

Individual Attitude toward Recycling of Municipal Solid Waste in Lagos, Nigeria.

Tunmise A. Otitoju

(Institute of Biodiversity and Environmental Conservation, Universiti Malaysia Sarawak, Malaysia)

Abstract: - Attitudes of the waste generators in the community appears to be critical as their points of understanding in waste recycling eventually play a significant role in providing answers to municipal solid waste management problems in Lagos State. Individual involvement has a direct bearing on an effective recycling practice. This study investigates factors influencing individual waste recycling performance and their likelihood to participation in Lagos State. This paper presents the results of the quantitative survey administered among 201 individuals in Lagos State. The result shows that gender is significant towards waste recycling participation in Lagos. Result also shows that the lack of knowledge is the major limiting factors preventing individuals from waste recycling in Lagos State. The result also shows a significant difference between waste recyclers and non-waste recyclers on their requirements for participation towards regular awareness, workshop & exhibition likewise also showing an insignificant difference on individual requirements towards the provision of facilities, regular collection, incentives, and legislation in waste recycling.

Keywords: - Attitude, Critical, Individual involvement, Performance, Waste recycling

I. INTRODUCTION

Municipal solid waste has become an important concern in Nigeria. Piles of wastes are often found by roads, rivers and many other open spaces in cities, and this is causing significant health and environmental problems. While the Nigerian population is increasing by about 2.8% per annum, the rate of urban growth is as high as 5.5% per annum [1]. Nigeria is already heavily populated, having a higher population than any other country in Africa [2], of which an estimated 10% live below the national poverty line [3]. This is increasing the difficulties associated with providing an effective solid waste management system. As the urban population grows at an alarming rate, land use becomes increasingly complex and the wastes generated increase in volume and variety [4]. The amount of waste generated has increased in both quantity and diversity without adequate investment in collection, transport, treatment and disposal facilities. These problems are further complicated by political, economic and social factors.

In Nigeria, Waste Management has proven to be a huge challenge for local and national authorities in recent years due to inefficient MSW management strategies. The Federal Government of Nigeria has implemented various laws and regulations in an attempt to tackle this problem, however, insufficient funds are available at the local level to invest in either training or the technical resources that are needed to tackle waste problems [2]. In addition, solid waste management in Nigeria is hampered by a lack of data at all levels from the ward, district and municipality, and where available, is generally unreliable, scattered and unorganized [5, 6]. As a result, planning of solid waste management has remained a difficult task.

Although, waste recycling has been recognized in Lagos as an effective strategy towards waste diversion from landfills but yet only few practice it because individual "felt needs" and attitudes are not emphasized. Nonetheless, it is difficult to develop an effective strategy towards waste recycling if the waste generators needs are not considered. The success of any recycling activity depends highly on their participation. An individual behavior changes would occur when the individual is aware of the problem or need that gives individuals an initial reason or incentive to follow a particular course of action.

II. MUNICIPAL SOLID WASTE MANAGEMENT IN LAGOS

Lagos is the most populous city in Nigeria and one of the most industrialized in the country even though it is the smallest in terms of land area hence enormous pressure is put on the environment due to huge amounts of solid waste generated in the state. An estimated 4 million tons of municipal solid waste was generated in Lagos in 1995 [7]. In Lagos, the main governmental agencies that have been entrusted with the responsibility of keeping the environment clean are the Lagos State Waste Management Authority (LAWMA), Lagos State Environmental Protection Agency (LASEPA), the Local Government Councils (LGCs) and the Ministry of Environment and Physical Planning (MEPP). Treatment of Lagos waste is achieved by open incineration, which pollutes the environment.

