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Economic and Utilization Potentials of Solid Wastes Management in Urban Markets of Ibadan

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Abstract

The study evaluates solid waste management techniques in two selected markets in Ibadan in order to determine solid waste management for the purpose of efficient utilization potentials and economic benefits. The markets selected are Aleshinloye and Bodija markets which are built to meet national standard. Oral interview was conducted on the randomly selected respondents using well-structured questionnaires and review of published literature was also adopted for this study. The nature and composition of solid waste generated, disposal techniques, recycling, and potentials of waste management techniques in relation to the socio-economic characteristics of the traders in the markets were investigated. 200 questionnaires were administered to the study areas and the data obtained were analyzed using frequency, bar charts and chi-square for the solid waste techniques between both markets. The findings showed that there are variations in all the variables and revealed that the techniques used for waste management in both markets were inadequate. It was recommended that awareness campaign should be set up for proper waste management process through proper education among the traders especially. This paper also suggests that State and local government should collaborate with other environmental agencies in managing, constructing and building waste recycling plant and government should assist in other logistics to allow smooth running of the factory. Finally, it was recommended that urban renewal strategy should also be adopted for future reference.

Keywords Markets; Recycling; Waste; Management; Solid waste; Socio-economic; Ibadan

Introduction

In most developing countries, the problems associated with solid waste management are more acute than in the developed countries [1]. Some of these problems are lack of financial resources to manage the waste and infrastructure to deal with solid waste to create a vicious cycle; the lack of resources management leads to low quality of service provision which leads to fewer people willing to pay for services, which in turn further erodes the resource base and so on [1,2]. The problem associated with the solid waste management is further complicated by the rapid growth in population and urbanization of the country, which has influenced an increase in the volume of waste being generated and waste retrieval/disposal services in municipal areas. In Nigeria, the rate of urban expansion is put at 3.6% per annum with higher growth figure of 6% been recorded in cities like Lagos, Ibadan, Kaduna, Port Harcourt, Warri etc. [3,4]. It was estimated that 374.4 million are city dwellers in Africa in 2007 and is expected to hit 759.4 million by the year 2030 and possibly rising to 1.2 billion by 2050 [5]. However, more often than not, an increase in population is not matched with an equal increase in service and revenue for the local municipalities for waste management [1].

Wastes are materials which arise from animal and human activities that are referred to as useless, unwanted and discarded materials [6,7]. In the same vein, the Number 16 of Lagos State Environmental Sanitation Law of 1984 also defines 'domestic waste as 'refuses' and section 27 also defines waste as either any substances which constitute scrap material or an efficient or other unwanted, or surplus substances arising from application of a process, or any substance or article which requires to be disposed of as broken, worn out or otherwise spent. While in developed countries like USA, United States Environmental Protection Agency also defines solid waste as any useless, unwanted or discarded material with insufficient liquid content to be free flowing. It can also be referred to as wastes from households, municipal services, construction debris and agricultural activities. This also includes non-hazardous, non-liquid wastes from institutions and industries [8]. According to the World Bank, waste generation is greatly influenced by a country's development [9]. In Nigeria, it was estimated that about 20 kg of solid waste is generated per person/capital while Lagos State alone generates over 10,000 tones of solid waste daily [3,10]. In Ibadan city, 0.71 Kg are generated per person/day with about 55,200 kg per day of solid wastes were estimated to be generated in Oyo State [11,12]. The volume of solid waste generated in Nigeria is over-whelmed and alarming, the urban administrator's need to urgently plan for their collection and deposal. Attempts to solve this problem effectively have given rise to myriad of strategies involving measurable amount of capital and human resources but yielded little or no positive impact on either the physical and economic importance of the urban or cities.

Generally, the more economically prosperous a country is, the more waste it generates per capita but the factor that seem to bridge the gap between waste generation and its resultant effect is the method or efficiency of waste management strategy adopted by such country. A developed country like Britain, USA, Canada, Germany, China etc. had well organized strategies and structures that generate revenue from solid waste used in their countries. But reverse was the case in most Africa countries like; Nigeria, Togo, South Africa, Ghana and

Cameroun. Their steady increase in population and poor waste management strategies give increase in their rate of waste generation from industrial and human activities. The income per capita and economic growth of developed countries will be increasing while the developing countries might be stagnant. In order to boost the economy and provide jobs for the teeming youths, the waste management strategies must change to accommodate profit-oriented mechanisms. Therefore, this study assessed the economic and utilization potentials of solid waste generated in urban markets in Ibadan metropolis.

