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Waste management towards sustainable development in Nigeria: A case study of Lagos state

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This paper discusses a key dimension of Wastenomics – that of addressing the sustainable waste management practices and education.

Key words: Waste, development, Lagos state.

INTRODUCTION

This paper reviews the waste management practises and the issue of sustainable development in Nigeria. It was discovered that mainly, private sector participation, highway managers, local government and Lagos State Waste Management Authority are responsible for the collection and disposal of all types of waste generated in Lagos State. While in term of solid waste, only six (including existing and new) dumpsites (erroneously refer to as landfills) exist in Lagos State, while all the closed dumpsites are still being used illegally among several other illegal dumpsites that adorn the landscape.

It was also discovered that most of the industries if not all in Isolo Industrial Environment of Lagos State, for example has no pollution abatement programme for their effluent, during the course of study, it was also discovered that Lagos Lagoon alone is estimated to absorb 10,000 M³ of industrial effluent daily.

It was also found that, waste disposal habit of the people, corruption, work attitude, inadequate plants and equipment among others are militating against effective waste management to attain sustainable development in Nigeria as a whole. Data generated by the study shows that the method adopted by these agencies was found to be ineffective and fall short of international standards in waste management practises and sustainable development.

The finding of this review will be useful to researchers, government stakeholders and professionals working in the area of waste to energy, recycling, material recovery and climate change.

WASTE MANAGEMENT AND SUSTAINABLE DEVELOPMENT

The end of the 1980s saw a radical reappraisal of our concerns over resource availability and use, the environmental consequences of resource exploitation and the relationship between the environment, poverty and economic change.

This re-appraisal has given rise to a new approach to environment and development issues - an approach which seeks to reconcile human needs and the capacity of the environment to cope with the consequences of economic system. This approach is called sustainable development.

Sustainable development is an implied development without destruction, it is the judicious use of non-renewable resources for the present and future generations, which are non-renewable resources, must be used at a judicious rate, neither too fast nor too slow and to ensure that the natural wealth that they represent is converted into long-term wealth as they are used.

In Nigeria we succinctly put it as sustainable development without jeopardizing future development, meaning that in our efforts to explore and exploit the natural resources to serve us, there is an obvious paradox evident in the need to ensure economic development, while protecting the environment.

It is important to note that there must be a balance between levels of development and the stock of natural resources, that is, development must be at a level that

can be sustained without prejudice to the natural environment or to future generations.

Therefore if there is to be sustainable development in waste management in Nigeria, the availability of land (for landfill), human resources, plant and equipment and other tools including capital must be readily available. We need to protect future for the next generation by cleaning up our environment of all types of waste, taking into consideration both physical and population development of the state.

As such waste management must mean the collection, keeping, treatment and disposal of wastes in such a way as to render it harmless to human and animal life, the ecology and the environment generally.

Waste

The federal environmental protection act (1988) does not define "waste", however Waste as the term implies is any solid, liquid or gaseous substances or materials which being a scrap or being super flows, refuse or reject, is disposed off or required to be disposed as unwanted, this is Environmental law, the term assumes it's ordinary literal meaning unlike in the real property Law, When "waste" is used as a term of art, having meaning completely different from its ordinary meaning.

One of the few statues in Nigeria, which attempts to define waste is the Lagos State Environmental Edicts 1985, there in Section 32, waste is define as follows:

Waste includes:

- i.) Waste of all description.
- ii.) Any substance, which constitutes scrap materials or an effluent or other unwanted surplus substances arising from the application of any process.

The United Kingdom's Environmental Protection Act 1990, re-enacting an earlier U.K statue, took this statutory definition a step further in section 75(2), it defines waste in these terms:

Waste includes:

- i.) Any substance which' constitutes a scrap material or an effluent or other unwanted surplus substance arising from the application of any process and
- ii.) Any substance or article, which requires to be disposed of as being broken, worn out, contaminated or otherwise spoiled.

