
ANALYSIS OF THE OPERATIONAL CHARACTERISTICS OF PUBLIC-PRIVATE PARTNERSHIP IN SOLID WASTE MANAGEMENT IN BAUCHI METROPOLIS

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ABSTRACT

The use of public-private partnership in provision of basic urban services like water and sanitation in many developing countries is becoming inevitable for attainment of sustainable development and meeting the millennium development goals. In Bauchi metropolis, Nigeria, the case is not different, as public-private partnership in solid waste management has been in operation since 2007. This paper studied the nature and operational performance of this partnership in Bauchi metropolis. This study analyzes the roles, and relationships between the public and private actors, the constraints hampering success and finally suggest mechanism of bettering the partnership. A qualitative approach involving interviews, focus group discussions, observations and photography was used to gather necessary primary data, while reference to relevant literature provided the much needed secondary data.

Keywords: Solid Waste, Public-Private, Partnership, Management.

INTRODUCTION

Municipal solid waste management (MSWM) refers to the collection, transfer, treatment, recycling, resource, recovery and disposal of solid waste in urban areas (Ogwueleka 2009). Solid waste management systems are an essential component of the environmental infrastructure in human settlements. In most Africa's urban areas, solid waste management is ultimately the responsibility of the municipal councils, while among most of the rural populations the wastes are handle at the household level. Millions of tons of solid wastes are generated daily in Africa; most of it ends up in open dumps and wetlands, contaminating surface and ground water of nearby settlements, thus posing a major health hazard to the nearby inhabitants. Solid waste generation rates in developing countries average only 0.4 to 0.6kg/person/day as opposed to 0.7 to 1.8kg/person/day in fully industrialized countries (Cointreau 1982). In Nigeria, for example, 25 million tonnes of municipal solid waste are generated annually (Ogwueleka, 2009). Recently, the Nigerian Minister of Environment on a National Television Programme, weekend file announces that at every time 3 million tonnes of wastes is not collected by municipal collection. Waste densities and moisture are also higher in developing countries, which require different technology and management systems (Cointreau, et al 1984). In Nigeria, the density of solid waste ranged from 250kg/m³ to 370kg/m³. High density reduces the effectiveness of compaction vehicles for waste transfer. Most waste in Africa is not collected by municipal collection systems,

because of poor management, fiscal irresponsibility, equipment failure and/or inadequate waste management budgets. Although, high and low value recyclables are typically recovered and re-used, these make up only a small proportion of the total waste stream, as majority of the waste, up to about 70% is organic. In theory, it can be converted to compost or used to generate biogas. But in situations where rudimentary solid waste management systems barely function, it is difficult to promote innovation even when it is potentially cost effective to do so. One dangerous aspect that complicates the waste management problem in Africa is hazardous and infectious materials are discarded along with general waste throughout the continent.

In most developing countries, solid waste generation exceeds collection capacity. Local authorities spend 77 – 95% of their revenue on collection and the balance on disposal but can only collect 50 – 70% of the municipal solid waste (Ogwueleka, 2009). Zurburgg (2003), describes that one to two-thirds of the solid waste generation in developing countries is not collected. Throughout sub-Saharan Africa solid waste generation exceeds collection capacity partly due to the rapid urban population growth rate which exceeds 4% in most African cities (Senkoro, 2003). In Nigeria, and in most developing countries of the world solid waste management is characterized by; inefficient collection methods, insufficient coverage of the collection system and improper disposal of solid waste. The common constraints faulty the environmental agencies includes; lack of institutional analysis, insufficient financial resources, absence of bylaws and standards. It is becoming increasingly clear that governments cannot meet the continually growing demand for services such as water and sanitation by acting alone and that there is a need to look for support from other sectors of the society. The public-private partnership (PPP) is one of the promising forms of such collaboration. It is based on the recognition that both the public and private sectors can benefit by pooling their financial resources, know-how and expertise to improve the delivery of basic services to all citizens.

