ASSESSMENT OF WASTE MANAGEMENT CHALLENGES AND THE MITIGATION STRATEGIES IN NIGERIA

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ABSTRACT

This study was to assess the waste management challenges in Nigeria and the mitigation strategies adopted. A descriptive survey design was adopted for the study. The study was conducted in Nigeria. The population of the study comprised all the environmental scientists. A stratified random sampling technique was used to select 300 environmental scientists, which constituted the sample size used for the study. The instrument, titled "Waste Management Challenges and the Mitigation Strategies Questionnaire (WMCMSQ)", was used for data collection. Face and content validation of the instrument was carried out by one expert in test and measurement from the University of Uyo and one environmental scientist from Akwa Ibom State Polytechnic to ensure that the instrument was appropriate for the study. The Cronbach Alpha technique was used to determine the level of reliability of the instrument. In this case, the reliability coefficient obtained was 0.77, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical techniques such as descriptive statistics. The test for significance was done at a 0.05 alpha level. The study concluded that waste management is an important issue that needs governmental action quickly. The current waste management in Nigeria lacks a holistic approach covering the whole chain of product design, raw material extraction, production, consumption, recycling, and waste management. Current systems in Nigeria cannot cope with the volume of waste management generated by an increasing urban population, and this impacts on the environment and public health. The practices of generating waste are too dangerous not only for today, but also for future generations. One of the recommendations made was that the government should educate people and tell them to adopt practices for recycling, reusing, and reducing rather than generating waste in society.

KEYWORDS: Waste Management, Challenges, Mitigation, Strategies, and Nigeria

INTRODUCTION

Environmental waste is the useless product of human activities that physically contains the same substance that is available in the useful product of management. Environmental waste has also been defined as any product or material that is useless to the producer (Basu, 2009). Most human activities generate environmental waste (Brunner and Rechberger, 2014). Despite that, the production of waste management remains a major source of concern. The rate and quantity of environmental waste generation have been increasing. As the volume of environmental waste increases, so does the variety of waste (Vergara and Tchobanoglous, 2012). The significant increase in the volume of environmental waste generation began in the sixteenth century when people began to move from rural areas to cities as a result of the industrial

revolution (Wilson, 2007). The migration of people to cities led to a population explosion that in turn led to a surge in the volume and variety of environmental waste generated in the cities. Environmental waste management entails the generation, collection, handling, transfer, disposal, reuse, recycling, reclaiming, and auditing of waste at a minimal cost (Demirbas, 2011). These practices differ from nation to nation, depending on the sources and types of waste. Waste management has played a vital role in nature's ability to sustain life within its capability. In many developing nations in the world, it has become a recurrent challenge, especially in urban areas. However, the negative impacts on the country are apparent.

Environmental waste management also represents an economic loss and burden to our society. Labour and the other inputs (land, energy, etc.) used in its extraction, production, dissemination, and consumption phases are also lost when the "leftovers" are discarded. Waste management costs money. Creating an infrastructure for collecting, sorting, and recycling is costly, but once in place, recycling can generate revenues and create jobs (European Environmental Agency, 2014). Waste is not only an environmental problem, but also an economic loss. Dijkema et al. (2000) pointed out that environmental wastes are materials that people would want to dispose of even when payments are required for their disposal. Although waste is an essential product of human activities, it is also the result of inefficient production processes whose continuous generation is a loss of vital resources (Cheremisinoff, 2003). Rapid economic growth, urbanization, and an increasing population have caused (materially intensive) resource consumption to increase, and consequently the release of large amounts of waste into the environment (Singh, Laurenti, Sinha, & Frostell, 2014). From a global perspective, current waste and resource management lacks a holistic approach covering the whole chain of product design, raw material extraction, production, consumption, recycling, and waste management.

STATEMENT OF PROBLEM

Environmental waste management is one of the greatest challenges facing humanity in modern times in Nigeria. Despite the numerous efforts by various government agencies all over the world to arrest the poor management of environmental waste, Waste management methods have adverse effects on the environment (in particular biodiversity and ecosystems) and human health. In recent times, the rate and quantity of waste generation have been increasing in urban areas. Therefore, the study investigates the waste management challenges and mitigation strategies in Nigeria.