One thing to notice is that none of the above definitions of waste give "value" to the elements considered. There is no suggestion that the items, which constitute a waste, do not have value or is intrinsically useless. The word "unwanted" which appears in the definition although it introduces its own problem, does not necessarily, import a value element for a substance or material that may be

unwanted notwithstanding that it has some value.

THE ISSUES OF WASTE COLLECTION AND DISPOSAL

Domestic waste management, collection and disposal have always been a universal problem. According to studies, it was noted that for years, the major problem in Israel (especially in Ramat Hovar) was the accumulation of tens of thousands of tons of organic wastes. Also in the U.S until the 1970's Federal Agencies had little authority to regulate hazardous and solid disposal often took in an unsafe manner at landfills or in inclined lagoons, with some wastes simply dumped on the ground or in surface waters.

Refuse and domestic waste will not constitute a strange sight to Lagosians whose streets are littered with tons of garbage from animal to human carcasses. At present, private sector waste disposal operators diligently visit homes and carry away refuse bags, load them into waiting trucks and cart them away for final disposal. "That is good" the residents say. They however worry that a lot of littering goes, on in the environment and the streets and avenues may have been ignored and not cleared.

Studies have revealed that household account for about half of the solid wastes generated, that is, by weight in the third world cities, which includes Lagos. It has also been noted that domestic waste disposal management has received considerable attention not only in Lagos State but Nigeria generally. Despite this laudable attention, collection, disposal processing, treatment, recycling and utilization have defied solution. For instance in Lagos State, the estimated daily generation is about 764 tons in all the 20 local government area including the 37 development areas.

The major problem caused by wastes to the environment is pollution characterized by various types of solid wastes which include paper, textile plastic, metals, glass, bone, wood, vegetal matter and food remnant of multiple consistency.

It has been pointed out that the generation of waste materials is a problem that is not peculiar to Lagos alone. This problem is prevalent the world over as noted earlier. This problem is not peculiar to the third world alone but cuts across the industrialized countries of the world where the pollutant effect of domestic and industrial wastes have caused considerable concern to environmental scientists. Our problems emanate from solid waste essentially. There are wastes from discarded materials generated from domestic and community activities or from industrial, commercial and agricultural operations.

Major classes of solid wastes

Municipal solid wastes generally can be classified in terms of three major sources of generators: residential, commercial, and industrial. Sometimes, institutional sources are separated from commercial sources and, thus a fourth source is referred to as institutional. In the traditional scheme of classification, residential (domestic) solid waste consists of household garbage and rubbish, or refuse. The

The garbage fraction is mostly in the form of wastes derived from the preparation and consumption of food (e.g., meat and vegetable scraps). An alternate term commonly used to describe the garbage fraction is "putrescibles." In the traditional scheme, all wastes not classified as "garbage" are classified as "rubbish." The major constituents of rubbish include glass, metal and plastic wastes, yard and garden debris, wastepaper and paper waste;

It is against this backdrop that this chapter intends to review the impediments to effective and efficient waste management for sustainable development in Lagos State.

The major effects of waste management on the quality of life

Environmental effects: The major environmental effects include air pollution, which includes odour, smoke, noise, dust, etc. Waste pollution – pollution from disposal site via flooding because of blocked drains and land degradation.

Health effects: This includes: flies which carry germs on their bodies and legs and also excrete them; mosquitoes breed in stagnant water in blocked drains in favourable location in cans, tyres etc. that collects rain water; Rats: rat's spreads typhus, salmonella, leptospirosis and other diseases they cause injuries by biting and spoil millions of tons of food. The refuse workers also faces some hazards which includes: parasite infection and infected cuts resulting from skin contact with refuse, other includes hazards on disposal sites; are injuries from glass, razor blades, syringes, tissue damage or infection through respiration, ingestion or skin contact.

PERCEIVED CAUSES OF THE INTRACTABLE WASTE PROBLEM

There are many perceived causes of the intractable waste problem in Lagos State among which are:

- i.) Waste disposal habit of the people.
- ii.) Attitude to work.
- iii.) Lack of adequate equipment, plant and tools necessary for waste disposal and collection.
- iv.) Corruption.
- v.) Overlap of function of the state enforcement and waste management agency.
- vi.) Population effect.

