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**ENVIRONMENTAL SUSTAINABILITY AND WASTE MANAGEMENT IN KHANA LOCAL
GOVERNMENT AREA: PROBLEMS AND PROSPECTS**

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Abstract

This paper focused on environmental sustainability in Khana Local Government Area of Rivers State, Nigeria. The aim of the study is to examine the problems and prospects of waste management to ensure sustainable environment. The methodology adopted by the researchers centred around the primary and secondary sources of data, where closed and open ended questionnaire distributed and retrieved from respondents selected for the study. It includes fifty households, one hundred persons selling in Bori market, twenty waste management staff and thirty workers (civil savants) totaling two hundred copies of questionnaire, One hundred and sixty questionnaire were retrieved, while forty were not respondent to. The simple random sampling techniques were used for the selection. To analyse the data, the tabular method, simple descriptive method and the chisquare were used to avoid bias in the work. The study found out that waste management faces some challenges and also have prospects and by way of recommendation government should enforce environmental laws so that environmental sustainability can be achieved.

Keywords: Sustainable Environment, Waste Management, Problems, Prospects

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Introduction

Most human activities on the planet earth give rise to residual materials, which are not immediate use as they arise. These residuals may be recycled, reclaimed or reused, otherwise they constitute waste, which ultimately be realized into the environment (Ken, 1992). Improper waste management is one main source of environmental pollution particularly in cities and towns where industries and domestic activities are on the increase (Asthana and Asthana, 2012).

Municipal waste is normally generated from residential and commercial complexes and consists mainly of household waste, debris arising from constructions and demolitions, residues from sanitation, and wastes from streets (Sulphey, 2013). Due to rapid urbanization in the study area, waste management has become a major problem. Man's unguided development and ineffective solid waste management especially in urban centres result in a degraded urban environment and outbreak of diseases such as cholera, diarrhea, malaria and typhoid fever (Omodu 2011). Environmental sustainability is a state in which demands placed on the environment can be met without reducing its capacity to allow all people live well, now and in future. It is also defined as responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long term environmental quality. The researcher maintained that the factors and practices that contribute to the quality of the environment on a long term basis is aimed at environmental sustainability. Therefore, effective solid waste management conservation of natural resources and economic sustainability needs to be addressed so that we can achieve sustainable development.

Aim and Objectives of the Study

The study aim examining the problems and prospects of waste management to ensure environmental sustainability. The following specific objectives shall be pursued in order to achieve this aim.

- a. To identify the types of wastes generated in the area.
- b. To identify means by which wastes are being managed in the area.
- c. To examine the problems of waste management in the area.
- d. To examine the prospects of waste management in the area.
- e. To examine the season of the year where higher volumes of wastes are produced in the area.

Research Objectives

- i. What are the types of waste generated in the study area?
- ii. What are the methods of waste management in the area
- iii. What are waste management problems?
- iv. What are the prospects of waste management
- v. At what season of the year is higher volumes of wastes are produced?

Hypothesis

Ho: There is no significant relationship between waste management and environmental sustainability.

The Study Area

Khana Local Government Area is one among the 23 LGAs of Rivers State, Nigeria. The area is geographically located on latitude $4^{\circ}41'N$ and longitude $7^{\circ}22'E$. its headquarters is Bori. According to the National Population Commission, the Local Government has a population of 294,217 as at 2006 census. There are three districts in the area which is Nyorkchana, Ken-Khana and Babbe Districts. The Local Government area is bounded on the North by Tai LGA, on the South by Andoni LGA, on the West by Gokana LGA and on the East by Oyigbo LGA. The area is situated in the heart of Niger Delta Region which falls under the third zone at the peak rainy season between (July and August). Another Characteristic feature of rainfall distribution is that it is remarkably spatial in magnitude determined by proximity to the coast and also by elevation. The temperature in Khana ranges between minimum of $27^{\circ}C - 32^{\circ}C$. the vegetation zones include mangrove forest, fresh water swamp forest, and rainforest.

