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
Management of municipal solid waste (MSW) is one thing that is common in every city. The variation of waste management 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.

Globally, 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, negative health implications, deformation of City’s aesthetics.
Abstract

The implementing of new technologies and habit change in waste handling and management can help in reducing or eliminating these problems.

This is a synthesis of waste management strategies for solving the prolonged waste management problems of the Lagos mega city using success and failure factors.

Application of knowledge based ‘green waste’ management approach supported by strategic planning, integrated with spatial analysis.

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.
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.

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.
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 many problems that they cannot solve.

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

LAGOS MEGACITY

Lagos is a city of over 21 million in population.

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

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 level of environmental awareness.
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 the 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 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.

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

The key aim for a transition to a GM is “to enable economic growth and investment while increasing environmental quality and social inclusiveness.”

Critical to attaining such an objective is to create the conditions for public and private investments to incorporate broader environmental and social criteria.

This is in line with UNEP “green economy” thinking which results in “improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities.”

In its simplest expression, a green economy is low-carbon, resource efficient, and socially inclusive.

This marks a departure from the usual approach where wastes are managed mainly from a compliance point of view characterised by end-of-pipe treatment such as incineration (without energy recovery) and landfilling.
WHY ‘GREENWASTE’ MANAGEMENT (GM)

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

The need to mitigate environmental pollution is crucial due to its direct impacts on human, 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.

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;
- Soil, air and water pollution;
- Flooding, ocean surge, insecurity, and limited access to basic infrastructure and municipal services.
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, similarly, open spaces, market places are littered with solid waste.

The volume of waste in Lagos rose geometrically with the population between 1970s and 90s.

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.
## WASTE SITUATION IN LAGOS

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

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**WHY ‘GREENWASTE’ MANAGEMENT (GM)**

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

![Waste Management Hierarchy](image)
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.

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).
THE STRATEGIES

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

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

- 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 governmental institutions from service provision to regulation

THE STRATEGIES

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

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

- 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
THE STRATEGIES

- 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.

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

Waste composition as shown in Figure 2 is an indication of areas of utilization that can be considered and the percentage 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 (Data source: http://www.lawma.gov.ng/)
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>
<thead>
<tr>
<th>City</th>
<th>Material Recovery (in tonnes)</th>
<th>Percentage of Total Waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cairo</td>
<td>433,200 Tones</td>
<td>13%</td>
</tr>
<tr>
<td>Cluj</td>
<td>979,400 Tones</td>
<td>30%</td>
</tr>
<tr>
<td>Lima</td>
<td>529,400 Tones</td>
<td>19%</td>
</tr>
<tr>
<td>Lusaka</td>
<td>12,000 Tones</td>
<td>4%</td>
</tr>
</tbody>
</table>

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 reducing emissions reduction and improving the general traffic flow.
CONCLUSION

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

The 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. Investing in GM can generate multiple economic and environmental benefits – energy saving,

THANK YOU