The problems and issues of solid waste management in Lagos are of immediate importance. However, it has been discovered that most individuals are struggling with how to manage their waste. Waste is accumulating day-in day-out, as it is often noted that there is no waste management system. In Lagos, the methods of solid waste disposal include dumping of refuse to gutters, drains, roadside, unauthorized dumping sites and stream channels during raining season and burning of wastes on unapproved dumping sites during the dry season [8]. In Lagos, MSW management is easy and does not involve ISWM approach as the waste is collected by the various agencies, transported to the designated landfill sites, and concurrently burnt openly to reduce the volume. This creates pollution problems for the environment through the release of air pollutants and harmful gases into the atmosphere. Lagos does not have an integrated waste management plan, and the margins of the present waste disposal methods are clear. Open burning contributes to atmospheric pollution and leaves residues to be disposed off in landfills. Incineration, which refers to the controlled burning of wastes at a high temperature, sterilizes and stabilizes the waste in addition to reducing its volume up to ten-fold, and may be used as disposal option when landfilling is not possible and the waste composition is highly combustible. An appropriate technology, infrastructure, and skilled workforce are required to operate and maintain the plant [9]. Some of the municipal managers are looking to the development of municipal incinerators around the periphery of their cities as a first solution in many countries [10]. Incineration produces ash, metal and non-combustibles while composting yields residue like glass, ferrous, material, and plastics [11]. This eventually ends up in a landfill [12].

Landfill is the physical facility used for the disposal of solid waste and residuals on the surface of the earth [13]. Landfilling is the ultimate waste disposal method that can deal with all materials in the waste stream [14]. Solid waste disposed in a landfill usually is subjected to a series of complex biochemical and physical processes that lead to the production of both liquid and gaseous emissions [15]. This particular option of waste disposal is suitable when the land is available at an affordable price and adequate workforce and technical resources are available to operate and manage the site [16]. However, if properly designed and operated, landfill gas provides a source of energy that can be used for several energy producing purposes and thereby generates revenue. These requirements can easily be met by Lagos. The benefits of utilizing landfill gas recovery, especially for electricity production which would supplement the existing inadequate supply from the national grid, cannot be over emphasized. According to [17], 50% of the waste streams in Lagos are made up of Biodegradable wastes which could easily be diverted away from the landfill enabling a lesser volume. The bio-waste could effectively be used for resource recovery by composting, headway for which is being made in all of European Countries. Consequently, as in Japan [18], Lagos must now address the solid waste problem by implementing programs that promote waste reduction, reuse and recycling of useful materials.

III. CURRENT MSW RECYCLING IN LAGOS

It is wasteful to throw away anything that could be made use of, particularly when there is a desperate need for it elsewhere [19]. Waste recycling is an interesting approach to achieve an efficient, integrated manner of management of municipal solid waste. However, MSW recycling is restricted to well segregated materials. The study of [20] revealed that most of the secondary raw materials scavenged from wastes are not recycled by industries in the state. This is partly due to the fact that most of the industries do not actively promote take-back recycling as practiced in developed countries such as in Japan [18]. However, if the raw materials scavenged from wastes are recycled, it is expected that there will be a reduction in the energy associated costs by industries during production because recycling provides easily obtainable manufacturing feedstock [21, 22].

According to [20], municipal solid waste recycling in Lagos is at an early phase, just like in Thailand [23] and also in Malaysia. Despite its existence in Lagos to be precised, recycling and resource recovery as forms of Municipal solid waste diversion have not received adequate attention from the governments and the waste management authorities in the past and at present. MSW recycling in Lagos is carried out by the informal sector. Often times, some individual stores unlimited amount of recyclables such as cans, bottles, plastics, newspapers at their residents hoping to sell it to itinerant buyers, or to house-to house collectors of which only few lucky individuals get their recyclable materials sold to these itinerant buyers. As soon as they get frustrated of these piles of waste, they open burnt them at their resident thereby causing air pollution and also open dump

some materials like cans, glass, etc. These recyclables have significant potentials for recovery if there is effective waste recycling (collection) strategy in Lagos.

Most recycling in Lagos appears to be carried out by segregation from mixed waste as waste streams is mixed with high contents of organic waste such as food & yard waste. Such sorting is carried out by the informal sector most dominated by the scavengers with the use of carts for collections, both from street bins and at the dumpsite. Scavengers normally have no formal education, vocational training or access to appropriate equipment and do not normally have alternative employment opportunities in the formal sector. The scavengers and other informal sector recyclers generally sell their recovered materials to middlemen, who in turn sell to small and large scale processing and manufacturing industries. For instance, collected glass is processed and recycled locally as cullet for use in the glass industry; whole/complete glass bottles are cleaned and reused as syrup, drinks and juice containers; the base of broken bottles are sold to small scale industries that cut and polish the glass to manufacture items such as ash trays and candle holders [24].

