarely collects their garbage. It is rarely because the garbage collector/truck is sometimes not entering in the school so the staff and owners of food stall are liable to take their wastes at their houses.

**Table 6 Type of container used in collecting waste**

Types of Containers Used	Frequency	Rank
Carton	0	4 <sup>th</sup>
Waste Baskets	2	3 <sup>rd</sup>
Plastic/Garbage bag	44	1 <sup>st</sup>
Can	9	2 <sup>nd</sup>
Others	0	4 <sup>th</sup>

Table 6 shows the type of container usually used in collecting solid waste, most of the stall owners and staff preferred to use plastic/garbage bag in segregating wastes which have a frequency of 44 because it is cheaper and it is disposable, this is the most appropriate type of container since this is the prevalent one used to lessen the burden of the garbage collector. Least in the rank is the use of carton which has a frequency of 0, no one had chosen it because of the type of wastes, and this container can be easily destroyed.

**Table 7 Place to put away Segregated Waste**

Place for Segregated Wastes	Frequency	Rank
In the public bin	12	2 <sup>nd</sup>
Garbage collector/truck	32	1 <sup>st</sup>
An open space	6	3 <sup>rd</sup>

Table 7 shows that most of the staff bring home their wastes to be collected by the garbage collector with 32 respondents. Second is they put their wastes in the public bin with 12 respondents, Least is putting it in an open space. It shows that most of the staff bring home their wastes to be collected by the garbage collector/truck, according to what they said that there is a schedule where the garbage collector/truck roved around to collect the wastes.





**Table 8 Solid Waste as a Major Issue currently affecting CSU natural environment**

Item	Response	Frequency
Is the solid waste a major issue affecting the institution?	Yes	36
	No	14
	Total	50

Table 8 shows that solid wastes can be a distraction in the sight of someone who is appreciating the beauty of the surroundings of the school. This statement is proven when the most number of respondents agreed that solid waste is a major issue affecting the natural environment in the CSU.

**Table 9 Management of Solid waste can minimize environmental issues in CSU**

Item	Response	Frequency	Percent
Can Management of Solid waste minimize environmental issues in CSU	Yes	48	72.0
	No	2	28.0
	Total	50	100.0

Table 9 tells us that almost all of the staff agreed that it could be minimized if all of us will comply in the said ordinance. Since managing of solid waste is considered to be a major issue about the environment, disposing garbage in their proper places is a great action which anyone can do in order to lessen its consequences as coincide by the respondents.

**Table 10 Evaluating the State of solid waste segregation in food stalls area**

Item	Mean	Std. Deviation	Descriptive Scale
Evaluation of solid waste segregation of food stalls area	1.50	.678	Good

Table 10 shows the evaluation of solid waste segregation in food stalls area that most of the owners and staff evaluated good which means that most of them are maintaining their area clean because they have knowledge about the said law which is the R.A 9003.

**Table 11 Relationship between the Implementation of Ecological Solid Waste Management and Profile of Respondents**

	solid waste	Age	Sex	number of seminars
Pearson Correlation	1.000	.358	.228	-.019
Age	.358	1.000	.061	.059
Sex	.228	.061	1.000	-.095
number of seminars	-.019	.059	-.095	1.000



Sig. (1-tailed)	solid waste		.005	.056	.448
	Age	.005		.336	.343
	Sex	.056	.336		.256
	number of seminars	.448	.343	.256	
N	solid waste	50	50	50	50
	Age	50	50	50	50
	Sex	50	50	50	50
	number of seminars	50	50	50	50

		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
Model	Solid waste					.798
	Age	.025	.010	.346	2.568	.014
	Sex	.300	.198	.205	1.514	.137
	number of seminars	-.017	.116	-.020	-.147	.883

a. Dependent Variable:

Regression was used to test relationship between level of evaluation on solid waste management and profile of the respondents in terms of age, sex, and number of seminars and trainings attended. Statistically, according to the result from the SPSS, it can be seen that there is a significant low positive relationship ( $r=0.358$ ) between solid waste management and age since the p-value is less the 0.05 level of significant. This means that the higher the age of the respondents the higher the level of evaluation on the implementation on solid waste management. Other independent variables like sex and number of trainings attended found to be no significant relationship.

## SUMMARY OF FINDINGS

As the study was conducted, it was found out that most of the owners and staff of food stalls has an age ranges from 22-32 and most of them are female. As to seminars about "Implementation of Ecological Solid Waste Management" only few have attended among of the respondents. Most of them practice the segregation of solid waste by segregating biodegradable from non-biodegradable waste by using garbage bag. The common problem that they encountered was the inefficient collection of garbage because the garbage collector/truck is sometimes not entering the school so the staff and owners of food stalls



are liable to take their wastes at their houses. Majority of them agreed that solid waste is a major issue that is currently affecting the natural environment of school, they also agreed that solid waste could be minimized in the institution if it is being managed properly and most of them evaluated good in the state of solid waste collection in their food stall area. With these findings, there is a significant relationship between the implementation of ecological solid waste management and the profile of respondents as to age and not as to the sex and numbers of trainings attended in solid waste management.