Consequent upon these, the Bauchi state government on October 2007, entered into partnership on solid waste management in the metropolis with a private company, cosmopolitan cleaners and later collaborates the National Union of Road Transport Workers (NURTW) tipper branch Bauchi into the partnership arrangement. It has been argued that this partnership or privatization has been motivated by the following considerations; reducing the cost of public services to the populace relieving the financial and administrative burden on the government satisfying unmet needs, increasing productivity and raising efficiency and promoting competition, adopting innovation and new technologies, maintaining the condition of equipment, improving responsiveness to cost control measures. However, one question remained unanswered whether the involvement of the private sector in solid waste management in Bauchi metropolis has duly considered the above issues and therefore led to an improvement in the management of solid waste in Bauchi metropolis.

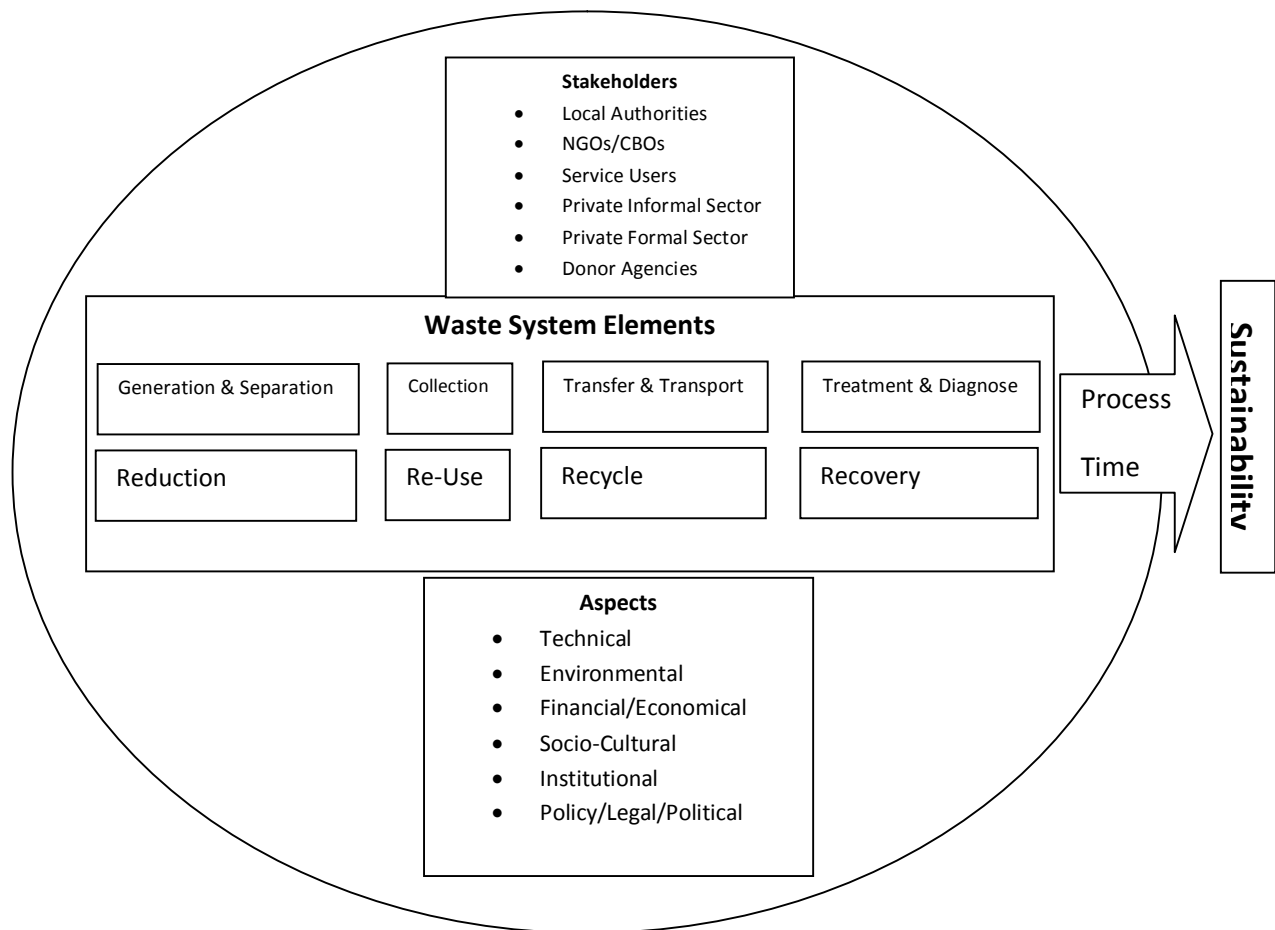
PUBLIC-PRIVATE PARTNERSHIP (PPP) AND SOLID WASTE MANAGEMENT FRAMEWORK **The Concept of the Public-Private Partnership (PPP)**

