

EXPLAINING THE RE-USE AND RECYCLING METHODS OF WASTE RESOURCES IN URBAN ZARIA

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ABSTRACT

Solid waste resource re-use and recycling occur in patterns that can be empirically investigated but which have not been conducted in Zaria. The objectives of this paper are to: determine the sources and destinations of recyclable municipal solid waste; analyse the spatial distribution of collection points, and analyse the spatial distribution of artisanal recyclers in the study area. A total of 252 scrap metal/plastic collectors, scavengers and artisanal recyclers' were studied using purposive and snowball sampling techniques and descriptive statistics was used for the analysis. The results showed that in Samaru artisanal recyclers, scrap metal and plastic bottle collectors About 71.8% of waste collectors collect from multiple sources compared to single sourcing of usable materials while only 7 % of the respondents usually partake in recycling activities. From the survey about 73.4% of the respondents collect assorted plastics for either sale to people involved in re-use or from both within and outside Zaria. As high as 83.7% dispose their materials within Zaria, about 11.1%, 4.0%, and 1.2% of major dealers of scrap metals and assorted plastic collectors convey such goods to Lagos and Kano. It is concluded that solid waste resource re-use and recycling activities from Zaria takes place within and outside the geographical boundaries of Zaria. In order to facilitate intra-spatial waste resource economy of scale, recycling plants should be established in Zaria.

Key words: Municipal solid waste, resource re-use/recycling, scavengers, artisanal recyclers.

INTRODUCTION

The term 'waste' has a different meaning for different people. In general, waste is 'unwanted' for the person who discards it; a product or material that does not have a value anymore for the first user and is thrown away. But 'unwanted' is relative and the waste could have value for another person in a different circumstance, or even in a different culture. There are many large industries that operate primarily or exclusively using waste materials such as paper and metals as their industrial raw materials. In the context of Integrated Solid Waste Management (ISWM), waste is regarded both as valueless and as a useful material providing a potential source of income. This real value of waste in many low-and middle-income countries in the South is confirmed by the huge informal sector that lives from waste collection and recovery (Van de Klundert and Justine, 2001).

Waste, either in solid or liquid form is being produced since the dawn of human existence. It is the first thing generated before people are able to contribute to the betterment of lives. Due to social and environmental consequences, waste recycle, reuse and recovery have become essential in minimizing the environmental damage that could occur through indiscriminate waste disposal (Sivapalan *et. al.*, 2005). Davies (2008) notes that "what some people consider to be waste materials or substances are considered a source of value by others" This relative attribute of waste can be compared with the concept of 'resource' which has also been defined as material that has use-value and "a reflection of human appraisal" (Jones and Hollier, 1977).

By "Re-use" what is inferred is a process by which discarded materials like plastic bottles, sachet water bags, glass, paper, woody furniture, scrap metals etc. in their original form

are utilized or sold to other users who need them. In other words, re-use is simply using materials for something other than the purpose for which they were originally designed. Re-use can be a creative process for using an item rather than throwing it away (Bill, 2009).

Recycling as adopted in this study is a process whereby recovered waste materials like paper, aluminum, animal by-products, plastics scrap metals etc, are converted to valuable materials (e.g. aluminum scrap and cans are transformed into frying pans and pots by artisanal recyclers) or as raw materials for utilization by the industrial sector. The recycling sector is a multi-million-naira investment, where some specialized equipment and machines are used for the conversion of the recovered items to finished products or raw materials that are also used in several other applications (Adebola, 2006).

Scavenging is now regarded as a means to reduce the amount of solid waste to be disposed and help to save the natural resources that leads to sustainable development (Muktar, 2011). It creates jobs and extra income for people especially the poor. Scavenging makes people to sort out materials from wastes in exchange for money and supplies raw materials for recycling enterprises. Nigerian Environmental Study Action Team (NEST) (1991) revealed that; the present harsh economic condition in the country has led to the emergence of interest in waste recycling. It is now quite common to see scavengers at work on most waste disposal sites salvaging all items they believe to be usable or in demand as industrial raw materials. Examples include; unbroken bottles, rusty pots and pans, broken metal chair legs, leaking plastic containers, old car tyres and plastic shoes, clothes buttons, and zip fasteners, as well as milk tins, among others. Despite the obvious health hazards which scavenging poses to both the waste pickers and their customers, it must be admitted that it is helping the society to cope with solid waste disposal problem.

