ARCHITECTURAL THESIS PROPOSAL

HYPOTHETICAL TOPIC AND SUB-TOPIC

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Course

Research methodology (Arc 805)

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PROJECT TITLE

For my M.tech architectural thesis, I propose A WASTE PROCESSING PLANT FOR LAGOS STATE.

PROJECT SUBTOPIC

The project's subtopic is "enhancing excellence through prompt and effective management of waste products"

ABSTRACT

Waste is the by-product of man and is produced everyday. It includes all unwanted or unusable items, remains, byproducts and household garbage. Lagos "the centre of excellence" produces a lot of waste products that litters all its streets and roads. The Lagos Waste Management Authority (LAWMA) has made efforts in the past and is presently making even more efforts to rid the state of these waste which still abounds everywhere in the state. Effective waste management is not a mirage as it is obtained in other countries of the world such as India, Norway and Germany. This research seeks to reveal the extent to which the slogan centre of excellence can be reflected visually in the state through an effective and prompt collection and processing of waste products.

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1.0 INTRODUCTION

Lagos, Nigeria's commercial capital and one of the six mega cities in the world where the population is more than 10 million people, has over time suffered from the high volume of unmanaged waste. Waste management is the collection, transportation, processing, recycling or disposal of waste materials. The term relates to materials produced by human activity, and is generally undertaken to reduce their effect on health, aesthetics or amenity, reduce the materials' effect on the environment and to recover resources from them. It involves solid, liquid or gaseous substances, with different methods and fields of expertise for each. Waste processing is a form of waste management. A waste processing plant is a facility where waste of different type undergoes various processes for it to be reusable or inert. The plant has a number of processing stations. They include reception, sorting, mixing and pumping, fermentation, pressing, and refining stations. Lagos generates about 9,000 metric tons of waste daily. As much as 80 percent of this waste can be recycled. (Oresanya, 2008) believes the huge waste generated in the city can be harnessed to positive use through recycling. Under the city's "zero waste program" recycling initiative, organic waste which makes up 60 percent of the city's waste is being recycled into compost. This however is not sufficient as waste continues to be a menace with Obalende as a critical point. Presently, waste is mostly disposed in dumpsites across the state and incinerated. A typical example is the Ojota waste disposal dump site. Facility at Oshodi for waste processing is not functioning as a result of non maintenance.

1.1 Aim and Objectives

The aim of this topic is to reduce to the barest minimum the pile of waste products that litter the streets of Lagos State. The objectives would be:

1. To ascertain the present condition of waste in the state
2. To evaluate the extent to which the Lagos State has in Its capacity catered for waste
3. To understand the various forms of wastes piling the streets and ways to effectively manage them

4. To evaluate the level of public participation in refuse disposal in the State
5. To provide a facility capable of managing waste effectively and promptly
6. To ensure continuity in prompt waste management through periodic evaluation, monitoring and corrective measures.

1.2 Statement of Problem

Lagos is one of the most populous cities in the world. According to U.N. projections, Lagos' population will reach 20 million by 2010. Many concede that the city's high population poses a challenge to waste disposal. Waste disposal when poorly managed affects health, safety and the environment. There is therefore a need to contain the waste product in the state in order to enrich its sceneries making a true centre for excellence.

1.3 Hypothesis

The hypothesis for this study is to examine the effect of prompt management of waste on the built environment of Lagos state. To prove it, a null hypothesis would be stated and proven otherwise.

1.4 Scope of Study

Lagos metropolitan area spreads over much of Lagos State (3345 sq km/1292 sq mi) covers a large area of land and has 4 islands (Lagos Island, Victoria Island, Ikoyi Island and Iddo Island. Waste that litters the streets includes domestic waste, commercial waste, electronic waste, etc. the proposal would focus on waste products that can be turned to energy and would serve one of the many communities of the state.

1.5 Justification of Research

The level of achievement of a city can be viewed from its architecture, coordination between the built environment and its open spaces. These open spaces are made up of setbacks, gutters, green areas, walkways and roads amongst other where wastes in the city of Lagos are piled up. It is with this view that in order for the architecture of Lagos to be in light, all form of waste be gotten rid off from the streets.

1.6 Limitation to Study

The major limitation often faced when embarking on a research work is often in the administration of questionnaires. Most people are always hostile whenever they see unknown faces, because it is generally believed that young people carry out a lot of criminal activities in the neighbourhood. Also, one always has to face the problem of transportation from one place to another in order to be able to have existing case studies of places with relevant information for the study, adequate transportation has to be provided or limit the study area to places that are in close proximity to the researcher.

