Market Based Instrument: An Alternative Means of Minimizing Municipal Solid Waste in Gombe Metropolis, Gombe State, Nigeria

Mu'azu Audu Zanuwa, Abdu Ali, Adamu Muhammad K., Faruk Ibrahim Gaya
Department of Geography Federal University of Kashere, Gombe State, Nigeria

Abstract: **- The amount of municipal solid waste produced daily is significantly increasing in the cities of developing countries. While the capacity and effectiveness of municipalities in providing municipal solid waste services remains undesirably low. The paper examined market based instrument an alternative means of minimizing municipal solid waste (MSW)in Gombe Metropolis of Gombe state, Nigeria. The study revealed that the amount of waste generated is proportional to the population and the average mean living standard of the people. Moreover, market based instruments may be used in minimizing municipal solid waste in Gombe metropolis through the use of purchase relevant instrument, discard relevant instrument, and jointly relevant instrument. The market based instrument for minimization of municipal solid waste comprises of various service such as Collection of waste, Transportation of waste, Separation and recycling of material. The paper recommend that, awareness campaign should be intensified in order to ensure that people employed the habit of sorting their waste, so that recycling material could be reuse by the manufacturer. Also government should make provision of incentive to both producers and consumers that reduce it waste generation.**

Keywords: **Market based instrument (MBIs) and Municipal Solid Waste (MSW), and Metropolis**

I. INTRODUCTION

Environmental problems, such as environmental pollution and solid waste management (SWM), have traditionally been addressed using command and control (CAC) regulations and polluter pay principle, which regulate behaviour directly by prescribing specific legislation and standards which must be achieved, and enforcing compliance through the use of penalties and fines (Perman et al., 2003). By contrast, market base instruments (MBIs), such as environmental taxes and subsidies, seek to change behaviour of producers and consumers indirectly, by changing the relative prices (and hence incentives) that individuals and businesses face. In the context of solid waste management (SWM), they provide incentives for waste generators (producers and consumers) and service providers to reduce waste generation and to seek alternatives to final disposal to landfill (such as re-use, recycling or recovery) (Inter-American Development Bank, 2003).

MBIs are broadly defined as instruments or regulations that encourage behaviour through market signals rather than through explicit directives (Stavins 2000). (Stavins, 2000) further describes the instruments as harnessing market forces because of their potential to redefine the agenda of firms and individuals such that the improved environmental outcomes are in their own interest. The focus in applying MBIs is on achieving outcomes through the self-interest of the firms and individuals. While the key interest in MBI application is achieving policy targets at reduced cost, other interests such as risk may also be targeted (Pannell 2001).

Metropolis is a large city or conurbation which is a significant economic, political, and cultural center for a country or region, and an important hub for regional or international connections, commerce, and communications (Oxford Dictionaries, 2018) The term is Ancient Greek word means the "mother city" of a colony (in the ancient sense), that is, the city which sent out settlers. This was later generalized to a city regarded as a center of a specified activity, or any large, important city in a nation.

A market-based tax approach determines a maximum cost for control measures. This gives polluters an incentive to reduce pollution at a lower cost than the tax rate. There is no cap; the quantity of pollution reduced depends on the chosen tax rate. A tax approach is more flexible than permits, as the tax rate can be adjusted until it creates the most effective incentive. Taxes also have lower compliance costs than permits. However, taxes are less effective at achieving reductions in target quantities than permits. Using a tax potentially enables a double dividend, by using the revenue generated by the tax to reduce other distortionary taxes through revenue recycling (Guerin, 2003).

Management of municipal solid waste is one of the challenges facing most of the urban area in the world, as developing countries continue to urbanize rapidly, 30-50% of the populations in developing countries are in urban area (Thomas, 1998). Although developing nations do spend substantial money on waste management (Schubeler, 1996, Thomas, 1998, Bartone 2000), this is often unable to keep pace with the scope of the problem. In fact, when government of African countries were asked by the world Health organization to prioritize their environmental health concerns, the result revealed that solid waste was identify as the second most important problem after water quality (Senkoro, 2003).

