GLOBUS

Cosmos An International Journal of Management
A Refereed Research Journal
Vol 11 / No 1 / Jul-Dec 2021 ISSN: 2278-1218

SOLID WASTE MANAGEMENT PRACTICES OF EMPLOYEES AND THEIR EFFECT ON SCHOOL'S WASTE MANAGEMENT OUTCOMES

*Ma. Elizabeth B. Vivar

Paper Received: 02.11.2021 / **Paper Accepted**: 30.11.2021 / **Paper Published**: 03.12.2021
Corresponding Author: Ma. Elizabeth B. Vivar; doi:10.46360/cosmos.mgt.420212007

Abstract

The main concern of the study was to determine the solid waste management practices and their effect on the waste management outcomes of a private Catholic university in the Province of Bulacan. The respondents of the study were the full-time employees of the University during the 2nd semester of the school year 2015-2016. The study utilized the descriptive correlation type of research and the mode of data gathering was the survey questionnaire. Results of the regression revealed that the employees' solid waste management practices in terms of collection practices and recovery and processing practices produced B coefficients of .046 and .046 with associated probability less than the significance level set at .05. The findings indicated that for every unit increase in collection practices and recovery and processing practices could generate .046 improvements in school's outcome. The obtained F-ratio of 4.409 with probability value of .005 which was found significant at .05 alpha indicated that the three (3) waste management practices namely: collection practices, disposal practices, and recovery and processing practices formed a very significant set of predictors for schools' outcome in terms of water quality, general health, types of waste, and income generation.

Keywords: Solid Waste, Management Practices, School's Waste Management Outcomes.

Introduction

Solid waste management has become both a major public health and environmental concern of many developing countries, particularly in urban areas due to the continuing urbanization. Sandec (2008) maintained that the overall goal of urban solid waste management is to collect, treat and dispose of solid waste generated by all urban population groups in an environmentally and socially satisfactory manner using the most economical means available. In an attempt to accelerate the pace of its industrial development, an economically developing nation may fail to pay adequate attention to solid waste management. Such a failure incurs a severe penalty at a later time in the form of resources needlessly lost and a confounding adverse impact on the environment and on public health and safety. The penalty is neither avoided nor lessened by a resolve to do something about the waste at a later time, when the country may be in a better position to take appropriate measures.

According to Perez (2011), segregating waste is also part of waste management. Avoidance of producing more garbage is one way of lessening the current environmental problem in the country. Using materials that are environmental friendly to minimize and solve the garbage production can be a solution. On one hand, the focus on economic growth has led to take environmental management and awareness for granted. Solid waste became the most visible environmental problem in the country and has remained so for years. Also, integrated waste management is a frame of reference for designing and implementing new waste management systems and for analyzing and optimizing existing systems. Integrated waste management is based on the concept that all aspects of a waste management system (technical and non-technical) should be analyzed together, since they are in fact interrelated and developments in one area frequently affect practices or activities in another area.

A management that can help planners study objectively and make rational decisions as to the best alternative strategic options of managing, recovering and utilizing the vast quantity of solid waste is a very important investment (Guzman et al, 2010). It is therefore the objective of the study to assess the implementation of solid waste management practices at a private Catholic Higher Education Institution and their impact on the school's waste management outcome.

Theoretical Framework

This study was premised on the United Nations Environmental Program (UNEP, 2005), which states that the collection, transport, treatment, and disposal of solid wastes, particularly wastes generated in medium and large urban centers, have become a relatively difficult problem to solve for those responsible for their management. The problem is even more acute in economically developing countries, where financial, human, and other critical resources generally are scarce.

The organic fraction of MSW is an important

**La Consolacion University, Philippines.*

component, not only because it constitutes a sizable fraction of the solid waste stream in a developing country, but also because of its potentially adverse impact upon public health and environmental quality. A major adverse impact is its attraction of rodents and vector insects for which it provides food and shelter. Impact on environmental quality takes the form of foul odors and unsightliness. These impacts are not confined merely to the disposal site. On the contrary, they pervade the area surrounding the site and wherever the wastes are generated, spread, or accumulated. (UNEP, 2005)

Unless an organic waste is appropriately managed, its adverse impact will continue until it has fully decomposed or otherwise stabilized. Uncontrolled or poorly managed intermediate decomposition products can contaminate air, water, and soil resources.