The definition of partnership has evolved from a matter of simple coordination and coalition to more participatory terms such as mutual collaboration, common goal and shared responsibility (Haque, 2004). Other authors have provided definitions of public-private partnership in public management perspective. Linder and Rosenau (2000) defined public-private partnership as the formation of cooperative relationships between government, profit making firms, and nonprofit oriented private firms to fulfill a policy function. Bovaird (2004) also define public-private partnership as working arrangement based on mutual commitment between public sector organizations with any organization outside of the public sector. Public-private partnership offer an alternative to full privatization by combining the advantages of both sectors; that is, they combine the:- Social responsibility, environmental awareness and public accountability of the public sector; with the finance, technology, management efficiency and entrepreneurial spirit of the private sector. In solid waste management, public-private partnerships have emerged as a promising alternative to improve municipal service delivery when private sector is involved in waste management; government role is shifted from service provision to implementation of regulation. Private sector remains to provide solid waste collection, transfer and disposal services. The service delivery is more efficiently and at lower cost than the public sector (Cointreau-levine, 1994). Essential conditions for successful private sector involvement include competitive bidding, technical and organizational strengths and capacities.

Integrated sustainable Waste Management

For understanding the concept of solid waste management systems, Muller and Hoffoman (2001) developed a solid waste management framework (ISWMF). The framework introduces the various actors who participate in solid wastes management in developing countries, clarifying and defining their roles. In principle, these actors are part of every solid waste management system both in developing and developed countries.

Integrated Sustainable Waste Management



Source: Mugagga, 2006

The framework point out that in most situations, few clear boundaries can be drawn between the formal and informal sector, both of which are involved in the collecting and recycling of waste materials. Many enterprises operate in a kind of 'grey zone' where characteristics of both formal and informal sector apply.

The Stakeholders in Solid Waste Management

Municipal Government: Within this framework, urban authorities around the world traditionally interpret their mandate to include the delivery of services, including sanitation, waste removal, and disposal, within their political geographic jurisdiction. The characteristics of the public sector in fulfilling its responsibility for waste management systems are:

- Motivated by legal and political concerns, and sometimes by international prestige
- Performing activities because of its mandate and obligation, or because of the power and patronage they confer on the government, or its representatives.
- Using public tax-generated resources and/or fees for services rendered.

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- Regulating or contracting with the private sector

The Formal Private Sector: The formal private sector is here understood to refer to private sector corporations, institutions, firms and individuals, operating registered and/or incorporated business with official business license, and organized labour force governed by labour laws, some degree of capital investment, and generally modern technology (Furedy, 1990). In general, the defining characteristic of the formal private sector is that its main objective is to generate profit on investment. They may participate in the waste management system in a number of ways, including;

- Entering into contract period the municipality to perform disposal or cleaning services for compensation.
- Purchasing the right to perform service and keep (all or part of) the income generated.
- Entering into contracts with individuals or business for collection services.
- Functioning as a purchaser of recovered materials from the municipality or the collector

Therefore, the following characteristics may be typical of the formal private sector in its participation in waste management systems. Motivated by profit, performing activities because of their potential to generate income, using private resources, regulated and/or contracted by the municipal government.

The Informal Private Sector: The term “Informal Private Sector” refers to unregistered, unregulated, or casual activities carried out by individuals and/or family or community enterprises, that engage in value adding activities on a small-scale with minimal capital input, using local materials and labour intensive techniques (Furedy, 1990)

Informal activities, in contrast with the formal sector in waste collecting and recycling, are often driven by poverty and are initiated personally and spontaneously (and sometimes haphazardly) in the struggle for survival (although) some enterprises, especially the ones engaged in recycling activities, manage to make considerable profits.

Community Based Organization (CBOs): Community – based organizations are groups formed within a local community. These can include neighbourhood committees, youth and women’s group, religious groups e.t.c. However, they are often formed for a specific reason, to find a collective solution to a problem that they face as a group. In low-income countries, they frequently exist in order to address a poor service provided by the official or government agencies. For example, a number of households may come together to initiate a waste collection programme.