Also, there is no officially known material recovery facility (MRF) in the state. Presently, only paper, plastics, glass and metals, have high market values in the City. These are separated from wastes either at the source or at landfill sites by scavengers and then sold to the market [25]. Over time, scavengers have increased in quantity as that is the only available means of their survival. There are usually 1–30 scavengers sorting recyclable materials at each waste disposal site in the state [25]. However, the number of scavengers at each disposal site also depends on how large the solid waste dumpsite is.

IV. DEMOGRAPHIC AND ATTITUDINAL INFLUENCE ON WASTE RECYCLING

Many studies in the last two decades on socio-demographic variables and environmental perception have helped in understanding people's views, and thinking about the environment. They have attempted to predict environmental awareness and attitudes of people based on their socio-demographic characteristics. For instance, [8] analysis on the effect of demographic variables on willingness to take part in recycling programme and produced various results. The results show that, place of resident has no significant effect on willingness to recycle. Gender of respondents has no significant effect on willingness to recycle as well as age though those in the middle age group were more willing to recycle than older and young respondents. Educational level has no significant effect on willingness to recycle. Household size significantly affects willingness to recycle with respondents in the middle-sized families of (5-7) or more willing to participate in recycling programme. Employment status significantly affects willingness to recycle with civil servants willing to recycle more. Income has no significant effect on willingness to recycle but respondents in medium-income group were more willing to recycle. Tenants were not willing to recycle than house owners likewise the type of housing (commercial, institutional and residential) has no significant effect on willingness to recycle.

[26] reported that age, education and gender have shown strong and consistent relationship with environmentalism. Some others have also explored the influence of education, income, age, and gender on public awareness and attitude toward environmental quality issues. [27] reported that environmental concerns among residents of Gaborone vary according to education and income levels, while age and gender do not seem to have any significant influence on the concerned variation. Gender is a variable that has received consistent attention among researchers [28, 29, and 30]. [26] found that women were significantly more likely than men to be concerned with environmental problems. Females have been consistently shown to have higher environmentally conscious attitudes than men. However, in other studies such as [31] gender was not a significant predictor of environmental concerns and attitudes as other socio-demographic variables. [32] Compared the mean attitude scores on the pretest with gender, the result obtained shows that girls score significantly higher moral attitude scores than boys; there was no significant difference in the ecologic attitude scores of boys and girls.

The profile of recyclers and their reasons for doing so might be expected to be the opposite to those of the non-recyclers. [33] Cite environmental concerns as the main reason for participation, with convenience being next in importance. They also state that the more mature, the more affluent, the better-educated and homeowners are more likely to be recyclers. [34] Identified the three main reasons for non-participation in the use of recycling centres in Glasgow to be a perception that the centres were too far away, apathy and a lack of interest in recycling. Further investigation by [34] of the first cause (distance) revealed that those giving this reason lived no farther away than the recyclers, implying that one of the other reasons was more likely to be the cause but the respondents felt uncomfortable admitting it. A similar survey of recycling centres by [35] found that the chief reason given by the respondents for not recycling was a lack of local facilities, even though the survey was carried out next to local recycling centres. [33] found in their survey that the commonest reasons given for not recycling before implementation of the schemes were inconvenience/lack of time, distance to recycling centres and storage/handling problems. [36] Found inconveniences and a lack of facilities as the main barriers to their participation in waste recycling in Glasgow. A survey into the British public's attitudes to the environment by

[37] found that the most likely reason for not recycling was the inadequacy of local facilities, followed by the facilities being too far away and a lack of storage space, a point echoed by over a quarter of respondents in [38] study. The effort involved in recycling was cited by [39] survey as the commonest reason for not recycling, and that access to better facilities would encourage more non-recyclers to participate. An [40] survey identified a lack of time as the barrier to recycling among non-recyclers (though other reasons for non-participation were not sought).

Some other literature suggests that technical factors influencing the system are related to lack of technical skills among personnel within municipalities and government authorities [41], deficient infrastructure [42], poor roads and vehicles [43], insufficient technologies and reliable data [44].

V. RESEARCH METHODOLOGY

Data for this study were collected between December 2013 to April 2014 by means of a questionnaire survey mailed to 300 individuals residing in Lagos. 67% response rate was recovered. This was done in order to produce a quantitative data. The questionnaire was made of open-ended questions in order to ensure the respondents not only agree or disagree to a particular question but also provide their opinions as precisely as possible in their own words. The initial part of the questionnaire addresses the demographic traits of the respondents such as age, gender, race and education level.

