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Urban Waste Disposal Management and Service Delivery in Port Harcourt Metropolis

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Abstract

The study was necessitated by the indiscriminate dumping of refuse in public places and on drainages which now constitute an eyesore and sometimes block this drainage system which results to flood and destruction of properties. The general objective of this study is to determine the extent to which urban waste management affect service delivery while the specific objective is to examine the extent to which solid waste management affect the quality of service delivery in Port Harcourt metropolis. The study employed Correlation Research Design, with a population of seven hundred and twenty thousand, two hundred and forty eight (720,248) people, and a sample size of four hundred (400) determined with the use of Taro Yamane formula of finite population. The statistical data was analyzed using the Pearson's Product Moment Correlation Coefficient on SPSS which establishes the extent of the relationship between the variables under consideration. The findings showed that there is a significant relationship between solid waste management and quality of service delivery in Port Harcourt metropolis. The researcher recommended that Private sector participation should be allowed in waste collection/management. This will ensure prompt clearance of solid wastes from the receptacles or dumping sites and also sanitary/dumping sites should be properly selected and managed by the government.

Keywords: Solid Waste; Waste; Service Delivery; Disposal; Hazard; Refuse: Environment; Safety.

1.   Introduction

There has been global concern about the quality of environment in which human beings live. Many international conferences, workshops and seminars have been held on the impact of degraded environment on human beings and the need to promote environmental qualities. It is a known fact that human safety is contingent among other things, on the quality of air he breaths, the food he eats, and the water he drinks and the environment in which he lives. Indeed Nigeria is not left out among the committee of nations that are showing great concern for environmental matters. Nigeria is a country with productive and diverse eco systems including mangroves, rainforest and wetlands. Port Harcourt the study area is the capital of Rivers State, Nigeria.

The area is an important industrial and commercial center with a number of flourishing industries such as National Fertilizer Company of Nigeria (NAFCON), Eleme Petrochemicals Company limited, and Port Harcourt Refining Company Limited etc. The presence of potential energy from oil and natural gas has made Port Harcourt to become one of Nigeria most important industrial cities. Gobo (2010) reveals the atmospheric temperature to be 25.50 centigrade(0C) in the rainy season and 30.0 centigrade(C) in the dry season. The daily relative humidity values ranges from 55.50 percent in the dry season to 96.00 percent in the rainy season. Port Harcourt metropolis is the fourth largest urban center in the country. It possess substantial natural resources prominent which are major oil and gas deposits in the Niger delta region of the country, a variety of solid minerals, good agricultural lands and water resources, a large labour force and a vibrant private sector. Average daily waste (refuge) generated in Port Harcourt ranged between 900 to 1350 metric tons (RSESA, 2005). The agency charged with the responsibility of solid waste management in Port Harcourt is Rivers State Environmental Sanitation Agency (RSESA). The agency created refuse collection centers/ points within the metropolis and evacuate it to a designated government approved dumped sites. Composition of waste generated are; garbage - 41

percent (%) paper and plastic -35 percent (%) scrap metal and glass - 15 percent (%) construction waste - 4 percent (%) sludge - 3 percent (%) and expired chemical waste and drugs -2 percent(%) (RSESA).

Environment is the source of global economy that must be protected and managed sustainably. All efforts directed at managing and administering the environment is to ensure continues existence of the biological diversity entities on the earth of which humans are the prime species and without it, humans cannot exist (Aluko 2009). The creation of this agency to manage this waste was to ensure that the environment remains clean and safe for the inhabitants to live in and transact their businesses.

Port Harcourt has always been known as the garden city of Nigeria right from its creation on May 19, 1968 after it was captured by the Nigeria forces. It also became the center of the Nigerian oil economy and it subsequently reaped benefits of its associations with the petroleum industry by undergoing modernization and urbanization with its flourishing beauty and neatness but the ghastly picture presented today by the metropolis has become a major problem and difficult to contend, environmental pollution and hazard seems to be on the increase because of the indiscriminate disposal of refuse which now affects the inhabitants of the area. The extent at which waste now loiter the environment of Port Harcourt metropolis calls for the present study. It is believed that the outcome of the study will not be biased as to be a representative result of the selected areas in Port Harcourt metropolis.