There is a great potential for CBOs to work for improvement in solid waste management, mainly in primary storage and collection.

The two common roles CBOs could adopt are

- To act as a pressure group upon municipal agencies
- To act as a service provider

Non – Governmental Organizations (NGOs): The term Non-Governmental Organization can refer to such diverse organizations as universities, labour organizations,

environmental organizations and lobbies. Sometimes even donor organization fall under this heading. Generally, NGOs are intermediate organization which not directly and continuously involved in community projects. NGOs not only advocate they can also be involved in awareness raising, advocacy and decision making. NGOs can act as intermediaries between grassroots initiatives (CBOs) and municipal government or serve the ideological political, or represent interest of international organization. The role of NGOs as partner organizations in waste management systems ranges from serving as the umbrella organization under which CBOs operate, and providing a channel for donor agencies for financing. As partners, they can sometimes confer a degree of credibility and perspective on the informal sector in the eyes of the municipality.

STUDY AREA

Bauchi metropolis is the headquarters of Bauchi state, north eastern Nigeria. It is located between latitudes $9^{\circ} 00'$ and $9^{\circ} 30'$ north of the equator and longitudes $10^{\circ} 25'$ and $11^{\circ} 20'$ east of the Greenwich meridian. It occupies a total land area of 3, 604, 0 hectares, and it is about 128km north east of Jos and 150km west of Gombe town. It is one of the towns in northern Nigeria that falls within Sudan savannah vegetation zone. It is generally less uniform and grasses are shorter than what is obtainable further south. The topography of Bauchi metropolis is relatively flat in the centre. There are ranges of disjointed hills on the north eastern part of the metropolis. Two main season are experienced in Bauchi town; cold dry season which last from October to April and hot wet season from May to Sept. the hottest months being April and May with the highest temperature record of $40-50^{\circ}\text{C}$, while a minimum temperature record of 6.11°C and 7.22°C respectively. The annual rainfall last for seven months, April to October with a total annual record of 1091.4mm the town lies over 2000ft above sea level and a latitude of 795.2m above. Laterite soil characterized the higher areas of the Bauchi plains, while the more productive clay and loam occur along the flood plain and provide fertile farm lands and good residential, commercial, industrial, institutional and public development.

SOLID WASTE GENERATION AND COMPOSITION

Solid Waste Generation in Bauchi Metropolis

Both primary and secondary of data were employed in this study, the primary source include physical site measurements, questionnaire administration, group discussions, direct observations and using key informants from the state agency for environmental protection agency (BASEPA), community based organizations (CBOs), private contractors like the cosmopolitan cleaners, district and head of wards, trade unions and environmental sanitation mobile court while the secondary sources includes survey reports, published and unpublished texts, maps, and so on. Twelve (12) wards constituted the Bauchi metropolis area and therefore the research covers all the wards for easy questionnaire administration, demographic and density studies. Also face-to-face interview were carried out with household and commercial outfit respondents and visits to some important establishments. Population constitutes an integral and vital component of urban solid waste management and disposal. According to the 2006 national population census, the population of Bauchi metropolis stood at 318,038 in June 2010, using the national growth rate for urban centers of 4.5%, and with this rapid

population growth couple with influx of people to the state capital from neighboring states, an efficient and effective solid waste management becomes more difficult, where population is not taken into consideration as in Bauchi.

Table I

Ward	Population	No of hh	Density	Per capita Generation rate (kg)	Average (kg)
Old GRA	155560	2192	Low	5.13	1.03
New GRA	8974	1197	Low	5.02	1.00
Fadaman Mada	20194	2885	Low	4.89	0.98
Yelwa	50533	6563	medium	4.56	0.91
Dan'iya	28956	3810	medium	4.01	0.80
Makama	12134	1517	medium	4.03	0.81
Ibrahim bako	17100	2250	medium	4.41	0.88
Nasrawa`	35444	4170	High	3.50	0.70
Dan kade	31763	3737	High	4.24	0.85
Dawaki	42156	4790	High	3.99	0.80
Dan amar	39488	4816	High	3.49	0.70
Hardo	15736	1748	High	3.49	0.70
Total	318038	39675		50.74	