According to [45], in order to support recycling projects, it is important to understand who recyclers are, how they recycle and the possible limitations towards waste recycling. To that respect, the questionnaire also probes into assessing their level of participation. This also includes their level of acceptance, knowledge on recycling and individual rating of the existing efforts from the MSWM authorities. The responses received were coded and entered into the Statistical Package for Social Sciences (SPSS) database. The results from the processed data were thus displayed using statistical tables for interpretation and discussion.

VI. FINDINGS AND DISCUSSIONS

6.1 Waste Recycling Awareness in Lagos, Nigeria

According to [46], the efficiency on the waste recycling practices depends on the awareness of citizens in the city. A question was designed in order to delve into the level of awareness of respondents. To the question "Have you heard about waste recycling?" The responses obtained were analyzed and the results shows that 89.6% (180) of the respondents indicated that they have heard of waste recycling, while 10.4% (21) have never heard of waste recycling. The result indicated that the respondents had adequate awareness on the current waste recycling scenario.

A further test was conducted to find out the source of waste recycling information. Out of the 180 respondents that have heard of waste recycling in the city, the result shows that major news about waste recycling was sourced through Education from schools (45.8%). However, Municipal leaflet only constitutes 2.5% of the responses, indicating that the existing information/news by the municipality needs to be reviewed with focus on waste recycling. 3.8% of the respondents have heard about waste segregation through friends/neighbors still pointing to the fact that publicity through the municipality leaflet still needs to be given adequate attention. There is possibility of transferring knowledge from a neighbor/friend to other neighbours or friends if the knowledge is well received and practiced by the former neighbor in the city. The fact that majority of the respondents have heard of this initiative/activity does not guarantee maximum turnout of people practicing or willing to practice this act. It is interesting to note that not all the residents in the city have access to learning from schools as can be seen in (Table I) that majority of respondents had received the news through this media. So in order to strengthen the communication of the news to the whole populace at large, media such as T.V, Municipal leaflet, Internet, Radio must be effectively utilized. This awareness has to be regularly communicated to the public thus serving as a source of reminder to the public.

Table I: Communication media on waste segregation

<i>Media</i>	<i>Percentages (%)</i>
Education from school	45.8
Municipal leaflet	2.5
Radio/Television	20.3
Newspaper & articles	18.6
Neighbours/Friends	3.8
Others (internet, conference, etc)	8.9

However, it is necessary to make the public aware of waste recycling practices through liable communication channel and active participation in the system. In practice, system efficiency is directly

proportional to the number of participating citizens for waste segregation. Moreover, it is difficult to have an effective waste recycling system in the city when the waste generators who are also the stakeholders are not informed about the practices and benefits.

One of the most important aspects of public participation is to get each and every individual to cooperate in the daily waste management activities. These activities include waste separation, proper storage and placement of individual waste in containers, discipline in the use of public collection points, placement of waste bags in the collection points at the right day of collection, participation in composting activities, etc. These aspects can be enhanced with the help of continuous education campaigns through a reliable media for easy access and must be transparent.

6.2 Participation in Waste Recycling in Lagos, Nigeria

According to [47], awareness “does not necessarily translate into concern or taking personal action”. While information is necessary to inform the audience about an issue and its possible solution, it does not increase the sense of personal responsibility towards this issue. When people receive and understand the information about their environment, then can effectively work towards reducing environmental degradation [48].

In order to know who the recyclers are in the sample, a general question was asked “do you practice waste recycling”. It was revealed that 37.8% (76) of the respondents are currently practicing waste recycling while 62.2% (125) do not practice waste recycling. The level of individual participation in waste sorting is very low in Lagos. This low participation in waste recycling in the sample area could allude to a low level of awareness of environmental issues and low environmental education (formal and informal) which may cultivate into apathy towards waste recycling.

However, a further test was carried out to see how the respondents carry out waste recycling at their residents. Since there was no limit on the number of different responses for multiple choices, percentages (see Table II) were calculated rather than the total number of respondents. Higher response rate was received from individuals separating paper items at the residence.