Methodology

This study was carried out in the city of Ibadan, located on longitude 30 53'E of the Greenwich Meridian and latitude 7034'N of the equator. Ibadan has eleven (11) local government areas, namely Ibadan North, Ibadan North East, Ibadan North-West, Ibadan South-East, Ibadan South West, ido, Akinyele, Lagelu, Ona-ara, Egbeda and Oluyole. The city currently covers an area of over 500 km^2, near the forest grassland boundary extending West side to Abeokuta, East side to Ile-Ife, North side to Ilorin and South side to Lagos. Ibadan is known for trading and has many markets located in all the local government areas. But the choice of the market used for this study was prompted by the factors such as population, quantity of waste generation and structure of the market. Having sorted all the markets located in all the local government areas based on the factors mentioned above, the shortlisted ones were randomly selected using randomize sampling technique. Following these procedures, Aleshinloye and Bodija markets that falls under Ibadan South West and Ibadan North local government area councils were selected. The primary and secondary sources of data in this study were through the use of questionnaire administration. 100 of well-structured questionnaires were administered to the respondents in each market with interviews. Also, direct observation was conducted to ensure an in-depth understanding of the subject matter under investigation and to verify some information provided by respondents. The secondary sources of information gathered were from text-books, journals and documentaries derived from the State and Local Government Environmental Unit responsible for waste management in the markets. The data collected were analysis using Microsoft excel (window 10) for chi-square, descriptive statistic and the results were presented in table and bar chart formats.

Results and Discussion

Demographic characteristics

The demographic characteristics of respondents within the study areas where there is integrated waste recycling plant (Aleshinloye market) and where there is not (Bodija market) were presented in Table 1. It was shown in Table 1 that 36.7 and 33.3% of the respondents were between the ages of 36-45 years for Aleshinloye and Bodija markets and these are the highest dominants aged group found in both markets. At the same time, 2.2 and 4.2% of the respondents from Aleshinloye and Bodija markets with the aged group that falls between 66 and above was found to be the least dominants of people in the markets. In Table 1, it was found that 63.3 and 54.0% of the respondents in Aleshinloye and Bodija markets were female; while 36.7 and 43.7% were male from Aleshinloye and Bodija markets. This finding implies that female traders were predominant in both markets than their male counterpart. Additionally, Table 1 also shows that 65.6 and 81.3% of the respondents were married and the majority of the respondents with 57.8 and 47.9% had attained secondary school education for Aleshinloye and Bodija markets. Furthermore, the majority of the respondents of 72.2 and 76% had a family size of 2-5 for Aleshinloye and Bodija markets and are mostly Yoruba with 53.3 and 66.7%, followed by the Ibo with 44.4 and 18.8%. It was also revealed that most of the respondents have spent 6-10 years of their lives as trader in the markets followed by respondents with 10-15 years (Table 1).

Classification of waste disposal

Nature of wastes disposed: The results related to the nature of waste disposed in both markets are shown in Figures 1 and 2. The wastes disposed in the markets were classified into biodegradable and non-biodegradable, the solid waste types include paper, nylon, wood, dust, cloth, metal scraps, electronic gadgets, bottles, food remnants and vegetables, sawdust, ashes, rubber, bones and plastics. The wastes disposed by the respondents in Bodija market has 85.4 and 23.3% for non-biodegradable and biodegradable while Aleshinloye has 76.7 and 14.6 percent for non-biodegradable and biodegradable (Figure 1), which implies that respondents in Bodija markets disposed more non-biodegradable wastes than the respondents in Aleshinloye market, which could be as a result of land mass occupied by each of the market. The nature of solid wastes generated in these markets agrees with previous findings [3,13]. However, when compared in terms of nature of wastes disposed, it was shown in Figure 1 that non-biodegradable waste items were more predominant than biodegradable waste items in the markets.

This study also investigates the composition of waste disposed in these markets. Figure 2 shows that vegetables, papers, textiles, plastics, metals, animal wastes and others were higher in percentage for Bodija market than Aleshinloye market. In all the composition of wastes disposed in the markets, Figure 2 shows that plastics waste were most disposed at 31 and 28 percent, followed by vegetables waste with 28 and 24 percent, followed by animal wastes with 23 and 19 percent, followed by textiles waste with 8 and 14 percent while the least waste disposed are metals, tyres, bottles etc. this findings corresponded with the previous study [12] that total solid waste generated in Ibadan were 66.1% from domestic, 20.3% commercial and 11.4% industrial. So therefore, most of the solid wastes generated in the markets are more of domestic than the others.

