Solid waste governance in Owerri urban area, Nigeria: problems and prospects

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A Glance at the World

Edited by Maria Cristina Lavagnolo

This column comprises notes and info not subjected to peer-review focusing on waste management issues in different corners of the world. Its aim is to open a window onto the solid waste management situation in any given country, major city or significant geographic area that may be of interest to the scientific and technical community.

Solid waste governance in Owerri urban area, Nigeria: problems and prospects

The status of SWM in an area is often indicative of its form of governance. While it is an acknowledged fact that good governance impacts positively on development, a major expectation in the notion of good governance globally is that local governments assume active roles in the processes of urban development and management. Accordingly, Local Government Councils in Nigeria have been saddled with the constitutional responsibility of SWM. However, the councils have not been able to effectively perform this task due to a variety of factors, some of which are related to governance (Agunwamba, 1998), a situation which sometimes prompts state authorities to intervene in SWM.

In the city of Owerri in Imo State, Nigeria, poor governance has encumbered the SWM sector for many years. With the advent of a new democratic civilian administration in the state in 2007, the city witnessed the initiation of several public sector reforms, the most notable being the so-called Clean and Green Initiative whose objective is to recreate Owerri, through improved SWM and beautification , to become a Garden city.

Two years on, the Clean and Green Initiative appears to have made some impacts on the cityscape, and has of recent tended to present Owerri as a model of sustainable waste management in Nigeria. This article examines the state of SWM within the governance system of the city of Owerri. Measures to ensure sustainability of current initiatives in tackling the problem of solid waste in the city are suggested.

Waste generation and collection

The city of Owerri is both the administrative and commercial capital of Imo State of Nigeria. In this study, Owerri was divided into six urban districts comprising residential and commercial areas, and government secretariats (Table 2). Data collection for the study was through questionnaire survey, field observations and in-depth interviews with government officials responsible for SWM.

The amount of waste generated in Owerri has increased in both quantity and diversity over the years, without commensurate investment in collection, transport, treatment and disposal infrastructure. These problems are further aggravated by economic, political and social factors (Imam et al., 2008). Table 1 shows available data on annual quantities of waste generated and disposed of in Owerri over a period of 6 years.

The volume of solid waste generated in the various districts of Owerri is influenced by the population size, economic status, consumption pattern, and season of the year. At the time the study was undertaken, Nigeria's population and housing census had not been conducted. As a result, estimates of population for the districts in Owerri were based on projected 1991 population figures. Table 2 shows population distribution and rate of waste generation across the districts of Owerri.

Three methods of waste collection are operational in Owerri. These are house-to-house collection, curbside collection and collection at communal depots.

The first method is practiced mainly in the high-income, low-density residential districts of Aladinma and Government Station and the middle-income neighborhood of Ikenegbu. The Bureau of Environment and Sanitation (BES), the body in charge of SWM, is not directly involved in this method of waste collection from residences. Rather, informal sector cart pushers service the areas according to the willingness of residents to pay, and with the consent of BES. This arrangement allows cart pushers to empty solid waste into communal depots.

The curbside collection is a common method of waste collection practiced by BES, especially in the Main town where intense commercial and residential activities lead to high rates of waste generation. However, the regularity of collection from the curbsides leaves much to be desired as uncollected MSW pile at the city's central business district (CBD) along Douglas Road, with humans often in contact with refuse (Fig. 1a).

The Communal depot collection appears more convenient for most residents. Communal waste storage facilities are centrally located. Approximately 30 refuse collection vehicles (RCVs) with roll-on-roll-off containers and waste bins recently donated by the Niger Delta Development Commission (NDDC) are to be distributed in the Owerri region for communal collection. Under this arrangement, householders deposit their solid waste at designated locations for the roll-on-roll-off containers. RCVs visit these sites at intervals to collect MSW from the often over-filled containers. BES considers this method to be more convenient and better because it reduces considerably the number of service points for solid waste collection. However, this method has a major limitation with the problem of getting suitable land in a central location that is accessible to residents and vehicles alike.

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Table 1
Annual waste generation and disposal rates in Owerri (Unpublished data from Bureau for Environment and Sanitation, Owerri).

Year	Volume generated (tons)	Volume disposed of (tons)
2001	100,375	74,898
2002	102,200	54,093
2003	104,025	55,188
2004	105,228	66,576
2005	107,343	58,254
2006	109,500	57,378
Total	628,671	366,387

Table 2
Population distribution and daily rate of waste generation in Owerri (data from Planning, Research and Statistics Department, Owerri Municipal, LGA and BES).