Table II: Waste recyclers methods of separation

<i>Limitations</i>	<i>Percentage (%)</i>
Backyard composting	13.9
Glass separation	10.4
Paper separation	28.7
Metal separation	24.3
Plastic separation	22.8

6.2.1 Barriers to participation in waste recycling

An attitudinal question towards waste recycling was asked from the non-recyclers. To the questions “why don’t you recycle at your residence?” Since there was no limit on the number of different responses for multiple choices, percentages (see Table III) were calculated rather than the total number of respondents.

It is apparent that “No idea” on waste recycling appeared as the major constraints towards waste recycling in Lagos. This is because most respondents have limited knowledge on waste recycling. They felt that the process and benefits are not well communicated to them.

According to [49], “It is widely agreed that education is the most effective means that society possesses for confronting the challenges of the future. Indeed, education will shape the world of tomorrow. Progress increasingly depends upon the products of educated minds: upon research, invention, innovation and adaptation. Of course, educated minds and instincts are needed not only in laboratories and research institutes, but in every stage of life. Indeed, access to education is the sine qua non for effective participation in the life of the modern world at all levels. Education, to be certain, is not the whole answer to every problem. But education, in its broadest sense, must be a vital part of all efforts to imagine and create new relations among people and to foster greater respect for the needs of the environment.”

As pointed out by [49], education is a powerful tool that should be used towards building a more sustainable society. Through education it is possible to build a society that is better informed, has critical views and has wiser and more responsible people. Better educated people will not solve the problems of the world, but it will provide the means and the determination to address them. According to [50], the way humans respond and co-operate on waste management issues is influenced by their education. Therefore, the public’s education is an essential element of the success of any waste recycling initiative. Individuals need to be given the necessary knowledge in the scheme in order to ensure maximum participation.

20% of the non-recyclers have no interest to practice this activity. When this knowledge and the benefits of waste recycling are not well received by the public, this could thus lead to the public displaying a no

interest towards the practice. Inconveniencies such as distance to the bins, lack of facilities, no recycling centres, irregular collection of wastes, and no benefits can also cause individuals showing no interest in waste recycling but felt uncomfortable admitting it.

Table III: constraints towards waste segregation practice

<i>Limitations</i>	<i>Percentage (%)</i>
No facility	17.1
Inconveniencies	2.9
No collectors	7.1
No interest	20.0
Not aware	14.3
No idea	25.7
No space	2.9
No time	10.0

According to [51, 52], Lack of access to recycling facilities is represented as a major reason for households in developing countries not to participate in waste recycling. [53, 54, 52] noted that the advocates for increasing recycling and waste diversion behaviors in developing nations call for governments and municipalities to improve access to facilities and increase educational programs as methods to improve waste management.

6.2.2 Requirements for Participation in waste Recycling

For the assessment of the recent efforts done by LASEPA, LAWMA, LGCs and MEPP, majority of the responses were not favorable, with most of the respondents (91.1%) felt that the councils had not done enough to encourage and develop waste recycling initiatives effectively in the state. These points to the fact that the state municipal councils have not done enough in respect to waste recycling. In respect to their requirements towards efficient participation, though there was no limit on the numbers of different responses for multiple choices, percentages (see Table IV) were calculated rather than the total number of respondents. Majority of the respondents suggested the Provision of Infrastructures such as Provision of bins to their residents coupled with regular collection. The benefit of facility to local residents can influence attitudes [55]. However, citizen's attitudes depend on knowledge about a facility [56].

It is difficult to achieve an effective waste recycling initiative even though the necessary bins are provided without a regular collection strategy. Some residents might separate their recyclables but when it is not timely or occasionally collected, the waste generators gets discouraged. Providing the necessary bins would serve as an incentive to them thus encouraging the non-recyclers. According to [57], Some reasons such as "lack of facilities" or "distance of facilities too far from home" are also clear proof that most individuals are not aware that they can do their bit in recycling by simply putting the recyclables and non recyclables in separate bags and placing them in the ordinary rubbish bins available at home which will then be collected by the council or appointed agents. Therefore, the location of the recycling station is essential, public attitudes and knowledge about waste recycling in general are of interest for the functioning of the whole system