These vegetation types are parts of the Delta of River Niger which is one of the world's largest wet lands encompassing over 20,000 square km. the soil types includes sandy, loam, clay and alluvium soils. The economic activities in the Local Government are too numerous. For instance, a modern motor park, higher institution, Banks, Hospital, Clinics, a modern market, a police station, post office, schools, and above all a hospitable lifestyle.

Brief Literature Review

Population growth, increasing rate of urbanization and industrialization as well as rising standard of living have all contributed to an increase in both the amount and variety of solid waste generated in the study area (Naabara and Igbara, 2016). According to Akpofure (2009), solid waste management refers to the collection, transfer, treatment, recycling, resource recovery and disposal of solid waste generated in an area. Urban solid waste encompasses; refuse storage and collection, street and drain cleaning, solid waste transfer and transport resource, recovery and disposal. It involves vehicle maintenance repair, financial management, and administrative activities such as routing, scheduling and record keeping, staff management and developing strategic urban solid waste management planning.

Omuta (1988), observed that wastes are elements that insult the environment and it is usually considered in three categories namely; gaseous, liquid and solid. Patrick (2007), opined that wastes are unwanted materials dispose off by man, which have lost their value in the eyes of the first owner. Omodu (2011) stated that waste can also be seen as those products of society that the generator finds more profitable to discard rather than to utilize.

Timiebi and Anthony (2017), defined solid waste management as the application of techniques that will ensure the orderly execution of the functions of collection, transportation, processing, treatment and disposal of solid waste.

Environmental sustainability is a state in which demands placed on the environment can be met without reducing its capacity to allow all people live well, now and in future. It is also defined as responsible interaction with the environment to avoid depletion or degradation of natural resources and allow for long term environmental quality (Sharma, 2009). The maintenance of factors and practices that contribute to the quality of environment on a long term basis is known as environmental sustainability.

In the words of Smriti (2008) Environmental sustainability allows for the needs of man to be met without jeopardizing the ability of future generations to meet their needs.

DEFECTIVE BILATERAL RELATIONS AND THE CHALLENGES OF MULTINATIONAL....

But in summary, the cited persons or works in this study looked at wastes and their impact on the environment, without looking at the problems and prospects. As this study intends to bridge this gap.

Methods of Waste Management in the Study Area

Waste management is the systematic administration of activities, which provide for the proper storage, collection/transportation and final disposal of waste in areas designated for such by the appropriate authority. Storage involves the provision of sufficient number of containers to hold the volume of waste generated before collection and transportation to the disposal sites. Waste collection refers to the various methods of removing accumulated wastes from households to approved depots for final disposal while transportation are the various systems of collection, storing and movement of waste, equipment and vehicles for effective waste management. Though, some scholars see incineration, open dumping and burying of wastes in the soil as part of waste management (Uchegbu, 2002).

Methods of Waste Disposal in the Study Area.

The following are predominant methods of waste disposal practiced in developing countries. Open dumping, dumping wastes in water bodies, incinerations, composting etc.

Open Dumping

The open dumping method is the most commonly practiced in the study area. Open dumps develop when residents start piling up wastes on an empty land or in abandoned properties. This in turn constitutes public nuisance and eye sores.

Dumping of Wastes in Water Bodies

This practice is one of the oldest methods of waste disposal in the area. It involves getting rid of wastes by disposing them into the surrounding rivers and streams without prior treatment.

Incinerations

This is a common practice amongst residents of the local government, because residents prefer to set fire on their wastes rather than walk a few kilometers to the temporary collection points. Generally, people are not aware of the dangers associated with this form of waste disposal. The fumes produced during combustion can pose health risks to residents.

Composting

This is a natural process of decomposition of organic waste that yields manure which is very rich in nutrients. Composting is a biological process in which micro-organisms, mainly fungi and bacteria convert degradable organic waste into humus like substance. This finished product is high in carbon and nitrogen and is an excellent medium for growing plants (Smriti, 2009).

