

IMPLEMENTING 'GREENWASTE' MANAGEMENT IN A SUSTAINABLE CITY OF LAGOS, NIGERIA

Surv. Ekpete, BERNARD ORJI, Nigeria
and Michael-Agwuoke, MACBEDA UCHE, New Zealand

Key words

Classical waste management

Environmental degradation

Lagos mega city

Knowledge based 'greenwaste' management

Sustainable city

Integrated Waste Management

Abstract

Management of municipal solid waste (MSW) is one thing that is common in every city. Government service levels, environmental impacts and costs may vary depending on the level of funding, waste stream composition, waste management methodology and the habits of the people.

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

Abstract

Usually, the biggest waste management problem is the contribution of greenhouse gases to the environment. Classical waste management processes causes other problems like underground water contaminations, inefficient resource utilization, ozone depletion and toxic emissions into the environment, leading to environmental degradation, and negative health implications.

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

Information of City's aesthetics

Abstract

the implementing of new technologies and habit change in waste handling and manage help in reducing or eliminating these problems

is a synthesis of waste management strategies for solving the prolonged waste management problems of the Lagos mega city using

ccess and failure factors

e application of knowledge based 'greenwaste' management approach

pported by strategic planning, integrated with spatial analysis

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

INTRODUCTION

- Traditionally, rubbish is forgotten after leaving them out for collection
- In recent years, the growing awareness of the environmental and health effects of simply throwing waste has increased the expectations for enhanced environmental standard.
- resulted to increased pressure to act in response to waste problems
- This was triggered by a number of problems and scandals related to the handling of waste.
- Resulting to Waste Management legislations around the world, especially in Europe and North America

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

INTRODUCTION

- ❑ In response to these legislations, visionaries, through research and development, have developed various tools and methods
- ❑ Even where these legislations are absent, the visible and political sensitivity of waste management on the credibility of a public administration, is another impetus to strive to put things right
- ❑ Waste management requires a concerted chain of activities starting from services to segregation at point of generation, transport, treatment, landfill, and disposal of refuse

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

INTRODUCTION

- ❑ Major source of solid wastes are residual materials from homes, cumulative aggregation of all from municipal and commercial establishments and industrial firms.
- ❑ Therefore, planning and selection of waste management system structure is a multi-stage process involving identification of differences and common elements of various solutions, selection of the most favourable solution, and evaluation of operation results

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

INTRODUCTION

It is common knowledge that we are always thinking of more money or more equipment, even when money and equipment are not the essence of the problem.

As a result, money and equipment are used incorrectly and at large expense, for the major problems that they cannot solve.

Therefore, the problems are not due to the increasing generation of waste, or the burden placed on the municipal budget as a result of the high costs associated to its management, but mainly due to a lack of understanding over a diversity of factors that affect the different stages of waste management.

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

LAGOS MEGACITY

Lagos is a city of over 21 million in population

Increasing at 6-8% per p/a

Population density of about 4,193 persons per sq. km

In the face of continuous increase in indiscriminate disposal of MSW

The continuous indiscriminate disposal of municipal solid waste is accelerating and is linked to poverty, poor governance, urbanization, population growth, poor standards of living, and low level of environmental awareness

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

LAGOS MEGACITY

Lagos is the foremost manufacturing city in West Africa, and the hub of business and economic development in Nigeria.

This coastal city is situated within latitudes 6° 23'N and 6° 41'N and longitudes 2° 42'E and 3° 42'E.

The GM approach is a comprehensive approach to prevent (reduce waste from source), recycle more waste and manage solid waste in ways that most effectively increases resource utilization; protect human health and environment.

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

LAGOS MEGACITY

The city has the largest concentration of multinationals and commercial institutions and is home to about 60% of Nigeria's non-oil economy.

Therefore, the first problem facing Lagos Waste Management Authority (LAWMA) is rapid urbanization and the problem of dysfunctional solid waste management facilities and services.

For Lagos to emerge as a sustainable mega city, the policy makers and local councils have to tackle this issue and find economically sustainable solutions to the urban waste problem without compromising environmental goals.

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

WHY 'GREENWASTE' MANAGEMENT (GM)

ening the waste sector refers to a shift from less preferred waste treatment and disposal methods such as
neration (without energy recovery) and different forms of landfilling towards the three Rs: Reduce, Reuse
ycle.

strategy is to move upstream in the waste management hierarchy (Figure 1)

key aim for a transition to a GM is “to enable economic growth and investment while increasing
ironmental quality and social inclusiveness

ical to attaining such an objective is to create the conditions for public and private investments to incorpo
ader environmental and social criteria

s is in line with UNEP “green economy” thinking which results in “improved human well-being and socia
ity, while significantly reducing environmental risks and ecological scarcities

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

WHY 'GREENWASTE' MANAGEMENT (GM)

its simplest expression, a green economy is

n-carbon,

source efficient, and

cially inclusive.

is marks a departure from the usual approach where wastes are managed mainly from a
pliance point of view characterised by end-of-pipe treatment such as incineration (with
ergy recovery) and landfilling

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

WHY 'GREENWASTE' MANAGEMENT (GM)

The persisting problems of municipal waste management in Nigeria prompt the need for communicating innovations and knowledge to achieve desired transformation in overcoming socio-economic and environmental challenges

The need to mitigate environmental pollution is crucial due to its direct impacts on humans, plants and animals and the increasing contribution to climate change.

