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Investigating Factors Affecting Domestic Solid Waste Management in Abuja: Towards Achieving Zero Waste

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Abstract: *This study examines the factors influencing domestic solid waste management in the Federal Capital Territory, Abuja, Nigeria. While the problem of waste management in Abuja cannot be attributed solely to a lack of legislative framework, the study identifies several social, economic and natural factors contributing to the crisis. The social economic status of Abuja residents complicates effective waste disposal, while the poor economy of the region limits investment in waste management infrastructure and manpower. The region's natural topography, flooding, and wind patterns make waste management challenging for waste management companies. In response to these challenges, the study recommends a shift towards a zero-waste approach that emphasizes the reuse and recycling of waste materials. This requires improvement in waste management facilities and staff, and the implementation of citizen sensitization programs to reduce corruption and mismanagement. The study suggests that households must segregate waste and adopt proper segregation techniques. Results suggest that there are high levels of knowledge among residents about the color coding system for segregating waste. The study proposes the adoption of domestic waste management tools such as waste carbine and waste recycler machines to reduce the volume of waste generated and enhance waste management efficiency. Proper management of waste in Abuja will not only enhance the environmental quality of this region but also improve the health of the population.*
Key words*: Abuja, domestic solid waste management, zero waste, waste recycling, sanitation legislation, environmental quality.*

I. INTRODUCTION

The study is on the influencing factors of domestic solid waste management in Abuja targeted at investigating and studying the factors influencing domestic solid waste management in Abuja, the concept on this chapter is to slate back ground of the study giving a brief knowledge of the study, statement of the research problem a quick touch on the possible challenges in the cause of the study with the positive mind of overcoming them. Statement of the research questions covering possible questions to be addressed by the study, derived from the aim and objectives of the study, also the justification of the study statement for the reason of the study, slating observations and finds resulting to this s, Historically, the amount of wastes generated by human population was insignificant mainly due to the low population densities, coupled with the fact that there was very little exploitation of natural resources. Common wastes produced during the early ages were mainly ashes and human & biodegradable wastes (Biodegradable waste is a type of waste, typically originating from plant or animal sources, which may be broken down by other living-organisms.

Waste that cannot be broken down by other living organisms may be called non-biodegradable) and these were released back into the ground locally, with minimal environmental impact.
Recognizing the urgency of this problem, a growing number of countries have taken initial steps to respond to this need. These include the establishment of regulatory frameworks, development of national plans and the demonstration of innovative approaches. However, funding of healthcare waste management remains very inadequate.
The management of solid waste continues to be a major challenge in urban areas throughout the world particularly in the rapidly growing cities of the developing world (Foo, 1997). A high rate of population growth and increasing per capita income have resulted in the generation of an enormous volume of solid waste, which poses a serious threat to environmental quality and human health (Snigdha, 2003). Access to sanitation services and clean adequate water are therefore regarded as crucial to the health and wellbeing of people. It is widely accepted that the management of solid waste is a global problem. This problem is even more pronounced in developing countries such as Nigeria where solid waste management is a major concern. Adeyemi et al, (2001) observed that solid waste constitutes a major problem in most developing countries. Adeyemi added that waste management is one of the most intractable problems facing city administrators and environmental agencies. Ogwueleka, (2009) reported that solid waste management is by far one of the greatest challenges facing environmental bodies in the country. As a result of the management challenges, Adefemi and Awokunmi, (2009) reported a breakdown of law and order in relation to waste management. They observed that urban centers are experiencing an increased rate of environmental deterioration as a result of indiscriminate dumping of solid waste. Ogbonna et al., (2007) reported that in response to the enormous challenges pose by municipal solid waste management, the Government is taking steps to address these problems by engaging local contractors to evacuate waste. Ogbonna et al. (2007) observed that cities are divided into sections for the local contractors. However, inefficiency still thrives due to the lack of coordination on the part of the Government and the lack of expertise on waste management issues by the environmental agencies. The reasons behind inefficient waste management practice in Nigeria have been well researched. For example, Agunwamba, (1998) reported that there is a general lackadaisical attitude on the part of the government towards waste management. In addition, Adeyemi et al, (2001) observed that in Nigeria the management of municipal solid waste revolves mainly around open burning, open dumps, landfilling, reuse/recycling and waste conversion.