Conceptual Framework

Figure 1 presents the conceptual model of the study that was used in assessing the effect of solid waste management practices of employees at a private Catholic HEI on school's waste management outcome.

Solid waste management refers to the discipline associated with the control of generation, storage, collection, transfer and transport, processing, and disposal of solid wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations, and that is also responsive to public attitudes. As used in this study, these refer to the school's implementation of collection practices, disposal practices, and recovery and processing practices, respectively. Meanwhile, school's waste management outcome would mean assessing the impact of solid waste management practices on employees' general health, water quality, solid waste generation and generating income from waste by-products.

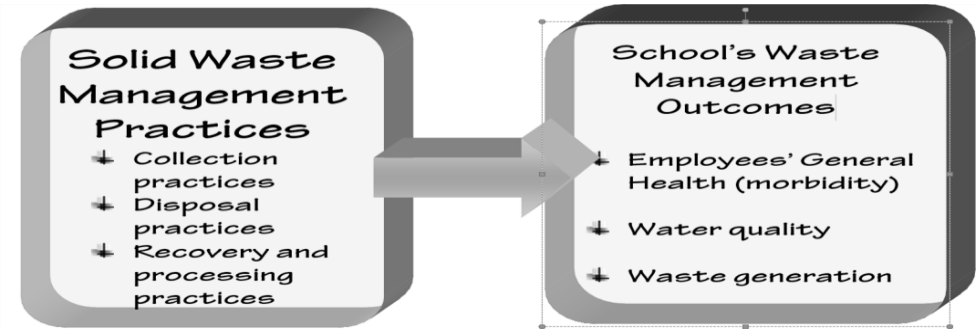

Figure 1: Conceptual Model of The Study

Statement of The Problem

The main concern of the study was to determine the solid waste management practices at a private Catholic higher education institution and their effect on school's waste management outcome. Specifically, this study sought answers to the following questions:

1. To what extent do the employees of the private higher education institution implement the following solid waste management practices:
   1.1 collection practices;
   1.2 disposal practices;
   1.3 recovery and processing practices.
2. How may the schools' waste management outcome be described in terms of:
   2.1 Employees' general health (morbidity);
   2.2 Water potability; and
   2.3 Reduced solid waste (types and volumes)
3. To what extent do the implementation of the following solid waste management practices significantly affect the school's waste outcome?
   3.1 Collection practices;
   3.2 Disposal practices;
   3.3 Recovery and processing practices.
4. What solid waste management implications for LCUP may be developed based on the findings of the study?

Hypothesis of The Study

The following hypothesis was tested at .05 level of significance.

Ho1: The implementation of solid waste management practices does not significantly affect the school's waste management outcome.

Scope and Delimitation of The Study

The focus of the study was the assessment of the employees' solid waste management practices at a private Catholic HEI and their effect on school's

waste management outcome. Meanwhile, school's waste management outcome would mean assessing the effect of solid waste management practices on employees' general health, water quality, solid waste generation and generating income from waste by-products.

This study involved all teaching and non-teaching employees of the private higher education institution during the second semester of the school year 2015-2016.

Methodology of The Study

This study utilized the descriptive correlation type of research which according to Beredo et al. as cited in Punongbayan (2014), is a statistical research that describes data and characteristics about what practices, level of effectiveness, and recovery and processing. It answers the question who, what, where, and how. This kind of research also deals with the present and existing conditions. Hence, this study is focused on the extent of implementation of solid waste management practices of employees and their effect on school's waste management outcome.

Standardized structured questionnaire on solid waste management practices was used as primary data gathering tool. Documentary analysis was also utilized in analyzing the overall employees' general health, water quality, solid waste generation and generating income from waste by-products.

Respondents of The Study

The respondents of the study were the entire employees of the private higher education institution during the 2nd semester of the school year 2015-2016. Table 1 shows that the respondents of the study included the employees of LCUP to wit: academic personnel, academic support personnel, non-academic personnel, and administrators.