Recycling is also now accepted as a suitable option on the waste management hierarchy (Agarwal *et. al.*, 2005; Bolaane 2006). This is because it does not only provide an avenue for the identification, recovery and exploitation of waste as a resource (Sicular, 1992; The Chartered Institution of Wastes Management, 2007) but also for its potential contribution towards environmental management and livelihoods (Masocha, 2006; Langenhoven and Dyssel, 2007). Waste recycling in developing countries is being driven by the informal sector, often with minimal, if any, input from institutions of the state (Castells and Portes, 1989; Ahmed and Ali, 2004; Wilson *et. al.*, 2006). At the same time, the informal sector is becoming increasingly integrated into the social, cultural and economic systems of most developing countries. Consequently, solid waste management (SWM) and recycling by the informal sector, unarguably of contemporary phenomena, which have contributed to socioeconomic development in low-and middle- income countries (Berthier, 2003; Wilson *et. al.*, 2006; Gonzenbach and Coad, 2007; Medina, 2007; Gutberlet, 2008).

Though waste problem has not been pronounced for long in the less developed countries like Nigeria, it is known that there have been some local methods by which solid wastes were been reused or recycled. The knowledge of waste recycling and reuse might not be totally new in the Nigerian context. Rather, it is the current sophistication involved that is rather new (Tajuddeen, 2003). For example, it was a taboo to waste anything that cost money in Nigeria. So there was this reuse culture that has been planted in to Nigerians subconsciously. Every item used were structured for reuse. Even today, the sachets of “pure water” are used by horticulturists for flower nursery and paper wrappers are reused. The reuse tradition is what makes old newspapers useful for wrapping roasted groundnut (*Arachis hypogea* Linn) and pop corn (*guguru*) or *akara*, the popular fried beans cake. The fact that the reuse culture saves lots of

money; it is highly conservative resulting in waste management (Ajibade, 2005). Ado (1998) studied the economic importance of solid wastes in Kano metropolis. The findings showed that on the average scavengers that buy recyclables from households generate an income that is equivalent to 50% of the cost of purchase (e.g. for each recyclable they bought at ₦1.00, they would get 50k as profit). The aim of this paper is to explain the re-use and recycling methods of waste resource as waste management strategy in Zaria metropolis. This is what the paper addresses with a three pronged objectives: (1) to determine the sources and various destinations of recyclable Municipal Solid Waste, (2) to analyse the spatial distribution of collection points, and (3) to analyse the spatial distribution of artisanal recyclers in the study area.

STUDY AREA

Zaria lies between latitudes 11°00'N-11° 12'N and longitudes 7° 36'E-7° 45'E, (see figure 1.0). It is about 85 km north of Kaduna. Zaria is one of the seven historical Hausa states, and it is situated within the undulating high plains in the southern part of Hausaland of northern Nigeria. It is the administrative head quarter of Zazzau Kingdom (Musa, 1993). The study area comprises several suburbs such as Samaru (where in is located Ahmadu Bello University), Hayin Dogo, Zango, Palladan, Hanwa, Chikaji, Muchia, Government Reserve Area, Sabon-Gari, Gyellesu, Tudun-Wada, Tudun-Jukun, Tukur-Tukur, Zaria city and Wusasa. These suburbs grew differently, but have almost merged together to become an urban centre known as Zaria (see figure 1.0).

The composition of Zaria population is less heterogeneous than that of Kaduna or Kano. However, Sabon Gari and Samaru population are more heterogeneous in character. The modern crafts include tailoring, barber shop, silver smiths, carpentry etc. Many of the inhabitants are civil servants, factory workers, among others, presenting a ready market for products which when consumed or are used and disposed (Ukoje, 2011). Based on the survey; increase in consumption and affluence have greatly influence waste generation in the study area.

MATERIALS AND METHODS

In order to achieve the aim and objectives of this research a reconnaissance survey was conducted and this afforded the opportunity of knowing the localities in the districts prior to sampling. It also informed the sampling frame and technique appropriate for the study. Data were generated from primary sources such as field observation, questionnaire administration and interview schedules. Additional information was obtained from available literature to enrich the theoretical background of the work.