Figure 1: Municipal Solid Waste Quantities (Hoornweg and Bhada-Tata, 2012)

The total amount of MSW generated globally is estimated at about1, 300 million tonnes per area, and it is expected to increase to approximately2, 200 million tonnes by 2025 as shown in Figure 1 (Hoornweg and Bhada-Tata, 2012). The major sources of MSW are the residential and commercial sectors (Figure 2; Mihelcic and Zimmerman, 2010). The quantities of food wastes, garden wastes, paper, plastic and glass generated from both sectors contribute most to solid waste over all. Then the waste quantities vary among the remaining sectors, with construction and demolition having the highest contribution percentage after the residential and commercial sectors. This is due to the generation of concrete, metal, wood, asphalt, wallboard and dirt-predominant wastes.

Figure 2: Municipal Solid Waste Source (Mihelcic and Zimmerman, 2010) I. Aims and objectives of study

This work is aimed at investigating the factors influencing domestic solid waste management in Abuja and possible ways of enhancing the waste management service in Abuja Federal Capital of Nigeria. In order to achieve these goals, the following objectives set out for the study are to: -

1. To determine the social factor affecting the management of domestic solid waste.
2. To determine the economic factor affecting the management of domestic solid waste.
3. To determine the natural factor affecting household solid waste management in Abuja.
4. To determine other factor affecting household solid waste management in Abuja.

II. The Study Area

Abuja is the capital city of Nigeria. It is located in the center of Nigeria, within the Federal Capital Territory. It falls within latitude 8.28◦ and 9.20◦ North of the Equator and longitude 6.45◦ and 7.39◦ East of the Greenwich Meridian. It occupies an area of about 250km^2 within the Gwagwa Plains in the northeast quadrant of the FCT. At the 2006 census, the city of Abuja had a population of 776,298 (NBS Census, 2006), making it one of the top ten most populous cities in Nigeria. The FCT is bounded on the north by Kaduna State, on the west by Niger State, on the east and south-east by Nassarawa State, and on the south-west by Kogi State.

The physical development of Abuja is planned to progress in four operational phases. It is being developed in phases (four phases in all) over an area of 250 square kilometres. Each of the phases is divided into districts and each district is further subdivided into neighborhoods for planning and development purposes. The physical development of Abuja is planned to progress in four operational phases. Phase 1 consists of seven districts: The Central Area, Garki I, Garki II, Wuse I, Wuse II, Asokoro, and Maitama. Phase II consists of 14 residential districts and four sector center. Phase III consists of eleven districts. The spiraling economic and sociopolitical activities, with the attendant strains on housing and living conditions, contributed largely to the upsurge of squatter

settlements in the territory. These settlements (with the exception of Garki Village within Garki II District of the city) are predominantly situated in the city suburbs, otherwise known as satellite towns. These suburban areas generally are densely populated and lack good infrastructure, basic social services and amenities. Poor unemployed persons and lowincome workers who live in shanty and poor accommodation structures mainly constitute the suburban population.

III. Justification

Social factors affecting the management of domestic waste, which covers from domestic waste in terms of sources, these social factors are; class of employment wherein the head of an household is working in a well-paid organization it will be easier for such to pay the bills attached to waste disposal or even hire or subscribe to a waste management agency to help ensure proper management of their household waste, this might not be possible for someone whose monthly take home does not even pay his family meals, light bills or water bills. The family size is another key player in the increase of waste and management of it, at single it may be easier to control waste, when married waste generation increases and as the family increase their is an increase in the quantity of waste generated therefore managing such maybe become difficult or unaffordable. The level of awareness may stand as a social factor in affecting the management of these waste as residents may have poor knowledge on how to manage these waste even by themselves or even know that there is an agency for waste management, information may be limited reaching them, the knowledge of the policies guiding domestic waste might be out of their knowing, A sought of knowledge gap.

IV. Methodology

This chapter is designed to describe the procedures adopted in this research. The procedures involve the following: research design, population of the study, sample and sampling techniques, instrumentation, validation of the instrument, administration of the instrument and data analysis techniques. This research will cover the study of solid waste management in the Federal Capital Territory municipalities using ISWM (integrated solid waste management) as an assessment tool. The area of this study is confined to the five area councils and one municipal area council that makes up Abuja. The focus of the survey aspect of the research will include all residents residing within these areas. Primary data were collected through questionnaires using random sampling for the residential questionnaire. The field survey will be inclusive of all areas within research scope. The research boundaries of the study include the system elements of the integrated solid waste management system.