Table 1: Respondents of The Study

Respondents	Target	
	F	%
Academic personnel	95	56
Academic Support personnel	5	3
Non-Academic Support personnel	51	30
Administrators	18	11
Total	**169**	**100**

Instrument of The Study

This study utilized a standardized instrument that assessed the extent of implementation of solid waste management practices at a private Catholic higher education institution. The instrument was adopted from the study conducted by Punongbayan et al. (2014) entitled "Waste Management Practices of an Educational Institution" which was published in the Asia Pacific Journal of Education, Arts and Sciences and available online thru SAGE Journal. The instrument was tested by its internal consistency of .86, hence making its content highly reliable.

The content of the instrument included the school's implementation of collection practices, disposal practices, and recovery and processing practices, respectively. Meanwhile, school's waste management outcome would mean assessing the impact of solid waste management practices on employees' employees' general health, water quality, solid waste generation and generating income from waste by-products Documentary analysis was the method of choice in assessing the school's waste management outcome.

Data Gathering Procedure

The mode of data gathering was the questionnaire method. Each of the respondents was given a set of structured questions. In gathering the data, the researcher carried out the following procedure:

1. A letter was sent to the University President to ask permission in the conduct of proposed study.
2. With the approval of the President, the researcher proceeded with the distribution of the questionnaire and interviewed employees personally.
3. The researcher collected the questionnaires from the respondents and checked whether all the questions were answered.

Data Processing and Statistical Treatment

The data collected were tabulated and processed using Statistical Packages for Social Sciences (SPSS). In order to analyze and interpret the data gathered, the following statistical measures were used:

- The extent of employees' implementation of solid waste management practices was quantified using the following scale:

Rating Scale	Range	Analytical Description	Interpretation
5	4.50 - 5.00	Waste Management Practices are very extensive and functioning excellently	Very Great Extent
4	3.50 -4.49	Waste Management Practices are moderately extensive and functioning very well	Great Extent
3	2.50 - 3.49	Waste Management Practices are adequate and functioning well	Moderate Extent
2	1.50 - 2.49	Waste Management Practices are limited but functioning well	Least Extent
1	1.00 - 1.49	Waste Management Practices are limited and functioning poorly	None at all

- Frequency counts, ranking, weighted mean, and percentage procedures were utilized to analyze the school's waste management outcome.
- The effect of solid waste management practices on school's waste management outcome were quantified using correlation and regression analysis.

Results and Discussions

Solid Waste Management Practices at LCUP

Solid waste management (SWM) is a major challenge in urban area throughout the world, particularly in the fast growing cities and towns of the developing world (Jin et al., 2006). According to World Health Organization (2010), solid waste management of school is an important facet of environmental hygiene and it needs to be integrated with total environmental planning. Its storage, collection, transport, treatment and disposal can lead to short term risks. In the long run there may be dangers arising particularly from the chemical pollution of water supplies. Rao (2013) said that the problems connected with refuse storage in buildings were, insects, rats, fire, and odor. These problems are also associated with other problems of human health and water systems.

It may be good to note on Table 2 that in general, the solid waste management practices at the private Catholic higher education institution was to a great extent in terms of collection practices (3.68), disposal practices (4.0), and recovery and processing (3.89).

Table 2: Solid Waste Management Practices at LCUP

Indicators	WM	Interpretation
Collection practices	**3.68**	**Great Extent**
Waste Materials are collected according to the schedule.	4.05	Great Extent
Waste Materials are collected during weekends.	3.88	Great Extent
Departments are informed on the days when garbage are to be collected.	3.72	Great Extent
No garbage are left uncollected on the scheduled time.	3.95	Great Extent
Waste Materials are collected in designated area.	4.19	Great Extent
Medical Waste are place in appropriate container located throughout medical department facility at time of generation. (if applicable)	3.06	Moderate Extent
Wastes are collected by the maintenance staff.	4.33	Great Extent
Infectious Waste, chemical waste, toxic substances are collected together, regardless of whether or not they are contaminated. (if applicable)	2.88	Moderate Extent
Grease trap, kitchen waste, are collected by authorized staff in strong, leak proof containers that are clearly label. (if applicable)	3.94	Great Extent
Disposal practices	**4.00**	**Great Extent**
Waste Materials are not disposed to rivers, canals, sea, or vacant lots.	4.28	Great Extent
Disposal of waste materials are being done through bidding process.	3.86	Great Extent
Waste Materials are disposed according to the methods prescribed by the government.	4	Great Extent
Waste Materials are disposed properly in the designated trash bins.	4.27	Great Extent
Waste is disposed according to schedule.	4.22	Great Extent