Many years ago Port Harcourt used to be known as the garden city of Nigeria because of its aesthetic beauty which attracts visitors from all over the world including foreign investors and partners but in recent times what makes the city the garden city has faded away. The city now wallows in pitiable, impoverished image. The indiscriminate dumping of refuse in public places and on drainages now constitutes an eyesore and sometimes leads to blockage of drainages thus leading to flood. The neglect of these filled refuse bin or containers in recent times now affects the quality of our water and air. Many areas around the homes are littered with domestic refuse sewage waste, garbage and other waste from industrial operations. Despite the government's effort at making the environment clean people seem to be careless about their environment. Despite the provisions of refuse receptacles by the government, many people still prefer dumping refuse at places they consider convenient to them. People seem not to be aware of the interrelatedness of dirty environment and pollution. It is based on this view that this study seeks to determine the extent to which urban waste disposal management affects service delivery in Port Harcourt metropolis.

With regards to the problems stated above, the general objective of this study is:

To determine the extent to which urban waste disposal management affects service delivery in Port Harcourt metropolis.

However the specific objective of the study is:

To examine the extent to which solid waste management affects the quality of service delivery in Port Harcourt metropolis.

Research Question

In what ways has solid waste management affect the quality of service delivery in Port Harcourt metropolis?

Hypothesis

H0: There is no significant relationship between solid waste management and quality of service delivery in Port Harcourt metropolis.

H1: There is a significant relationship between solid waste management and quality of service delivery in Port Harcourt metropolis.

2. Review of literature

The term "REFUSE" is an age long concept, while "WASTE" as a term is a new concept that is synonymous with refuse. For the purpose of this study the two terms were used interchangeably, however for balance, the term refuse is mostly used as the term of choice. Refuse is a solid waste that remains as residue or an incidental by-product of the processing of a substance and for which no use can be found by the organism or system that produces it (Allaby, 1988). The fact is that before refuse can be generated, the element must be worthless to its original user. Hence it is thrown away or discarded. A material maybe unwanted by a person or its original owner, but it may be a source of raw materials for another person. For this study, waste is any solid or semi-solid materials which have been discarded by its primary owner or original user, and may or may not be found useful by any other person but constitute nuisance to the people and the environment when left untreated. Waste could be explained to mean leftovers, used products whether liquid or solid having no economic value or demand and which must be disposed or thrown away (Oluwande, 2002, Bartone, 2000, Buckle and smith 2000).

Waste Management: is all those activities and action required to manage waste from its inception to its final disposal. This includes amongst other things, collection, transport, treatment and disposal of waste together with monitoring and

regulation. It also encompasses the legal and regulatory framework that relates to waste management encompassing guidance on recycling etc. Fred (2004). The term usually relates to all kinds of waste, whether generated during the extraction of raw materials, the processing of raw materials into intermediate and final products, the consumption of final products, or other human activities, including municipal (residential, institutional, commercial), agricultural, and special (household hazardous wastes, sewage sludge) Ekpoh (2009)

Solid wastes can be classified as:

Municipal Waste: These wastes are made up of household wastes, construction and demolition debris, sanitation residue and waste from the streets. These include; garbage, paper, plastic and aluminum, nylons, scrap metal and glass. These wastes are discarded and considered as dirt's and unwanted stuffs in the house hold but in the real sense they are raw materials which can be processed and turned into finished goods. For example; the plastic wastes can be recycled into fleeced jacket, aluminum cans could be shredded, grind and melted to form another aluminum sheet, bottles, glass and ceramics could be recycled into their original products, vegetable stems and garbage could be used to produce compost and animal bones crushed and used to produce vim.

Industrial Waste: these can also be known as hazardous waste, it contains toxic substances which could be highly toxic to humans, animals and plants. They could be highly corrosive, highly inflammable or explosive and reacts when exposed to certain things e.g. gases. These include; metal, chemical, pesticides, dyes, batteries, refining and rubber goods.

Biomedical Waste: these are made up of hospital and pharmaceuticals wastes. These are waste generated during the diagnosis treatment or immunization of humans or during research activities. These include; sharps, anatomic wastes, discarded medicines, chemical wastes etc.