District	Population figure[a]	Population figure[b]	Population (%)	Waste generated (tons)	Waste generated (%)
Ikenegbu	10,818	24,232	8.04	37.74	12.58
Aladinma	11,506	25,773	8.55	40.75	13.58
Main town	49,009	109,780	36.40	102.2	34.07
Amakohia	16,935	37,934	12.58	24.12	8.04
Government St.	27,174	60,870	20.18	69.54	23.18
Orji	19,188	42,981	14.25	25.65	8.55
Total	134,630	301,570	100	300	100

[a] 1991.
[b] Projected 2006.

Waste disposal

The most common method of waste disposal is open dumping by the formal sector and cart pushers. The Njoku Sawmill dumpsite is the main waste disposal site in the city. There are currently no treatment facilities and sanitary landfills for environmentally safe handling of solid waste in the city. Fly-tipping of solid waste remains a significant problem in the city, particularly in drains, open spaces, and undeveloped lands.

Waste recovery and recycling

Source separation and formal sector waste recycling are absent in Owerri just as in other Nigerian cities (see Nzeadibe (2009), for example). As a result, the city's recycling system is being driven by informal sector operatives, notably waste pickers (known locally as "obungwongo" or "akpakaratingwo") mainly from Njoku Sawmill waste disposal site (Fig. 1b) and from street bins.

Major items recovered and recycled in Owerri include various types of plastics, metals, glass bottles and paper. Scavenging is also practiced along some streets. Important areas of street scavenging are the Amaigbo Road, Royce Road and the New market.

Problems of SWM in Owerri

This relates to the availability and serviceability of SWM equipment. It also relates to the skills and competence of management and operational personnel in Owerri. Insufficient refuse collection vehicles and personnel lead to incomplete collection, and accumulation of refuse at curbsides and other points. Equipment such as roll-on-roll-off containers is inadequate for collection and disposal. At the time of this study, only 20 trucks with 20 truck drivers were available to collect and dispose of the vast amounts of solid waste generated in the area. Table 3 shows the estimated daily waste generation and collection rates in each of the districts in Owerri.

It can be seen that out of about 300 tons/day generated, only 157.2 tons/day representing about 52.4% of the waste generation, is collected and disposed of.

The Owerri urban area serves both as headquarters of Owerri municipal Local Government Area and as the State capital. There is a duplication of SWM functions between municipalities and state institutions, with the municipalities often feeling sidelined and redundant.

Fig. 1. A curbside collection point along the CBD at Douglas Road (a) and waste pickers at the Njoku Sawmill disposal site (b).

Table 3
Estimated daily waste generation and collection rates in Owerri.

Districts	Waste generated (tons)	No. of RCVs	Trips/day (average)	Waste collected and disposed (tons)	Residual (tons)
Ikenegbu	37.74	3	5	18	19.74
Aladinma	40.75	4	6	28.8	11.95
Main town	102.2	5	8	48	54.2
Amakohia	24.12	2	4	9.6	14.52
Government St.	69.54	4	9	43.2	26.34
Orji	25.65	2	4	9.6	16.05
Total	300	20	36	157.2	142.8

There has also been a multiplicity of institutions involved in SWM, with no clear delineation of roles and responsibilities. There have at different times been in existence a State Environmental Protection Agency, an Environmental Sanitation Authority, Municipal Governments, BES and most recently, the Environmental Transformation Committee (ENTRACO).

The Clean and Green Initiative: impact and sustainability

In compliance with the current governance reform program implemented in Imo state, known as the Clean and Green Initiative, refuse management and urban improvement are receiving significant attention. Owerri the State capital has been a major focal point. Two years into the initiative and prima facie, this solid waste improvement program seems to be succeeding in recreating Owerri into a model of sustainable SWM in Nigeria.

Within the framework of this development paradigm, a 15-man ENTRACO was appointed to drive the initiative. However, ENTRACO as constituted, cannot rely on the cooperation of individuals with expertise in the area of waste and resource management, such as representatives of professional waste and environmental associations, credible environmentally-focused Non-Governmental Organizations (NGOs), and university professors and researchers who could catalyze action for sustainable SWM policies and programs.

Governance of the SWM would, therefore, seem to be determined only by state authorities, with little or no input from citizens' groups and the general public. As a result, the Clean and Green Initiative is destined to succeed or fail at the pleasure of its initiators. There is also little evidence that the program will be embraced in the development objectives of future governments.

Sustainability of the system will require fundamental changes than the present political sloganeering that has gained currency with the State Government. Suggested restructuring of the city's SWM system is listed below:

- Reform of governance in Owerri to allow the three municipalities to carry out the task of MSWM in line with constitutional provisions, i.e. decentralization of governance of the Clean and Green Initiative at the level of the municipalities.
- Involvement of formal private sector service providers (PSSPs) in SWM in Owerri.
- Reform of the solid waste management to give a role to the informal sector would also seem appropriate, considering the crucial support it is giving to the formal sector in SWM and development in Owerri.
- Increasing awareness into the association between SWM, health and development. If residents are made aware of these issues they will no longer perceive and treat SWM as an "essential service" and be willing to pay for SWM services.
- Development of capacity of municipal staff to undertake effective solid waste planning and implementation is essential to improving SWM in Owerri.
- Involving community groups and neighbourhood associations in the SWM process could be an effective strategy for promoting better MSWM in Owerri.