1.7 Significance to Knowledge

On completion, this project is expected to bring to the limelight the possibility of having a sanitized Lagos and inform architect alike of the usefulness of researching into waste, considered not useful, and it potential and positive effects on architecture.

2.0 LITERATURE REVIEW

Waste management methods are necessary tools for waste processing. A method or Combination of methods can be used to rid the streets of Lagos of waste.

Waste management methods vary widely between areas for many reasons, including type of waste material, nearby land uses, and the area available.

DISPOSAL METHODS

Landfill

Disposing of waste in a landfill involves burying waste to dispose of it, and this remains a common practice in most countries. Historically, landfills were often established in disused quarries, mining voids or borrow pits. A properly-designed and well-managed landfill can be a hygienic and relatively inexpensive method of disposing of waste materials. Older, poorly-designed or poorly-managed landfills can create a number of adverse environmental impacts such as wind-blown litter, attraction of vermin, and generation of liquid leachate. Another common byproduct of landfills is gas (mostly composed of methane and carbon dioxide), which is produced as organic waste breaks down anaerobically. This gas can create odor problems, kill surface vegetation, and is a greenhouse gas.

Plate 1: Landfill operation in Hawaii.
Source: Wikipedia.com

Many landfills also have landfill gas extraction systems installed to extract the landfill gas. Gas is pumped out of the landfill using perforated pipes and flared off or burnt in a gas engine to generate electricity.

Incineration

Plate 2: A waste-to-energy plant in Saugus, Massachusetts.
Source: Wikipedia.com

Incineration is a disposal method that involves combustion of waste material. Incineration and other high temperature waste treatment systems are sometimes described as "thermal treatment". Incinerators convert waste materials into heat, gas, steam, and ash.

Incineration is carried out both on a small scale by individuals and on a large scale by industry. It is used to dispose of solid, liquid and gaseous waste. It is recognized as a practical method of disposing of certain hazardous waste materials (such as biological medical waste). Incineration is a controversial method of waste disposal, due to issues such as emission of gaseous pollutants.

Incineration is common in countries such as Japan where land is scarcer, as these facilities generally do not require as much area as landfills. Waste-to-energy (WtE) and energy-from-waste (EfW) are broad terms for facilities that burn waste in a furnace or boiler to generate heat, steam and/or electricity.

RECYCLING METHODS

Recycling

The process of extracting resources or value from waste is generally referred to as recycling, meaning to recover or reuse the material. There are a number of different methods by which waste material is recycled: the raw materials may be extracted and reprocessed, or the calorific content of the waste may be converted

to electricity. New methods of recycling are being developed continuously, and are described briefly below.

Physical reprocessing

The popular meaning of 'recycling' in most developed countries refers to the widespread collection and reuse of everyday waste materials such as empty beverage containers. These are collected and sorted into common types so that the raw materials from which the items are made can be reprocessed into new products. Material for recycling may be collected separately from general waste using dedicated bins and collection vehicles, or sorted directly from mixed waste streams.

The most common consumer products recycled include aluminum beverage cans, steel food and aerosol cans, HDPE and PET bottles, glass bottles and jars, paperboard cartons, newspapers, magazines, and cardboard. Other types of plastic (PVC, LDPE, PP, and PS: see resin identification code) are also recyclable, although these are not as commonly collected. These items are usually composed of a single type of material, making them relatively easy to recycle into new products. The recycling of complex products (such as computers and electronic equipment) is more difficult, due to the additional dismantling and separation required.

Biological reprocessing

Waste materials that are organic in nature, such as plant material, food scraps, and paper products, can be recycled using biological composting and digestion processes to decompose the organic matter. The resulting organic material is then recycled as mulch or compost for agricultural or landscaping purposes. In addition, waste gas from the process (such as methane) can be captured and used for generating electricity. The intention of biological processing in waste management is to control and accelerate the natural process of decomposition of organic matter.

There is a large variety of composting and digestion methods and technologies varying in complexity from simple home compost heaps, to industrial-scale

enclosed-vessel digestion of mixed domestic waste (see Mechanical biological treatment). Methods of biological decomposition are differentiated as being aerobic or anaerobic methods, though hybrids of the two methods also exist.