Based on the reconnaissance survey and the conviction that there were fewer artisanal recyclers but more number of scavengers and plastic bottle collectors, non-probability sampling techniques such as purposive and snowball sampling were used in identifying individuals who responded to the questionnaire. These sampling techniques were appropriate given their strength in identifying unique and informative cases. Thus, a proportionate sample size was decided to be, a total of 252 respondents. The respondents comprised forty nine (49) scrap metal collectors, 75 plastic bottle collectors, 110 scavengers and 18 artisanal recyclers. The field work was conducted within a period of four weeks (second week of November to first week of December). Direct interactions were made with respondents to reveal additional vital information that was not part of questionnaire-interviews. In addition to the interactive sessions, observation of the activities of

waste management entrepreneurs (WMEs) was used to verify the facts of the respondents (see figure 1.0). Information obtained was analyzed through descriptive statistics such as table, percentages, charts etc.

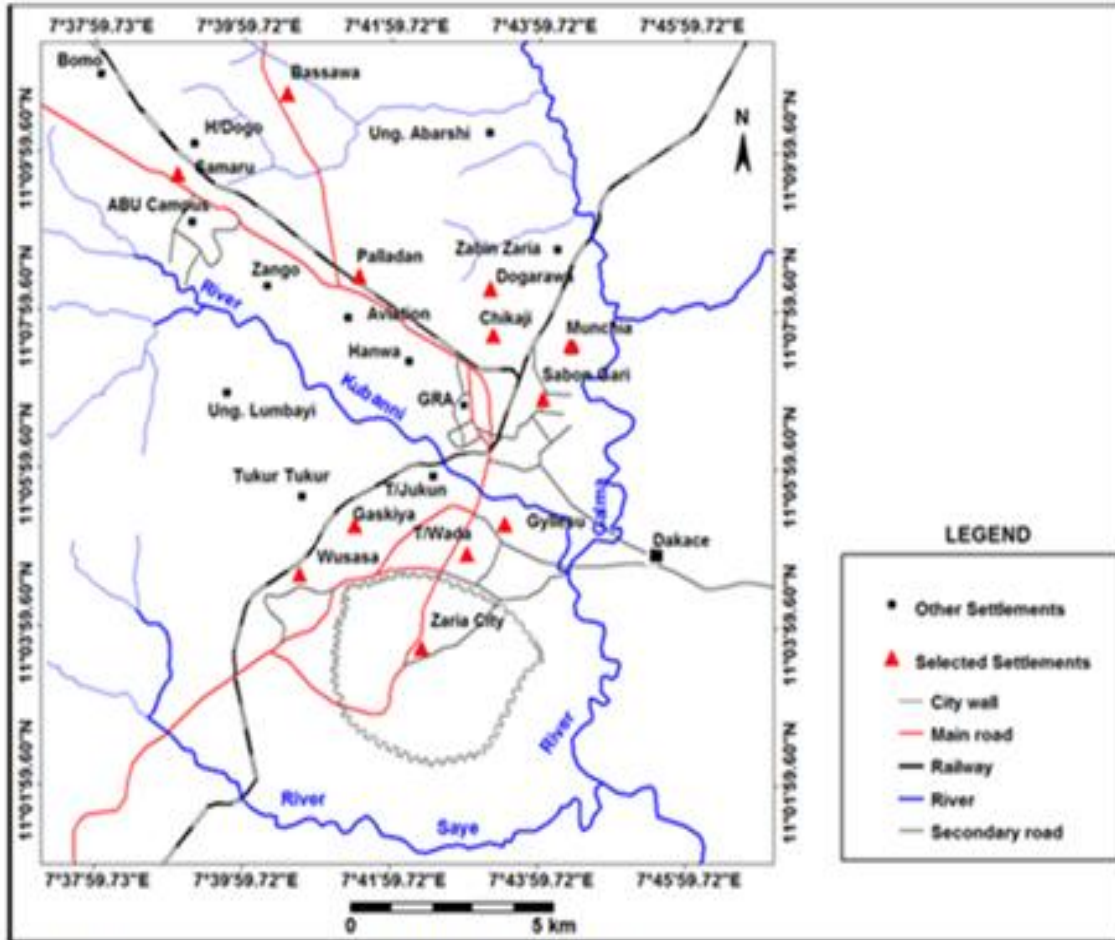


FIG. 1.0 : ZARIA SHOWING SELECTED LOCALITIES AND SUB-URBS

Source : Adapted and Modified from Topographic Map of Zaria, sheet 102, SW

RESULTS AND DISCUSSION

Spatial Distribution of Collection Points

The result revealed that majority of the primary waste collectors (46.4%) within urban Zaria were less than 20 years old. Those between 21-30 years constitute for 34.5% while the least is 1.2% which covers 60 years and above. About 10.3%, 5.6%, 2.0%, are between 31-40 years, 41-50 years, and 51-60 year respectively. While all age groups are represented, the majority are youths, accounting for nearly half of the sampled population. About 82.9% of the respondents who were males mostly involved in all waste activities (scrap metal and plastic bottle collection, scavenging and artisanal recycling). The remaining 17.1% are females.

In Zaria, different localities account for different waste valuables. In all the 12 localities of urban Zaria selected (see figure 1.0), scrap metals and plastic bottles are collected as valuable materials from the twelve localities except for artisanal recyclers which are only found in

Samaru, Muchia and Wusasa. Samaru as a collection point comprises of all actors (scrap metal collectors, plastic bottle collectors and artisanal recyclers) which are the majority accounted for about 15.9% of the sample. Sabon Gari, comprises of only scrap metal and plastic bottle collectors which accounted for about 15.9%.