OBJECTIVE OF STUDY

1. To find out the prevalent of waste management challenges in Nigeria.

2. To determine the mitigation strategies used in curbing waste management issues in Nigeria.

RESEARCH QUESTIONS

1. What are the prevalent of waste management challenges in Nigeria?

2. What are the mitigation strategies used in curbing waste management issues in Nigeria?

CONCEPT OF ENVIRONMENTAL WASTE MANAGEMENT

Environmental waste management is the collection, processing, recycling, and deposition of the waste materials of human society. The high rate of urbanization in African countries implies a rapid accumulation of refuse. Social and economic changes that most African countries have witnessed since the 1960s have also contributed to an increase in waste disposal (Owusu et al. 2012 and Ahmed & Ali 2011). Waste is classified by source and composition. The term "waste" is typically applied to solid waste, sewage (wastewater), hazardous waste, and electronic waste. Waste disposal is the final step of waste management and ideally comprises placing radioactive waste in a dedicated disposal facility, although the discharge of effluents into the environment within permitted limits is also a disposal option. Environmental waste disposal in landfills leads to resource loss and can facilitate the contamination of groundwater and soil via leaching that has the potential to have a negative impact on the surrounding environment. According to Flores, et al. (2017), organic waste, such as food waste and yard waste, makes up 25 to 50% of what people throw away. Treatments and disposal methods depend on the residents of a community. Residents or any responsible citizen of the community should be able to conduct an appropriate solution for the sake of their environment. It is also said that various human activities, such as improper dumping of refuse, can result in a negative impact that can also cause health hazards to the residents. Proper discipline and awareness of residents is needed to foster an accurate pattern of refuse disposal.

## CHALLENGES FACING ENVIRONMENTAL WASTE MANAGEMENT

Environmental waste management is facing a number of challenging issues, for instance, balancing objectives between promoting recycling and protecting consumers against harmful chemical substances in recycled materials; insufficient data collection; quality aspects related to recycling; energy recovery of waste; and waste prevention (European Union, 2015). The main challenges related to environmental waste management are seen as promoting recycling while making sure consumers are protected from toxic substances that can be found in waste. Adu-Boahen et al. (2014) states that African cities are facing serious waste disposal problems. Indeed, a visit to some cities and towns in Nigeria revealed aspects of the environmental waste management problem, such as heaps of uncontrolled rubbish, polythene bags scattered everywhere and disposal sites overflowing with filth, which come with their associated health hazards such as cholera, malaria, and typhoid to residents who live near the dumping sites. Environmental waste usually ends up in illegal dumps on streets, open spaces, and waste lands. This may cause flooding which destroys human lives and properties. Noiki et al. (2020) stated that there are several challenges associated with existing waste management practices: informal settlements, low budgetary provision, small private sector participation, poorly implemented policies, and enforcement of environmental laws and regulations.

According to Adu-Boahen et al. (2014), wastes also have an impact on soil drainage, which hinders crop growth. Littering devalues the land around it, and this has an impact on tourism, businesses, and residents. Most of the time, it causes harm to the tourist industries of that particular area or country. Another equally important challenge that the people endure when it comes to poor environmental waste management is sickness, as made reference to the frequent outbreak of diseases in some areas, especially in the rainy season. The effects of waste on the

natural environment and people's lives dispose of waste on the environment and health, and improper waste disposal has had a significant negative impact on citizens' health.

STRATEGIES OF ENVIRONMENTAL WASTE MANAGEMENT

The ideal of environmental waste management alternatives is to prevent waste generation in the first place. Environmental waste prevention is a basic goal of all waste management strategies. Numerous technologies can be employed throughout the manufacturing, use, or post-use portions of product life cycles to eliminate environmental waste and, in turn, reduce or prevent pollution (LUMEN 2020). The long-recognized hierarchy of waste management consists of prevention, minimization, recycling and reuse, biological treatment, incineration, and landfill disposal.
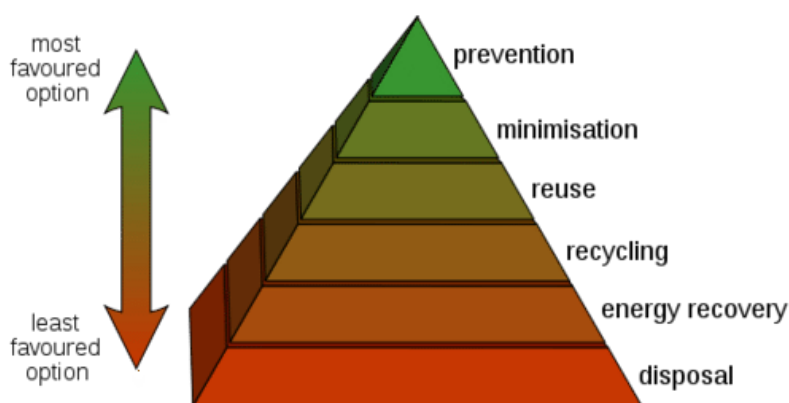
Some representative strategies include environmentally conscious manufacturing methods that incorporate fewer hazardous or harmful materials, the use of modern leakage detection systems for material storage, innovative chemical neutralization techniques to reduce reactivity, or water-saving technologies that reduce the need for fresh water inputs. (LUMEN 2020). Environmental waste minimization strategies are extremely common in manufacturing applications; the savings in material use not only preserves resources but also saves significant manufacturing-related costs. Waste management strategies like careful segregation at source, storage facilities, transportation amenities, and disposal of waste need to be planned in a coordinated manner. This includes concerted efforts from the governmental and private sectors and the general public (Antony, Reshmy, Raveendran, & Parameswaran, 2019). An all-inclusive strategy including stringent legislative enforcement, governmental policy making, and funding for novel and innovative measures to reduce the minimal residual waste is desirable.