ENERGY RECOVERY

Waste-to-energy

The energy content of waste products can be harnessed directly by using them as a direct combustion fuel, or indirectly by processing them into another type of fuel. Recycling through thermal treatment ranges from using waste as a fuel source for cooking or heating, to fuel for boilers to generate steam and electricity in a turbine. Pyrolysis and gasification are two related forms of thermal treatment where waste materials are heated to high temperatures with limited oxygen availability. The process typically occurs in a sealed vessel under high pressure. Pyrolysis of solid waste converts the material into solid, liquid and gas products. The liquid and gas can be burnt to produce energy or refined into other products. The solid residue (char) can be further refined into products such as activated carbon. Gasification is used to convert organic materials directly into a synthetic gas (syngas) composed of carbon monoxide and hydrogen. The gas is then burnt to produce electricity and steam.

Waste management concepts

There are a number of concepts about waste management which vary in their usage between countries or regions. Some of the most general, widely-used concepts include:

1. Waste hierarchy - the waste hierarchy refers to the "3 Rs" reduce, reuse and recycle, which classify waste management strategies according to their desirability in terms of waste minimization. The waste hierarchy remains the cornerstone of most waste minimization strategies. The aim of the waste hierarchy is to extract the maximum practical benefits from products and to generate the minimum amount of waste.

2 Extended producer responsibility - Extended Producer Responsibility (EPR) is a strategy designed to promote the integration of all costs associated with products throughout their life cycle (including end-of-life disposal costs) into the market price of the product. Extended producer responsibility is meant to impose accountability over the entire lifecycle of products and packaging introduced to the market. This means that firms which manufacture, import and/or sell products are required to be responsible for the products after their useful life as well as during manufacture.

3 Polluter pays principle - the Polluter Pays Principle is a principle where the polluting party pays for the impact caused to the natural environment. With respect to waste management, this generally refers to the requirement for a waste generator to pay for appropriate disposal of the waste.

There are many waste streams consisting of a number of waste types. A study of them would enhance the prompt and effective collection of waste. These are produced by a variety of processes. Each waste type, all of which is present in Lagos, has different methods of associated waste management. The following is a list of waste types:

Animal by-products; Biodegradable waste; Bulky waste; Business waste; Clinical waste; Coffee wastewater; Commercial waste; Construction and demolition waste (C&D waste); Controlled waste; Composite waste; Domestic waste; Electronic waste (E-waste); Farm waste; Food waste; Green waste; Grey water; Hazardous waste; Household waste; Human waste; Industrial waste; Inert waste; Kitchen waste; Litter; Liquid waste- any waste in the liquid state of matter; Medical waste; Mixed waste; Municipal solid waste; Packaging waste; Post-consumer waste; Radioactive waste (nuclear waste): Low level waste, High level waste, Spent nuclear fuel and Mixed waste (radioactive/hazardous); Recyclable waste; Residual waste; Sewage; Sharps waste; Slaughterhouse waste; Special waste; Toxic waste; Uncontrolled waste; Waste heat; Wastewater and Winery wastewater

3.0 RESEARCH METHODOLOGY

This looks at all methods and techniques employed by a researcher in conducting his research. For my M.tech thesis, it is important that data and information on Lagos State, its inhabitants and waste processing plants is sourced and analysed.

3.1 Data collection: methods of data collection to be used for a successful research would be through questionnaires, literature reviews on related literatures, observation, interviews and case studies that would be carried out on existing large and small parcels of dumpsites across the state with particular emphasis placed on the Ojota dump site. Foreign cases of waste processing plants and their operations would be looked at. Homes and property section of the Guardian and the Nation Newspapers on Mondays and Tuesdays respectively are periodicals that would be useful throughout the course of the research.

3.2 Data analysis: data collected would be analysed using basic charts, graphs, tables, plates, figures etc.

3.3 Target completion dates: at the Federal University of Technology Akure, the M.tech thesis is for a duration of two semesters (12 months), the period of which I would use to complete this research work.

3.4 Predicted results: at the end of this research work, it is expected that a functional waste processing facility, strategically sited in the state to meet needs of the state would be on ground. It is also expected that according to the objectives that the people of the state would be sensitized on the need for effective waste disposal and the state sanitized.

4.0 SUMMARY AND CONCLUSION

Summary

This research proposal is aimed at examining the effects of a prompt and effective management of waste in the sanitation and architecture of Lagos state by proposing a waste processing plant for the state. Though the plant would not process the 9000 tonnes of waste produced in a day in the state, it would service a quantum of this waste. Relevant knowledge on the state, its dwellers and the sections, waste types and processes in waste processing plants for effective analysis of data.

Conclusion

It can however be concluded that at the end of this research work that an effective network for waste disposal and processing would have been established and functioning.

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