Final remarks

In the recent past, poor governance programs have produced a negative impact on SWM in Owerri. The current Clean and Green governance initiative provides a renewed impetus and opportunity to improve SWM in the city of Owerri. However, fundamental changes in the solid waste sector as outlined above are imperative if the sustainable solid waste management is to be achieved. In addition, massive and sustained advocacy in universities, colleges, schools and the mass media could bring about a positive change in perceptions and attitudes towards the solid waste sector in Nigeria.

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Municipal solid waste management at Taman Beringin Transfer Station in Malaysia

The increase in human population and change of consumption patterns have led to an increase in volume and composition of solid waste production. Disposal of solid wastes is one of the major issues in both urban and rural waste management. Due to the low cost and ease of disposal, landfilling is generally considered an economical means of municipal solid waste (MSW) disposal.

Municipal solid waste (MSW) generation and characteristics in Malaysia

The volume of MSW generated in Malaysia has increased drastically due to the change in consumption pattern as a result of its rapid economic growth over the past two decades. The issue of municipal waste disposal in the rapidly growing urban and industrial hub of Federal Territory of Kuala Lumpur (FTKL) and the State of Selangor (SS) has received considerable attention from the Federal Government of Malaysia. In the Ninth Malaysia Plan (2006–2010)

Table 1
Main facilities of TBSWTS.

Main equipment/facilities	Units	Environmental facility	Lot
Weighbridge waste receiving	2	Leachate treatment plant	1
Compaction system	4	Odor and dust control system	1
Container semi-trailer	66	Deodorizer spray system	1
Tractor head	41	Fuel station	1
Prime mover	4		
Weighbridge (waste delivered)	1		

report published by the Economic Planning Unit (EPU, 2006), it is reported that the amount of solid waste generated in Peninsular Malaysia has increased from 16,200 tonnes per day in 2001 to 19,100 tonnes in 2005 or an average of 0.8 kg per capita per day. The volume of MSW is expected to reach 30,000 tonnes per day in 2020. In spite of intensive efforts to increase the reuse, reduction and recycling (3Rs) of waste through the National Campaign on Recycling, the amount of solid waste recycled remained less than 5.0% of total waste disposed. This is not surprising, since organic waste was the major composition of MSW generated in Kuala Lumpur city. The MSW generated in Malaysian urban areas generally consists of 45% of food waste, 24% of plastic, 7% of paper, 6% of iron, 3% of glass, and 15% others. The majority of these wastes (58.3%) was disposed of in landfills. Sanitary landfills are the most popular method of MSW disposal in many developing countries including Malaysia. Due to the rapid population growth, a rising number of sanitary landfills is being developed to cater for the increased in solid waste volume. Due to the shortage of suitable land to be used for the purpose of sanitary landfills in urban areas such as Kuala Lumpur, most of these newly developed landfills are located far from the city. Hence, a solid waste transfer station is needed to reload the MSW collected from the city to a suitable container prior to transportation to the sanitary landfill.

Taman Beringin Solid Waste Transfer Station

An MSW transfer station is comprised of facilities to transfer waste from self-haul or route collection vehicles to large capacity containers, which subsequently transport the waste to a disposal site. Transfer facilities are typically used in areas located more than 15 miles from collection routes or when special transportation containers are required to deliver waste to a remote disposal site (UNEP IETC, 2005). The type and design capacity of a transfer facility is determined according to the projected size and characteristics of the waste stream and the anticipated number of vehicles using the facility (UNEP IETC, 2005). The main purpose of implementation of a transfer station is to help improve the collection operation, transportation, and proper disposal of solid waste. This kind of waste transfer station reduces the serious environmental pollution associated with garbage open stacking and transfer, thus avoiding spillage during transportation. With respect to the effects of surrounding and internal working condition, MSW transfer station takes active measures to prevent pollution of dust, odour and sewage. Furthermore, according to the characteristics of specific waste and disposal requirements, MSW transfer station may build pre-treatment plant to enhance its functions and efficiency.

The Taman Beringin Solid Waste Transfer Station (TBSWTS) located at Jinjang Utara, Kuala Lumpur, was built by the Kuala Lumpur City Hall (DBKL). The TBSWTS commenced operations in April 2002. It was established to address the high cost and scarcity of land and landfill facilities within the Klang Valley, and built as part of a modern solution for waste management to transfer the MSW to a remote landfill. This transfer station occupies an area of more than 16 hectares land. Table 1 presents the main equipments and environmental facilities of TBSWTS.