Problems of Waste Management in the Area

Indiscriminate solid waste disposal is actually a problem and embarrassment to any society that practice it. The challenges facing the management of waste in the study area are multi-faceted in nature and range from;

- i. Poor funding and poor implementation of environmental laws by the government.
- ii. Poorly maintained urban streets and roads.

- iii. Inadequate enlightenment of the public on the need to properly disposed off their wastes.
- iv. Lack of well-trained personnel and the issue of placing a square peg in around hole.
- v. Those who have the required skilled are not or were not offered placement in solid waste management (Baljeet, 2001).
- vi. Lack of safe and satisfactory final disposal sites

Prospects of Waste Management.

From extensive interactions with the people of Khana Local Government Area, the researchers discovered that proper management of wastes will enhances the following prospects.

- ❖ It will encourage the creation of new jobs, generation of revenues through transportation and selling of recovered products from waste.
- ❖ More money can be saved if manufactures employed the use of recycled materials for packaging.
- ❖ It will encourage environmental protection and preservation.
- ❖ It will prevent pollution and improve environmental quality of the study area.
- ❖ It will promote international friendship by attracting foreign investors in waste management.
- ❖ It will eliminate health hazards and toxic substances from the environment thereby maintaining the beauty of the external surroundings.

Methodology

Both the primary and secondary, data were utilized for this study. The sample population of the study consists of fifty (50) households, and hundred (100) persons selling in Bori market, twenty (20) staff of waste management agency and thirty (30) civil servants, totaling two hundred (200) respondents interviewed in the study area. The simple random sampling techniques were employed for the selection of the sample. The retrieved questionnaire were analyzed using the tabular method (i.e. able and percentages) including the chi-square statistical tool to test the hypothesis formulate in the work. The formula is expressed as
$$X^2 = \sum \frac{(O-E)^2}{E}$$

Result and Analysis

Table 1: Questionnaire Distribution and Retrieval from the Field

Respondents	Quest Dist.	Question Retrieved	Percentage Response
Households	50	40	25.00
Sellers in Bori market	100	80	50.00
Waste management staff	20	20	12.50
Civil servants	30	20	12.50
Total	200	160	100

Source: Field Work, 2021

This table shows respondents and number of questionnaire distributed and retrieved in the area. For households 50 copies were given and 40 retrieved, meaning 10 copies were not retrieved representing 25.00%, those selling in Bori market 100 copies and 80 retrieved representing 50.00% waste management staff 20 copies given and the same 20 retrieved

DEFECTIVE BILATERAL RELATIONS AND THE CHALLENGES OF MULTINATIONAL....

representing 12.50% while civil servants were given 30 copies and 20 retrieved representing 12.5% respectively. Percentage retrieved will be 160 divided by 200 multiplied by 100 equals to 80% which is good for the study.

Table 2: Types of Waste Generated in the Area

Waste	(O)	(E)	(O-E)	(O-E) ²	(O-E) ² /E
Domestic	80	32	48	2.304	0.072
Plastics	30	32	2	4	0.125
Polythene bags	30	32	2	4	0.125
Papers	15	32	17	289	9.0313
Metal	5	32	27	729	22.7813
					X ² =32.135

H₀: All these wastes are not generated in the study area.

H₁: All these wastes are generated in the study area

X² calculated = 32.135

X² tabulated at 5% degree of freedom

df = (n-1) (5-1) =4

X² tabulated (4,0.05) = 9.49

Decision Rule:

Since calculated value greater that tabulated value 32.135> 9.49, Ho rejected and H₁ accepted that all these wastes are generated in the study area.

Table 3: Method of Waste Management and Disposal in the Area

Methods	(O)	E	(O-E)	(O-E) ²	(O-E) ² /E
Open dumping	90	40	50	2.500	0.063
Incineration	35	40	5	25	0.63
Composting	25	40	15	225	5.63
Burying of waste in soil	10	40	30	900	22.5
					X ² =28.82

H₀: Not all these methods are employed in waste disposal and management in the area

H₁: All these methods are employed in waste disposal and management in the area

X² calculated = 28.82

X² tabulated at 5% degree of freedom

df= (n-1) (4-1) =3

X² tabulated (3,0.05) = 7.82

Decision Rule:

Since calculated value greater than tabulated value 28.82 > 7.82, Ho rejected and H₁ accepted that all these method are employed in waste disposal and management in the area.