According to (Nabegu, 2008) Solid waste is defined as including non-hazardous industrial, commercial and domestic refuse including household organic trash, street sweepings, Hospital and institutional garbage, and construction wastes; generally sludge and human facael waste are regarded as liquid waste problem outside the scope of municipal solid waste management. Point out that although certain contaminated medical wastes, human facael and hazardous industrial wastes are not included by definition, in many developing nations, Nigeria inclusive these are in fact part of the municipal solid waste stream and there are no special measures employed to encourage their separation and mitigate the potential harmful effects.

Once scarcity is acceptable, appropriate technology will be developed to minimize waste generation, minimization of waste will be achieved by adopting the 3R principle of reduce, reuse and recycle. There are two basic problems with the disposal of municipal solid waste, the first is that, opportunity cost of landfills is very low and is rising, the second problem is not in my back yard syndrome (NIMBY) (Jenkins, 1993).Even if the opportunity cost of landfills is small, the NIMBY syndrome make the use of Landfills unattractive option due to the increased transportation cost and shortage of space land.

Nabegu (2006), is of the opinion that waste management in Kano metropolis is inadequate, a significant portion of the population (80%) does not have access to waste collection services and only 20% of the waste generated is actually collected. The organization for the transfer and disposal of waste is unsatisfactory, from the environmental, economic, and financial points of view. The vast majority of the users of the service (90%) consider the service as very poor.

Study by (Buba, 2016) on assessment of household solid waste management in Gombe, Nigeria. The study revealed that the socio-economic characteristics of the households in the study area have influence on waste generation, collection and disposal in terms of their educational levels, monthly income, and households' family size. At the high and medium income neighborhoods such as G.R.A and Federal Low cost the rate of waste generation is higher compared to the low income neighborhoods such as Ajiya and Kagarawal. This is as a result of the high income levels of the residents of the high and medium income neighborhoods in purchasing more items than the residents of the low income neighborhoods. The study also revealed that majority of the residents in Gombe dumps their wastes in open spaces, drainages and vacant plots. About 32% of the residents do not have their wastes collected at all most especially in the low income neighborhoods such as Kagarawal. The results also indicate that waste separation does not take place at both households' level and official dumpsites. Most of the wastes generated are food, paper, textile materials, plastic materials, polythene bags, bottle and tin cans. The results indicated that the agencies in charge of solid waste management in Gombe were not efficient. This could be closely linked with the lack of equipment's, trained manpower, and poor funding of these agencies and also the negative attitude of the households towards solid waste management.

In Nigeria, for instance it is not unusual to see heaps of garbage in the major cities littering the streets, dumped in drains, vacant plots, and water bodies, and this has in many cases resulted in spread of communicable diseases. The situation appears to continue unabated due largely to the factors of urbanization, population growth, improved life style and insufficient funds to properly manage solid waste. Furthermore, some of the factors influencing solid waste generation in Nigeria include inadequate technology, facility for separation at source, strength of solid waste management policy and enforcement, environmental education and awareness and income status of individuals (Abel, 2009).

The accumulation of wastes at various corners of the Gombe metropolis and varying levels of collection or non-collection in areas of the metropolis, inadequate transportation and storage facilities has made refuse common features of Gombe metropolis. Despite the efforts put in by the Gombe State Environmental Protection Agency (GOSEPA) as well as the State Ministry of Environment, it still faces waste management problem. Despite this problem, very little research on municipal solid waste minimization has been carried out in Gombe metropolis. Therefore, municipal solid waste minimizationin Gombe metropolis need to enhanced. This can be enhanced through the use of market based instrument to minimize generation of municipal solid waste in Gombe metropolis. This paper examined market based instrument an alternative means of minimizing municipal solid waste in Gombe metropolis, the paper illustrate how market base instrument might bring about efficiency in municipal solid waste minimization with a view to identifying constraints that impede efficient minimization.