Muchia and Wusasa are collection points like actors in Samaru accounted for about 11.5% and 6.7% respectively. Other collection points are dominated by scrap metal and plastic bottle collectors and these include Palladan and Gaskiya which accounted for about 6.0%. Also Chikaji and Dogarawa accounted for about 3.6% each, while Tudun Wada, Gyllesu, Zaria City and Basawa accounted for about 13.5%, 9.1%, 5.2%, and 3.2% respectively. Field investigation revealed that pockets of collection points for scrap metal, assorted plastics, artisanal recyclers and scavengers keeps increasing on a daily basis because of wealth attachment to waste valuables.

Sources and various Destinations of Recyclable Municipal Solid Waste

The field investigation shows that 71.8% of waste collectors collect from multiple sources comprising households, institutions, landfill/dumpsites, restaurants etc compared to single sourcing of usable materials. However, institutions constitute for 15.1% while restaurants and households accounted for about 10.7% and 2.4% respectively, of waste collectors that collect waste valuables from single sources. Multiple sourcing of valuable materials adopted by the scavengers, artisanal recyclers, plastic bottle and scrap metal collectors provide a variety and large quantity of recyclable materials which improve their income. It is important to note that at times, especially in institutions or households, scavengers purchase valuable waste from the owners that want to dispose of their waste material, based on negotiation depending on the quantity seen with the eye and not on measurement using weighing balance.

The waste generated can be ascribed to the urban standard of living in the 12 localities sampled. Generally, manufactured products in iron, aluminium and plastic packaging are affordable and consumed by residents in the areas leading to waste materials. From the findings about 73.4% of the respondents collect assorted plastics ranging from plastics for bottling water, or other assorted drinks; for either sale to people involved in reuse or both. From the analysis, about 26.6% of the respondents in the twelve localities were not engaged in plastic bottles collection.

Referring to Table 1 it was observed that a relatively high proportion (56.7%) of respondents disposes the assorted plastics to those involved in reuse like, bottling of locally made drinks (*Zobo and Kunu*), traditional herbs and honey both within and outside Zaria. The collectors surveyed expressed that most of the plastics are utilized locally but at times people from neighbouring state and local government areas such as Katsina and Makarfi, Giwa and Soba obtain these products. The field observations further revealed that some of the respondents sell the retrieved materials within Zaria and transport others to Kano to other reusers.