Demographic characteristics	Levels	The selected Markets			
		Aleshinloye		Bodija	
		Frequency	Percentage	Frequency	Percentage
Age (yrs)	15-25	6	6.7	6	6.3

	26-35	20	22.2	16	16.7
	36-45	33	36.7	32	33.3
	46-55	21	23.3	28	29.1
	56-65	8	8.9	10	10.4
	66 above	2	2.2	4	4.2
Gender	Male	33	36.7	42	43.7
	Female	57	63.3	54	56.3
Marital Status	Single	21	23.3	14	14.5
	Married	59	65.6	78	81.3
	Widow	8	8.9	4	4.2
	Divorce	2	2.2	0	0.0
Educational qualification	No formal	2	2.2	10	10.4
	Primary	8	8.9	6	6.3
	Secondary	52	57.8	46	47.9
	Tertiary	28	31.1	34	35.4
Family size	Below 2	2	2.2	5	5.2
	2 – 5	65	72.2	73	76.0
	Above 5	23	25.6	18	18.8
Tribe	Yoruba	48	53.3	64	66.7
	Ibo	40	44.4	18	18.8
	Hausa	2	2.2	8	8.3
	Tiv	0	0.0	5	5.2
	Fulani	0	0.0	1	1.0
Primary occupation	Trade	96	100.0	90	100.0
	Any other	0	0.0	0	0.0
Year of experience	1-5	2	2.2	6	6.2
	6-10	52	57.8	48	50.0
	15-20	26	28.9	30	31.3
	20 above	10	11.1	12	12.5
Total		90	100%	96	100%
Source: Study 2017.					

Table 1: Shows the outcome of demographic information collected from the respondents at each of the market.

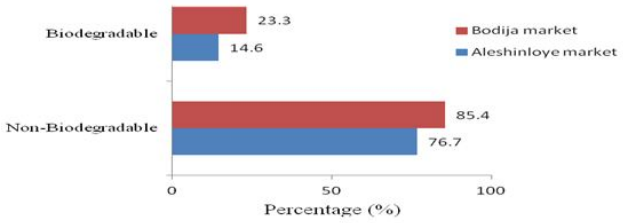

Figure 1: Nature of waste disposed in the markets.

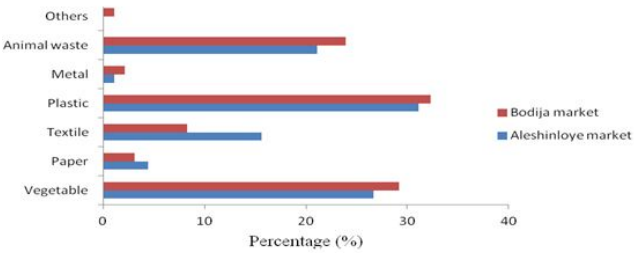

Figure 2: The composition of waste disposed in the markets.

Waste disposal techniques

In the assessment of waste disposal practices in the markets, it was discovered in Figure 3 that most respondents in both markets disposed their wastes at the designated dump sites, showing that this technique of disposing waste on the dump site was higher in Bodija market with 72.9 percent to Aleshinloye market with 67.8 percent. It also shows that 12.8 percent and 8.3 percent of the respondents disposed their wastes by burning while 10.0 percent and 12.5 percent disposed their wastes by exchange (selling) in Aleshinloye and Bodija markets. The response from the respondents shows that 3.3 and 4.2 percent disposed their wastes through burying while very small respondents with 1.1 and 2.1 percent in Aleshinloye and Bodija markets respectively disposed their waste in unlawful manners like pouring it into drainages and in unauthorized locations (sites) such as; middle of the road (Figure 3). These observations are similar to the previous findings that most markets in Enugu State dispose their wastes through burning as well, which seems to be the method being used predominantly for waste disposal other than any other methods [8]. Results also show in Figure 3, that disposal techniques like dumping waste in dump site, burying, selling and other unlawful means were more practiced in Bodija than Aleshinloye market. This could be as a result of lack of facilities, lack of advanced technology, poor management policy and enforcement, lack of environmental education. Abel in his study showed that education, income and social status play important factors in solid waste generation and management [9].

Waste recycling management

There has been improved better technology for waste management in the society, many researchers have worked on different mechanisms and there results are still not known to the producers of these wastes. This study therefore investigated there level of awareness in waste recycling management. The outcome of the responses from the respondents on their ideas or knowledge about waste recycling techniques are presented in Figure 3; it shows that large percentage of the respondent in Aleshinloye market are more familiar with the recycling method of managing waste by 94.4 percent with their response as "YES" while only few responded "NO" which is 5.6 percent, but have lesser response from the respondents in Bodija market; 44.8 percent responded to "YES" while those that responded to "NO" were 55.2 percent compared to Aleshinloye market.

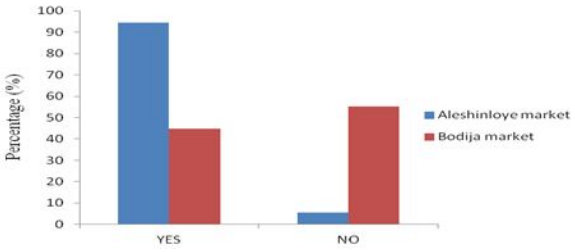

Figure 3: Respondents that have knowledge in recycling techniques.