Leftovers are disposed in separate trash bins. (if applicable)	4.09	Great Extent
Wastes are disposed in the designated collection area.	4.27	Great Extent
Infectious Wastes, chemical waste, sharps waste, toxic substances are disposed properly.	3.42	Moderate Extent
Kitchen waste, infectious waste, chemical waste, sharp waste, toxic substances, medical waste is disposed in marked high-density garbage bags. (if applicable)	3.22	Moderate Extent
Recovery and Processing	**3.89**	**Great Extent**
Practice 3R. (Reuse, Reduce, Recycle)	4.24	Great Extent
Using 5S. (Sort, Set in Order, Shine, Standardized, Sustain)	3.98	Great Extent
Full implementation of MRF. (Material Recovery Facility)	3.89	Great Extent
Overall Mean	**3.86**	**Great Extent**

It may be gleaned in Table 2 the great extent of the employees' practices when the waste materials are collected according to the schedule (4.05); waste materials are collected during weekends (3.88); departments are informed on the days when garbage are to be collected (3.72); no garbage are left uncollected on the scheduled time (3.95); waste materials are collected in designated area (4.19); wastes are collected by the maintenance staff (4.33); and grease trap, kitchen waste, are collected by authorized staff in strong, leak proof containers that are clearly label (3.94). Meanwhile, in terms of waste disposal practices, the following were executed to a great extent: waste materials are not disposed to rivers, canals, sea, or vacant lots (4.28); disposal of waste materials are being done through bidding process (3.86); waste materials are disposed according to the methods prescribed by the government (4.0); waste materials are disposed properly in the designated trash bins (4.09); and waste are disposed in the designated collection area (4.27).

Great extent of recovery and processing was likewise recorded as evidenced by their practice of 3R's or reduce, reuse, and recycle (4.24); Using 5S or Sort, Set in Order, Shine, Standardized, Sustain (3.98); and full implementation of MRF or Material Recovery Facility (3.89).

Although the practices were in general to a great extent, it may be perused also in Table 2 that there were waste management that were practiced to a moderate extent only such as: the collection practices of infectious waste, chemical waste, and toxic substances in the laboratory facilities of the College of Allied Medical Sciences (2.88). It was also observed that medical wastes are not placed in appropriate containers located inside the Department. The top management may also look into the disposal practices that registered low such as: kitchen waste, infectious waste, chemical waste, sharp waste, toxic substances, and medical waste. Special attention must also be given to kitchen wastes of the Canteen for if it will not be done properly may impose health risks to both the students and employees patronizing the University's canteen. This study, however, suggests that policies should be formulated to focus on promoting knowledge, education, and skills of the employees and, in addition, to empower them as a means of improving their quality of life.

In the study conducted by Punongbayan et al. (2014), they aimed to assess the waste management practices of LPU-B. The researchers concluded that waste management practices of LPU-B was effective in terms of collection, disposing, recovery and processing as perceived by the respondents. Problems occurred specifically that disposal areas of waste materials were not strategically located. Moreover, means of recovering and reusing such waste were not strictly implemented. Likewise, Laguador (2013) aimed to determine the status of Waste Management practices of Brgy. Wawa residents in terms of: waste disposal, segregation, seashore clean-up, cooperation with Lyceum International Maritime Academy (LIMA), environmental cleanliness and the contribution of LIMA community extension service to the waste management practices of the Barangay. The results showed that the status of waste management practices Wawa is already well-mannered and orderly but still really need to sustain, innovate, and develop more the habit of the best practices in waste management.