From this analysis, about 7.9%, 5.6%, 3.2% of the respondents claimed to dispose the material to people producing locally made drinks, traditional herbs and honey respectively. Based on the study about 15.5% of the respondents reuse and sell plastic bottles, about 9.1%, 4.8%, 1.6% are engaged in bottling *Kunu and Zobo*, traditional herbs, and natural honey respectively. While a greater percentage of the respondents don't reuse assorted plastics and this accounted for about 84.5%. The survey revealed that as high as 83.7% dispose their materials within Zaria.

Table 1: Major users of assorted plastics in the study area

Consumers	No. of respondents	Percentage (%)
Honey	8	3.2
Traditional herbs	14	5.6
Locally made drinks (<i>Zobo and Kunu</i>)	20	7.9
No response	67	26.6
All of the above	143	56.7
Total	252	100

Source: Field survey, 2012

These are mainly scavengers, plastic and scrap metal collectors. Moreover, some plastic collectors as earlier stated in Table 1 and products from artisanal recyclers are spatially distributed or utilized both within and outside the study area.

The field investigation revealed that about 11.1% of the respondents especially major dealers of scrap metals convey such goods to Lagos. This may be due to the concentration of recycling plants and high price offered per tonne of the materials as compared to other locations with recycling plants. Also about 4.0% of assorted plastic and scrap collectors indicated that the waste materials are distributed to buyers in Kano. The least (1.2%) were some major scrap dealers that dispose their waste at both Kano and Lagos.

Cost is a very vital item to consider in any business that has to do with conveying of goods from one destination point to the other. Distance in some cases reduces profit margins in any business involving long distance travel. The field investigation revealed that 87.3% of the respondents claimed that they are not involved in transporting the materials to other destinations except to major dealers as earlier stated, absent of recycling plant and high cost actually discourages most entrepreneurs from participating in individual distribution to points outside Zaria. In addition, the cost of conveying recyclables to recycling places as claimed by 8.7% of the respondents who partake in the movement of waste materials to various points was between ₦100,000-₦120,000.00 per 30 tonne load truck capacity, while about 2.0% were also asked same question and their response was that they pay between ₦121,000.00- ₦141,000.00, ₦142,000.00 and above per standard truck each.

Table 2: Cost of 1 tonne of waste material in recycling industries

Cost per 1 tonne	No. of respondents	Percentage (%)
>₦47,000	1	0.4
₦42,000-₦47,000	25	9.9
₦36,000-₦41,000	2	0.8
₦30,000-₦35,000	5	2.0
No response	219	86.9
Total	252	100

Source: Field survey, 2012

According to Table 2, about 86.9% of the respondents don't know the cost of 1 tonne of recyclables in recycling industries. About 9.9% of the respondents were of the view that a tonne of recyclables is worth between ₦42,000-₦47,000 while others 2.0% disclosed that the recycling

industries buy at between ₦30000-₦35000. Only 2 of the respondents claimed that a tonne is sold between ₦36000-₦41000 while only one collector claimed that the price is over ₦47000.00.

Spatial Distribution of Artisanal Recyclers

The finding shows that about 7.1% of the respondents usually partake in recycling activities. It was clearly seen from the responses that most of the respondents were in one way or the other involved in activities that have to do with waste materials aside artisanal recycling. From this analysis, as high as 92.9% of sampled waste collectors in the study area were only engaged in activities like; reuse, scavenging, plastic and scrap metal collection.

Respondents that were involved in artisanal recycling were further asked the products they produce from cans and scrap Aluminium. Only about 6.0% of the local recyclers indicated that they produce pots while a small percentage (1.2%) produces pots and frying pan. About 92.9% constitute the category that never responded since they don't participate in recycling.

RECOMMENDATIONS AND CONCLUSION

By adopting the wealth aspect from waste or treating solid wastes as resources, effective waste management has become not only a service but an instrument for alleviating poverty. Government should not only conceive waste management as a means of service delivery but a war against poverty and poor living environment.

It is suggested that waste activity being an informal sector should be transformed into a more formal sector which will in turn bring about better organization of the sector, hence making it more attractive thus, paving ways for lots of job opportunities for a good number of both unskilled and skilled people residing in Zaria. This can be achieved through involvement of non-governmental organization (NGO) to provide appropriate public awareness, tools and educational programmes concerning the benefits of solid waste management.

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