22.6% of the respondents suggested the regular distribution of information to the masses. They believe information has a significant impact on the masses. They felt if they are not regularly distributed, this would discourage the public from the practice. Some respondents also stress that often times when they receive information through communication media, they don't receive information of its significance to them. This means that the public are not really aware of the social, economic and environmental benefits of waste recycling pointing to the fact that they only see waste recycling strategy as revenue to the government/municipal agents. It is important for Lagos state to harness the channel of recycling communication to the public. Since not all the inhabitants in Lagos can speak nor write. So in order to have an efficient waste recycling practice in Lagos state, such promotion has to be transparent (using a simple language known to all). Waste management is for all, so there must be no room for compromise or being biased during its promotion thus the general public should be given equal priority/treatment. According to [46], she noted that when citizens receive information about the benefits of recycling, how to sort the waste and they participate in the designing of the programs, they are more likely to participate in recycling campaigns. The initiation of such program is essential to rapidly educate the public and facilitate the development of environmentally friendly community waste behavior. To be successful, useful programs should be designed to engage their target audiences in not only increasing their environmental knowledge but their environmental skills, attitudes and behavior as well. Many studies have identified wide and sustainable involvement of the public in source recycling programs as a fundamental factor to their success [58, 59, 60, and 13].

17.5% of the respondents suggested the need for regular workshop and exhibition to encourage them to participate. This point to the fact that knowledge on how to practice wastes recycling/composting is essential for a successful practice. If the residence have heard about this scheme but do not know what to do with the materials at that particular time, this would often time lead to a waste of time and resources. So for recycling activity to be effective, a regular workshop and seminar needs to be put into place. Likewise the exhibition of the end products of the recoverable generated from waste recycling needs to be displayed to the public to see. This would thus have a significant impact towards motivating them. However, when individual begin to see benefits in what they do (that is social, economic and environmental), they are often encouraged to do more.

11.8% of the respondents suggests incentives be given to motivate the public to participate. When promoting waste recycling, it is important to provide incentives for the public. Individual would only derive joy and pleasure in an activity when they get the necessary satisfaction from it. MSWM organizations should emphasize these benefits when promoting waste behavior changes.

Enforcing the citizens to practice waste recycling received the lowest response rate. In a City such as Lagos where waste recycling is still at its peak, it would be difficult to impose laws without providing the necessary enabling facilities for the citizens. The success of waste recycling strategy depends actively on the level of public acceptance with time. Waste recycling initiative must not be seen as a strategy that can lead to an immediate positive outcome but as an initiative that is expected to change dynamically with time when they are properly implemented. However [61] argues that an individual behavior changes occur when the individual is aware of the problem or need that gives individuals an initial reason or incentive to follow a particular course of action.

Table IV: Motivating factors to participate in waste segregation

<i>Requirements to participate</i>	<i>Percentage (%)</i>
Provision of Infrastructure (bins, collections)	24.2
More awareness/campaign be provided	22.6
More Workshop & Exhibition	17.5
Regular collection of separated waste	13.6
Give/Increase Incentives	11.8
Legislation be enforced	10.4

6.3 Influential factors on waste recycling in Lagos

The following factors were tested for this study;

6.3.1. There is no significant relationship between Age, Race and Education to participation in waste recycling.

A Pearson correlation was used to determine whether demographic factors can influence waste recycling participation in Lagos. As can be seen in (Table V), Age, Race and Education show no significant relationship towards waste recycling in Lagos state. This shows that waste recycling in Lagos can be done irrespective of individuals age, race and education as it doesn't require any formal education before it can be carried out efficiently. This is in support of [8] who found age, education as insignificant factors towards waste recycling.

6.3.2. There is a significant relationship between Gender to participation in waste recycling.

Gender shows a significant relationship towards waste recycling practice in Lagos. This was supported by the fact that the highest participation among recyclers in the study was noticed among female (56.6%) while (43.4%) was seen among male. This shows that women tend to participate more actively in Waste recycling than men as they are environmental friendly. This is in support of, [26], studies who found women more likely concern than men with environmental problems. This study is not in support of [8] that gender is insignificant towards participation in waste recycling [31] that gender is not predictor of environmental concerns.

Table V: Correlation test of age, sex, race and education to participation in waste segregation

<i>Variables</i>	<i>Pearson's Correlation (r)</i>	<i>Sig.(P)</i>
<i>Age</i>	0.072	0.483
<i>Gender</i>	-0.218	0.002**
<i>Race</i>	0.112	0.115
<i>Education</i>	-0.075	0.293

** . Correlation is significant at the 0.01 level (2-tailed)

6.3.3 There is generally no significant difference between waste recyclers and non-waste recyclers on their requirements for participation in waste recycling.