II. STUDY AREA

The study area is located between latitude $10^0$15' 02''N - 10^0 20' 00''Nof the equator and between longitude $11^0$15' 00''E - $11^0$15' 05''E of the green wich meridian. Gombe metropolis is located in North East geopolitical zone of Nigeria. Gombe metropolis has an area of 52km2 and a population of 266,844 persons according to 2006 population census (NPC, 2006). The population is projected to be 399,531 persons in 2015 using 3.2% growth rate (National Population Commission Gombe State Office). Gombe metropolis shares common borders with Kwami in the North, Akko in the South and Yamaltu Deba Local Government Area in the East.

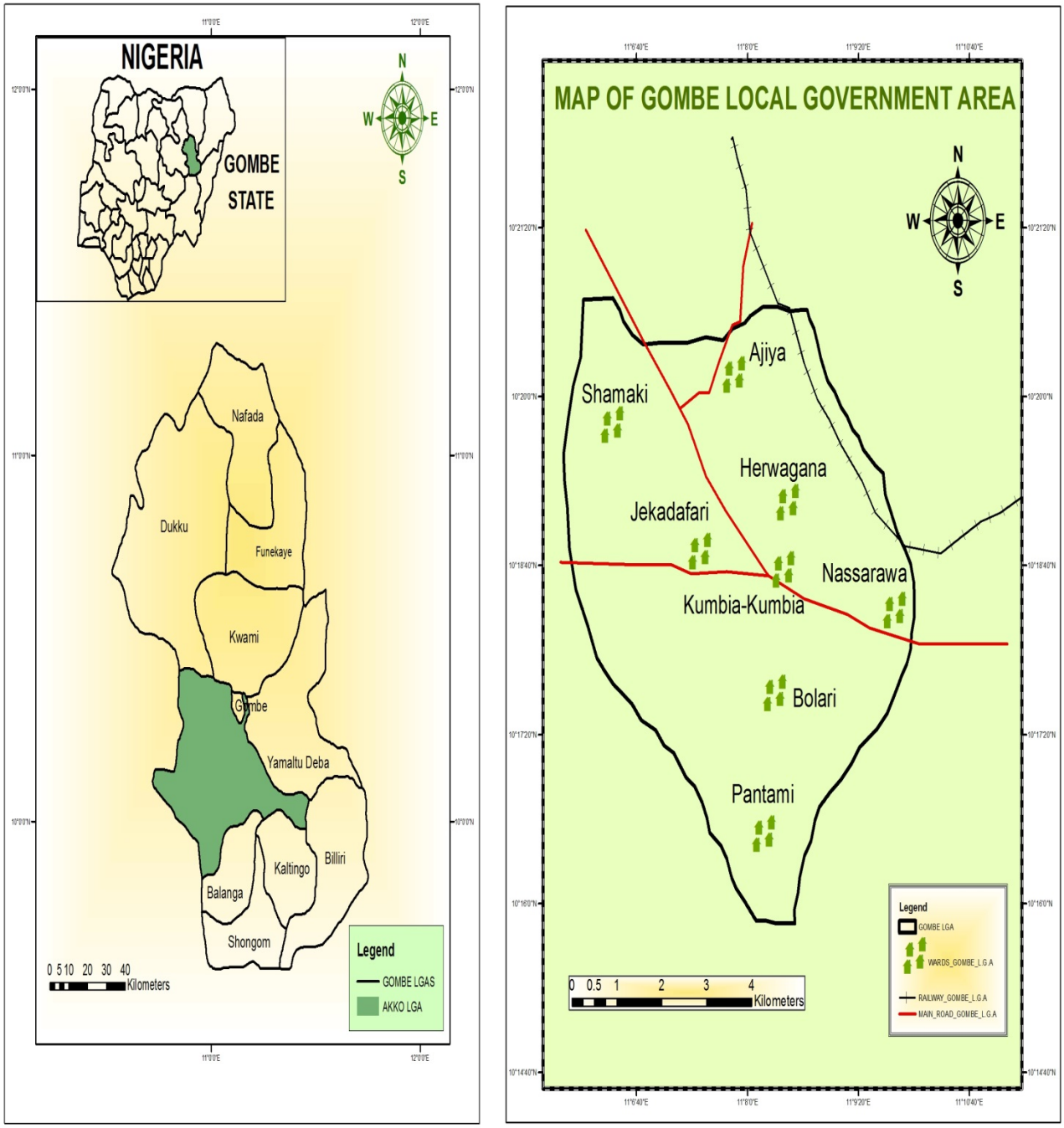

Figure 1: Map of Gombe Local Government Area Showing Gombe Metropolis

Source: Adopted and Modified From Administrative Map of Gombe State

III. METHODOLOGY

In order to examine market-based instruments as an alternative means of minimizing municipal solid waste. Inventory of available information on municipal solid waste management from Gombe state waste management agency, literature review on market-based instruments. Greater emphasis was placed on metropolitan residents, as these typically face the largest volumes of domestic, commercial and industrial waste.

IV. DISCUSSION

Market based instruments for minimizing municipal solid waste in Gombe metropolis, are;

Purchase relevant instrument**:** These are instrument that will affect the price of the product that generates MSW.

Therefore, they will bring about chargers in consumer choice between substitutes in competitive market economy. For example product levies such as packaging tax on material used for packaging, which increase the price of the product, will lead to a reduction in packaging material per unit of volume or per unit of weight packed. Similarly goods continuing recycled material should attract lower product leave than goods that are similar but do not incorporate recycled materials. Such levies will change the behavior of both producer and consumer and in turn will force them, directly to take account of the minimization of MSW in Gombe metropolis.

Discard relevant instrument: These are instruments that work at the time of discard as the name suggest. An example of this is the quantity related garbage collection and disposal fees (Hong etal 1993: Jenkin, 1993). Since garbage and disposal fees is free in Gombe metropolis, government should introduced fees based on the quantity of refuse discarded, there will be greater incentive to reuse of some material that is capable of being reuse, Which would have been normally discarded in the absence of such instrument. This instrument will not only encourage reuse of material but also recycling of material. Government should also put additional charger leaved on household in removing the unwanted material as garbage by the municipality is greater than the additional cost. (Including the opportunity cost of time) incurred by the household in taking that material to the recycling centre.