Waste disposal habit of the people

Ignorance coupled with poverty may be adduced to the habit of most people in Lagos State especially in the densely populated areas of the state. It beats one hollow to see a man defecating in broad daylight on the side of the Highway or a woman with her wrapper pulled up doing her thing on the sidewalk or gutter in full glare of the

public or where a man or woman parks his or her car and throw waste on the street, then one begins to wonder the reasons for these dirty habits of our people.

Nigerians are permanently accustomed to dirt. Evidence of this can be seen everyday by way of indiscriminate discharge of garbage into drains and at times on the highways

In a survey carried out by Lagos Waste Management Authority (LAWMA), which is rested with the responsibility of providing facilities for refuse collection, in all the streets within the state does not have adequate refuse collection bins in most of the streets in Lagos State. Hence the indiscriminate dumps of waste on the streets. Also, the frequency of carting away the refuse was not regular where the public refuse bins are found.

In another survey carried out, it was succinctly put that the volume of municipal waste piled up (for disposal) will be influenced by nearness to disposal sites, accessibility transportation facilities street layout, composition of wastes methods and individual attitude. Our individual attitude to waste disposal in Lagos state leaves more to be desired.

A situation whereby a landfill that has been closed to the public is still being used as a dumpsite calls for questioning. Also where waste is placed on the road median, gutter side, inside gutter and roadside does not augur well for effective waste management.

Despite the facts that illegal communal waste dumps indiscriminately located in public places have been officially cancelled yet several illegal refuse collection points, were indiscriminately created by residents which pose health hazard and loss of environment aesthetics.

Attitude to work

In Nigeria employee productivity is low due to certain factors including sociological factor, which is felt in the manifested lack of a sense of belonging in an organization, and the tendency by employees to perceive a job as another's business.

This negative attribute to work has negatively impacted on the waste management efforts of the state government poor attitude to work, poor coordination and inadequate communication among workers and the institution saddled with solid waste management responsibilities due to bureaucratic impediment and administrative hitches have resulted in chaos, confusion and ineffectiveness in delivery of many urban public services.

Inadequate vehicles, plant and equipment and tools necessary for waste management

Waste disposed or deposited at designated points of collection has to be transported either to the transfer loading station where sorting is done or to the incinerator facility or sanitary landfill or the final disposal point. It was further noted that for effective and efficient collection system, there must be enough and well maintained equipment such as trucks tippers, pay loaders, bulldozers,

road sweepers, compactors and others. In Lagos State municipal solid waste transportation, collection and disposal has been epileptic, since the state realized its responsibility to the environment.

A lot of problems such as inadequate number of vehicles, lack of spare parts, dearth of fund, poor technical know-how, poor maintenance practices, insufficient funding and lack of motivation has bedevilled the agency responsible for the disposal and collection of waste. The total numbers of vehicles required in the 20 local government area of Lagos state was 757, while the Lagos State Waste Management Authority, just received 100 brands new waste compactors.

The heaps and stretch of refuse which adorn our roads pollute the environment and disfigure the landscape are nothing but the result of inefficient waste collection and disposal management method.

Corruption

Corruption is a canker worm that has eaten deep into every fabric of the Nigerian society. This we may not deny except to our collective demise and peril. The collapse in most of Lagos State Waste Management Authority infrastructure (in the past) in the state may allegedly be traced to this menace of corruption.

It has also been reported in some instances that market women have had to bribe the Lagos State Waste management agency operatives (PSP) before waste could be removed from market place. Also truck pushers and scavengers have been known to bribe officials before they can be allowed to dispose their waste at designated points, this has led to illegal dumpsites springing up at different points of the state creating bottleneck to the already chaotic situation of waste management

Overlap of function of the enforcement agencies

Achieving sustainable development is inextricably linked to the promulgation and establishment and enforcement, regulations, legislation and control criteria on environmental management and pollution control, but an overlap in the agencies responsible for effective enforcement of the various laws may create problems for effective waste management.