Construction & Demolition Debris (C&D): This waste stream is comprised of bulky material generated during construction and renovation projects including ceiling tiles, plumb-ing fixtures, carpeting, concrete, bricks, fill dirt, etc. Recycling of C&D waste is a common consideration in new construction and renovation projects, as it can qualify the organization for points under LEED certification. C&D waste is unique in that the totals are not typically included in the determination of total waste generated at a facility, as it can dramatically skew baseline data with its large volume and immense weight.

Composting Waste: This waste stream is primarily comprised of food and landscaping waste material that will breakdown naturally in short periods of time under the proper temperature and pressure conditions, such as grass, weed clippings, tree limbs and branches, waste from vegetable produce, bread and grains, and paper products such as napkins or paper plates. Organizations are finding ways to compost this material either onsite or using an offsite contractor. Diverting this waste from other waste can significantly reduce waste disposal costs.

Agricultural Waste: is waste produced as a result of various agricultural operations. It includes manure and other wastes from farms, poultry houses and slaughterhouses; harvest waste; fertilizer run- off from fields; pesticides that enter into water, air or soils; and salt and silt drained from fields. Agricultural production leaves considerable amounts of agricultural waste. Some of it is recycled into the agricultural production as fertilizer, while large amounts remain unused and in many instances pose a disposal problem. Uncontrolled burning in the fields is not only a hazardous disposal solution;it is also wasting useful energy. With efficient collection systems, waste from agricultural production can be utilized as fuel for power and heat production.

2.1.1 Waste Disposal Methods

This study identified six methods of waste collection and disposal methods. They are:

Recycling: is the reprocessing of discarded material into new, useful product; the ultimate objective is to reduce the amount of waste that must be disposed in landfill or incinerator. It is a way of refilling or re-using of old material that may be considered useless, that has no further use by the consumers, for example, old aluminum cans and glasses bottles are usually melted and recast into new cans and bottles.

Composting: is a biochemical process in which organic materials such as lawn clipping and Kitchen scraps decompose to a rich solid like material. It is a process of rapid, partial decomposition of moist solid organic waste by aerobic organisms. It involves the use of natural microbial organism to decompose the organic fraction of waste. Composting is aerobic and produces primarily carbon dioxide, while anaerobic processes produce methane. Such gas contributes to global warming.

Open dumping method: is the most common and widely used in the state. It involves dumping of the waste in a designated sport which is uncovered. Ekpoh (2009), open dumps are unsanitary, unsightly and generally smelly, with foul odour as they attract rats, insects, flies, snakes, etc.

Land fill process: is designed to concentrate and contain refuse without creating a nuisance or hazard to public safety, (Daniel and keller 1995). The idea is to confine the waste, reduce it to the smallest volume and cover with compacted soil to prevent insects, rodents, seagulls, and avoid ground water percolation.

Burning waste: causes irritation of respiratory tract, aggravated asthma, contributes to chronic obstructive pulmonary disease, acute/ chronic respiratory disease. The inhabitants experience shortness of breath, sore throats, and breathing difficulties, dizziness, headaches, etc. It is responsible for fluids collection in the lungs and fibrotic changes, growth effects DNA, immune and reproductive system.

Incineration: is a process where combustible wastes are burned at temperature high enough (900-1000`c or 2650-1830`f) to consume all combustible materials, leaving only ash and non-combustibles to be disposed off in a land fill. Under ideal condition, incineration may reduce the volume of waste by 75% to 95%, modern incineration method has electrostatic precipitators, dual scrubbers and filter to reduce the volume of waste to at least 99% of most organic materials (anger and least smith 1998).

2.1.2. Service Delivery (Quality)

Service delivery according to Anton (2009) can be known as the act of providing a service to a customer or people. For the purpose of this study the quality of service delivery is an assessment of how well a delivered service conforms to the people's expectations. Service business operators often assess the service quality provided to their customers in order to improve their service, to quickly identify problems, and to better assess client satisfaction. The standard or the quality of solid waste disposal management in Port Harcourt metropolis can be seen as follows:

Flooding Menace: flooding had become a serious issue of concern of some major roads and streets in the city, and it is seriously attributed to the insensitivity of proper solid waste management. Poor solid waste management had been labeled the major factor to clogging and blocking of existing drainages or water channels (where solid wastes are dumped right into water channels or drainages), which have seriously contributed to severe flooding and associated disasters in the destruction of lives and properties.