School Wastes' Outcome

The waste outcome of the University was appraised in terms of employees' general health, types of waste, whether wastes have generated income for the department, and the school's water quality profile.

Employees' General Health

The health of the employees was assessed using the records of the University clinic, in which the most common cause of disease was looked into. It may be noted in Table 3 that the top five most common cause of diseases of HEI's employees were as follows: common cold (1st), hypertension (2nd),

cough (3rd), body pain (4.5th), and urinary tract infection (4.5th). The data suggested that the University physicians may develop program that could alleviate the occurrence of the aforementioned common causes of diseases that are affecting the general health of the employees. If not given attention, this could result in absenteeism and less quality of work outputs. The problems related to health may be attributed to improper waste disposal and waste pollution have a significant effect to harm almost all forms of life. The government tried to put laws to protect the quality of environment. However, everyone plays a major role to combat health problem and should take the responsibility of making the environment and oneself healthy.

Types of Wastes

The rapid increase in volume and types of solid and hazardous waste due to continuous economic development, urbanization and industrialization was becoming a burgeoning problem for most governments in ensuring effective and sustainable management of wastes (Igoni et al., 2007). The data revealed that the University is generating more non-biodegradable, which was expressed by majority or 98.2 percent of the respondents. Non-biodegradable wastes consist of plastics, polystyrene, metals, plastic and aluminum cans, toxic chemicals, paints, tires etc. Only 3 or 1.8 percent have communicated that they produced biodegradable wastes. Biodegradable waste includes food waste like vegetable and fruit peels, dead plants and animals, chicken, egg shells, paper materials, garden waste, etc.

The management of waste should focus on how to find the value and redirect it back to the community. Unfortunately, the collection and dumping processes often make separation an expensive and sometimes impossible task to manage properly solid wastes (Sharama, 2015). It has been observed that between one-third and one-half of the solid wastes generated within most cities in low and middle-income countries are not collected but end up as illegal dumps on streets, open spaces and wasteland (Ajani, 2007).

Income-generating Possibility

Another waste outcome that was studied is the possibility of generating income from non-biodegradable wastes. Majority or 87.6 percent of the employee respondents are positive that income can be generated out of the wastes that the University have. They can be separated and recycled but the process is very expensive.

Non-Biodegradable items for instance can be 'Recycled' and used again. Plastics, metals, bottles can be broken down with the help of chemicals and can once again be used to create new plastic and metal products. This can go a long way to effectively reduce the environmental hazard caused by these non-biodegradable products and creating a better and greener planet.

Water Quality

Water quality refers to the suitability of water to sustain various uses or processes. Any particular use will have certain requirements for the physical, chemical or biological characteristics of water. For example, limits on the concentrations of toxic substances for drinking water use, or restrictions on temperature and pH ranges for water supporting invertebrate communities. Consequently, water quality can be defined by a range of variables which limit water use. Although many uses have some common requirements for certain variables, each use will have its own demands and influences on water quality.

Water is an indispensable input for industrial production and human existence. Currently, people are increasingly concerned about their health and their interest in the safety of drinking water. Some people prefer purchasing bottled water and using water-treatment equipment to drinking tap water. These actions can be interpreted as preventive behavior against the decline in tap water quality. Hence, the quality of drinking water was presented in this study.

Table 3 showed that all of the water samples collected were within the prescribed pH range of the DAO 90-34 standards. In addition, Biological Oxygen Demand, Dissolved Oxygen, Chemical Oxygen Demand passed the water quality testing as they passed the minimum requirements prescribed in the DAO standards.