Jointly relevant instrument: Here the consumer pay a leave when he or she purchase the product and receive a refund when the consumer return the container of the product. An example of this is the deposit we pay for bottle on the purchase of a bottle drink and refund that you receive when that is bottle is returned to the place of purchase. The purpose of this is to encourage people to return the container, which could be reuse or recycling by the manufacturer, rather than throwing it as garbage. Such policy instrument will help in reducing the society total cost of deposal of material by encourage the reuse and recycling of material.

For Market based instrument to minimize municipal solid waste in Gombe metropolis should satisfy the following three important criteria, namely;

- The principle of economic efficiency: That is, it should provide a least cost solution that is able to mitigate range of pollution and resource usage impact associated with packaging, Including the administration and compliance cost. Also the market base instrument should provide a continuous incentive for seeking least cost solution.
- The principle of equity: That is, the market base instrument should not confer disproportionate burden on the least well off in the society. That is, the impact of the instrument should not be significantly regressive.
- The principle of acceptability: That is, the market based instrument should be easily internalized by the existing market and institutional system and should be transparent.

Solid Waste Quantities and Characteristics

Knowledge of the source and the types of solid waste, along with data on composition and generation rates, is basic to minimization of solid waste. In Gombe metropolis, there is little knowledge on the quantiles of solid waste generated. This latest estimate, which are currently far from being reliable, indicate that the total amount of solid waste disposal at open dump site is around fifteen metric ton, which is equivalent to fifteen thousand kilo gram (15,000kg) daily in Gombe metropolis(Gombe State Environmental Protection Agency, 2018).

Economic Instrument

The economic instruments proposed by this paper is in line with the polluter pay principle. The solid waste package and product levies as well as deposit refund schemes. This service levy should be at least about 75% of the economics service levy in view of the poor socio- economic status pot holder in the service area. An attempt could be made to cross subsidize this levy by the solid waste levies. The sanitation fees in the household areas should be at least 50% of the economic fees in the household area, and 100% in the non -residential source.