Human and Vehicular Traffic Jam: Overflow of solid wastes from the storage facilities litters and scatters wastes materials. The indiscriminate roadside dumping of waste and the spread of waste of a landfill onto access roads undoubtedly prevents the free flow of human and vehicular traffic at such locations, thereby unnecessarily waste man hour in a bit to bypass such nuisances.

Breeding Ground for Disease Carrying Organisms: poor and unwholesome approach of solid waste management from the point of storage collection, transportation, final disposal can create favorable conditions for the breeding of vectors or disease carrying agents such as: flies, mosquitoes, cockroaches, worms etc., which is dangerous to the wellbeing of man and the ecosystem.

Aesthetic Degradation: Aesthetic degradation of the surrounding by an overflowed storage facility, unconfined transfer station, roadside dumping and litter along transport route and near landfill due to absence of fence and top cover are unsightly, and the emission of offensive odour around these facilities causes an innate human reactions of anxiety, depression and other negative psychological reactions. These reactions are vital to our existence and dictates how we live in harmony with others (Omubo-Pepple et al., 2010).

Noise Pollution: noise at landfills can be noticeable in nearby residential areas from truck traffic and bulldozers. It has also been established that excessive noise can have many undesirable effects on those exposed to it. In most cases, however, the noise is simply regarded as an annoyance; that causes hearing loss and stirs up anxiety, depression and also stimulates cardiovascular diseases. Hirshfeld et al, (1992). Noise pollution of the areas near a proposed landfill is a justified issue of concern because of the often limited buffer land between where wastes will be deposited and adjacent properties. This means that adjacent property owners can potentially experience noise pollution on their properties by the proposed landfill.

Physical Effects: the physical impacts are related to ground and surface water pollution by leach ate migration, atmospheric releases of offensive odours and landfill gas, and fires. Landfill gas is known to cause explosions resulting in loss of life and property, and damage to vegetation.

Block of Drainage System: it was observed that silting of building wastes in drainage channels, largely contributed to blocking the gutters and waterways, with the resultant effect of flooding in some parts of the capital city, Port Harcourt, during heavy downpour. Obuah (2014) regretted that building wastes, which include wastes produced from construction, alteration, repair or demolitions of any structure, were in most cases deposited in nearby gutters and waterways. Most worrisome, according to the sole administrator, was the fact that the wastes are carried by rain water and deposited on roads and streets in Port Harcourt and its environs after each downpour, thereby obstructing movement, and becoming an eye sour as well as causing environmental hazards to residents of the areas.

2.2 Theoretical Framework

This study is anchored on humans-environment interaction theory by Timothy Lynam (1993). The theory portrays a system of dependency of humans on its environment and the impact of its attitudes and activities on the same environment. From the theory, humans can either choose to protect or destroy their environment through his/her actions. The result of this action is either total destruction or sustainability of the environment. The theory also revealed the fact that either humans choose to destroy or protect their environment; the repercussion of their choice goes back to humans. The people are at risk when the environment is not properly managed. Oyaigbevwen (2000) states that the disposal of solid waste on land, without careful planning and management can present danger to humans and their environment. The unrestricted dumping of domestic, hospital, industrial and agricultural waste at the city dumping site was a cause for concern. The land cannot be used for domestic and agricultural use. The dumpsite occupies about 10 acres with at least 700 tonnes of deposited waste daily. Indiscriminate dumping of refuse and open dumping of refuse contaminate drinking water from both underground and surface suppliers. It also pollutes air and land. Above all it provides easy arena for disease spread.

3. Methodology

A research design is a plan, pattern and blue print that stipulate how data for the solution of the research problem was collected and analyzed (Nwakwo 2000). The study employed correlation survey design. In this study attention was paid to the variables of the study which are solid waste (independent variables) measured with municipal, biomedical and industrial wastes and the quality of service delivery (dependent variables) such as noise pollution, blockage of drainages, physical effects, aesthetic degradation, human and vehicle traffic jam, flooding menace. The population of the study consists of five areas in Port Harcourt local Governments Area. They are as follows: Azikiwe Road, Aggrey Road, Eastern by-pass, phc-aba express road and Ikwerre road with total population of 720,248. The proportional sampling technique was adopted in administering the research instrument to the respondents. This technique helped an equal proportion of the inhabitants within the sample frame to have equal chance of being selected. The sample size was determined using the Taro Yamane formula and 400questionnaires were distributed. The proportion of the questionnaire to be administered to each road will be determined using the Bowley's proportional allocation Formula. The primary data were gathered from respondents through questionnaire instrument, while the secondary data were elicited through textbooks and journals articles. The instrument used to collect data for the study was subjected to content validity and face validity by the researcher, the supervisor and some experts to ensure that the items of the questionnaire capture the variables of the study.The Spearman-Brown Formula Split-Half Reliability Likert Tests was measured by using the Cronbach's alpha test. In order for measurements to be acceptable, the minimum acceptable level of the Cronbach's alpha score should be equal to or more than 0.70 (alpha $\geq$ 0.70), as suggested by Sekaran (2003). The Cronbach's alpha score for the item is 0. 964 indicating an excellent internal consistence.