Table 3: School Wastes' Outcome

General health	Frequency	Percent	Rank
Asthma	6	3.55	8
Body pain	10	5.92	4.5
Common Cold	52	30.77	1
Cough	18	10.65	3
Diabetes	5	2.96	9

Dyslipidemia	4	2.37	10
Gallstone	1	0.59	12
Hypertension	43	25.44	2
Hyperlipidemia	9	5.33	6
Migraine	8	4.73	7
Obese	3	1.78	11
UTI	10	5.92	4.5
Type of Waste	**Frequency**	**Percent**	**Rank**
Biodegradable	3	1.8	2
Non-biodegradable	166	98.2	1
Income generating	**Frequency**	**Percent**	**Rank**
Yes	21	12.4	2
No	148	87.6	1
Water Quality	**Parameters**	**Assessment**	
Chemical	pH, Biological Oxygen Demand, Dissolved Oxygen, Chemical Oxygen Demand	Passed	
Biological	E. coli	Negative	

The standard requirement for water system was the total absence of E. Coli in all samples within 100 ml content. As shown in Table 3, the water samples passed the DAO 90-34 standard (E. Coli = Absent). The biological properties of the water sample tested showed that these were mostly within admissible level of ground water quality.

Safe water was a precondition for health and development and a basic human right, yet it was still denied to hundreds of millions of people throughout the developing world. Water related diseases caused by insufficient safe water supplies coupled with poor sanitation and hygiene caused 3.4 million deaths a year, mostly among children. Despite continuing efforts by governments, civil society and the international community, over a billion people still did not have access to improved water sources (UNICEF, 2008).

Effects of Solid Waste Management on School's Waste Outcome

In conducting the study, it was hypothesized that solid waste management practices of LCUP employees do not significantly affect school's waste outcome. To determine the extent of the effect of waste management practices on school's outcome, the data were subjected to regression analysis.

Results of the regression in Table 4 revealed that the employees' solid waste management practices in terms of collection practices and recovery and processing practices produced B coefficients of .046 and .046 with associated probability less than the significance level set at .05. The findings indicated that for every unit increase in collection practices and recovery and processing practices could generate .046 improvements in school's outcome.

Table 4: Regression Analysis of Employees Sold Waste Management Practices on School's Waste Outcome

Variables	Unstandardized Coefficients		Standardized Coefficient	T	P-value
	B	S.E	Beta		
(Constant)	2.167	0.082		26.555	.000
Collection practices	0.046	0.022	0.234	2.086	0.039
Disposal practices	0.037	0.026	0.156	1.395	0.165
Recovery and processing practices	0.046	0.019	0.193	2.366	0.019
R-squared = .074					
F-value = 4.409					
p-value - .005					
alpha - 0.05					

The obtained Beta coefficients of .234 and .193 indicated that the employees' collection practices and recovery and processing practices contributed almost the same significant effects in school's outcome. The factor "disposal practices" also contributed to school's waste outcome but not to a significant extent.

The obtained F-ratio of 4.409 with probability value of .005 which was found significant at .05 alpha indicated that the three waste management practices namely collection practices, disposal practices, and recovery and processing practices formed a very significant set of predictors for schools' outcome in terms of water quality, general health, types of waste, and income generation.

The data implied that the continuous and frequent implementation of solid waste management could also improve the school's waste outcome; hence, strict implementation of waste management may be necessary. Some of these effects were the result of hydrological changes, such as the building of dams, draining of wetlands and diversion of flow. More obvious were the polluting activities, such as the discharge of domestic, industrial, urban and other wastewaters into the watercourse (whether intentional or accidental) and the spreading of chemicals on and in the drainage basin (Meybeck et al., 2006).

Implications Drawn Based on the Findings of The Study

A number of implications were drawn based on the findings of the study:

- Public health problems caused by non-segregation of solid wastes at source and their subsequent improper management were increasingly caused by the effect of solid waste management which appeared to be unavoidable and not easily mitigated.
- Improper waste disposal carried a risk of spreading disease. Some wastes had been identified as having a higher risk of spreading disease than others. At the top of the list was medical waste and bio-waste. It is important to consider that even a bandage that has been used on an individual infected with specific diseases may require disposal very similar to hospital medical waste. Some office waste may present increased risk of spreading disease. Among these office wastes may have deposits of dusts and molds that are removed from the different departments.
- The quality of water may be described in terms of the concentration and state (dissolved or particulate) of some or all of the organic and inorganic material present in the water, together with certain physical characteristics of the water. It is determined by onsite measurements and by examination of water samples on site or in the laboratory. The main elements of water quality monitoring are, therefore, on-site measurements, the collection and analysis of water samples, the study and evaluation of the analytical results, and the reporting of the findings. The results of analyses performed on a single water sample are only valid for the particular location and time at which that sample was taken. One purpose of a monitoring program is, therefore, to gather sufficient data (by means of regular or intensive sampling and analysis) to assess spatial and/or temporal variations in water quality
- Moreover, the employees should be made more familiar with the waste management issues in order to get their stronger collaboration, with a heightened sense of co-ownership of the school environment. The teaching, research, and service functions of the university may be used as avenues to educate various stakeholders on the importance or proper waste management.