Furthermore, energy conservation, energy generation, resource and material recovery from waste through improved municipal waste management is possible by deploying best solutions

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

WASTE SITUATION IN LAGOS

With a daily influx of more than 2000 people, carrying about 2 tonnes of generated MSW, Lagos certainly faces daunting environmental problems

These problems include

dumping of often toxic industrial waste,

ineffective solid waste management,

insufficient sanitary infrastructure;

land, air and water pollution;

rising sea level, flooding, ocean surge, insecurity, and limited access to basic infrastructure and

municipal services

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

WASTE SITUATION IN LAGOS

Waste management has been a great problem to the government of Lagos State

in most parts of the city,

streets are partially or wholly blocked by solid waste,

and similarly, open spaces, market places are littered with solid waste.

The volume of waste in Lagos rose geometrically with the population between 1970s and 1990s

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

WASTE SITUATION IN LAGOS

The current administration has made impressive progress in fundamental areas essential for improving urban management and service delivery

The ambitious MSW management in collaboration with World Bank, USTDA, UNDP, DFID, Clinton Foundation and indigenous Banks is commended.

Under the new dispensation, Table 1 summarizes the collection situation between 2007 and 2012.

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

WASTE SITUATION IN LAGOS

Projected Population *	Per capita Waste Generation **	Expected Annual Waste Generation (metric tonne)	Volume of Waste Collected (metric tonnes)**	Estimated Volume of MSW not collected (metric tonnes)	Percentage waste not collected
18114636	0.5kg/per/day	3305921.070	2222745.5	1083175.57	32.76
18694305	0.5kg/per/day	3411710.663	2814543.45	597167.213	17.50
19292522	0.5kg/per/day	3520885.265	3831708	-310822.735	-8.83 ***
19909883	0.5kg/per/day	3633553.648	2549629.55	1083924.098	29.83
20546999	0.5kg/per/day	3749827.318	Incomplete data	Incomplete data	
21204503	0.5kg/per/day	3869821.797.5	3948902.52	-79080.722	-2.04 ***

XXV International Federation of Surveyors Congress, Kuala Lumpur, Malaysia, 16 – 21 June 2014

WHY 'GREENWASTE' MANAGEMENT (GM)

- ❑ The GM concept is built around the concept of integrated sustainable (solid) waste management



Figure 1: Waste management hierarchy

(Source: UNEP, 2011)

THE STRATEGIES

The GM encompasses planning and management systems, waste generation processes, organisations, procedures and facilities for waste handling.

Development strategies comprise specific objectives and measures in these areas

XXV International Federation of Surveyors Congress, Kuala Lumpur, Malaysia, 16 – 21 June 2014

THE STRATEGIES

They need to consider the specific interests, roles and responsibilities of numerous actors, including households, community-based organisations (CBO) and other service users, local and national government authorities, non-governmental organisations (NGO) formal and informal private sector enterprises, and external support agencies (ESAs).

XXV International Federation of Surveyors Congress, Kuala Lumpur, Malaysia, 16 – 21 June 2014

THE STRATEGIES

achieve GM go beyond purely technical considerations to formulate specific objectives and implement appropriate measures with regard to

Political

- Formulation of goals and priorities
- Determination of the legal and regulatory framework:
- Determination of roles and jurisdiction

Institutional

- Distribution of functions and responsibilities
- That correspond to organisational structures, procedures, methods, institutional capacities and private sector involvement:
- An appropriate distribution of responsibilities, authority and revenues between the state government, LAWMA and local governments
- Private sector involvement in GM implies a shift in the role of government institutions from service provision to regulation

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

THE STRATEGIES

Social

- Covers the pattern of waste generation and handling – generators, managers and workers = attitudes, economic characteristics, etc

Financial

- Budgeting and cost accounting,
- capital investment,
- cost recovery and cost reduction are very strategic in every enterprise, including GM

Economic

- Consideration of the impact of services on economic activities,
- cost-effectiveness of the systems,
- macro-economic dimensions of resource use and conservation, and income generation

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

THE STRATEGIES

Technical

- Concerned with the planning and implementation and maintenance of collection and transfer systems, waste recovery, final disposal and hazardous waste management = operating characteristics, performance, and maintenance requirements and expected life-cycle costs. Close attention should be paid to preventive maintenance, repair and spare parts availability. In all, local characteristics and circumstances should be considered in the whole process