In the assessment of the waste management practices in the market found within Ibadan metropolis, it was discovered that most of the shop occupants, especially those inside the markets are not familiar with any other management techniques than burning or engaging the waste management authority for collections, this agree with previous findings [13], it does mean that most of the respondents have little or no environment knowledge in Bodija market but the response was different in Aleshinloye. This response might be as a result of establishment of solid waste recycling factory found at Aleshinloye market. Open dump and burning of solid waste has being a common practice in Nigeria, some are dump their wastes by road side, while some empty it into free run stream. Figure 4 shows that 90.3 percent of the respondents believes in the idea of recycling wastes than burning or dumping it in the drainages, very little of 4.3 percent thinks it is not necessary while 5.4 percent are (indifferent) do not know, which could be probably be due to the lack of knowledge or low level of environmental educations. Many considered these methods as cheap way of disposing off their wastes but dangerous to the environment, cases of several diseases have been recorded as a result of these techniques [14,15]. In open burning system, Thick and dark smokes from burning of plastic components and saw dust in the mills have been seen spiraling up the sky, this causes serious and dangerous environmental pollution by releasing gaseous that leads to serious climate change [13]. All these problems could be solved if proper awareness on reuse and recycling of solid waste can be embarking upon and the government should be ready to provide facilities for the system. Furthermore, this study also looks at the possible benefits that could arise from establishment of waste recycling factory in the markets as a way of managing the wastes disposal. Most of the respondents believe the solid waste recycling facility will help in maintaining cleanliness in the market, generate revenue and create job opportunities. In cross sections of the markets selected for this study, most of the respondents in both markets think it would be a great development if solid waste recycling plants could be established in the markets. Some researchers have studied the great potentials in recycling Nigeria's municipal solid wastes to production of biogas and organic fertilizer [16]. Others researched on mixtures of manure and ashes from burnt wastes for soil amelioration in Jos [17]. The use of

wood wastes, plastic and nylon waste bags generated per day are other raw materials for the production of polymer composite. All these can form huge economic benefit to the people and governments.

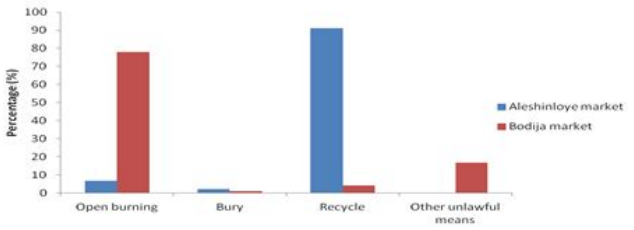

Figure 4: Methods of waste management techniques used in the markets.

Impact of government to solid waste management in urban markets

The impact of governments to solid waste management techniques in the markets was investigated in the study. Majority of the respondent believes government effort in managing the solid waste in the markets was fair and while few of the respondents believe there involvement is excellent and good. The outcome of these response leads to the following suggestions that;

1. Government should create awareness programme on solid waste management techniques and how best to manage waste and generate revenue from it.
2. Government should collaborate with relevant stakeholders in providing facilities to support solid waste management and also build hygiene environment for buying and selling.
3. Government should be able to provide necessaries logistics to support smooth running of recycling plants.

The result of Pearson chi-square shows that there is no significant variations between the type of waste disposed and methods of waste disposal in the markets, this implies that the type for waste disposed in both markets are similar. However, there are significant variations in the knowledge about waste recycling techniques.

Conclusions

The findings from the study could be summarized based on the assessment of solid waste disposal in two selected major markets in Ibadan conducted through administering of questionnaires to 200 respondents found within Aleshinloye and Bodija markets. The following conclusions were drawn:

- Most of the solid wastes generated and disposed in urban markets are found to be non-degradable such as plastics, polythene bags, scrap metals etc.
- Most of the respondents preferred to engage in unlawful and unhealthy means of waste disposal techniques which may cause problems such as outbreak of epidermis diseases and flooding that may lead to loss of life and properties.
- There is lack of adequate knowledge and awareness on recycling methods and techniques for solid wastes.
- The performance of the recycling facilities found in one of the markets proved effective in market cleanliness and revenue generation.

Recommendations

From the study, these were the following recommendations made:

- The government and private sector entrepreneurs should collaborate to set up solid waste recycling/processing plant in markets for health and economic benefits.
- The most fundamental way to reduce waste is to prevent it from becoming waste in the first place. The materials found in our dustbins are raw materials for other products.
- Government or concerned agency should stipulate standards for the construction and design of solid waste management systems for recycling and processing system.
- There should be frequent public education enlightenment and awareness on proper methods of solid waste collection and disposal.
- There should be proper prosecution and punishment for individuals who generate and dispose solid wastes indiscriminately.

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