V. CONCLUSION AND RECOMMENDATIONS

The study showed that market-based instruments are important policy instruments for minimizing municipal solid waste. If designed well, the instruments offer potential to decrease compliance costs, compared to present method of municipal waste management in the study area. The analysis identified a number of market-based instruments and incentives that could potentially be applied to the design municipal solid waste minimization. Successful implementation of the identified potential instruments and incentives requires accurate advance planning. Moreover, the role of the government is essential in the introduction and implementation of market-based instruments for municipal solid waste minimization. The identified instruments are mostly price- based instruments based on positive incentives (e.g. subsidies for municipal solid waste reduction) and negative incentives (e.g., tax on municipal solid waste collection).

The paper recommends that:

- With the opportunity cost of land rising and with NIMBY syndrome, finding suitable land to dump municipal solid waste may become a major problem therefore, an instruments such as market base instrument may help in changing the behavior of both producers and consumers to minimize municipal solid waste in the study area.

- Awareness campaign should be intensified in order to ensure that people employed the habit of sorting their solid waste, so that recycling material could be reuse for other purpose by the manufacturing companies and individuals.
- Government and non- government organisation should make provision of incentive to both producers and consumers that reduce and sort it waste.

REFERENCE

[1] Abel, O. A. (2009). An Analysis of Solid Waste Generation in a Traditional African City: The Example of Ogbomoso, Nigeria. *Environment and Urbanization, SAGE Journals*, 19(2): 527- 537.

[2] Bartone, A.S. (2000).*The environmental dimension of urbanization in Developing countries* London, mathuenen.

[3] Bonhm, p (1981), *Deposit Refund system: The theory and application to environmental Conservation and consumer policy*, John Hopkins University press, Battimore, USA.

[4] Buba, H. B. (2016) *Assessment of Household Solid Waste Management in Gombe, Nigeria*; A Dissertation Submitted to the School of Postgraduate Studies, Ahmadu Bello University, Zaria

[5] GOSEPA. (2018). *Gombe State Environmental Protection Agency* (GOSEPA)

[6] Guerin, K. (2003). Property right and environmental policy: A New Zealand perspective, Wellington. New Zealand: NZ Treasury.

[7] Hong, R, Adams, R,Love, A. (1993). "An economic analysis of household recycling of solid waste":The case of Portland oregun", *Journal of environmental economic and management*,Vol.25,pp.136-146.

[8] Inter-American Development Bank.(2003). *Economic instruments for solid waste management*: Global review and applications for Latin America and the Caribbean. Washington, D.C. Inter-American Development Bank

[9] Jenkins, R.R. (1993).*The economics of solid waste Reduction***,** Edward Elgar.UK.

[10] Nabegu, A.B. (2006).Option for the organization of solid waste management in Developing Countries: The case of Kano Metropolis. *Journal of Research in environmental issues* 2006/25JRES

[11] Nabegu, A.B. (2008). Municipal solid waste characteristic in three Residential Zone of Kano Metropolis: implication for management. *Journal of Art and social science* vol.6

[12] National Population Commission. (2006). *Population and Housing Census of the Federal Republic of Nigeria*. Priority Tables (LGA) National Population Commission Volume II.

[13] Oxford Dictionaries. (2018).*Definition of metropolis*: Retrieved on 25, May 3018

[14] Pannell, D.(2001). 'Harry Potter and the Pendulums of Perpetual Motion: Economic Policy Instruments for Environmental Management'. *Connections - Farm Food and Resource Issues*, summer.

[15] Perman, R., Ma, Y., McGilvray, J. and Common, M.(2003). *Natural resource and environmental economics*. Pearson Education, Harlow.

[16] Schubeler, R. (1996).*Population, Urbanization and the environment:* UK Press Ltd

[17] Senkoro, D. (2003). *Framework for municipal waste management* in Dakar.

[18] Stavins, R. N. (2000).*Experience with market based environmental policy instruments,* Resources for the Future Discussion Paper 0009, January 2000.

[19] Thomas, H. J.A. (1998).*Municipal solid waste management in Developing countries:*Options. New York