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

DISCUSSIONS

Developing an integrated waste management system which will help the development of recycling and reuse system in the suburbs of Lagos where movement of collection trucks are difficult or impossible is very crucial

the form of small scale composting projects or

establishing recycling centres (resource recovery centres)

Involving local residence through cooperatives within the inaccessible parts of Lagos megacity will increase the supply and empower the poor in the society while increasing the utilization of the biodegradable fractions of waste in the country

Implementing source separation will improve on the quality of the waste fractions and their utilization for purposes like bio-fuel

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

DISCUSSIONS

Developing an integrated waste management system which will help the development of recycling and reuse system in the suburbs of Lagos where movement of collection trucks are difficult or impossible is very crucial

the form of small scale composting projects or

establishing recycling centres (resource recovery centres)

Involving local residence through cooperatives within the inaccessible parts of Lagos megacity will increase the supply and empower the poor in the society while increasing the utilization of the biodegradable fractions of waste in the

Implementing source separation will improve on the quality of the waste fractions and their utilization for purposes like bio-fuel

XXV International Federation of Surveyors Congress, Kuala Lumpur, Malaysia, 16 – 21 June 2014

DISCUSSIONS

Waste composition as shown in Figure 2 is an indication of areas of utilization that can be considered and the per centage utilization achievable. Informal waste recycling is a noticeable business in Lagos. Though there is no available record to show the contribution of this group to the MSW industry in Lagos, (Scheinberg, 2011) in Table 2 demonstrates their contribution to resource recovery in developing countries

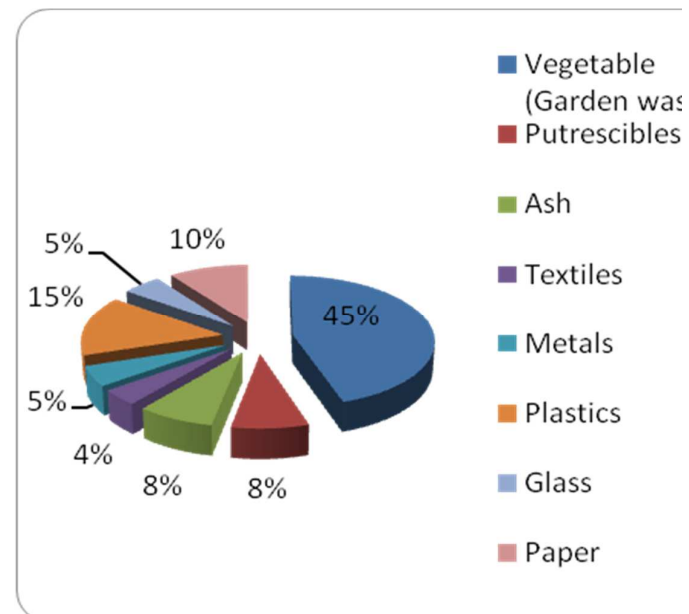










Figure 2. Waste Composition of Lagos State (Source: <http://www.lawma.gov.ng/>)

XXV International Federation of Surveyors Congress, Kuala Lumpur, Malaysia, 16 – 21 June 2014

DISCUSSIONS

Table 2. Comparison of material recovery by formal and informal sector, baseline scenario (in tonnes and as a percentage of total waste generated) (Scheinberg, 2011)

Table 2: Comparison of material recovery by formal and informal sector, baseline scenario (in tonnes and as a percentage of total waste generated)

Cairo		Cluj	
			
13 % 433,200 Tonnes	30% 979,400 Tonnes	5% 8,900 Tonnes	8% 14,600 Tonnes
Lima		Lusaka	
			
0.3% 9,400 Tonnes	19% 529,400 Tonnes	4% 12,000 Tonnes	2% 5,400 Tonnes

XXV International Federation of Surveyors Congress, Kuala Lumpur, Malaysia, 16 – 21 June 2014

DISCUSSION

Although waste-to-energy (WTE) is a very expensive endeavour, a comprehensive research on the true composition of Lagos MSW and other characteristics will help in knowing the viability of venturing into a WTE project, as the best technology for the project can be decided. Because of the high vehicular density of Lagos megacity, consideration should be given to restricting waste collection trucks to night time. This will have a considerable impact on CO₂ emissions reduction and improving the general traffic flow.

XXV International Federation of Surveyors Congress, Kuala Lumpur, Malaysia, 16 – 21 June 2014

CONCLUSION

rough awareness campaign and legislations, creation of database of the sources and quar
MSW, collaboration through integration, the volume of waste disposal can be reduced to
out 30 per cent in the first year of implementation. This is expected to increase systemati
about 70 per cent within five years of continuous improvement in waste data recording,
nitoring and improved management

e growth of the waste market will increase resource utilization and may lead to scarcity ;
availability of new technologies are offering opportunities for greening the waste sector
esting in GM can generate multiple economic and environmental benefits – energy savi

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014

THANK YOU

XXV International Federation of
Surveyors Congress, Kuala Lumpur,
Malaysia, 16 – 21 June 2014