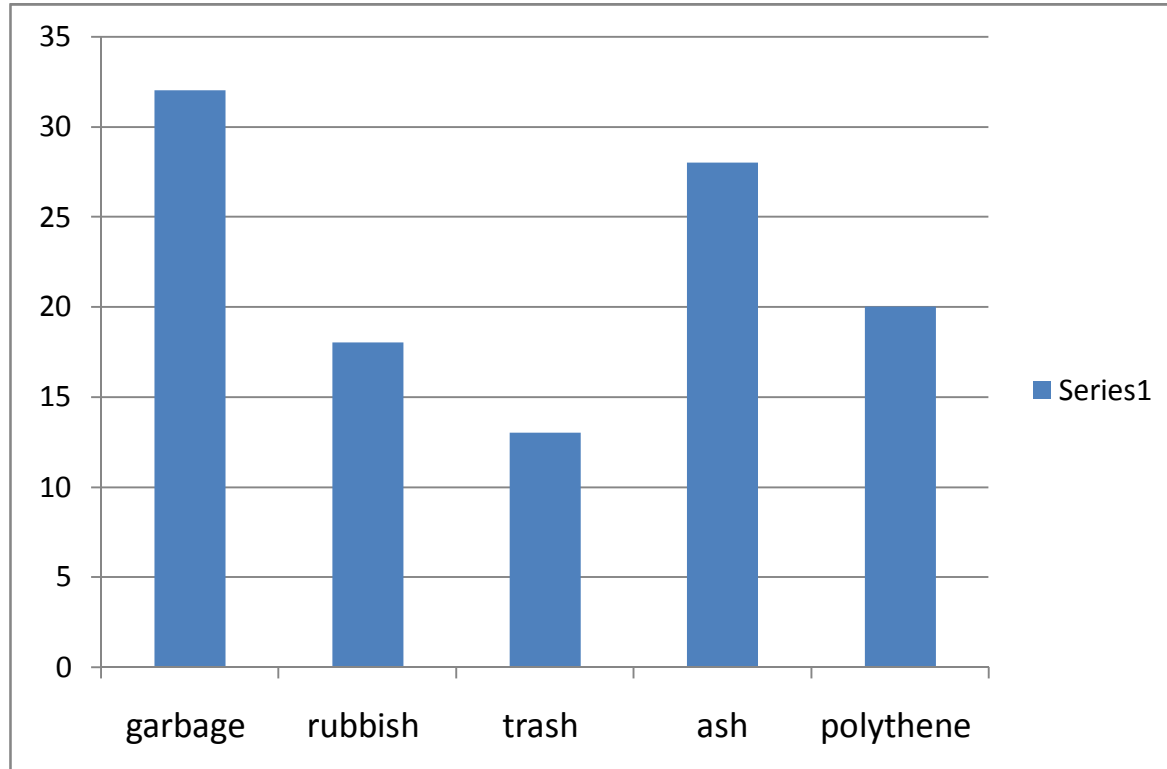
Source: field survey 2012

From the table above, it can be noticed that the amount of wastes generated in Bauchi metropolis is relatively small, but ineffective management was responsible for the waste accumulation. This research discovered that the average solid waste generated in high density residential areas stood at 0.79kg/capita/day; 0.89kg/capita/day for medium density area and 1.03kg/capita/day in low density residential areas. The general average per capita solid waste generated was 0.86kg/capita/day. Therefore, total amount of waste generated in Bauchi metropolis is 27312.68kg/day.

The Composition of Solid Waste in Bauchi Metropolis

Table II shows the composition of waste by percentage. Garbage constituted over 32% of the waste, ash reach about 28% of the composition. This shows that the composition and characteristics of the waste generated in Bauchi metropolis is organic, which is not different from those found in most other 3rd world cities.

Table II



Source: Field Survey 2012

THE CURRENT DOMESTIC SOLID WASTE STORAGE AND COLLECTION PRACTICES

Primary storage and collection: In theory, various alternatives of storage items are available to the people including plastics, low density polyethylene (LDP) bags, old metallic tins, paper boxes, plastic buckets, and so on. Based on surveys and interview conducted, the medium and low income areas, households uses old metallic containers, including wheel barrows and broken plastic containers paper boxes, and LDP bags. While in the high income areas, where both the formal private and informal (unregistered) privates operates, most households uses metallic container (drums). Plastic containers and LDP bags to store waste. Most of these containers are usually supplied by the private operator who collects the waste for a fee. These containers are mostly dumped by the household owners themselves in to communal bins or transfer stations. While the private operators dump their own directly at the landfills. Medical waste storage, is usually done at the source in both plastic and metallic containers (drums) throughout the metropolis, with little or no separation.