A situation where you have Lagos State Waste Management Authority that is saddled with the responsibilities of waste collection and disposal grappling with local government authorities, Lagos State Environmental Protection Agency, the Police and other enforcement agencies in the state may not argue well for effective enforcement and sustainable waste management.

For us to have effective waste management and sustainable development in terms of waste collection and disposal effort in Lagos State, the enforcement mechanism should preferably be left with only one organisation where many agencies must be involved, their role must

be clear-cut and well spelt out.

The enforcement of environmental laws in Nigeria generally has been problematic. The management and regulation of the environmental Laws has been beset by a host of problems, and has met with very limited success. These problems that hinder the enforcement of sanction on violators of the environment are political, social and economic.

It is therefore clear that any effort towards a sustainable legal framework for successful enforcement, avoidance of overlap of environmental laws must come to terms with these issues, as a positive step towards the protection of the environment through effective waste management.

Population effect on waste management

Population growth has always affected waste generation, collection and invariably disposal due to population growth and higher standards of living.

The population of Lagos state rose from 1,443,569 in 1963 to 5,685,981 in 1991 and to 6,947,191 in December 1996. It is probable that the present population of Lagos state has reached the 21 million mark. This has impacted negatively on both the environment and waste generation in the State.

Lagos State, which is the most densely populated state in Nigeria due to its commercial activities, the quality of waste generated in the state is in proportion to population size- as population increases so also waste generated also increases.

With many other cities in the urban developing world, cities in Nigeria (especially Lagos) are faced with the twin problems of population increases and rapid expansion. These phenomena have no doubt brought increasing strain on urban infrastructural facilities. One area in which this strains has become obvious is in waste management where the existing system appears to be incapable of coping with the mountain load of waste generated and heaped on the surface.

In conclusion, population growth goes hand in hand with increased pollution and environmental decay.

WAY FORWARD FOR WASTE MANAGEMENT IN LAGOS STATE TOWARDS SUSTAINABLE DEVELOPMENT

Some of the major problems confronting and militating against an effective management and sustainable development of waste collection and disposal in Lagos state have been identified in this paper to include among others:

- i.) Population growth.
- ii.) Waste disposal habit of the people.
- iii.) Attitude to work (of those rested with the responsibility of collecting and disposing the waste).

- iv.) Lack of adequate equipment and plant and other tools necessary.
- v.) Corruption.
- vi.) Overlap of function enforcement agents.

The entire above highlighted problem cannot allow for effective management and sustainable development. Therefore it is against the background that there is an urgent need to address the effective waste management system to be adopted for a sustainable development.

MITIGATING MEASURES

Expanding recycling programmes can help reduce solid waste pollution but the key to solving severe solid waste problems lies in reducing the amount of waste generated. It was noticed that only the landfill system of waste disposal is being generally adopted in Lagos State. Whereas in other places for example, there are several methods of waste disposal used to ameliorate and mitigate the issue of population effect on waste management. Such systems that can or may be adopted are:

- i.) Recycling
- ii.) Bio treatment
- iii.) Incinerations
- iv.) Neutralization
- v.) Secure sanitary landfill
- vi.) Composting

Also international cooperation should be sought to learn how other countries have effectively managed their waste collection; handling and disposal. The state government should seize the opportunity to apply for assistance in an effort to mitigate the looming disaster posed by population explosion in the state in terms of waste generation and disposal

Remediation through education is also necessary. People should be educated on the need to reduce the amount of waste generated. The Lagos government should fund LAWMA to provide adequate collection bins in most areas of the metropolis and hinterland to forestall the wrong habit of throwing waste anywhere and everywhere, creating illegal dumps and doting and adorning the major streets of the state with wastes.

A sustainable development strategy action plan using a consensus-building approach should be formulated between government and other stakeholders. These should include national government the private sector, academics, environmental planners and experts, and non-governmental organizations to produce, an action plan document that may last 20 years. This document shall be published and made available for public consumption and fully implemented by all concerned.