Table 4: Problems or Challenges of Waste Management in the Area

Problems	(O)	E	(O-E)	(O-E) ²	(O-E) ² /E
Poor funding	60	40	20	400	10.00
Poorly maint. of urban streets	30	40	10	100	2.50
Lack of env. edu. awareness	20	40	20	400	10.00
Lack of safe disposal sites	50	40	10	100	2.50
					X ² =25.00

H₀: There is no problem facing waste management in the study area.

H₁: Waste management are faced with these problems in the study area

X² calculated = 25.00

X² tabulated at 5% degree of freedom

df = (n-1) (4-1) =3

X² tabulated (3, 0.05) = 7.82

Decision Rule:

Since the calculated value greater than tabulated value 25.00>7.82, reject H₀ and accept H₁, that is to say waste management faced these problems in the study area.

Table 5: What are the prospects of waste Management in the Area?

Prospects	(O)	E	(O - E)	(O - E) ²	(O - E) ² /E
Creation of new jobs	40	26.7	13.3	176.9	6.63
Environmental protection	30	26.7	3.3	10.9	0.41
Pollution prevention	30	26.7	3.3	10.9	0.41
Promotes int'l friendship	20	26.7	6.7	44.9	1.68
Eliminates hazards and toxic substance from the environment	30	26.7	3.3	10.9	0.41
It saves more money	10	26.7	16.7	278.9	10.45
					X ² = 19.99

H₀: There are no prospects in waste management

H₁: There are prospects in waste management

X² calculated = 19.99

X² tabulated at 5% degree of freedom

df = (n-1)(6-1)=5

X² tabulated (5, 0.05) = 11.07

Decision Rule:

Since the calculated value greater than tabulated value 19.99>11.07, H₀ rejected and H₁ accepted that there are prospects in waste management. Therefore there is a significant relationship between waste management and environmental sustainability.

DEFECTIVE BILATERAL RELATIONS AND THE CHALLENGES OF MULTINATIONAL....

Table 6: What seasons of the Year do higher volumes of wastes are produced in the area

Option	Responses	Percentage
Dry season	60	37.5
Rainy Season	100	62.5
Total	160	100

Source: *Field Work, 2021*

On this table, out of 160 responses, 100 is of the opinion that higher volumes of wastes are produced during the rainy season representing 62.5% while 60 said in the dry season respecting 37.5%.

Discussion of Findings

The study found out on the table 1 that those selling in Bori market generates higher volumes of wastes, mainly domestics with 50.00% followed by individual households selected from various communities across the L.G.A Table 2, discusses waste generation from the available options, and the calculated value using chi-square test revealed $32.135 > 9.49$ tabulated figures. Meaning all the wastes listed area actually generated in the study area. On the table that handles waste management and disposal strategies, calculated value of 28.82 also exceed tabulated value of 7.82. Therefore, the management and disposal methods adopted by the people are actually open dumping, incineration and composting. Table 4 accepted the fact that waste management in the area has some problems or challenges where the calculated value $25.00 >$ tabulated value 7.82.

On the table that talks about prospect of waste management the calculated value $19.99 > 11.07$ meaning that managing wastes attract good prospects.

Recommendations

- i. There is need for municipal government in the study area to recognize waste management as a viable venture and allocate appropriate resources to tackle it.
- ii. Government at all levels should enforce environmental laws for proper functionality, so that sustainability of the environment can be achieved.
- iii. Opening dumpsites are not encouraging because it distorts the beauty of urban centres, therefore sanitary land filling is recommended to maintain urban beauty, waste reduction and ensure waste to wealth syndrome.

Conclusion

The environment is a place where human activities evolved. Therefore, the rates of waste generation from projects and commercial outfits should not exceed the assimilative capacity of the environment to ensure the concept of sustainability in what we do.

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