## **CONCLUSION**

The researchers therefore conclude that there is a relationship between the implementation of solid waste management and the profile of the respondents as to age. Based on the findings, most of the staffs which were 22-32 ages are tend to be presentable with their appearances, however at their age, they tend not to care about the implementation of solid waste management because people nowadays has not been fully aware of what may an improper management of solid waste can cause to the environment. However, some of them may or may not have been attended seminars regarding the implementation of solid waste management.

## **RECOMMENDATIONS**

Based on the findings of the study, the researchers recommend the following scheme:

- There must be a regular collection of garbage by the assigned unit of the institution
- There must be a regular checking of stalls as to the implementation of the proper solid wastes disposal and segregation.
- A stricter penalty be imposed for those who will not comply with the ordinance.
- Every stall should have at least four garbage cans or bins and be marked as biodegradable, non-biodegradable, residual waste and recyclable.
- Cagayan State University should encourage all the food stall owners and staff to attend a seminar/training about the implementation of ecological solid waste management.

## **REFERENCES**

1. Agamuthu Periathamby, Fauziah Shahul Hamid, Kahlil Khidzir (2007): Evolution of solid waste management in Malaysia: impacts and implications of the solid waste bill



2. AnaPires' GraçaMartinho' Ni-BinChang (Volume 92, Issue 4, April 2011): Solid waste management in European countries: A review of systems analysis techniques.
3. Anne Scheinberg, Michael Simpson (Published September 28, 2015): A Tale of Five cities: Using Recycling frameworks to analyse inclusive recycling performance
4. Damghani AM, Savarypour G, Zand E, Deihimfard R., (2008): Municipal solid waste management in Tehran: current practices, opportunities and Challenges
5. Dipl. Ing. Theo Schneider, Ressource Abfall GmbH; Dipl. Ing. Gernod Dilewski, Infrastruktur und Umwelt; M. A. Fanny Jacquesson, Infrastruktur und Umwelt(ERIA Research Project Report 2009, No. 10): A Long And Winding Road From Legal Framework To Real Changes In Waste Management
6. Dong Qing Zhanga, Soon KeatTanb, Richard M.Gersbergc (January 2016, Volume 18, Issue 1) : Municipal solid waste management in China: status, problems and challenges
7. Geng Y, Zhu Q, Haight M (2007): Planning for integrated solid waste management at the industrial park level: a case of Tianjin, China
8. Goel S (2008 Oct; 50 (4): 319-28): Municipal solid waste management (MSWM) in India: a critical review
9. GoranVego'SavkaKučar-Dragičević and NatalijaKoprivanac (Volume 28, Issue 11, November: Application of multi-criteria decision-making on strategic municipal solid waste management in Dalmatia, Croatia
10. Jannick H.Schmidt, PeterHolm, Anne Merrild, PerChristensen (Volume 27, Issue 11, 2007): Waste Management Life cycle assessment of the waste hierarchy – A Danish case study on waste paper
11. JianjunJin' ZhishiWang' ShenghongRan (Volume 57, Issue 3, 25 May 2006): Comparison of contingent valuation and choice experiment in solid waste management programs in Macao
12. Julian Cleary (Volume 35, Issue 8, November 2009): Life cycle assessments of municipal solid waste management systems: A comparative analysis of selected peer-reviewed literature
13. Michikazu Kojima (March 2010): 3 R Policies for southeast and East Asia



14. Sujauddin M, Huda SM, Hoque AT (2008): Household solid waste characteristics and management in Chittagong, Bangladesh
15. Yasuhiko Hotta, Chettiyapan Visvanathan, Michikazu Kojima, Agamuthu Pariatam (January 2016, Volume 18): Developing 3R policy indicators for Asia and the Pacific region: experience from Regional 3R Forum in Asia and the Pacific
16. Y. Fernández-Nava J. del, Río J. Rodríguez-Iglesias L. Castrillón E. Marañón (Volume 81, 15 October 2014): Life cycle assessment of different municipal solid waste management options: a case study of Asturias (Spain)
17. Yong Geng, Qinghua Zhu, Brent Doberstein, Tsuyoshi Fujita (Volume 29, Issue 2, February 2009): Implementing China's circular economy concept at the regional level: A review of progress in Dalian, China
18. Yousuf TB<sup>1</sup>, Rahman M (2007): Monitoring quantity and characteristics of municipal solid waste in Dhaka City