As earlier mentioned, the waste disposal habit of the people may change if government stopped paying lip service to the serious issue of waste management. The availability and nearness of disposal sites will greatly

enhance and improve the habit of dumping waste "anywhere and everywhere". Research and development into areas of better waste handling method may also go a long way to assist in elaborating and interjecting the situation.

Nigeria has very little or nothing to showcase for as her achievements in the area of proper waste management. Heaps of garbage is also commonplace along major roads, riverbanks, and ravines and in excavated areas, particularly places excavated to obtain sand for road construction.

In States where there is organized refuse collection, such as Lagos; the disposal of such wastes is usually an open dumpsites, located not far from living areas. Such dumpsites (called landfills) are not provided with environmental safeguards, and the leachates from them percolate freely into streams and the groundwater system

Industrial effluents

With the exception of a few places, Nigeria cannot pride herself over having a functional sewage system. Industrial effluents of all types (both toxic and non-toxic) are discharged freely; into, surface and groundwater sources. Waste is allowed to pile, up before it is ordered to be cleared with military dispatch and automatic alacrity. This leaves room for corruption and does not allow for effective waste management.

In developed countries, industries are compulsorily made to discharge all it effluents into only license on-land disposal sites, where such effluents are treated prior to re-use, recycling or discharge into streams or other approved places.

There are no such controls in Nigeria and where they exist they are not enforced and most industries discharge raw, untreated and highly toxic liquid effluents into open gutters, drains, streams, lakes, estuaries and lagoons. For example the effluent from the Aswani Textile Manufacturing Factory and other industries around the area of Isolo are of Lagos State are only discharged on the major road leading through the area.

This contributes to the continuous wearing of that section of the road year, round. Rendering the road sometime impassable especially on the path of the effluent despite this, market women and men troop to this place every Tuesday of the week to buy and sell not mindful of the great danger locking around.

To most Nigerians wastes is simply a nuisance, full stop. They hardly give serious thought to the polluting effects of wastes or their deleterious effects on human health. Increase in urban population and 'blind', haphazard industrialization has contributed a great deal to the generation of wastes in Nigeria. In the municipal areas of Lagos State, more solid wastes are produced than the generators can effectively cope with or manage. The situation of unmanageable wastes in the cities appears to worsen with perceived increase in the income of the

inhabitants. The slums and the shanty neighbourhoods, as expected, receive little or no waste disposal services.

URGENT SOLUTION FOR WASTE DISPOSAL SITES

We concentrate on two types of waste disposal sites: Landfills and Open dumps. A landfill is differentiated from an open dump in that the landfill is an engineered design, consisting of a variety of systems for controlling the impact of land disposal on human health and safety and on the environment. An Open dump is an uncontrolled system and has not been the subject of engineering design. This is the type of waste disposal been adopted in Lagos State in generally but commonly refers to as "landfill".

For the purposes, a waste disposal site is generally defined to consist of that portion of the site wherein wastes are buried, as well as any surrounding property within the boundary of the site, the surrounding property may serve as a buffer, support landfill-related operation and facilities (e.g., maintenance) or unrelated activities (e.g., recycling depots), or contain access routes and roadways.

REQUIREMENT FOR SETTING UP OF LANDFILL IN LAGOS STATE

Acceptable definitions of a modern landfill are based on the concept of isolating the landfilled wastes from the environment until the wastes are stabilized and rendered innocuous as much as possible through the biological, chemical, and physical process of nature. The main differences among definitions of a landfill involve the degree of isolation and the means of accomplishing it. Isolation includes prevention of water from entering the landfill, as well as isolation of discharges directly from the fill to the environment.

Three basic types of practices and requirements for a landfill:

- i.) Consolidation of wastes into the working face; compaction of waste to conserve land resources; design and operation of the fill to control settlement, to optimize the chemical and biological processes (e.g., for landfill gas recovering), or both;
- ii.) Covering the waste with cover material on daily basis to control the risk of hazards from exposed wastes.
- iii.) Control or prevention of adverse environmental impacts wastes disposed on land to soil, water, and air resources and of their subsequent impact on public health and safety.