Waste Separation: Information gathered, reveals that separation of waste has received little attention at household level. Neither the formal private operators, nor the informal waste collector provides containers for separation of waste. One reason that discourage the separation is the composition of the waste, which is mostly organic waste scavengers who usually moves around every corners of the metropolis an especially in the low density areas like GRA collects re-useable materials, such as plastics cans and bottles in the household storage bins in the high and medium density areas, some

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separation activities has been found to be in practice at household level. House wives and children are found to be engaged in sorting and collecting, bottles, plastic cans metal scraps and other discarded materials, for sale to waste vendors and entrepreneurs. This was found to be as a result of poverty and low-income level of the communities. Although, the government has established a plastic recycling plant, to encourage and empowered youths in waste management.

Secondary Storage and Collection: Secondary storage involves keeping solid wastes generated from different households at a common or central point from where collection vehicles can pick it. Secondary storage facilities include stationary bunkers or masonry bins, and movable metallic skips. In Bauchi metropolis, the high density areas, mostly encompasses areas within the old town wall and the major streets in the town, waste are dumped at road sides every day for collection. The cosmopolitan cleaner uses compactor trucks with its crew, to collect the waste, usually twice a day. While in the areas where its difficult to operates due to the nature of the roads, or uneven development and in some low density areas, the national union of road transport workers (NURTW) tipper branch and BASEPA collects wastes from such areas weekly and sometimes once in a month. These areas dumped their wastes at any available space within their environment.

Such spaces as vacant plots, public buildings and uncompleted building structures in some locations masonry bins; and movable metallic bins are provided by the municipal government.

RESOURCE REUSE AND RECOVERY PRACTICES

Neither the BASEPA nor the cosmopolitan cleaners or any private operators is involved in any direct solid waste reuse and recovery projects. Reuse and recovery of material is practices by private individuals, with some little participation of youth encouraged by the government through establishment of polythene recycling plants

Urban agriculture: - as shown in the preceding sections, the waste in Bauchi metropolis contain high amount of organic matter, therefore some farmers paid the tipper drivers or officials of the cosmopolitan cleaners or BASEPA to dump these wastes in their farmlands. Organic composting is predominantly not common in the metropolis.

Reuse and Recycling of Metal Scraps Cans and Bottles: Scavengers, waste vendors and entrepreneurs are involved in metal re-use. Scrap metals parts collected from motor vehicle garages and scrap yards are either sold to the vendors who in turn sold it to iron and steel company outside the state or moulded it to energy saving stoves; poultry feed containers, frying pans and so on. Empty juice cans, are used by local aluminum smelting industry to produced aluminum kitchens utensils while bottles are re-used for bottling local products.

Disposal of Domestic Solid Waste in Bauchi: Waste collected from secondary disposal facilities and transfer station by both the formal private and informal private operators are usually dump at open landfills, or farmlands if required by farmers and burrow pits

or stagnant water pools as back filling. These landfills are usually along or beside the trunk A roads that connects Bauchi and other neighbouring states. Heaps of garbage can be noticed along Bauchi Gombe road to the east at Dungulbi. Bauchi Kano road on the north Bauchi Jos road on the west and Bauchi industrial estate and Yelwa on the south. Open dumping cannot be considered as a long-term environmental method of disposal, due to the dangers associated with it, ranging from pollution and health hazards.

THE ROLE AND RELATIONSHIP BETWEEN PRIVATE-PUBLIC OPERATORS

The law and the informal waste collectors

- The law does not recognize the informal waste collectors and their contribution towards improving solid waste management
- They operate within the high income and medium income areas, with good access roads, water and other urban infrastructural service and areas they can pay for the waste collection services.
- Interview conducted and discussions, revealed that residents of these households prefer the services of either the informal private or formal private operators, who collect waste for a fee.
- The operation of these private operators in these areas creates laxity on the part of the government and its partners in delivering waste collection services to the area.