Conclusion

In the light of the findings of the study, the following conclusions were drawn:

1. That the problems related to health may be attributed to improper waste disposal while waste pollution has a significant effect to harm almost all forms of life. However, the government tried to put laws to protect the quality of environment. Moreover, everyone plays a major role to combat health problem and should take the responsibility of making the environment and oneself healthy.
2. The management of waste should focus on how to find the value and redirect it back to the community. Unfortunately, the collection and dumping processes often make separation an expensive and sometimes impossible task to manage properly solid wastes.
3. The extent of solid waste management practices significantly affected school's waste outcome in terms of employees' general health, waste generation, income generation, and water quality.
4. A number of implications drawn based on the findings of the study may be utilized in developing waste management advocacies for the University.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are hereby submitted:

1. The school administrators may develop further training and awareness campaign on the implementation of solid waste management practices, especially those that were found to be moderately practiced in some areas of waste collection and disposal.
2. Non-Biodegradable items for instance can be used again. Plastics, metals, bottles can be broken down with the help of chemicals and can once again be used to create new plastic and metal products. This can go a long way to effectively reduce the environmental hazard caused by these non-biodegradable products and creating a better and greener University.
3. Hospital administrators may find other possible reasons in order to further improve the quality of life or patients in the hospitals.
4. Strict implementation of waste management may be necessary to improve the school's waste outcome.

References

1. Abul S., (2010). "Environmental and health impact of solid waste disposal at Mangwaneni dumpsite in Manzini: Swaziland". Journal of Sustainable Development in Africa 12: 64-87.
2. Ahsan A, Alamgir M & Imteaz M, et al., (2012). "Role of NGOs and CBOs in waste management". Iranian Journal of Public Health 41: 27-38.
3. Asnani P.U., (2015). "Solid waste management. In: Rastogi A, editor", India Infrastructure Report. New Delhi, India: Oxford University Press. pp. 160-189.
4. Bandara NJGJ and Hettiarachchi JPA, (2010). "Environmental impacts with waste disposal practices in a suburban municipality in Sri Lanka". International Journal of Environment and Waste Management 6: 107-116.
5. Bunn T.L., Slavova S. and Tang M., (2011). "Injuries among solid waste collectors in the private versus public sectors". Waste Management & Research, 29, 1043-1052.
6. Census of India, (2011). "Provisional population totals paper 1 of 2011: Puducherry UT", Retrieved from: http://censusindia.gov.in (accessed 8 June 2013).
7. Chattopadhyay S., Dutta A. & Ray S., (2009). "Municipal solid waste management in Kolkata, India -A review". Waste Management 29(4), 1449-1458.
8. Cointreau S. and Mundial B., (2010). "Occupational and environmental health issues of solid waste management", Special emphasis on middle and lower-income countries. Washington: World Bank.
9. Colon M. and Fawcett B., (2011). "Community-based household waste management: Lessons learnt from EXNORA's 'zero waste management' scheme in two South Indian cities". Habitat International, 30, 916-931.
10. Farzadkia M, Jorfi S, Akbari H, et al., (2012). "Evaluation of dry solid waste recycling from municipal solid waste: case of Mashhad city, Iran". Waste Management & Research, 30, 106-122.
11. Fujii Y, (2008). "Successful source separation in Asian Cities: Lessons from Japan's experience and action research in Thailand". Tokyo: Institute of Developing Economies-Japan External Trade Organization.
12. Gupta R, Joshi R. and Gupta N., (2012). "Urbanization and air environment in Jaipur". Environment and Urbanization Asia, 3, 353-358.
13. Jain A.K., (2007). "Sustainable development and waste management". Environews - Newsletter ISEB India, 13(1), 1.
14. Joseph K., (2015). "Stakeholder participation for sustainable waste management", Habitat International, 30, 863-871.
15. Kumar K.N. and Goel S., (2009). "Characterization of municipal solid waste (MSW) and a proposed management plan for Kharagpur, West Bengal, India". Resources, Conservation and Recycling, 53, 166-174.
16. Kumar S, Bhattacharyya JK, Vaidya AN, et. al., (2009). "Assessment of the status of municipal solid waste management in metro cities, state capitals, class I cities, and class II towns in India: An insight". Waste Management, 29, 883-895.
17. Maiti S. and Agrawal P.K., (2015). "Environmental degradation in the context of growing urbanization: A focus on the metropolitan cities of India". Journal of Human Ecology, 17, 277-287.
18. Matter A., Dietschi M. and Zurbrügg C., (2013). "Improving the informal recycling sector through segregation of waste in the household - The case of Dhaka Bangladesh". Habitat International, 38, 150-156.
19. Nema A., (2009). "Report: Risk factors associated with treatment of mixed municipal solid waste in the Indian context". Waste Management & Research, 27, 996-1001.
20. Patel M.L., Jain R. and Saxena A., (2011). "Assessment of the Municipal Solid Waste & Status of Implementation of Municipal Solid Waste (Management & Handling), Rules, 2000 in the State of Madhya Pradesh, 2008 - A case study". Waste Management & Research, 29, 558-562.
21. Pattnaik S. and Reddy M.V., (2010). "Assessment of municipal solid waste management in Puducherry (Pondicherry), India". Resources, Conservation and Recycling, 54, 512-520.