A landfill must meet the above three key conditions regardless of stage of economic development of the country in which the landfill is located. However, meeting the three conditions may be technologically and economically difficult or impractical in Lagos State. Therefore, the

short-term, or immediate, goal should be to meet the conditions to the extent possible under existing circumstances. The long-term goal should be to eventually meet all three of the conditions. This approach is recommended since the benefits associated with a modern sanitary landfill are realized only to the extent that a land disposal facility fully meets the three basic conditions. The most important condition is the prevention of negative impacts on the public health and the environment.

In conclusion, knowledge of the quantities and characteristics of the wastes to be landfilled is fundamental to the proper design and operation of a landfill. Among other things, these parameters influence or control many aspects of the landfill system over its lifetime, including the annual rate of filling, the required volumetric capacity of the fill, production and characteristic of gas and leachates, and environmental impacts.

The role of scavengers: The role of scavengers is very important in the planning, implementation, and operation of land disposal sites in Lagos State. First, the occurrence of scavenging between the point of waste generation and the disposal location influences the quantities of waste that will be disposed, therefore this aspect of scavenging must be taken into account during the process of estimating waste quantities and characteristics in Lagos State.

Secondly, scavenging is a widespread occurrence at existing land disposal in Lagos State though this is opposed in most developed countries and is to be expected at new disposal sites unless policies and/or programs are implemented to prevent the practice.

Scavenger are normally part of the socio-economic structure, their displacement from a disposal site can have many direct and indirect consequences. While unsupervised and uncontrolled scavenging is detrimental to the health and safety of the scavenger, as well as personnel operating the facility, the exclusion of scavengers from disposal sites is not necessary if their activities are managed and controlled.

Scavengers help in the recovering of valuable resources that would otherwise be disposed as waste, the reduction of problematic materials entering a landfill and the subsequent adverse effect that they have upon landfill operation and performance, for instance whole tyres, toxic materials etc. and the reduction of the quantities of materials destined for land disposal in order to conserve resources, e.g., land, and water and air quality.

Reason why Lagos State adopts open dumps: In the case of developed nations, the degree of isolation considered necessary to protect the environment and human health and safety usually is much more than would be technically and financially practical in many developing countries including Lagos State. In the case of many developed countries, the high level of containment requires a complex and expensive engineered sys-

tem. Therefore the main reason why open dumps is adopted in Lagos State is due to the technical, financial, complex and expensive engineering system involved in setting up a sanitary landfill.

URGENT TIPS TO ATTAIN BEST PRACTICES

i.) In term of population, there is an urgent need for action plans and education in order to monitor and control waste expected in the state. There should also be a room for international co-operation towards achieving the action plans.

ii.) Expanding recycling programmes through the activities of scavengers among others (Waste-to-wealth).

iii.) Land fills management and control; Waste-to-energy programs can be generated through the land fills (Generation of Methane Gas).

iv.) There is need for purchase of updated equipment; there is an urgent need for well trained staff, vehicles, trucks, tipper, pay loaders, bulldozer and road sweeper, which must be backed up with well stocked maintenance store provided for spare parts for all equipment.

v.) There is a need for an organised refuse collection both from residential and industrial estates. There must be a disposal site in each street and avenue nearest to the sources of waste, which must be accessible by everyone and the collection should be daily and regularly.

vi.) The support of private sector and NGO's is also required most especially in the area of organising maintenance workshops and enlightened programme, which should include grassroots participation and input.

vii.) The Federal and State Government should properly fund the various agencies responsible for effective and safe waste management and make it the pivot of the agency in the various states to be responsible for collection and disposal of all types of wastes.

viii.) There is a need for at least one domestic waste incineration plants in each local government council constructed with a daily waste treatment capacity of at least 3000 tons, which can generate electricity through incineration so as to recover the energy out of the waste.

ix.) There is need for more effective and up to date domestic waste transfer stations.