SUPERVISION, MONITORING AND EVALUATION

Special Mobile Court: To insure an effective compliance with environmental laws and guidelines, the government set up a special mobile court to handle all matters relating to environment, under the chairmanship of chief magistrate. In the last one year, the court had treated about ten thousand three hundred and ten (10,310) cases while two hundred and ninety (290) cases are pending including those to be arrested (Bench Warrant) (BASEPA, 2012). The enforcement team also carried out the periodic cleaning of items displayed illegally along major streets and unauthorized locations.

Monthly Environmental Sanitation: In its effort to improve the sanitation condition of the metropolis, the state government has re-introduced the monthly environmental sanitation exercise, which is observed every last Saturday of the month.

Sanitary Inspection: The Bauchi State Environmental Protection Agency (BASEPA) conducts periodic household premises inspection in the medium and high density areas of the metropolis to ensure absolute compliance with the environmental sanitation laws. At the time of this study, about forty two thousand five hundred and sixty (42,560) premises were inspected (BASEPA 2012). Out of this figure, thirty two thousand two hundred and fifty (32,250) premises complied with the abatement notices served.

Supervision/Monitoring the Activities of the Waste Operators and Contractors: The major contractors, COSMOPOLITAN CLEANERS and NURTW tipper branch are supposed to be monitored and regulated by BASEPA. This research found that the agency concentrates mainly on its direct services of garbage collection rather than the monitoring and regulation of the activities of the private waste operators. This can be

attributed to the lack of institutional and political framework which will have governed the Public-Private Partnership arrangement.

Constrains to an Effective Solid Waste Management in Bauchi Metropolis

Constrains hampering the successful partnership:

Several problems can be attributed to an effective Public-Private Partnership arrangement in Bauchi metropolis, the common ones being:

- Capacities within the Public-Private sectors are lacking to cope with the new way of doing business, especially in waste management.
- Legal and regulatory framework is generally weak in terms of proper integration of the Public-Private sector.
- Transparency, fairness and accountability: The present Public-Private Partnership arrangement operates with unlimited and unaccountable services. The partnership was initialized without competitive tendering and operates with limited or no monitoring by the responsible agency. And also vested interest group in both the public and private sectors that benefit in terms of financial gain or power play under the present arrangement would want to maintain status quo.
- Lack of involving the serviced communities in the Public-Private partnership arrangement also made the operation of the private contractors difficult. For example, there is a time when the Cosmopolitan Cleaners were ordered by the state assembly to stop waste evacuation in Bauchi central market. This is because the market union reported to the house that the contractor causes traffic jams and inconveniencies around the market.
- The law has not recognized the informal waste collectors, viz-a-viz their incorporation in the Public-Private partnership arrangement. The term "informal" sector is used to refer to the economic activities which have the following characteristics; non-permanence and casualness, outside the scope of existing company law or government regulations, carried on in small-scale by less capitalize establishments mostly relying on household labour (Salahuddin and Shamim, 1992). The informal sector activities are not regulated or controlled by government agencies, they exist and operate because of market forces or other socio-economic factors (Ali, 1999), cited in Ali and Ahmed, (2003).

COLLECTION AND DISPOSAL PROBLEMS OF WASTE IN BAUCHI METROPOLIS

- Throughout the metropolis, the secondary waste storage facilities are grossly inadequate. This hampers the illicit and indiscriminate disposal of waste on drainages, around the waste bins, uncompleted buildings, and vacant plots and so on. This is a serious threat to the urban health and environmental hygiene.
- The uneven and rapid urbanization witnessed in the state between year 2007 to date, posed a tremendous difficulties on the authorities to provide an effective waste management services in the metropolis. Newly developed suburbs were characterized by lack of planned and motor able accesses, drainages and irregular building developments.
- Attitude and awareness towards waste management is very poor especially in the high density and newly developed areas within the metropolis. Despite the state

environmental mobile court and its enforcement team and the monthly environmental sanitation, majority of the populace are not educated on the need for best sanitation practices. This study observed that what the people considered as their only responsibility is evacuation of their garbage and sewages outside their compounds or premises. People dump their waste at any available space outside their homes and also channeled their sewage just behind their external walls. These contaminate and degraded and most times made the environment filthy.