In the sampling, since the researcher choose to undergo a quantitative research, a probability sampling technique is adopted under which a simple random technique is considered suitable for the study. The Yaro Yamane formula below will be used to determine sample size to be used at 0.05 confidence level (level of significance): The sample size will be obtained using formula

$$n = \frac{N}{1 + N(e)_2}$$ Where:

n = expected questionnaire, N = Target population, 1 = Constant, e = level of significant Now having n =? 1 = constant, N = 2,440,000, and e = 0.05

Using: $n = \frac{2{,}440{,}000}{1+2{,}440{,}000(0.05)^2}$; $n = \frac{2{,}440{,}000}{6101}$

Therefore, n=399.93

Approximately 400 questionnaires are admitted to the metropolitan city at random order. In other to have equal distribution the researcher will use the calculation to get the expected questionnaire per area, as the metropolitan city is divided into 6 areas. In order to avoid insufficiency in quantity or questionnaire 50 more questionnaire were added to the calculated 400 questionnaires making it a total of 450 questionnaire distributed.

$$expected\ number\ of\ questioniare = \frac{calculated\ number\ of\ questioniare}{number\ of\ areas}$$

$$expected\ number\ of\ questioniare = \frac{450}{6} = 75$$

Having the above result, the expected number of questionnaire distributed is 75 questionnaires to six areas of the metropolis. **V. Results and Discussion**

Considering the short coming in domestic waste management as observed people are reserved in this case, as a hopping sum of 282 have no comment on any short coming from the government or society or anyone. Though the next high sum of 43 stood bold that corruption is a major challenge to waste management in the area, where 25 of the participant said its lack of fund as if fund is made available then the management would easier, a percentage of 2.8(11) respondent said its poor technology that result to poor management, maybe drawing light from the overwhelming nature of the job, bad economy was not left out in this case of short coming of the present system of waste management in the area, as 20 respondent among others slated. When sensitization came up from a few of 10 participants out of 391.

Perceived all of the above in table 28 above. 62 % indicated that segregation should be done at the source, as against 24.67 % who indicated otherwise. There was satisfactory knowledge of colour coding of wastes which is an essential factor for proper segregation of waste.

A correlation analysis was done to check for the effect of one potential variable on another, this is to enable detection of the relationship and the intensity of such relationship between variables.

VI. Findings

The study made the following findings based on the responses of the respondents that:

To determine the social factor affecting the management of domestic waste.

1. Location have great effect on waste management, not that everyone should leave in that location, but amenities available in that location should be considered in other locations too.
2. There's is inadequate waste bin located across the location of study.
3. There should be corporate social responsibility among residence as not all within our environment should be left to government (AEPB).
4. There should be sensitization, to avoid waste been full before disposal.

To determine the economic factor affecting the management of domestic waste.

1. The key economic factor affecting waste management is the poor economy of the nation.
2. Poor or bad technological concept lack of facilities, insufficient man power and more affect the waste management.
3. The residence has poor attitude to waste management, this must be due to poor awareness, sensitization, and bad economy.
4. Unavailability of sufficient recycling company in the land, hence the residence has no economic importance of waste.

To determine the natural factors affecting household waste management in Abuja.

1. Top on the natural factor that affects waste management in Abuja is the wind, topography and flooding. Which made the management of this waste difficult by the waste management companies.
2. Rain have a slight stand out as during rainy seasons waste management team don't go into all sessions to extract waste.

To determine other factor affecting household waste management in Abuja.

This deals with the preventions of negative management, hence:

1. A domesticated recycler should be made available to residence.
2. Continuous training and awareness should be carried out via publicity arm of the society.
3. More waste collector should be strategically placed, to avoid wrong placement of waste by residence or passer-by.
4. Incorporation of waste management into basic school curriculum

VII. Conclusion

In conclusion it is expedient that the case of waste management should be taking more seriously as to help in limiting pandemics, epidemics and their likes. Keeping the environment hygienic enough is the call to everyone, not just a call to the government, the indigenes, citizen's foreigners should be intimated on proper waste management concept with the made available facilities from government and her partners to help cub the complications attached to the waste management. A better management technology should be introduced like the domesticated waste management cabinet and the domesticated waste recycler machine.

VIII. Recommendation

The study recommends that:

1. Further study should be done on domesticated waste carbine as it will help reduce the quantity of waste generated in the community, and it will help simplify the management of waste by the waste management team and recycling companies.
2. The domesticated waste machine or chamber should be further studied as it will be of interest to the economic growth of the nation, reduce social irresponsibility, and improved hygiene.

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