3.1 Test of Hypothesis

Hypothesis analyses using Pearson Moment Correlation.

H1– There is a significant relationship between solid waste management and the quality of service delivery in Port Harcourt metropolis.

Table 1: Correlations			
		SOLID WASTE	QUALITY OF SERVICE DELIVERY
SOLID WASTE	Pearson Correlation Sig.(2-tailed)N	1 357	.698** .000 357
QUALITY OF SERVICE DELIVERY	Pearson Correlation Sig.(2-tailed)N	.698** .000 357	1 357
**. Correlation is significant at the 0.01 level (2-tailed)			

Table 2: Responses Descriptive Statistics				
	N	Sum	Means	Std Deviation
QUE 1	357	779.00	2.9847	.91555
QUE 2	357	648.00	2.4828	1.00990
QUE 3	357	650.00	2.4904	.89276
QUE 4	357	892.00	3.4176	.84462
QUE 5	357	795.00	3.0460	1.05875
QUE 6	357	968.00	3.7088	.57469
QUE 7	357	740.00	2.8352	1.14676
QUE 8	357	936.00	3.5862	.85330
QUE9	357	674.00	2.6284	1.9875
QUE10	357	712.00	2.958	.912
ValidityN(listwise)				

4. Data analysis

The research question was analyzed using mean scores. Any item that is 2.50 and above was accepted and any item below 2.50 was rejected. The hypotheses were analyzed using Pearson product moment correlation on spss ver 20. Correlation analysis reports the interdependence of the study variables. Statistical correlation is significant if coefficient is more than 0.5. moreover if p-value is low (under 0.01), it means that correlation actually exists. In case p value is is high, it cannot be determined that the correlation actually exists, table 3 shows p value (0.000) is less than 0.01 (at a 2-tailed test) meaning that there is a significant relationship between solid waste management and the quality of service delivery in Portharcourt metropolis with the correlation coefficient of 0.698.

5. Results

Solid waste management is a major factor of service delivery in Port Harcourt metropolis and the result shows that there is a significant relationship between waste management and quality of service delivery. All the identified variables that constitute solid waste management (municipal, biomedical, industrial, composite and agricultural and construction debris) have great influence on the quality of service delivery (physical effects, block of drainages, aesthetic degradation, noise pollution) in Port Harcourt metropolis.

6. Discussion

The study discovered that there is a significant relationship between solid waste management and the quality of service delivery in Port Harcourt metropolis. This is in agreement with the observation of Ugwulor (2013) when he characterized these wastes and their recycling potentials notifying the public of its importance and benefits and for it to be encouraged in the society. Thus when people have a different view about these wastes and see it more as raw materials which can be processed into finished goods then there will be less indiscriminate dumping of refuse and the dumping sites provided by the government will be used properly therefore reducing diseases and risk of the exposed waste in the society. Alakinde and Michael (2013) support the view of ugwulor (2013) when observed private firms participation in waste management in different parts of the area. He was of the view that population enjoying private firm participation is comparatively smaller than those disposing their waste in unauthorized places and is mostly found in medium and low density zones.

7. Conclusion

This study concludes that solid waste disposal management is associated with real benefits to the inhabitants of Port Harcourt metropolis. The management and disposal of these wastes helps its citizens to live in a safe environment and reduced the risks and hazards that might occur in the environment as neglect of these waste or the indiscriminate dumping of wastes in the environment. Much attention and empowerment is to be given to the management of these wastes that are indiscriminately dumped in the environment and household services should also be rendered to the inhabitants of Port Harcourt metropolis.

8. Acknowledgements

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