It receives approximately 1700 tonnes of MSW per day from Kuala Lumpur with a peak capacity of 270 ton/h. The flow rate of fresh leachate generated ranges between 74 and 250 m per day. Kuala Lumpur is a growing city of over 2 million people who generate an average of 1 kg of waste per person per day. The main constituents of the Malaysian MSW were found to be food, paper and plastic, representing about 80% of the waste by weight. The average moisture content of MSW was about 55%, making incineration a challengeable process. The low calorific value of the waste (approximately 2200 kcal/kg) renders incineration an uneconomical option (Sivapalan et al., 2003). TBSWTS has commenced its performance to transport Kuala Lumpur's MSW to the Bukit Tagar sanitary landfill located in the northern parts of Selangor state, 61 km away from Kuala Lumpur since July 2006. In addition, the bulky waste transit station unit started to deliver the solid wastes from March 2008 to the same disposal site.

Fig. 1 shows the horizontal compact transfer station applied for TBSWTS. In this type of transfer station, the truck containing MSW

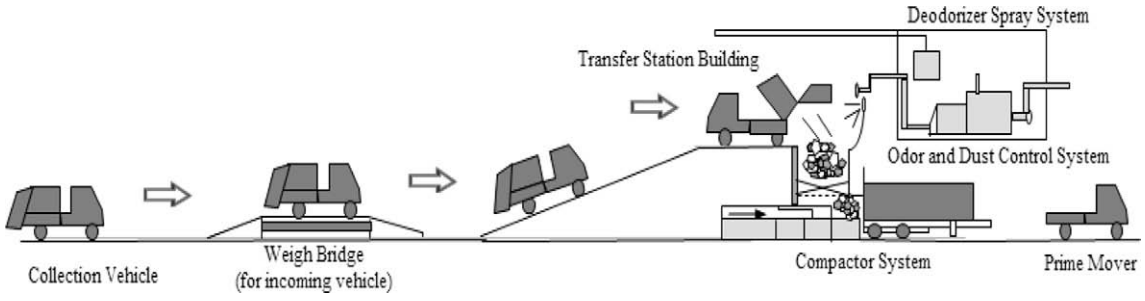

Fig. 1. Horizontal Compact Transfer Station.

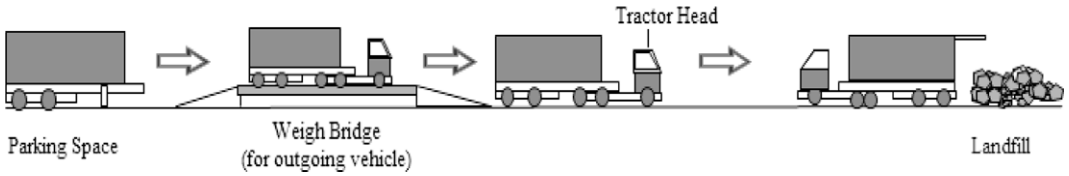

Fig. 2. Transportation of solid waste compacted to the remote landfill.

is firstly weighed then conducted to the transfer station unit to unload the waste. In this system, waste drops through a hopper into a stationary compactor. The compactor, mounted on the floor of the lower level of the transfer station, contains a hydraulically-driven ram. The ram pushes the waste from the compactor's receiving chamber into the storage chamber of the transfer vehicle in order to separate the leachate and reduce both solid waste weight and volume. In this system, the chamber of the transfer vehicle must be adequately reinforced to withstand the pressure created by the compacted. Deodorizing spray and dust control systems simultaneously are used to reduce the bad odours and dust. It is estimated that approximately 20% of total leachate is produced at this stage which is directly transferred to the leachate pre-treatment plant. The container filled with solid waste is moved by prime mover to the parking space, parked for almost 7 h (11 pm–6 am) and then moved to the weighbridge (as shown in Fig. 2). Subsequent to weighing, the leachate generated over the 7 h retention time is directly discharged to the pre-treatment plant.

It is estimated that 80% of total leachate production from solid waste will be collected at this level. At the end of the process, containers filled with solid waste are transported to the Bukit Tagar sanitary landfill for disposal. It should be underlined that the amount of leachate production at the transfer station largely depends on the compaction degree, solid waste composition, moisture content and rain depth and intensity.

Final remarks

The significant population growth in Malaysia over the past 15 years, particularly in the Klang Valley area has caused overloading of the existing sanitary landfill site. The TBSWTS was established to help reduce the weight and volume of MSW prior to transportation the new sanitary landfill in Bukit Tagar. However, this transfer station has faced several problems such as inefficiency and inadequate design of leachate treatment plant.

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