PREVALENCE OF ENVIRONMENTAL WASTE

Disposal and management of waste are world-wide problems. Poor, outdated, and illegal urban and hazardous waste disposal practices affect local communities in almost every country; this includes illegal transboundary trade, primarily from industrialized countries (Marsili 2009). Several investigations indicate poor and illegal waste management as the most important world-wide cause of contamination of soil and groundwater (Landrigan, 2015). However, with the progression of time, people are becoming aware of the hazardous effects of solid waste through information circulated via electronic and social media and the importance of the proper disposal

of solid waste and its impact. The solid waste problem is much more severe in urban environments (Anjaneyula 2005). Along with such educational programs, the government and other entities involved in tackling solid waste-related problems are making considerable efforts, including the inculcation of strict legislative actions, to keep the city clean and healthier. Besides the regular collection system provided by the Kolkata Municipal Corporation, in some areas there is still open dumping where people just throw their garbage on open land. According to Taylor et al. (2003), land filling is another simple and typically inexpensive method of waste disposal. It creates a very unsightly situation for the passersby and also a foul smell comes out during the monsoon, making the place an appropriate breeding ground for mosquitoes and flies.

METHODOLOGY

A descriptive survey design was adopted for the study. The study was conducted in Nigeria. The population of the study comprised all the environmental scientists. A stratified random sampling technique was used to select 300 environmental scientists, which constituted the sample size used for the study. The instrument, titled "Waste Management Challenges and the Mitigation Strategies Questionnaire (WMCMSQ)", was used for data collection. Face and content validation of the instrument was carried out by one expert in test and measurement from the University of Uyo and one environmental scientist from Akwa Ibom State Polytechnic to ensure that the instrument was appropriate for the study. The Cronbach Alpha technique was used to determine the level of reliability of the instrument. In this case, the reliability coefficient obtained was 0.77, and this was high enough to justify the use of the instrument. The researcher subjected the data generated for this study to appropriate statistical techniques such as descriptive statistics. The test for significance was done at a 0.05 alpha level.

RESULTS

Research Questions 1: The research question sought to find out the prevalent waste management challenges in Nigeria. To answer the research question, percentage analysis was performed on the data, (see table 1).

TABLE 1: Percentage analysis of the prevalent of waste management challenges in Nigeria

CHALLENGES	FREQUENCY	PERCENTAGE
Insufficient data collection	104	34.67**
Low energy recovery of waste	47	15.67*
Indiscriminate waste disposal	86	28.67
Ineffective promotion of recycling	83	21
TOTAL	**300**	**100%**

**   The highest percentage frequency
*   The least percentage frequency
SOURCE: Field survey

The above table 1 presents the analysis of the prevalent of waste management challenges in Nigeria. From the result of the data analysis, it was observed that the highest percentage

(34.67%) of the respondents affirmed "insufficient data collection" as the waste management challenge in Nigeria, while the least percentage (15.67%) of the respondents rated "low energy recovery of waste" as the waste management challenge in Nigeria. Hence, the result in the data analysis therefore proves that the prevalent waste management challenge in Nigeria is the insufficiency of data collection.

Research Questions 2: The research question sought to find out the mitigation strategies used in curbing waste management issues in Nigeria. To answer the research question, percentage analysis was performed on the data, (see table 2).

TABLE 2: Percentage analysis of the mitigation strategies used in curbing waste management issues in Nigeria

Mitigation Strategies	FREQUENCY	PERCENTAGE
Prevention	82	27.33**
Minimization	69	23
Reuse	56	18.67
Recycling	45	15
Energy Recovery	32	10.67
Disposal	16	5.33*
TOTAL	**300**	**100%**

**   The highest percentage frequency
*   The least percentage frequency
SOURCE: Field survey

The above table 2 presents the mitigation strategies used in curbing waste management issues in Nigeria. From the result of the data analysis, it was observed that the highest percentage (27.33%) of the respondents affirmed prevention, while the least percentage (5.33%) of the respondents stated that disposal is best mitigation strategy used in curbing waste management issues in Nigeria. Hence, the result in the data analysis in table 2 implies that prevention is paramount mitigation strategy used in curbing waste management issues.

CONCLUSION

The study concluded that waste management is an important issue that needs governmental action quickly. The current waste management in Nigeria lacks a holistic approach covering the whole chain of product design, raw material extraction, production, consumption, recycling, and waste management. Current systems in Nigeria cannot cope with the volume of waste management generated by an increasing urban population, and this impacts on the environment and public health. The practices of generating waste are too dangerous not only for today, but also for future generations.

RECOMMENDATIONS

1. The government should educate people and tell them to adopt practices for recycling, reusing, and reducing rather than generating waste in society.

2. Adequate awareness or sensitization should be carried out to inform the public about the consequences of improper waste disposal, which has a significant negative impact on their health.

3. Modern recycling technologies can be employed through the re-manufacturing firm, use, or post-use portions of product life cycles to eliminate environmental waste and, in turn, reduce or prevent pollution.

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