22. Ramachandra T.V. and Bachamanda S., (2007). “Environmental audit of municipal solid waste management”. Environmental Technology and Management, 7, 369-391.
23. Rathi S., (2007). “Optimization model for integrated municipal solid waste management in Mumbai, India”. Environment and Development Economics, 12, 105-121.
24. Ross D.E. and Pons G., (2013). “Much room for improvement: Occupational safety for solid waste workers”. Waste Management & Research, 31, 661-662.
25. Saxena S, Srivastava RK and Samaddar AB, (2010). “Towards sustainable municipal solid waste management in Allahabad City”. Management of Environmental Quality: An International Journal, 21, 308-323.
26. Sharholy M., Ahmad K., Mahmood G., et al., (2008). “Municipal solid waste management in Indian cities - A review”. Waste Management, 28, 459-467.
27. Swapan M., (2009). “Socio-economic aspects of solid waste recovery and recycling in Bangladesh: A case study of Khulna city”. In: Proceedings of the Annual Conference of Australian Sociological Association, 1-4 December, The Australian National University, Canberra, Australia, pp.1-14.
28. Tai J., Zhang W., Che Y., et al., (2011). “Municipal solid waste source-separated collection in China: A comparative analysis”. Waste Management, 31, 1673-1682.
29. Tukahirwa JT., Mol APJ and Oosterveer P., (2013). “Access of urban poor to NGO/CBO-supplied sanitation and solid waste services in Uganda: The role of social proximity”. Habitat International, 35, 582-591.
30. Uttara S., Bhuvandas N. and Aggarwal V., (2012). “Impacts of urbanization on environment”. International Journal of Research in Engineering & Applied Sciences, 2(2), 1637-1645.
31. Velis C.A. and Brunner P.H., (2013). “Recycling and resource efficiency: It is time for a change from quantity to quality”. Waste Management and Research, 31, 539-540.
32. Velis CA, Wilson DC, Rocca O, et al., (2012). “An analytical framework and tool (‘InteRa’) for integrating the informal recycling sector in waste and resource management systems in developing countries”. Waste Management & Research, 30, 43-66.
33. Vij D., (2012). “Urbanization and solid waste management in India: Present practices and future challenges”. Social and Behavioral Sciences, 37, 437-447.
34. Wilson D.C., Rodic L., Scheinberg A., et al., (2012). “Comparative analysis of solid waste management in 20 cities”. Waste Management and Research, 30, 237-254.