The difference between waste recyclers and non-waste recyclers on their requirements for participation was determined by conducting an Independent t-test. The result shows an insignificant value of $P > 0.05$ for all requirements except for awareness, workshop & exhibition. This shows that there is no difference in their requirements for participation towards the provision of infrastructural facilities, regular collection of separated waste, provision of incentives and Enforcement.

As can be seen in the table, there is no significant difference in their perception towards the provision of infrastructures (Regular collections and facilities), incentives and enforcement of the practice among recyclers and non-recyclers. However, significant difference is noted between recyclers and non-recyclers on their view towards awareness, workshop and exhibition. Non recyclers perceived that lack of knowledge on recycling methods was a major constraint that could prevent individuals from participating in waste recycling. Therefore it is expected that they need to get recycling knowledge from regular awareness, workshops and exhibitions. On other hands, most of the recyclers did not require these two variables to participate as they are already practicing and have obtained the basic knowledge on waste recycling.

Table V: difference between recyclers and non-recyclers on their requirements for participation

<i>Requirements</i>	<i>(t)</i>	<i>Sig.(P)</i>
Provision of Infrastructure (bins, collections)	-0.863	0.389
More awareness/campaign be provided	2.203	0.029**
More Workshop & Exhibition	2.625	0.009**
Give/Increase Incentives	-0.390	0.697
Legislation be enforced	0.319	0.750

**Significant at $P < 0.05$ level

VII. CONCLUSION

Individual participation has a direct bearing on efficient MSW Recycling. Yet, Lagos municipal authorities have failed to mobilize the community and educate citizens on the rudiments of proper practices of segregating waste in their own bins at the household, shop. In the absence of a basic facility of collection of waste particularly the recoverable from source, citizens would be prone to dumping waste on the streets, open spaces, drains, and water bodies in the vicinity creating insanitary conditions. There are many initiatives in place to raise awareness of waste recycling to motivate the audience to participate or increase efforts. Awareness creation in the form of education and technical training for staff is also important in making recycling a success. Improving the publics' general knowledge and awareness concerning these issues is of prime importance to the diversion of waste from landfills. Creating a sustainable society requires "a critical mass to take up sustainable lifestyles before the rest will follow" [62]. However, Efforts are also needed to involve the public in the policy-formation, development of plans, and implementation of waste management programs. Public support is essential for the success of such decisions.

The availability of an effective recycling infrastructure that enables the public to recycle their waste is clearly a crucial part of any recycling initiative but so too are the many other factors which motivate individuals to make use of that infrastructure. Given that individual recycling in Lagos is purely a voluntary activity, understanding these other motivational factors (Facilities, regular collection, incentives) is essential if recycling practice is ever to attain its full potential and become a part of everyday individual routine in the state. Knowledge of the reasons why people never recycle or, at best, only occasionally would enable scheme administrators to tailor the schemes more towards those individuals who do not participate fully. As [63] says: "the role of the Local Authority and actions of the public are paramount to the success of sustainable waste policies". [33] Noted that the key link in increasing recycling rates is the individual. Governments and municipalities can increase participation by improving access to waste diversion facilities.

It is also important to note that Lagos State needs to develop an efficient waste recycling initiative. An initiative where stakeholders' identifications and roles are identified would ensure an effective practice. This study recommends five (5) lists of stakeholders for an effective waste recycling strategy (See Table VI).

Table VI: Stakeholders and their roles in waste segregation

<i>No</i>	<i>Stakeholders</i>	<i>Roles</i>
1	Individual	Separating their waste.
2	Residential committee	Carrying out environmental education programs to enhance public awareness on waste separation and recycling.
3	Service Providers	Providing facilities for waste recycling activity such as waste

4	Recycling sectors (informal & formal)	containers, buy-back centres, recycling centres, etc. Recovering recyclable materials from public.
5	Environmental Sanitation Department	Collecting and transporting separated waste, operating of the material recovery facility (MRF).

This guideline can be used to determine the necessary stakeholders that should be involved for an effective waste recycling initiative in Lagos State. However more needs to be done in the area of Incentives whether Lagos residents wants their separated waste materials be exchanged for money or other items.

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