CONCLUSION AND RECOMMENDATIONS

Based on the available information gathered during this study, few but very important recommendations and suggestions were made, these are;

- The state government should create an enabling environment for the participation of Community Based Organizations (CBOs), the informal waste collectors, entrepreneurs, vendors and scavengers in the solid waste management stream. These can be achieved through;
 - Registration and incorporation of these actors in the Public-Private Partnership.
 - Encouraging and promoting cooperatives among the different actors. These can assist and making their activities formal and increased participation by different groups and individuals. For example, in countries like Mexico, Bangladesh, India, Scavengers cooperatives have been thriving well in solid waste management.
 - Improving their services, through given soft-loans, to use low cost technical and equipment in their operations. This would promote a decentralized system of solid waste management in the metropolis, where by low-cost vehicles, equipment and adopting technologies suitable for each particular area, would tremendously improved the sanitation condition of the state and generate employment opportunities.
- Capacity building in both the Public and the Private sector in solid waste management would grateful improve their skills and competence in handling the ever-increasing waste generation in the metropolis.
- Public campaigns on dangers associated with poor solid waste management are essential at this stage. This is crucial as the state government and its partners have not yet provide adequate waste storage facilities throughout the metropolis
- Also, public awareness to encourage segregation of waste at source, the importance of re-use and recycle should be made compulsory upon the government and any other interested private waste manager. Encouragement of re-use and recycle means reduction of the total waste to received final disposal.
- Stringent rules and regulations should be enacted and enforced through a joint effort by both the state agency for environmental protection (BASEPA) and Bauchi State Urban Development Board (BSUDB) on erection of buildings. This would be an added edict to the existing development control rule and regulations.
- The state government should look for international donor agencies, like USAID, UNESCO, and HABITAT INTERNATIONAL, e.t.c. in developing strategies towards improving solid waste management, especially in areas of disposal facilities; the landfills and also recycling facilities. Efforts should also be geared towards creating

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enabling environment for these donor agencies in assisting community base organization (CBOs), the scavengers' cooperatives and the private formal waste managers.

- These would greatly improve the sanitation condition of the metropolis, create employment, reduced poverty and environmental degradation and would be a step-forward towards achieving millennium development goals and sustainable environment.

REFERENCES

Bauchi State; A. Historical Perspectives (2006).

Benett *et al.*, (1999) "Public-Private Partnerships for Urban Environment" (Options and Issues) UNDP, New York.

Bennet *et al.*, (2000) "Joint Venture Public-Private Partnership for Urban Environmental Services. UNDP New York.

Bogoro (2012); The Role of Women in Household Waste Management in Bauchi Metropolitan Area. Unpublished Ph.D Thesis Abubakar Tafawa Balewa University, Bauchi.

Garg *et al* (2007) Public-Private Partnership for solid waste management in Delhi: a case study Proceeding of the international conference on sustainable waste management Chennai, India. Pp 552-559

Islam (2012); A Proposition for urban waste management and employment generation by Community Based Organization (CBO): Bangladesh Perspective Proceedings of the international conference on Environment services and Engineering Singapore.

Klundert and Ansehiitz (2000); The Sustainability of Alliances between stakeholders in waste management

Massoud and El-Fadel (2002); Public-Private Partnership for Solid Waste Management Services.

Mugagga (2006); Public-Private Sector Approach to Municipal Solid Waste Management. Unpublished M.Phil thesis, Norwegian University of Science and Technology Norway.

Nelson Mandela Metropolitan (2005-2010); Integrated Waste Municipality Environmental Management Plan. Services Business Unit, South Africa.

Ngowi (2005) "Public-Private Partnership (PPPs) in the management of municipalities in Tanzania. Mzumbe University.

Nkya (2004); Public-Private Partnership and institutional arrangements: Constrained, Improvement of solid waste management in Dar-es-salam. Uongozi Journal of Management Development Vol. 16 No. 1 June 2004.

Saci (2012); Application of Public-Private Partnership in Sustainable Solid Waste Management; case study of Delhi and Manila Metropolis. Unpublished M.Sc thesis Swiss institute of aquatic Science and Technology.

Uzodinma (2013); Public-Private Partnership and Nigeria's Development. Foundation for Public-Private Partnership Nigeria.

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